TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Prolificx New Zealand Ltd
Vector 300 Bluetooth Transceiver

To: FCC Part 15.247: 2005 (Subpart C)

Test Report Serial No:
RFI/RPTE2/RP48260JD02A

Supersedes Test Report Serial No:
RFI/RPTE1/RP48260JD02A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager:	
Tested By: Steven Wong	**Checked By: Michael Derby** **pp**
Report Copy No: PDF01	
Issue Date: 07 September 2006	**Test Dates: 26 July 2006 to 01 August 2006**

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1. Client Information

Company Name:	Prolificx New Zealand Ltd
Address:	Level 1 13 Ronwood Avenue Manukau City Auckland 1702 New Zealand
Contact Name:	Mr N Allen

2. Equipment Under Test (EUT)

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

2.1. Identification of Equipment Under Test (EUT)

Brand Name:	Prolificx
Model Name or Number:	Vector 300
Unique Type Identification:	V300
Serial Number:	'RF Sample'
Hardware Version:	None stated
Software Version:	None stated
FCC ID Number:	TXXV300
Country of Manufacture:	Malaysia
Date of Receipt:	26 July 2006

2.2. Accessories

The following accessories were supplied with the EUT:

Description:	Data cable
Brand Name:	Prolificx
Model Name or Number:	None stated
Serial Number:	None stated
Cable Length and Type:	0.5m, multicore
Connected to Port:	Data port

Description:	Serial to USB Cable
Brand Name:	Prolificx
Model Name or Number:	None stated
Serial Number:	None stated
Cable Length and Type:	2.9m, multicore
Connected to Port:	USB port

Description:	VHF Antenna and Cable
Brand Name:	Antenex
Model Name or Number:	B11322N
Serial Number:	None stated
Cable Length and Type:	5m RG58U
Connected to Port:	Satellite Antenna

Accessories (Continued)

Description:	Power Cable
Brand Name:	Prolificx
Model Name or Number:	None stated
Serial Number:	None stated
Cable Length and Type:	2.9 m Silicon sheath
Connected to Port:	Power port on EUT

Description:	GPS / GSM Antenna
Brand Name:	Hirschmann
Model Name or Number:	GPS 18 90 LP-P
Serial Number:	None stated
Cable Length and Type:	3m RG174
Connected to Port:	GPRS ANT + GPS ANT

Description:	USB Cable
Brand Name:	Prolificx
Model Name or Number:	None stated
Serial Number:	None stated
Cable Length and Type:	2.9 m Twisted Pair
Connected to Port:	USB port

2.3. Description of EUT

The equipment under test is an automotive telematics device designed for fleet management and vehicle location applications. Using an Intel X-scale processor running Windows CE 5.0 and can be supplied directly from a 12V DC or 24V DC nominal automotive supply.

The V300 uses a quad band GPRS module for communications and this is backed up by a satellite modem on the Orbcomm network. A GPS receiver provides positioning information.

An internal Lithium polymer battery provides back up operation in case of main supply failure.

2.4. Modifications Incorporated in EUT

FMS Printed Circuit board was replaced with a modified unit supplied by the client. This enabled the EUT to continuously transmit in *Bluetooth* mode when controlled from WDS Commander which is a PC application supplied by the Client.

2.5. Additional Information Related to Testing

Power Supply Requirement:	DC Supply of 12V DC or 24V DC Internal battery supply of 3.6V DC (backup)		
Intended Operating Environment:	Automotive		
Equipment Category:	Bluetooth Technology		
Type of Unit:	Mobile (Vehicular Use, powered via vehicle regulated supply)		
Transmit Frequency Range:	2402 to 2480 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	1	2402
	Middle	40	2441
	Top	79	2480
Receive Frequency Range:	2402 to 2480 MHz		
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	1	2402
	Middle	40	2441
	Top	79	2480
Maximum Power Output (ERP)	-3.3 dBm EIRP (measured)		

2.6. Port Identification

Port	Description
1	USB Client
2	USB Host
3	J1708
4	CAN

2.7. Support Equipment

No support equipment was used to exercise the EUT during testing.

3. Test Results

Reference:	FCC Part 15.247: 2005 Subpart C
Title:	Code of Federal Regulations, Part 15.247 (47CFR15) (Intentional Radiators operating within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz)

3.1. 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 (1987)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

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

ANSI C63.5 (1988)
Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)
Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)
Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

DA00-705 (2000)
Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.2. 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 made during testing.

5. Operation of the EUT during Testing

5.1. Operating Modes

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

For all transmit mode measurements the Bluetooth test mode was active and set to Top, Middle, Bottom and Hopping channels as necessary with the longest data pocket size. Receive mode measurements were performed with the EUT in Bluetooth mode and its normal search mode (receive on all channels).

5.2. Configuration and Peripherals

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

Powered by an external 12V DC Supply.
All ports terminated with supplied cables.
USB Cable connected. Battery connected.
Antenna ports connected to VHF and GSM/GPS antenna.
Heat sink load cables connected to 12 and 6 way connector to USB cable.
Second USB port connected to USB mouse.

6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Idle Mode Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2005 Section 15.109	Antenna	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 15: 2005 Section 15.247(a)(1)	Antenna	Complied
Transmitter Carrier Frequency Separation	C.F.R. 47 FCC Part 15: 2005 Section 15.247(a)(1)	Antenna	Complied
Transmitter Average Time of Occupancy	C.F.R. 47 FCC Part 15: 2005 Section 15.247(a)(1)(iii)	Antenna	Complied
Transmitter Maximum Peak Output Power	C.F.R. 47 FCC Part 15: 2005 Section 15.247(b)(1)	Antenna	Complied
Transmitter Radiated Emissions	C.F.R. 47 FCC Part 15: 2005 Sections 15.247(d) & 15.209(a)	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2005 Sections 15.247(d) & 15.209(a)	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.

7. Measurements, Examinations and Derived Results

7.1. General Comments

This section contains test results only.

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 Radiated Spurious Emissions: Section 15.109

The EUT was configured as for radiated emission testing as described in section 9 of this report.

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

Results:

Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
83.997	Vertical	26.6	40.0	13.4	Complied
135.090	Vertical	29.4	43.5	14.1	Complied
184.404	Vertical	36.0	43.5	7.5	Complied
233.486	Vertical	41.1	46.0	4.9	Complied
307.208	Vertical	44.7	46.0	1.3	Complied
356.348	Vertical	45.6	46.0	0.4	Complied
480.007	Vertical	26.6	46.0	19.4	Complied
571.959	Vertical	31.6	46.0	14.4	Complied
695.982	Vertical	27.5	46.0	18.5	Complied
779.950	Vertical	32.5	46.0	13.5	Complied
895.581	Vertical	30.3	46.0	15.7	Complied

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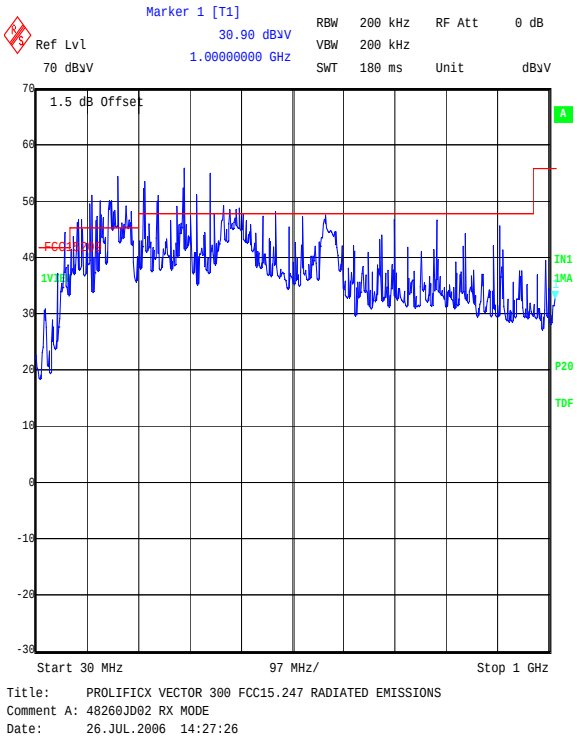
Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.2.2. Idle Mode Radiated Spurious Emissions: Section 15.109

Results:

Electric Field Strength Measurements (Frequency Range: 1 to 25GHz)

Highest Peak Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.195928	Vertical	57.6	-12.7	44.9	74.0	29.1	Complied
1.300171	Vertical	57.3	-12.4	44.9	74.0	29.1	Complied
1.595000	Vertical	59.2	-11.8	47.4	74.0	26.6	Complied
1.801543	Vertical	49.1	-11.6	37.5	74.0	36.5	Complied
1.997733	Vertical	60.9	-11.8	49.1	74.0	24.9	Complied
2.002114	Vertical	43.4	-11.4	32.0	74.0	42.0	Complied
2.021793	Vertical	43.1	-11.4	31.7	74.0	42.3	Complied
2.393557	Vertical	38.6	-11.4	27.2	74.0	46.8	Complied

Highest Average Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.195928	Vertical	46.2	-12.7	33.5	54.0	20.5	Complied
1.300171	Vertical	52.2	-12.4	39.8	54.0	14.2	Complied
1.595000	Vertical	41.8	-11.8	30.0	54.0	24.0	Complied
1.801543	Vertical	41.2	-11.8	29.5	54.0	24.5	Complied
1.997733	Vertical	49.3	-11.8	37.5	54.0	16.5	Complied
2.002114	Vertical	32.0	-11.4	20.6	54.0	33.4	Complied
2.021793	Vertical	34.3	-11.4	22.9	54.0	31.1	Complied
2.393557	Vertical	27.1	-11.4	15.7	54.0	38.3	Complied

