



Test Report

Product Name : Secure Outdoor Ethernet Radio Link

Model No.: ExpWave 240B, GateOne 240B

FCC ID.: R3N-GATEONE240B

Applicant : ZyGATE Communications Inc.

Address : 2F No. 48, Lung-Chin Road Lung-Tan, Taoyuan, Taiwan, R.O.C.

Date of Receipt : Apr. 21, 2004

Date of Test : Apr. 29, 2004

Report No. : 044H050FI

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Test Report Certification

Test Date : Apr. 29, 2004

Report No. : 044H050FI



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200347-0

Product Name : Secure Outdoor Ethernet Radio Link

Applicant : ZyGATE Communications Inc.

Address : 2F No. 48, Lung-Chin Road Lung-Tan, Taoyuan,
Taiwan, R.O.C.

Manufacturer : ZyGATE Communications Inc.

Model No. : ExpWave 240B, GateOne 240B

FCC ID. : R3N-GATEONE240B

Rated Voltage : AC 120V/60Hz

Trade Name : ZyXEL, ZyGATE

Measurement Standard : FCC CFR Title 47 Part 15 Subpart C: 2003

Measurement Procedure : ANSI C63.4: 2001

Test Result : Complied



The Test Results relate only to the samples tested.

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TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	5
1.1. EUT Description.....	5
1.2. Operational Description	6
1.3. Tested System Details.....	7
1.4. Configuration of tested System	8
1.5. EUT Exercise Software	8
1.6. Test Facility	9
2. Conducted Emission.....	10
2.1. Test Equipment.....	10
2.2. Test Setup	10
2.3. Limits	10
2.4. Test Procedure	11
2.5. Test Result of Conducted Emission.....	12
3. Peak Power Output	24
3.1. Test Equipment.....	24
3.2. Test Setup	24
3.3. Limits	24
3.4. Test Result of Peak Power Output.....	25
4. Radiated Emission.....	26
4.1. Test Equipment.....	26
4.2. Test Setup	26
4.3. Limits	27
4.4. Test Procedure	27
4.5. Test Result of Radiated Emission.....	28
5. Band Edge	40
5.1. Test Equipment.....	40
5.2. Test Setup	41
5.3. Limits	42
5.4. Test Procedure	42
5.5. Test Result of Band Edge	43
6. Occupied Bandwidth.....	48
6.1. Test Equipment.....	48

6.2.	Test Setup	48
6.3.	Limits	48
6.4.	Test Result of Occupied Bandwidth	49
7.	Power Density	50
7.1.	Test Equipment.....	50
7.2.	Test Setup	50
7.3.	Limits	50
7.4.	Test Result of Power Density	51
8.	EMI Reduction Method During Compliance Testing	52
Attachment 1: EUT Test Photographs		
Attachment 2: EUT Detailed Photographs		

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	: Secure Outdoor Ethernet Radio Link
Trade Name	: ZyXEL, ZyGATE
FCC ID.	: R3N-GATEONE240B
Model No.	: ExpWave 240B, GateOne 240B
Frequency Range	: 2412MHz to 2462MHz
Channel Number	: 11
Type of Modulation	: Direct Sequence Spread Spectrum
Antenna Type	: Connector (N TYPE male)
Data Speed	: 1 Mbps, 2 Mbps, 5.5 Mbps, 11 Mbps
Antenna Gain	: 8, 12, 16dBi
Channel Control	: Auto
Network / Power Injector	: ZyXEL, NPI-01, 1 Set
Omni Antenna (Option)(Mode 1)	: Procell, OA-02, 8 dBi
Flat panel Antenna (Option)(Mode 2)	: ZyXEL, FP-16, 16 dBi
Flat panel Antenna (Option)	: ZyXEL, FP-12, 12 dBi
POE Cable	: Shielded, 20m
RF Cable (Mode 2)	: Shielded, 2.0m
Cat-5 Cable	: Shielded, 2.0m
Grounding Wire	: Non-shielded, 3.0m
Power Adapter	: DVE, DSA-0151F-09A
	Cable Out: Shielded, 1.8m

Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	2412 MHz	Channel 5:	2432 MHz	Channel 9:	2452 MHz
Channel 2:	2417 MHz	Channel 6:	2437 MHz	Channel 10:	2457 MHz
Channel 3:	2422 MHz	Channel 7:	2442 MHz	Channel 11:	2462 MHz
Channel 4:	2427 MHz	Channel 8:	2447 MHz		