Test of: Prolificx New Zealand Ltd
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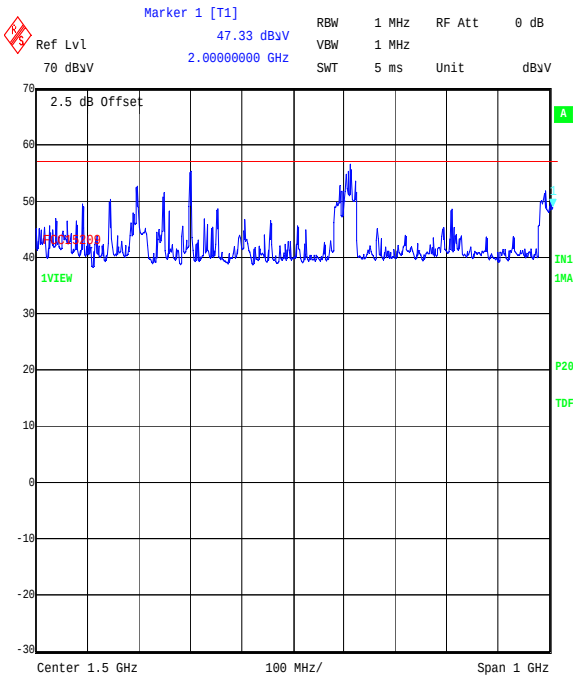
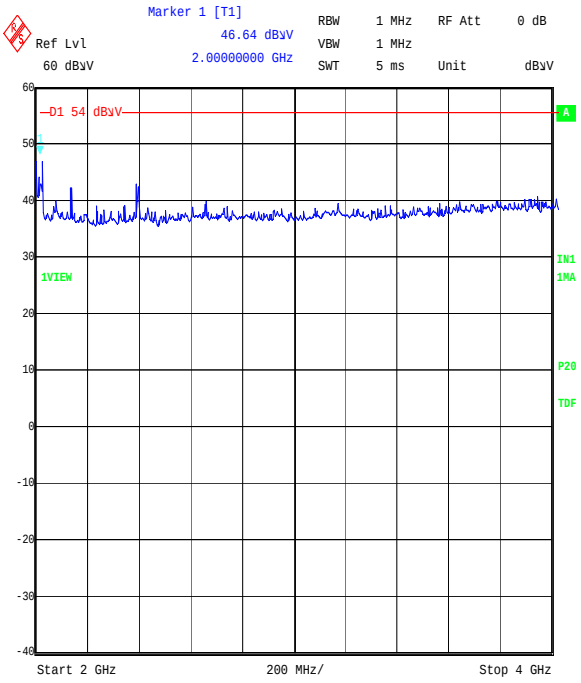
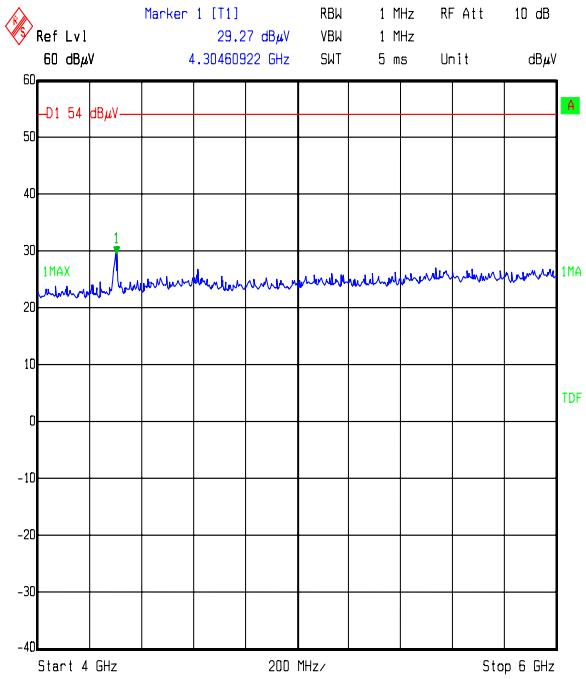
Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)



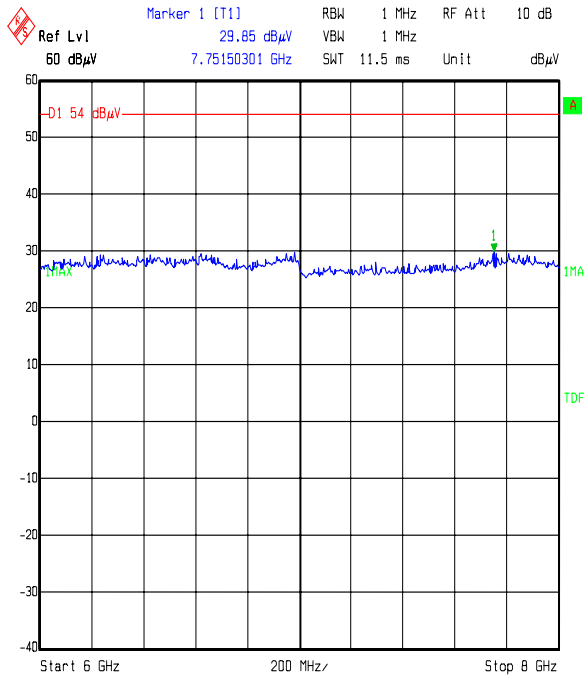
Title: PROLIFICX VECTOR 300 FCC15.247 RADIATED EMISSIONS
Comment A: 48260JD02 TX MODE TOP CHANNEL
Date: 26.JUL.2006 13:49:45



Title: PROLIFICX VECTOR 300 FCC15.247 RADIATED EMISSIONS
Comment A: 48260JD02 RX MODE
Date: 26.JUL.2006 14:39:52

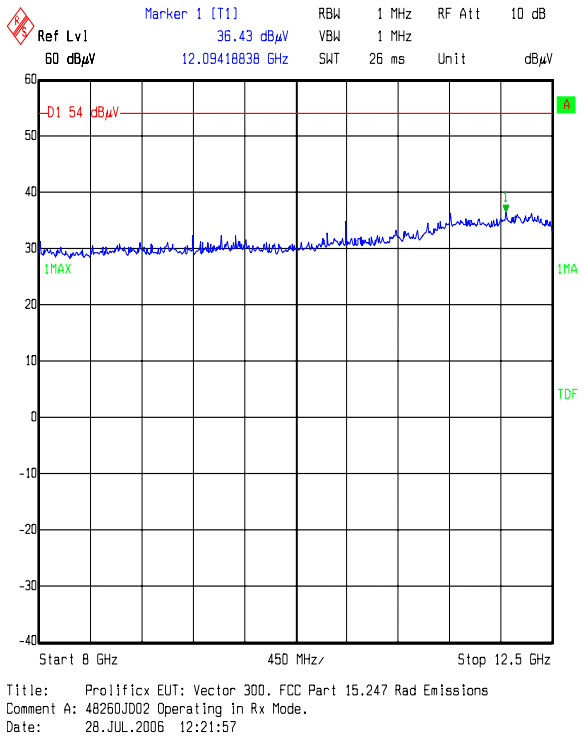


Title: Prolificx EUT: Vector 300. FCC Part 15.247 Rad Emissions
Comment A: 48260JD02 Operating in Rx Mode.
Date: 28.JUL.2006 12:06:05



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Rad Emissions
Comment A: 48260JD02 Operating in Rx Mode.
Date: 28.JUL.2006 12:08:16

Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)



Note 1: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Note 2: The comment on the 1 to 2 GHz plot, incorrectly states 'TX mode top channel', when in fact it was performed while in 'RX mode'.

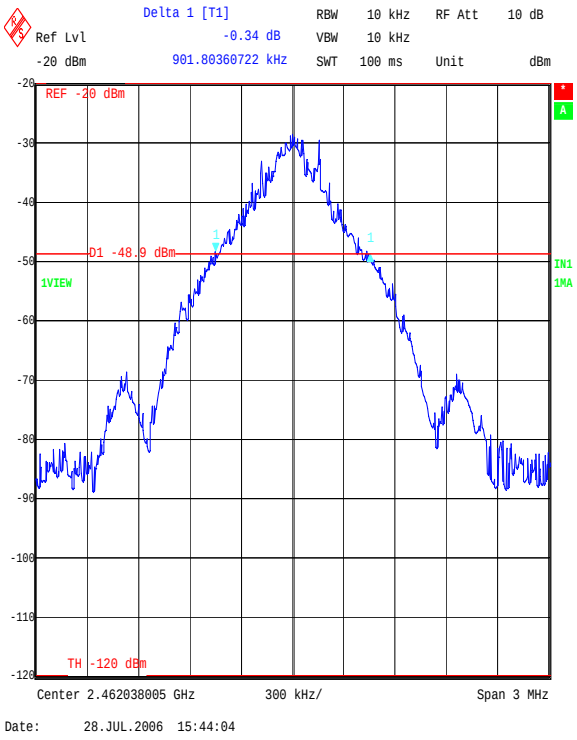
7.2.3. Transmitter 20 dB Bandwidth: Section 15.247(a)(1)

The EUT was configured for 20 dB bandwidth measurements as described in section 9 of this report.

Tests were performed to identify the 20 dB bandwidth.

Results:

Transmitter 20 dB Bandwidth (kHz)	Limit (kHz)
901.804	None specified



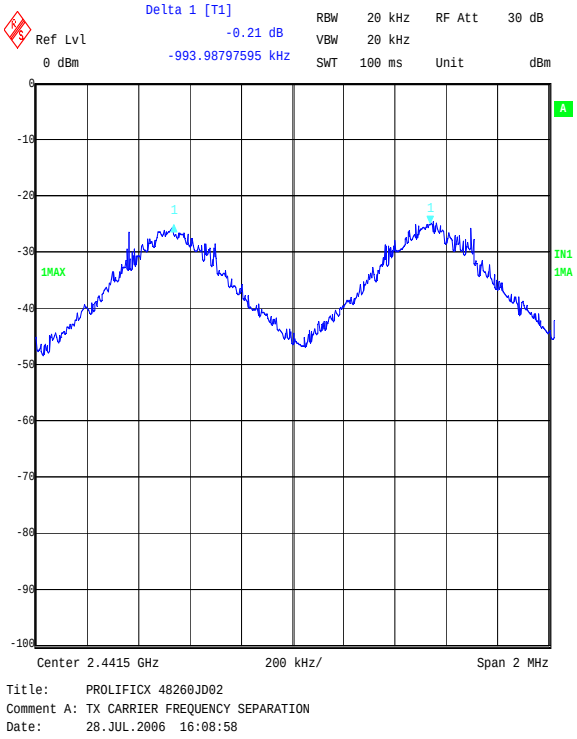
7.2.4. Transmitter Carrier Frequency Separation: Section 15.247(a)(1)

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

Tests were performed to identify the carrier frequency separation.

Results:

Transmitter Carrier Frequency Separation (kHz)	Limit $^{2}/_{3}$ of 20 dB BW (kHz)	Margin (kHz)	Result
993.988	601.202	392.786	Complied



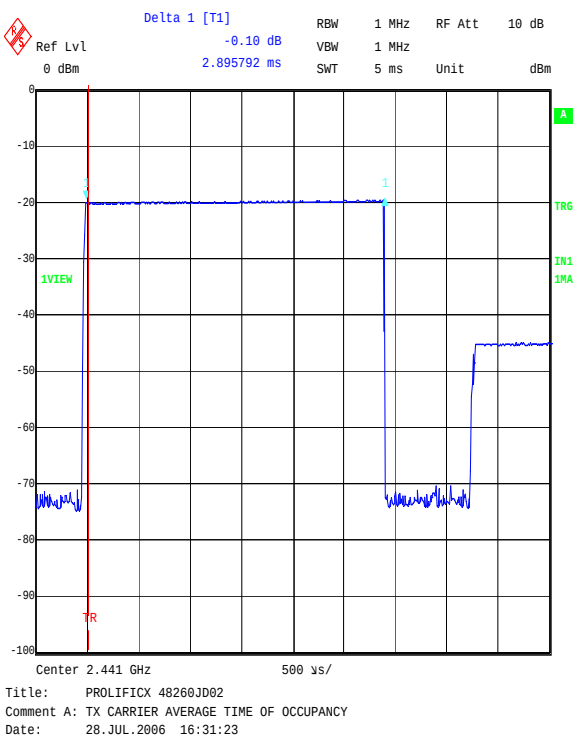
7.2.5. Transmitter Average Time of Occupancy: Section 15.247(a)(1)(iii)

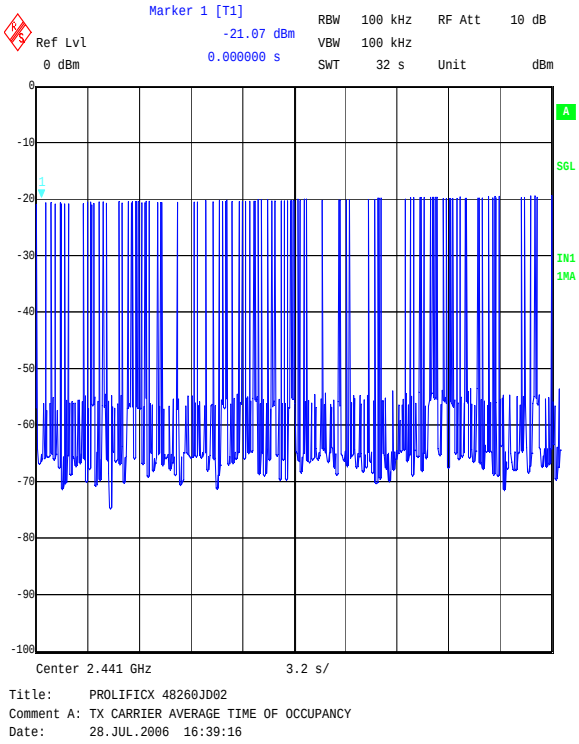
The EUT was configured for average time of occupancy measurements as described in section 9 of this report.

Tests were performed to identify the average time of occupancy in number of channels (79) x 0.4 seconds. The calculated period is 31.6 seconds.

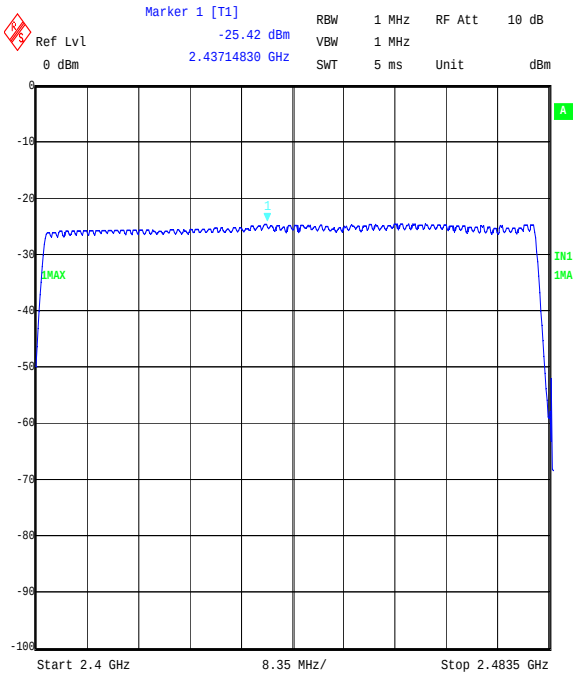
Results:

Emission Width (μs)	Number of Hops in 31.6 Seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
2895.792	106	0.307	0.4	0.093	Complied





Transmitter Average Time of Occupancy: Section 15.247(a)(1)(iii) (Continued)



Title: PROLIFICX 48260JD02
Comment A: TX NUMBER OF HOPPING CHANNELS
Date: 28.JUL.2006 17:08:50

7.2.6. Transmitter Maximum Peak Output Power: Section 15.247(b)(1)

The EUT was configured for transmitter peak output power measurements as described in section 9 of this report.

Tests were performed to identify the transmitter maximum peak output power (ERP) of the EUT.

Results:

DC Powered Devices

Channel	Input Voltage (DC)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	9	-3.3	30.0	33.3	Complied
Bottom	12	-3.3	30.0	33.3	Complied
Bottom	24	-3.3	30.0	33.3	Complied
Bottom	32	-3.3	30.0	33.3	Complied
Middle	9	-3.4	30.0	33.4	Complied
Middle	12	-3.3	30.0	33.3	Complied
Middle	24	-3.3	30.0	33.3	Complied
Middle	32	-3.3	30.0	33.3	Complied
Top	9	-5.1	30.0	35.1	Complied
Top	12	-5.2	30.0	35.2	Complied
Top	24	-5.2	30.0	35.2	Complied
Top	32	-5.2	30.0	35.2	Complied

Note(s):

1. *These tests were performed radiated; therefore the EUT antenna gain is encompassed in the final result and not measurable.*
2. *The test was performed at four input voltage levels, at the request of the customer. Two nominal (12V/24V) and upper / lower extremes. This is in excess of the FCC requirements.*

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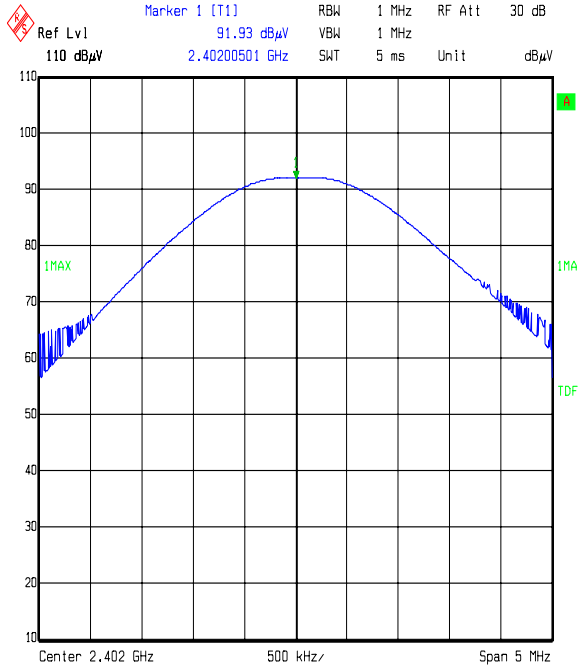
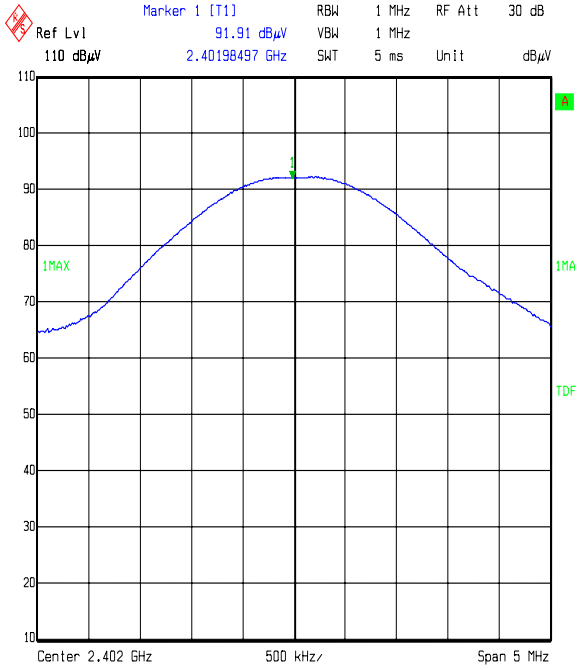
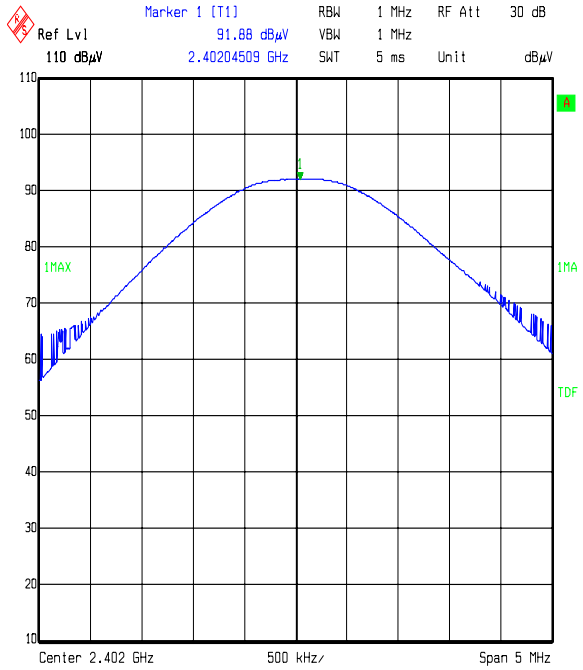
Transmitter Maximum Peak Output Power: Section 15.247(b)(1) (Continued)



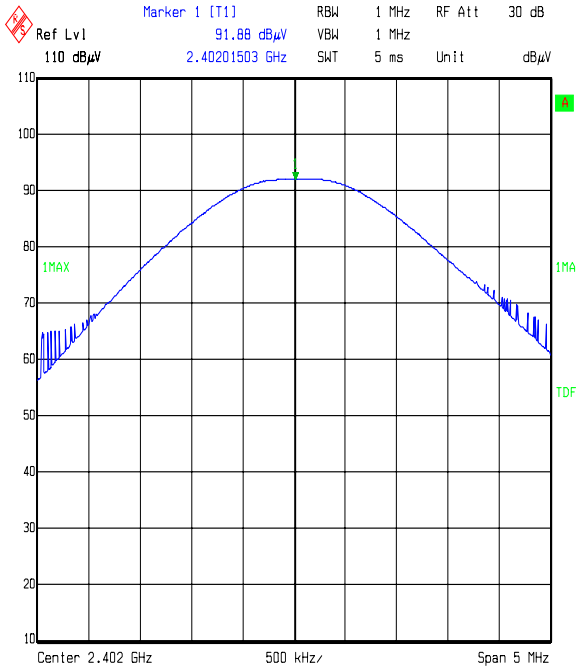
Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Bottom Channel. 9V
Date: 28.JUL.2006 11:25:47