Note:

1. This device is a 2.4GHz Secure Outdoor Ethernet Radio Link included a 2.4GHz receiving function, a 2.4GHz transmitting function.
2. The variation of model number is for different strategy of marketing. The circuit of each model is identical.
3. Regards to the frequency band operation; the highest rate that was included the lowest 、middle and highest frequency of channel were selected to perform the test, then shown on this report.
4. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
5. This device is a composite device in accordance with Part 15 regulations. The function receiving was measured and made a test report that the report number is 044H050F under Declaration of Conformity.

EMI Mode: Mode 1: Secure Outdoor Etherent Radio Link W/Procell Antenna
Mode 2: Secure Outdoor Etherent Radio Link W/ZyXEL Antenna

1.2. Operational Description

EUT is an Secure Outdoor Ethernet Radio Link with 11 channels. This device provided four kind of transmitting speed 1,2,5.5 and 11Mbps. The device of RF carrier is DQPSK, DB PSK and CCK.

The device adapts direct sequence spread spectrum modulation. The Connector antenna was provides diversity function to improve the receiving function.

This Secure Outdoor Ethernet Radio Link is an IEEE 802.11b Wireless LAN adapter. It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Operation in 2.4GHz Direst Sequence Spread Spectrum (DSSS) radio transmission, the Secure Outdoor Ethernet Radio Link transfers data at speeds up to 64/128-bit Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any 802.11b network.

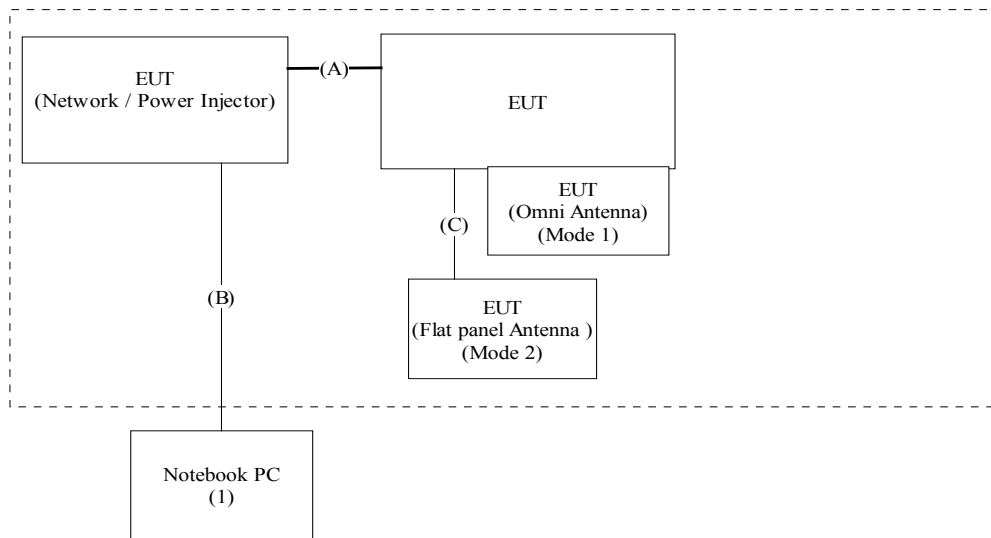
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
(1)	Notebook PC	IBM	Think Pad 570	27L8835	DoC	Non-shielded, 1.8m, a ferrite core bonded

	Signal Cable Type	Signal cable Description
A.	POE Cable	Shielded, 20m
B.	LAN Cable	Non-shielded, 5m
C.	RF Cable (Mode 2)	Shielded, 2m

1.4. Configuration of tested System



1.5. EUT Exercise Software

- (1) Setup the EUT and simulators as shown on 1.4
- (2) Turn on the power of all equipment.
- (3) Notebook PC reads data from disk.
- (4) Data will be transmitting through EUT.
- (5) The transmitted status will be shown on the monitor.
- (6) Repeat the above procedure 1.5.3 to 1.5.5

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: June 22, 2001 File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Reference 31040/SIT1300F2



0914

ILAC MRA

July 03, 2001 Accreditation on NVLAP
NVLAP Lab Code: 200533-0



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2. Conducted Emission

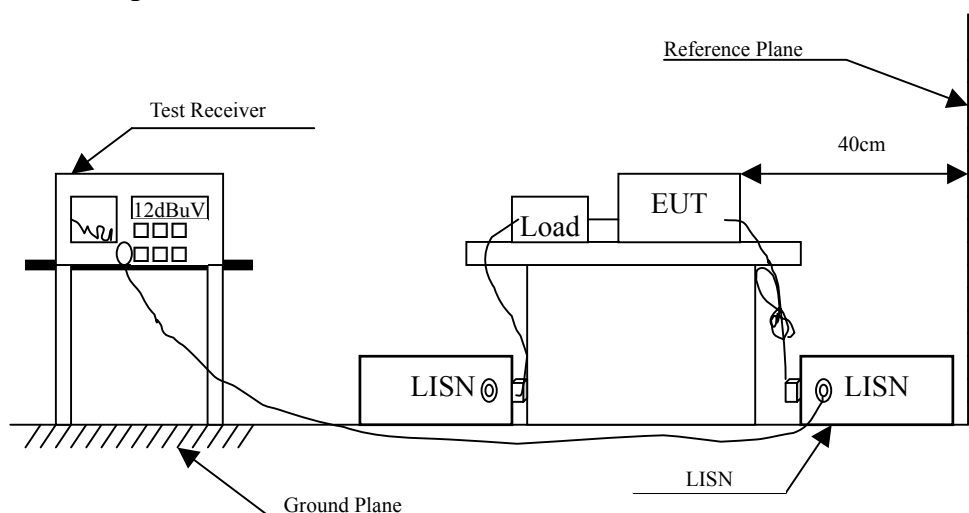
2.1. Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2003	
2	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2004	Peripherals
3	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2004	EUT
4	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2004	
5	No.2 Shielded Room			N/A	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2001 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Test Result of Conducted Emission