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Bottom Channel. 12V
Date: 28.JUL.2006 11:24:07



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Bottom Channel. 24V
Date: 28.JUL.2006 11:26:47



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Bottom Channel. 32V
Date: 28.JUL.2006 11:27:40

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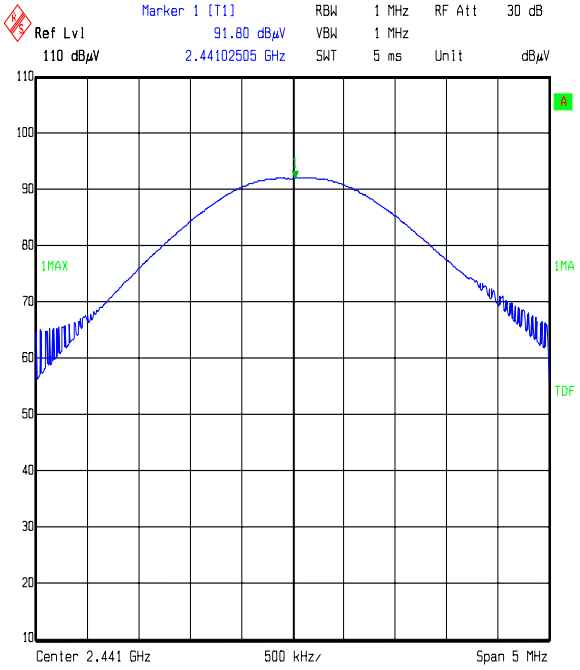
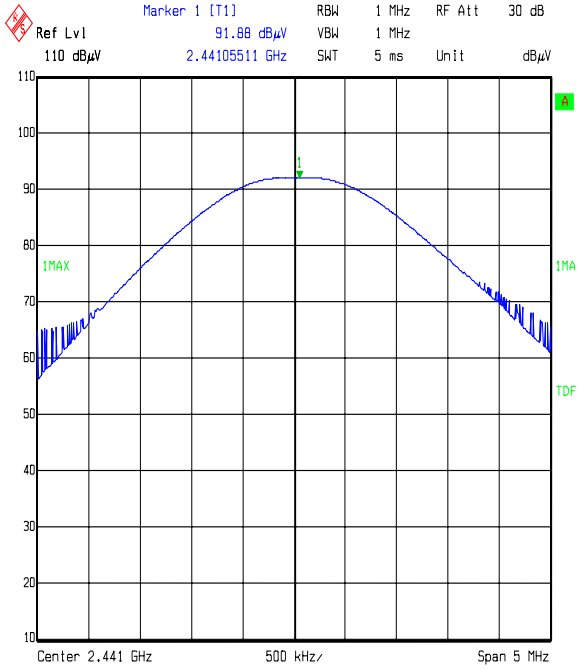
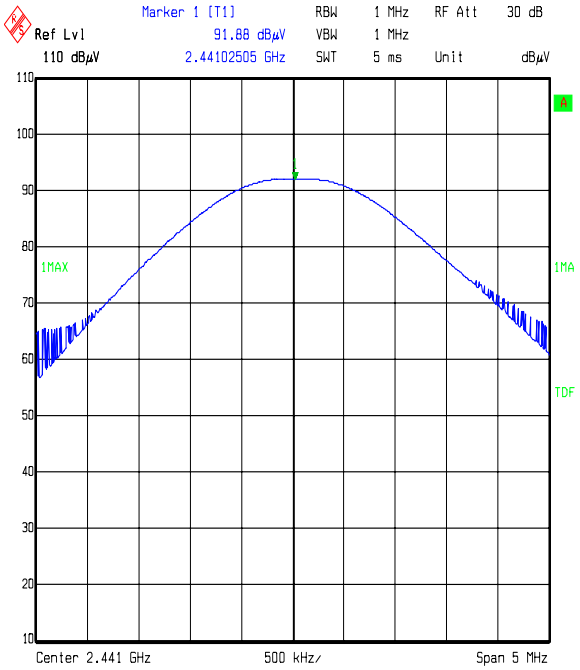
Transmitter Maximum Peak Output Power: Section 15.247(b)(1) (Continued)



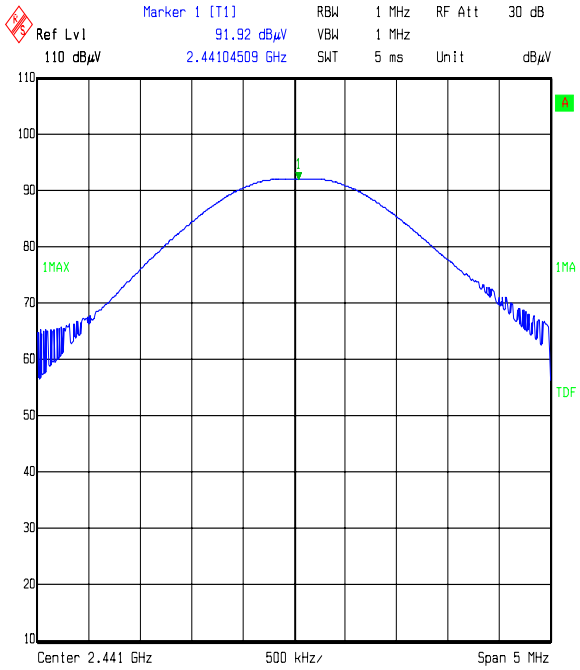
Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Middle Channel. 9V
Date: 28.JUL.2006 11:32:29



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Middle Channel. 12V
Date: 28.JUL.2006 11:31:43



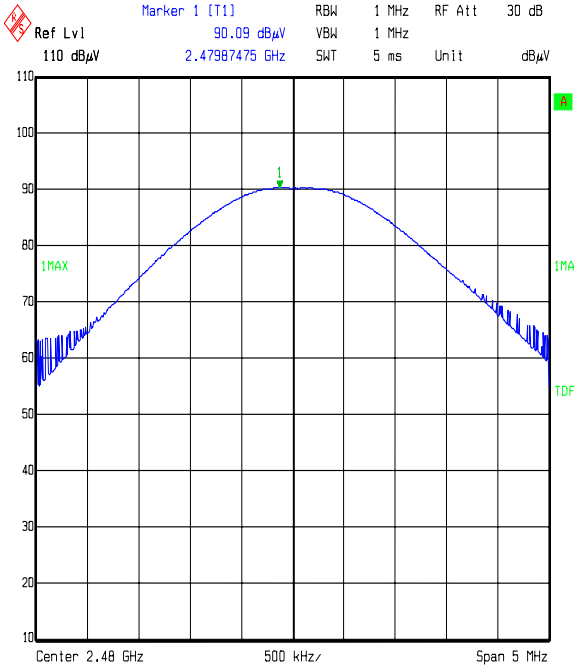
Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Middle Channel. 24V
Date: 28.JUL.2006 11:30:59



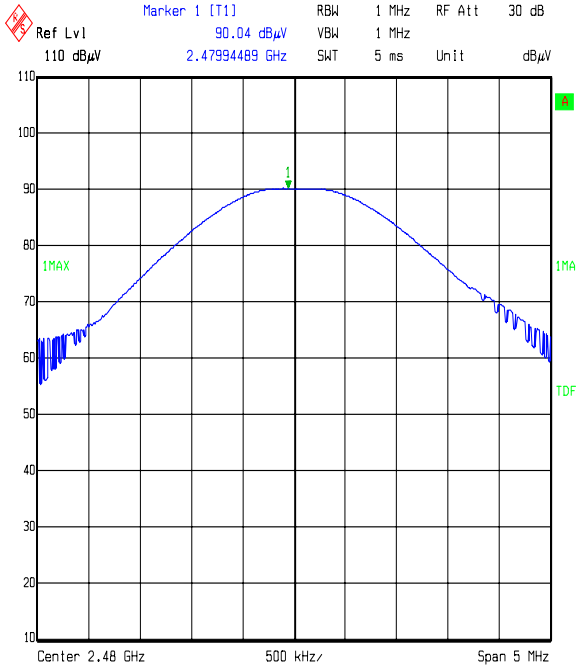
Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Middle Channel. 32V
Date: 28.JUL.2006 11:30:17

Test of: Prolificx New Zealand Ltd
Vector 300 Bluetooth Transceiver
To: FCC Part 15.247: 2005 (Subpart C)

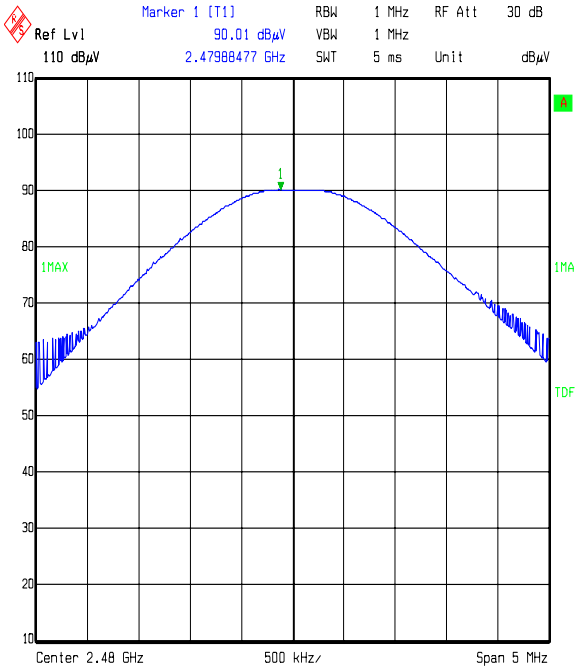
Transmitter Maximum Peak Output Power: Section 15.247(b)(1) (Continued)



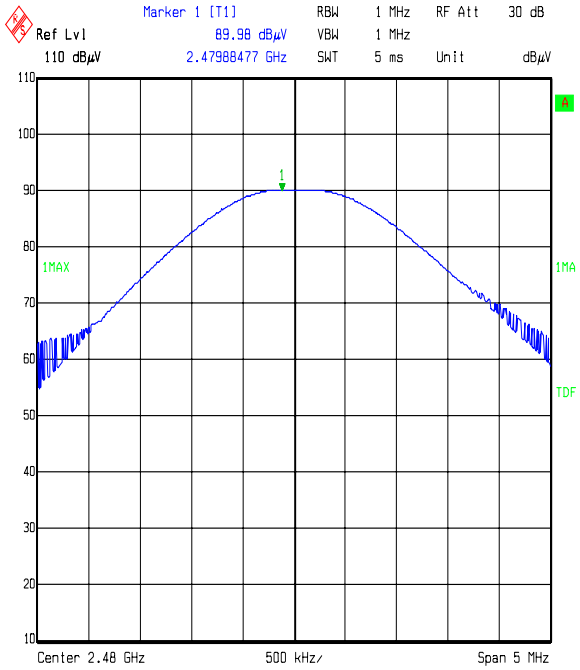
Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Top Channel. 9V
Date: 28.JUL.2006 11:34:40



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Top Channel. 12V
Date: 28.JUL.2006 11:35:47



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Top Channel. 24V
Date: 28.JUL.2006 11:36:27



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Peak Power
Comment A: 48260JD02 Operating in Tx Mode, Top Channel. 32V
Date: 28.JUL.2006 11:37:19

7.2.7. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a)

The EUT was configured for radiated emission testing as described in section 9 of this report.