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 1
 Test Mode : Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna (Channel 1)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
Quasi-Peak					
0.220	0.10	0.14	35.52	35.76	62.81
0.439	0.10	0.20	32.86	33.16	57.08
0.646	0.11	0.24	34.74	35.08	56.00
* 2.400	0.13	0.36	37.09	37.58	56.00
8.716	0.21	0.48	25.86	26.56	60.00
28.685	0.48	0.60	31.81	32.89	60.00
Average					
0.220	0.10	0.14	29.00	29.24	52.82
0.439	0.10	0.20	23.80	24.10	47.08
0.646	0.11	0.24	23.20	23.54	46.00
2.400	0.13	0.36	23.10	23.59	46.00
8.716	0.21	0.48	20.90	21.60	50.00
* 28.685	0.48	0.60	28.90	29.98	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 2
 Test Mode : Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna (Channel 1)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.217	0.10	0.14	31.60	31.84	62.93
0.334	0.10	0.18	32.20	32.48	59.36
0.853	0.11	0.26	31.00	31.37	56.00
* 2.369	0.13	0.36	34.86	35.35	56.00
4.779	0.16	0.43	28.93	29.52	56.00
28.685	0.48	0.60	31.47	32.55	60.00
Average					
0.217	0.10	0.14	23.40	23.64	52.93
0.334	0.10	0.18	22.20	22.48	49.35
0.853	0.11	0.26	16.80	17.17	46.00
2.369	0.13	0.36	20.50	20.99	46.00
4.779	0.16	0.43	21.90	22.49	46.00
* 28.685	0.48	0.60	28.40	29.48	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 1
 Test Mode : Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna (Channel 6)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.219	0.10	0.14	35.38	35.62	62.85
0.310	0.10	0.17	35.89	36.16	59.97
0.638	0.11	0.24	34.28	34.62	56.00
* 2.408	0.13	0.36	36.99	37.48	56.00
3.599	0.15	0.40	31.59	32.14	56.00
28.685	0.48	0.60	32.35	33.43	60.00
Average					
0.219	0.10	0.14	28.70	28.94	52.86
0.310	0.10	0.17	27.50	27.77	49.97
0.638	0.11	0.24	22.10	22.44	46.00
2.408	0.13	0.36	23.60	24.09	46.00
3.599	0.15	0.40	22.60	23.15	46.00
* 28.685	0.48	0.60	29.10	30.18	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 2
 Test Mode : Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna(Channel 6)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.220	0.10	0.14	31.52	31.76	62.81
0.326	0.10	0.17	32.56	32.84	59.56
0.529	0.10	0.22	31.41	31.73	56.00
* 2.400	0.13	0.36	38.14	38.63	56.00
3.599	0.15	0.40	33.52	34.07	56.00
28.685	0.48	0.60	30.80	31.88	60.00
Average					
0.220	0.10	0.14	21.90	22.14	52.82
0.326	0.10	0.17	25.70	25.98	49.55
0.529	0.10	0.22	20.70	21.02	46.00
* 2.400	0.13	0.36	26.00	26.49	46.00
3.599	0.15	0.40	24.60	25.15	46.00
28.685	0.48	0.60	28.20	29.28	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 1
 Test Mode : Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna (Channel 11)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.209	0.10	0.13	30.04	30.27	63.26
0.314	0.10	0.17	33.46	33.73	59.86
0.533	0.10	0.22	31.45	31.77	56.00
* 2.384	0.13	0.36	38.82	39.31	56.00
8.002	0.21	0.48	29.09	29.77	60.00
29.236	0.49	0.60	30.54	31.63	60.00
Average					
0.209	0.10	0.13	22.10	22.33	53.24
0.314	0.10	0.17	26.20	26.47	49.86
0.533	0.10	0.22	21.00	21.32	46.00
* 2.384	0.13	0.36	25.70	26.19	46.00
8.002	0.21	0.48	27.60	28.28	50.00
29.236	0.49	0.60	28.30	29.39	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 2
 Test Mode : Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna (Channel 11)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.224	0.10	0.14	30.49	30.73	62.66
0.314	0.10	0.17	35.71	35.98	59.86
0.627	0.11	0.24	33.07	33.41	56.00
* 2.380	0.13	0.36	37.48	37.97	56.00
8.002	0.21	0.48	28.97	29.65	60.00
26.611	0.45	0.59	30.60	31.64	60.00
Average					
0.224	0.10	0.14	20.10	20.34	52.67
* 0.314	0.10	0.17	29.50	29.77	49.86
0.627	0.11	0.24	19.40	19.74	46.00
2.380	0.13	0.36	24.50	24.99	46.00
8.002	0.21	0.48	27.20	27.88	50.00
26.611	0.45	0.59	27.40	28.44	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 1
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (Channel 1)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.212	0.10	0.13	33.75	33.98	63.11
0.306	0.10	0.17	36.16	36.43	60.07
0.642	0.11	0.24	33.68	34.02	56.00
* 2.373	0.13	0.36	38.24	38.73	56.00
3.431	0.14	0.40	30.88	31.42	56.00
26.490	0.45	0.59	34.07	35.11	60.00
Average					
0.212	0.10	0.13	29.60	29.83	53.13
0.306	0.10	0.17	26.30	26.57	50.08
0.642	0.11	0.24	21.90	22.24	46.00
2.373	0.13	0.36	24.50	24.99	46.00
3.431	0.14	0.40	19.50	20.04	46.00
* 26.490	0.45	0.59	31.20	32.24	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 2
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (Channel 1)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.308	0.10	0.17	34.10	34.37	60.03
0.744	0.11	0.25	31.25	31.61	56.00
1.310	0.12	0.30	32.96	33.38	56.00
* 2.396	0.13	0.36	38.28	38.77	56.00
3.509	0.15	0.40	33.87	34.41	56.00
24.904	0.43	0.58	32.15	33.16	60.00
Average					
0.308	0.10	0.17	24.80	25.07	50.02
0.744	0.11	0.25	19.20	19.56	46.00
1.310	0.12	0.30	20.30	20.72	46.00
2.396	0.13	0.36	26.50	26.99	46.00
3.509	0.15	0.40	23.10	23.64	46.00
* 24.904	0.43	0.58	30.50	31.51	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 1
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (Channel 6)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.216	0.10	0.13	35.50	35.74	62.96
0.314	0.10	0.17	35.79	36.06	59.86
0.630	0.11	0.24	33.60	33.94	56.00
* 2.322	0.13	0.36	37.23	37.72	56.00
3.630	0.15	0.40	32.68	33.23	56.00
28.685	0.48	0.60	34.94	36.02	60.00
Average					
0.216	0.10	0.13	28.20	28.44	52.97
0.314	0.10	0.17	29.60	29.87	49.86
0.630	0.11	0.24	21.40	21.74	46.00
2.322	0.13	0.36	22.90	23.39	46.00
3.630	0.15	0.40	23.00	23.55	46.00
* 28.685	0.48	0.60	32.70	33.78	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 2
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (Channel 6)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.313	0.10	0.17	32.57	32.84	59.89
0.517	0.10	0.22	31.04	31.36	56.00
1.494	0.12	0.32	32.11	32.55	56.00
* 2.134	0.13	0.35	37.95	38.43	56.00
3.443	0.14	0.40	35.55	36.09	56.00
26.611	0.45	0.59	34.44	35.48	60.00
Average					
0.313	0.10	0.17	25.80	26.07	49.89
0.517	0.10	0.22	19.90	20.22	46.00
1.494	0.12	0.32	20.80	21.24	46.00
2.134	0.13	0.35	25.50	25.98	46.00
3.443	0.14	0.40	25.20	25.74	46.00
* 26.611	0.45	0.59	31.80	32.84	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 1
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (Channel 11)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.216	0.10	0.13	35.50	35.74	62.96
0.302	0.10	0.17	36.14	36.41	60.18
0.634	0.11	0.24	33.54	33.88	56.00
* 2.338	0.13	0.36	37.63	38.12	56.00
3.459	0.14	0.40	34.03	34.57	56.00
26.611	0.45	0.59	35.16	36.20	60.00
Average					
0.216	0.10	0.13	28.40	28.64	52.97
0.302	0.10	0.17	24.70	24.97	50.19
0.634	0.11	0.24	21.60	21.94	46.00
2.338	0.13	0.36	22.90	23.39	46.00
3.459	0.14	0.40	23.50	24.04	46.00
* 26.611	0.45	0.59	32.30	33.34	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Conducted Emission
 Power Line : Line 2
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (Channel 11)

Frequency	Cable	Probe	Reading	Emission	Limits
	Loss	Factor	Level	Level	
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
0.216	0.10	0.13	32.88	33.12	62.96
0.306	0.10	0.17	34.03	34.30	60.07
0.736	0.11	0.25	31.15	31.51	56.00
* 2.150	0.13	0.35	38.17	38.65	56.00
3.427	0.14	0.40	35.04	35.58	56.00
26.607	0.45	0.59	34.42	35.46	60.00
Average					
0.216	0.10	0.13	23.00	23.24	52.97
0.306	0.10	0.17	26.00	26.27	50.08
0.736	0.11	0.25	19.10	19.46	46.00
2.150	0.13	0.35	26.60	27.08	46.00
3.427	0.14	0.40	25.20	25.74	46.00
* 26.607	0.45	0.59	31.40	32.44	50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

3. Peak Power Output

3.1. Test Equipment

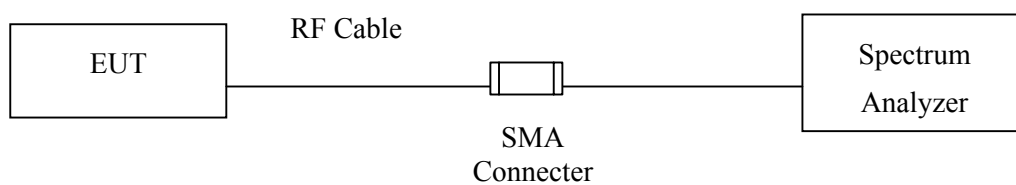
The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
1	Spectrum Analyzer	R & S	FSP / 100561	Mar., 2004	
2	No.1 OATS			Sep., 2003	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

3.2. Test Setup

Conduction Power Measurement



3.3. Limits

The maximum peak power shall be less 1 Watt.