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

Results:

Electric Field Strength Measurements: 30 to 1000 MHz
(emissions occurring in the restricted bands)

Top Channel

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
108.055	Vertical	34.5	43.5	9.0	Complied
119.980	Vertical	34.3	43.5	9.2	Complied
135.090	Vertical	29.4	43.5	14.1	Complied
168.396	Vertical	31.2	43.5	12.3	Complied
331.804	Vertical	43.8	46.0	2.2	Complied
409.929	Vertical	25.9	46.0	20.1	Complied
982.134	Vertical	38.2	54.0	15.8	Complied

Note(s):

1. *The preliminary scans showed similar emission levels for each mode/channel setting below 1 GHz, therefore final radiated emissions measurements were performed with the EUT set to the top channel only.*

7.2.8. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a)

The EUT was configured for radiated emission testing as described in section 9 of this report.

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

Results:

Electric Field Strength Measurements: 30 to 1000 MHz
(emissions outside the restricted bands)

Top Channel

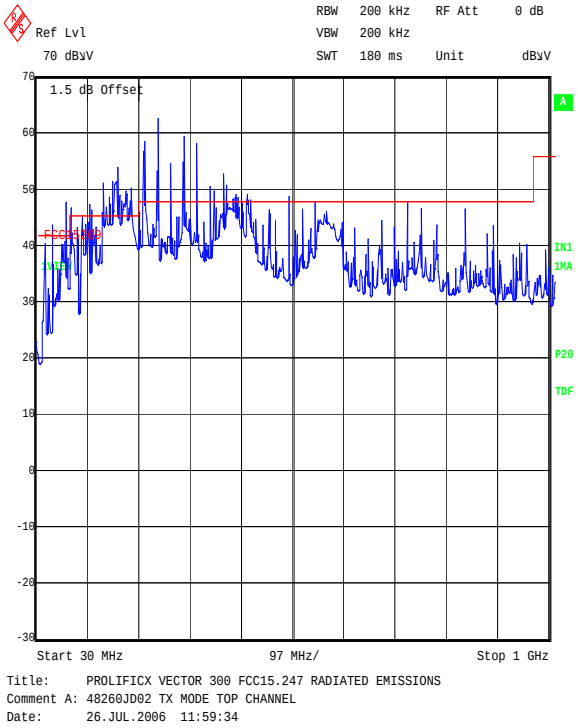
Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Result
159.738	Vertical	41.7	69.9	28.2	Complied
233.486	Vertical	47.2	69.9	22.7	Complied
307.208	Vertical	44.7	69.9	25.2	Complied

Note(s):

1. *The preliminary scans showed similar emission levels for each mode/channel setting below 1 GHz, therefore final radiated emissions measurements were performed with the EUT set to the top channel only.*

Test of: **Prolificx New Zealand Ltd**
Vector 300 Bluetooth Transceiver
To: **FCC Part 15.247: 2005 (Subpart C)**

Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.2.9. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) -

The EUT was configured for radiated emission testing as described in section 9 of this report.

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

Results:

Electric Field Strength Measurements (Frequency Range: 1 to 25.0GHz)
(emissions occurring in the restricted bands)

Highest Peak Level: Bottom Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.069055	Vertical	62.0	-12.7	49.3	74.0	24.7	Complied
1.196335	Vertical	46.1	-12.7	33.4	74.0	40.6	Complied
1.300229	Vertical	55.9	-12.4	43.5	74.0	30.5	Complied
1.596295	Vertical	54.6	-11.8	42.8	74.0	31.2	Complied
2.384489	Vertical	71.3	-11.4	59.9	74.0	14.1	Complied

Highest Average Level: Bottom Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.069055	Vertical	43.7	-12.7	31.0	54.0	23.0	Complied
1.196335	Vertical	37.3	-12.7	24.6	54.0	29.4	Complied
1.300229	Vertical	45.9	-12.4	33.5	54.0	20.5	Complied
1.596295	Vertical	51.4	-11.8	39.6	54.0	14.4	Complied
2.384489	Vertical	34.6	-11.4	23.2	54.0	30.8	Complied

Highest Peak Level: Middle Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.069055	Vertical	62.0	-12.7	49.3	74.0	24.7	Complied
1.196335	Vertical	46.1	-12.7	33.4	74.0	40.6	Complied
1.300229	Vertical	55.9	-12.4	43.5	74.0	30.5	Complied
1.596295	Vertical	54.6	-11.8	42.8	74.0	31.2	Complied
2.384063	Vertical	52.0	-11.4	40.6	74.0	33.4	Complied

Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)

Highest Average Level: Middle Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.069055	Vertical	43.7	-12.7	31.0	54.0	23.0	Complied
1.196335	Vertical	37.3	-12.7	24.6	54.0	29.4	Complied
1.300229	Vertical	45.9	-12.4	33.5	54.0	20.5	Complied
1.596295	Vertical	51.4	-11.8	39.6	54.0	14.4	Complied
2.384063	Vertical	32.8	-11.4	21.4	54.0	32.6	Complied

Highest Peak Level: Top Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.069055	Vertical	62.0	-12.7	49.3	74.0	24.7	Complied
1.196335	Vertical	46.1	-12.7	33.4	74.0	40.6	Complied
1.300229	Vertical	55.9	-12.4	43.5	74.0	30.5	Complied
1.596295	Vertical	54.6	-11.8	42.8	74.0	31.2	Complied
2.383037	Vertical	52.5	-11.4	41.1	74.0	32.9	Complied
2.486208	Vertical	68.5	-11.0	57.5	74.0	16.5	Complied

Highest Average Level: Top Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.069055	Vertical	43.7	-12.7	31.0	54.0	23.0	Complied
1.196335	Vertical	37.3	-12.7	24.6	54.0	29.4	Complied
1.300229	Vertical	45.9	-12.4	33.5	54.0	20.5	Complied
1.596295	Vertical	51.4	-11.8	39.6	54.0	14.4	Complied
2.383037	Vertical	33.7	-11.4	22.3	54.0	31.7	Complied
2.486208	Vertical	33.6	-11.0	22.6	54.0	31.4	Complied

Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)

Highest Peak Level: Hopping Mode

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.069055	Vertical	62.0	-12.7	49.3	74.0	24.7	Complied
1.186335	Vertical	46.1	-12.7	33.4	74.0	40.6	Complied
1.300229	Vertical	55.9	-12.4	43.5	74.0	30.5	Complied
1.596295	Vertical	54.6	-11.8	42.8	74.0	31.2	Complied
2.384689	Vertical	71.2	-11.4	59.8	74.0	14.2	Complied
2.486537	Vertical	62.8	-11.0	51.8	74.0	22.2	Complied

Highest Average Level: Hopping Mode

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.069055	Vertical	43.7	-12.7	31.0	54.0	23.0	Complied
1.196335	Vertical	37.3	-12.7	24.6	54.0	29.4	Complied
1.300229	Vertical	45.9	-12.4	33.5	54.0	20.5	Complied
1.596295	Vertical	51.4	-11.8	39.6	54.0	14.4	Complied
2.384689	Vertical	33.3	-11.4	21.9	54.0	32.1	Complied
2.486537	Vertical	32.7	-11.0	21.7	54.0	32.3	Complied

7.2.10. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a)

The EUT was configured for radiated emission testing as described in section 9 of this report.

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

Results:

Electric Field Strength Measurements (Frequency Range: 1 to 25.0GHz)
(emissions outside the restricted bands)

Highest Peak Level: Bottom Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Result
2.011683	Vertical	58.2	-11.4	46.8	71.7	24.9	Complied
2.024104	Vertical	57.4	-11.5	45.9	71.7	25.8	Complied

Highest Peak Level: Middle Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Result
2.011683	Vertical	58.2	-11.4	46.8	71.6	24.8	Complied
2.024104	Vertical	57.4	-11.5	45.9	71.6	25.7	Complied

Highest Peak Level: Top Channel

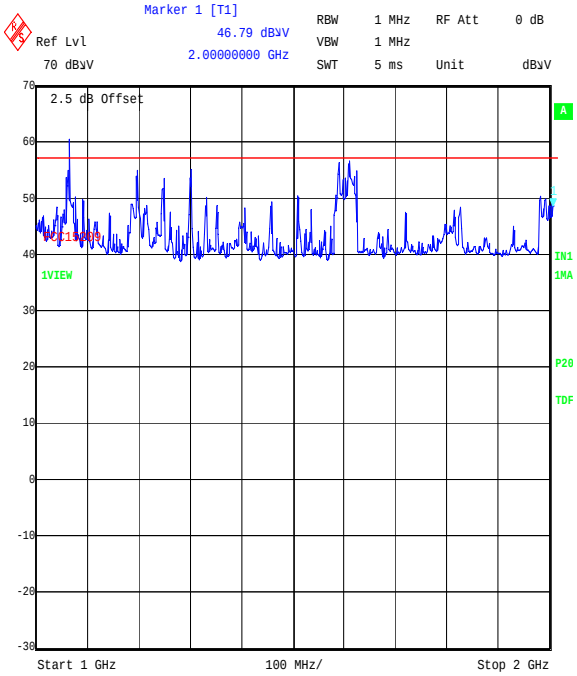
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Result
2.011683	Vertical	58.2	-11.4	46.8	69.9	23.1	Complied
2.024104	Vertical	57.4	-11.5	45.9	69.9	24.0	Complied

Highest Peak Level: Hopping Mode

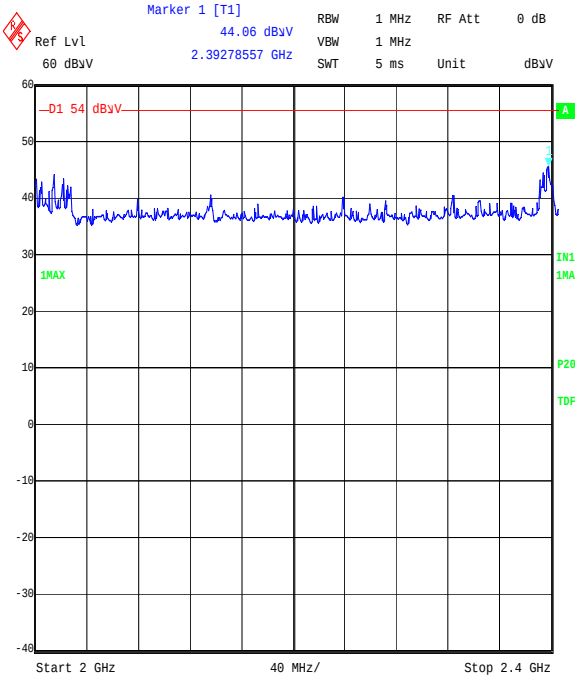
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Result
2.011683	Vertical	58.2	-11.4	46.8	72.3	25.5	Complied
2.024104	Vertical	57.4	-11.5	45.9	72.3	26.4	Complied

Test of: Prolificx New Zealand Ltd
Vector 300 Bluetooth Transceiver
To: FCC Part 15.247: 2005 (Subpart C)

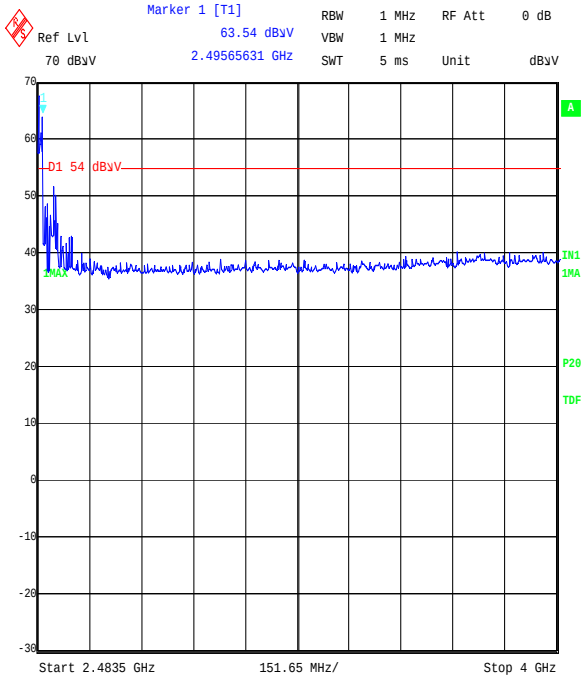
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)



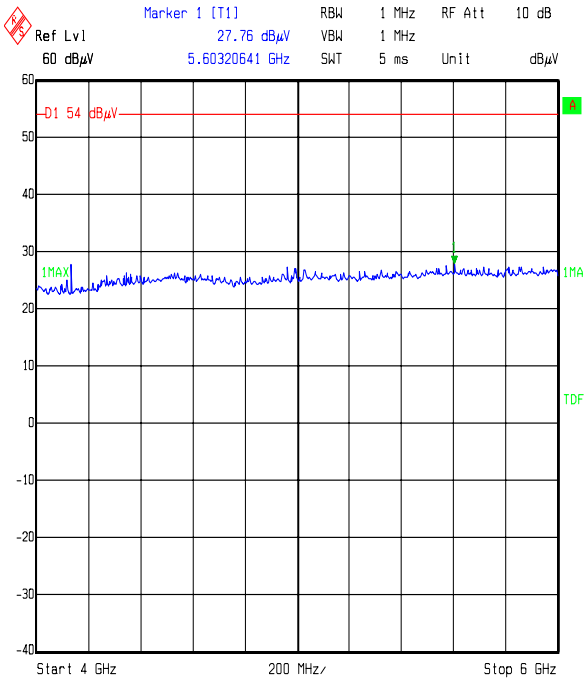
Title: PROLIFICX VECTOR 300 FCC15.247 RADIATED EMISSIONS
Comment A: 48260JD02 TX MODE TOP CHANNEL
Date: 26.JUL.2006 13:18:36



Title: PROLIFICX VECTOR 300 FCC15.247 RADIATED EMISSIONS
Comment A: 48260JD02 TX MODE TOP CHANNEL
Date: 26.JUL.2006 14:53:37

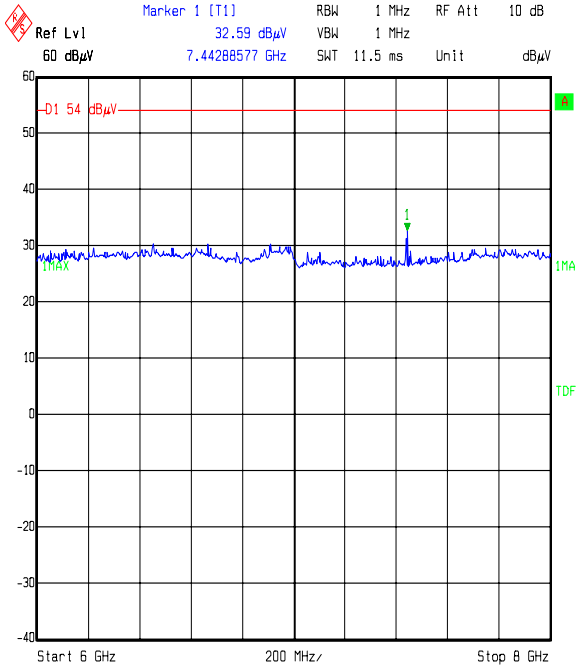


Title: PROLIFICX VECTOR 300 FCC15.247 RADIATED EMISSIONS
Comment A: 48260JD02 TX MODE TOP CHANNEL
Date: 26.JUL.2006 14:52:24

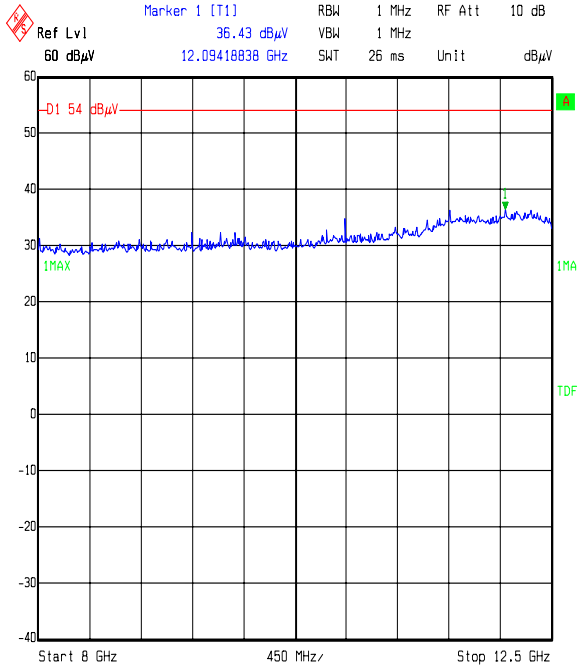


Title: Prolificx EUT: Vector 300. FCC Part 15.247 Rad Emissions
Comment A: 48260JD02 Operating in Tx Mode, Top Channel.
Date: 28.JUL.2006 12:03:28

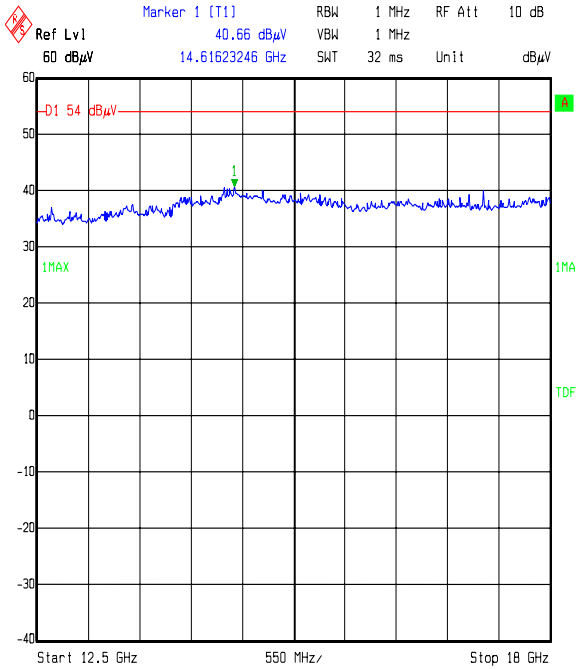
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)



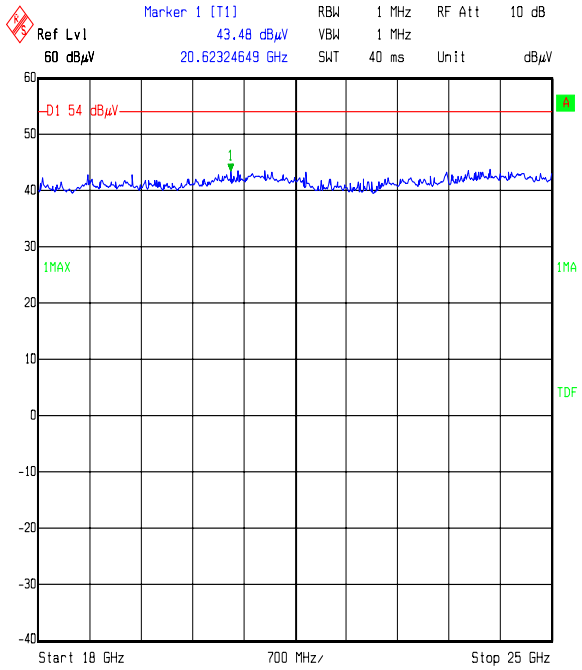
Title: Prolificx EUT: Vector 300. FCC Part 15.247 Rad Emissions
Comment A: 48260JD02 Operating in Tx Mode, Top Channel.
Date: 28.JUL.2006 12:11:16



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Rad Emissions
Comment A: 48260JD02 Operating in Rx Mode.
Date: 28.JUL.2006 12:21:57



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Rad Emissions
Comment A: 48260JD02 Operating in Tx Mode, Top Channel.
Date: 28.JUL.2006 12:24:31



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Rad Emissions
Comment A: 48260JD02 Operating in Tx Mode, Top Channel.
Date: 28.JUL.2006 12:28:00

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

7.2.11. Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a)

The EUT was configured for band edge compliance of radiated emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum radiated band edge emissions.