3.4. Test Result of Peak Power Output

Product : Secure Outdoor Ethernet Radio Link
Test Item : Peak Power Output
Test Site : No.1 OATS
Test Mode : Normal Operation

Channel No.	Frequency(MHz)	Measurement	Required Limit	Result
1	2412.00	13.87dBm	1 Watt= 30 dBm	Pass
6	2437.00	13.54dBm	1 Watt= 30 dBm	Pass
11	2462.00	13.17dBm	1 Watt= 30 dBm	Pass

4. Radiated Emission

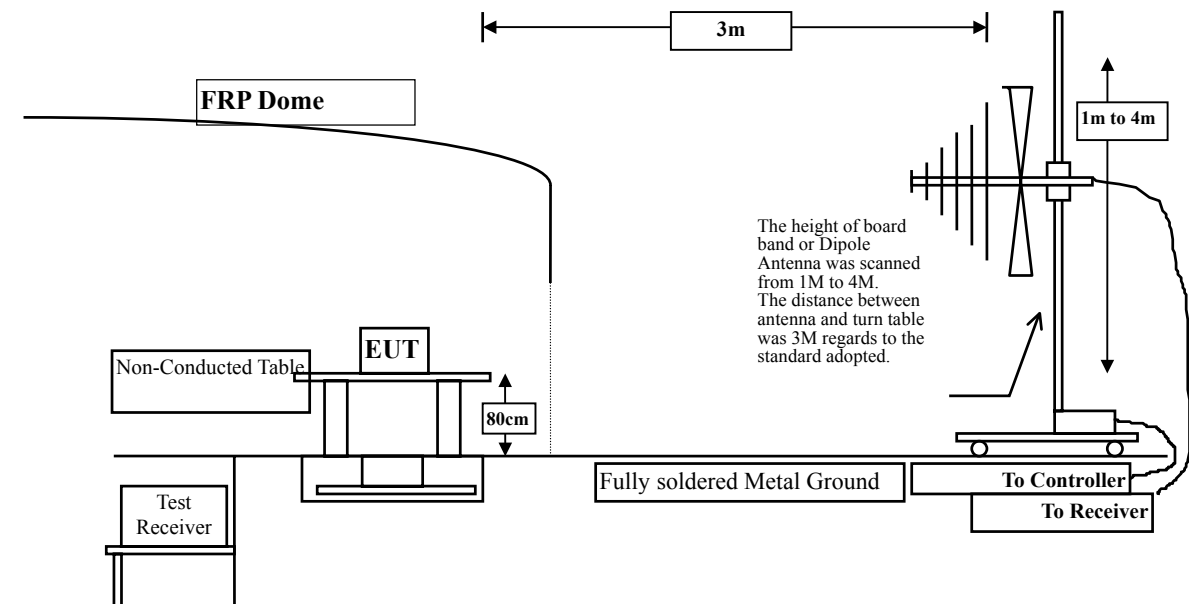
4.1. Test Equipment

The following test equipment are used during the test:

Item		Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	X	Test Receiver	R & S	ESCS 30 / 825442/017	Jan., 2004
2	X	Spectrum Analyzer	Advantest	R3261C / 81720266	N/A
3	X	Pre-Amplifier	HP	8447D / 2944A09276	N/A
4	X	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2003
5	X	Spectrum Analyzer	R & S	FSP40 / 100005	Aug., 2003
6	X	Pre-Amplifier	HP	8449B / 3008A01123	Feb., 2004
7	X	Horn Antenna	Schwarzbeck	BBHA 9120D / BBHA9120D312	Jul., 2003
8		No.1 OATS			Sep., 2003

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

4.2. Test Setup



4.3. Limits

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks :

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2001 on radiated measurement.

The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30)is 120 kHz, above 1GHz are 1 MHz.

The frequency range from 30MHz to 10th harmonics is checked.

4.5. Test Result of Radiated Emission

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Harmonic Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna (Channel 1)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

1256.000	2.20	24.58	31.92	31.01	25.87	48.13	74.00
4824.000	4.24	31.22	31.95	30.13	33.65	40.35	74.00
7236.200	5.63	35.95	32.67	29.69	38.60	35.40	74.00
9648.000	7.01	38.05	31.88	28.52	41.70	32.30	74.00
12060.00	8.40	38.59	31.32	28.15	43.81	30.19	74.00

Vertical

Peak Detector:

1200.000	2.17	24.52	31.91	33.77	28.54	45.46	74.00
4824.000	4.24	31.22	31.95	35.54	39.06	34.94	74.00
7240.000	5.63	35.95	32.67	35.52	44.43	29.57	74.00
9642.000	7.00	38.04	31.91	34.92	48.05	25