Results:

Electric Field Strength Measurements

Peak Power Level Hopping Mode:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4000	Horizontal	55.8	-11.4	44.4	72.3*	27.9	Complied
2.4835	Horizontal	74.3	-11.0	63.3	74.0	10.7	Complied

Average Power Level Hopping Mode:

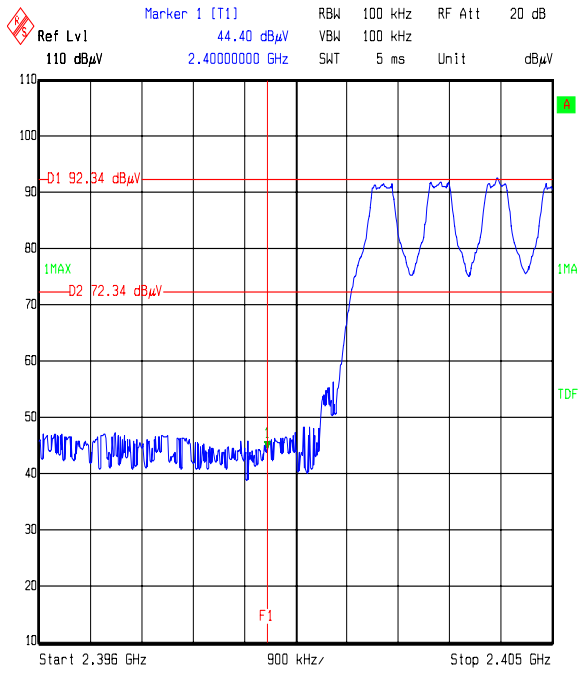
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4835	Horizontal	48.9	-11.0	37.9	54.0	16.1	Complied

Note(s):

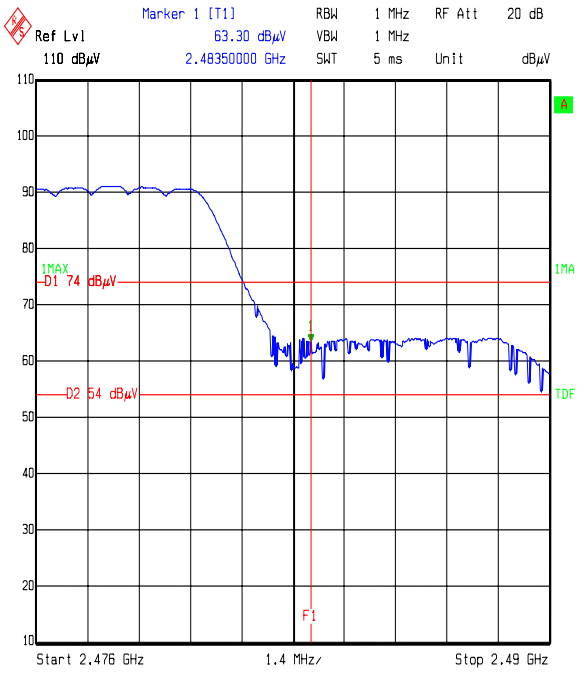
1. **-20 dBc limit*

Test of: Prolificx New Zealand Ltd
Vector 300 Bluetooth Transceiver
To: FCC Part 15.247: 2005 (Subpart C)

Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a) (Continued)



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Band Edge
Comment A: 48260JD02 Operating in Tx Mode, Hopping on all Channels.
Date: 28.JUL.2006 11:54:15



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Band Edge
Comment A: 48260JD02 Operating in Tx Mode, Hopping on all Channels
Date: 28.JUL.2006 11:49:24

7.2.12. Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a)

The EUT was configured for band edge compliance of radiated emission measurements as described in section 9 of this report.

Tests were performed to identify the average radiated band edge emissions.

Results:

Peak Power Level Static Mode:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4000	Horizontal	56.1	-11.4	44.7	71.7*	27.0	Complied
2.4835	Horizontal	67.1	-11.0	56.1	74.0	17.9	Complied

Average Power Level Static Mode:

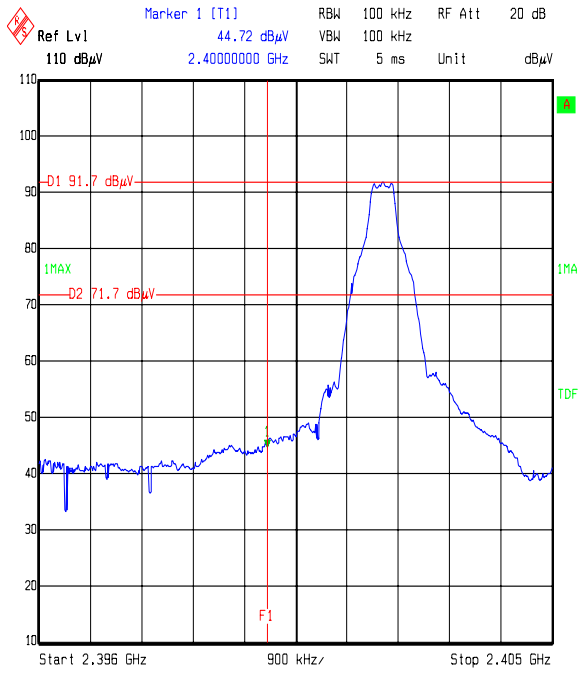
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4835	Horizontal	48.9	-11.0	37.9	54.0	16.1	Complied

Note(s):

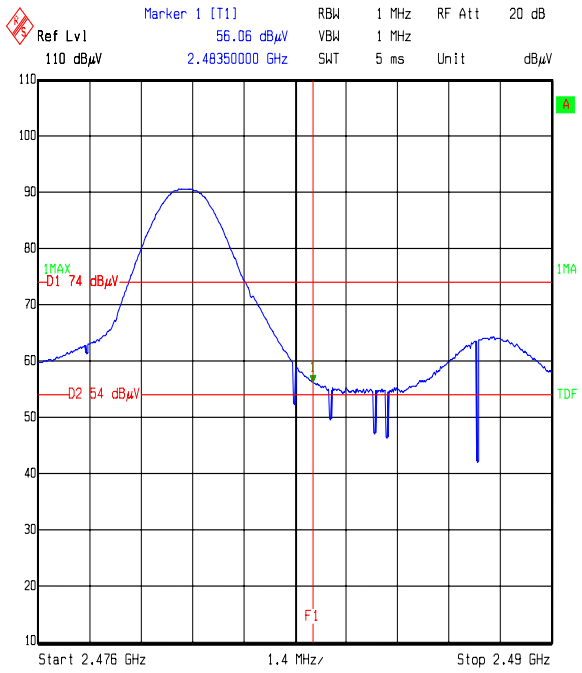
1. **-20 dBc limit*

Test of: Prolificx New Zealand Ltd
Vector 300 Bluetooth Transceiver
To: FCC Part 15.247: 2005 (Subpart C)

Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a) (Continued)



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Band Edge
Comment A: 48260JD02 Operating in Tx Mode, Bottom Channel.
Date: 28.JUL.2006 11:56:09



Title: Prolificx EUT: Vector 300. FCC Part 15.247 Band Edge
Comment A: 48260JD02 Operating in Tx Mode, Top Channel.
Date: 28.JUL.2006 11:40:39

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
Transmitter Maximum Peak Output Power	Not applicable	95%	±2.94 dB
Transmitter Carrier Frequency Separation	Not applicable	95%	±11.4 ppm
Transmitter Average Time of Occupancy	Not applicable	95%	±0.3 ns
20 dB Bandwidth	Not applicable	95%	± 11.4 ppm
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±4.64 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	±2.94 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. Radiated Emissions

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

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

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

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

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

All measurements on the open area test site were performed using broadband antennas in both vertical and horizontal polarisations.

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

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

Radiated Emissions (Continued)

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

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

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

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

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

9.2. Carrier Frequency Separation / 20 dB Bandwidth

The EUT and spectrum analyser was configured as for radiated measurements, and as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine the bandwidth and separation of each transmission channel the measurement analyser was configured to measure two adjacent channels whilst the EUT was in hopping mode. The spectrum analyser was configured with a resolution bandwidth and video bandwidth greater than 1% of the frequency span.

The analyser was set for a maximum hold scan to capture the profile of the signal. The peak points on the two adjacent channels were noted and the separation between them recorded.

To determine the occupied bandwidth, a resolution bandwidth of 10 kHz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of, at least, the same value was used.

The analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference line was drawn 20 dB below the peak level.

The bandwidth was determined at the points where the 20 dB reference line intercepted the power envelope of the emission.

9.3. Average Time of Occupancy

The EUT and spectrum analyser was configured as for radiated measurements, and as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

First the maximum packet length was determined on the centre channel.

The measurement analyser was configured to the time domain mode by setting the span to zero with a sweep time sufficiently wide enough to measure one pulse.

The EUT was configured to operate in normal mode of operation. The pulse width of one transmission was then recorded. The measurement analyser was then configured in zero span i.e. in the time domain and the sweep time was set to 32 seconds (the closest allowable setting to 31.6 seconds). This 31.6 second period was determined by multiplying the number of channels the device operates over (79) by 0.4 seconds.

The number of transmissions within this period was noted and multiplied by the pulse width recorded earlier. This gives the maximum occupancy over 31.6 seconds.

9.4. Effective Isotropic Radiated Power (EIRP)

EIRP 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; therefore 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 horn 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 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

Effective Isotropic Radiated Power (EIRP) (Continued)

Circumstances where the signal generator could not produce the desired a power substitution was performed with the signal generator set to 0 dBm. The radiated signal was maximised as previously described. The level indicated on the measuring receiver was noted. The delta between this level and the maximum level for the EUT was calculated and also noted. The EIRP of the signal generator was calculated using the above formulae. The recorded delta was added to the calculated EIRP to obtain the substituted EUT EIRP.

Delta (dB) = EUT – SG

where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual EIRP is calculated as:

EIRP SG= Signal Generator Level - Cable Loss + Antenna Gain

The EUT EIRP is calculated as:

EIRP EUT = EIRP SG + Delta.

The test equipment settings for EIRP measurements were as follows:

Receiver Function	Setting
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	1 MHz
Amplitude Range:	100 dB
Sweep Time:	Coupled

9.5. Band Edge Compliance of RF Radiated Emissions

The EUT and spectrum analyser were configured as for radiated measurements and as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine band edge compliance, the analyser resolution bandwidth was set to >= 1% of the analyser span. The video bandwidth was set to be ≥ to the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

A plot of the lower band edge of the allocated frequency band was produced. A marker was set to the level of the highest in band emission with a limit line set to 20 dB below this. The marker was then placed on the highest out of band emission (the specification states that either the band edge level must be measured or the highest out of band emission, whichever is the greater). The plots show that the highest out of band emission complies with the -20 dBc limit.

The above procedure was then repeated for the upper band edge except that, as the upper band edge fell on a restricted band edge (as defined in section 15.205(a)), the limit for the restricted band was applied instead of the -20 dBc limit i.e. the general limits defined in section 15.209(a).

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

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval
A027	Horn Antenna	Eaton	9188-2	301	8 Jun 2006	36
A031	Horn Antenna	Eaton	91889-2	557	8 Jun 2006	36
A1037	Bilog Antenna	Chase EMC	CBL6112B	2413	24 Jan 2005	36
A1534	Preamplifier	Hewlett Packard	8449B	3008A00405	26 July 2006	12
A253	Horn Antenna	Flann	12240-20	128	6 Oct 2003	36
A254	Horn Antenna	Flann	14240-20	139	6 Oct 2003	36
A255	Horn Antenna	Flann	16240-20	519	6 Oct 2003	36
A256	Horn Antenna	Flann	18240-20	400	6 Oct 2003	36
A259	Bilog Antenna	Chase	CBL6111	1513	10 Feb 2005	36
A436	Horn Antenna	Flann	20240-20	330	24 Apr 2006	36
M023	Test Receiver	Rohde & Schwarz	ESVP	872 991/027	10 Apr 2006	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	23 Nov 2005	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986_022	25 Aug 2005	12
M1263	Spectrum Analyser	Rohde & Schwarz	ESIB7	100265	6 Jan 2006	12
S0520	DC Power Supply	GW Instek	GPC-3030	E835141	26 Jul 2006	12
S201	Site 1	RFI	1		18 Jul 2006	12
S202	Site 2	RFI	2		12 Jun 2006	12

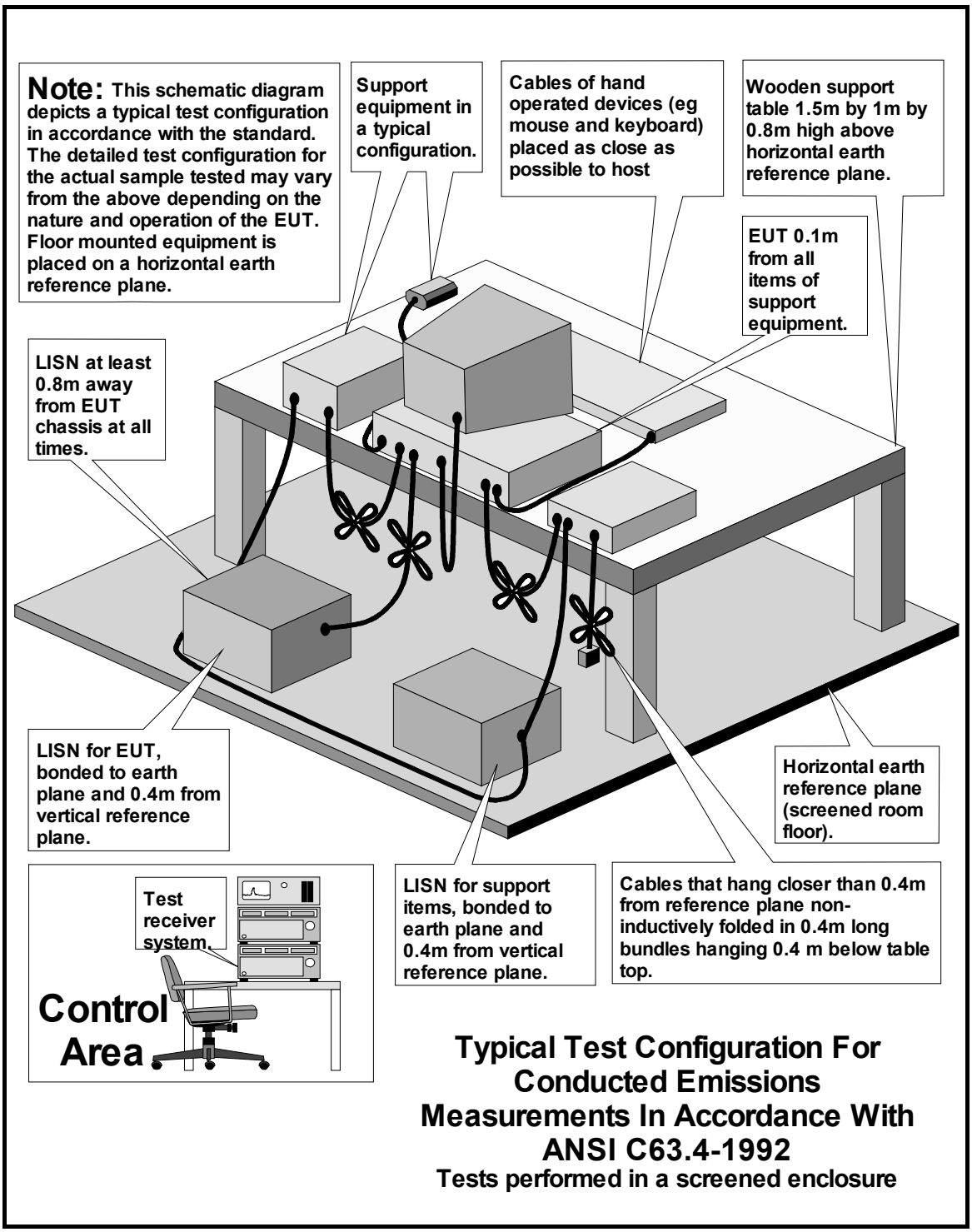
NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Test Configuration Drawings

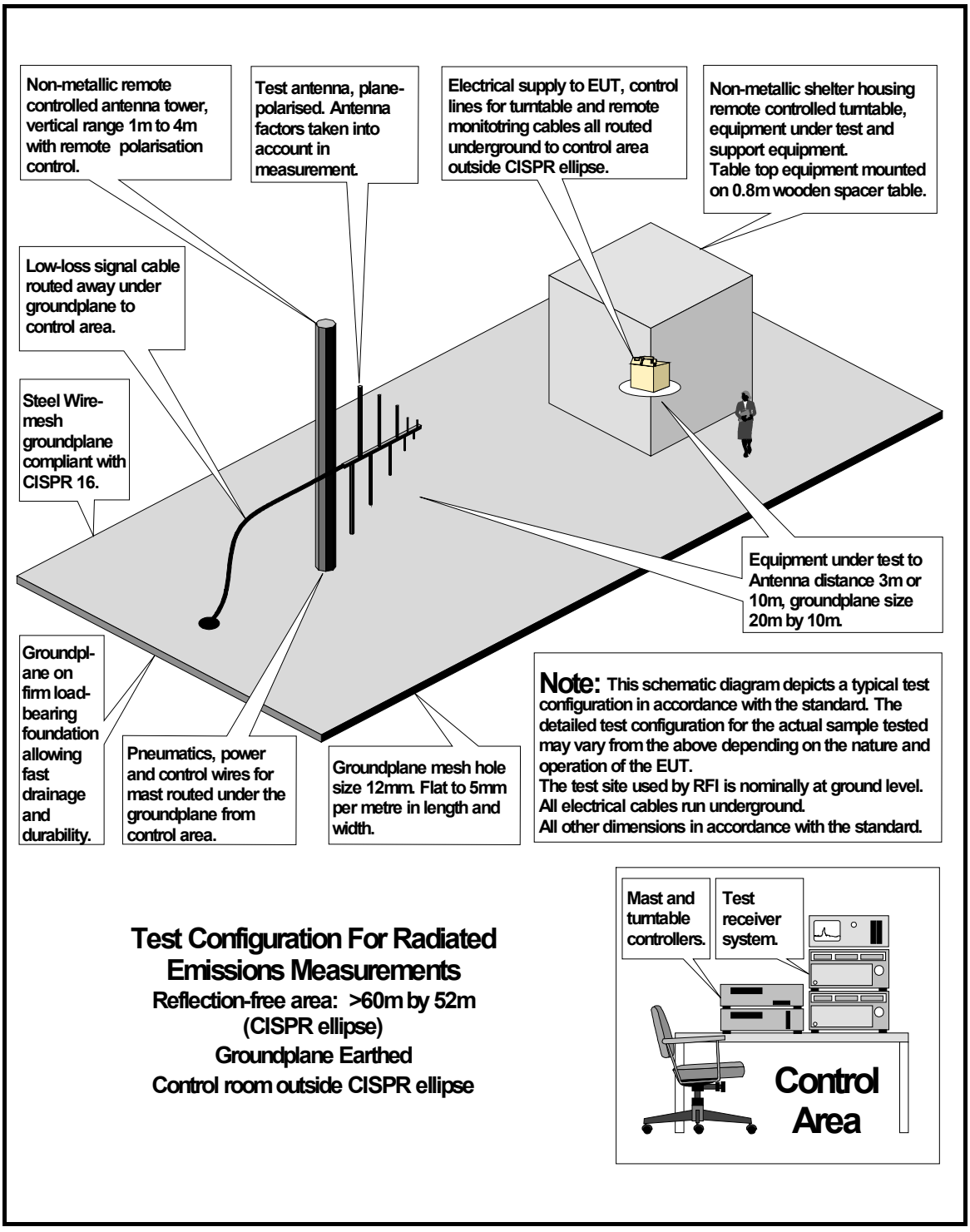
This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\48260JD02\EMICON	Test configuration for measurement of conducted emissions.
DRG\48260JD02\EMIRAD	Test configuration for measurement of radiated emissions.

DRG\48260JD02\EMICON



DRG\48260JD02\EMIRAD



Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m
(CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse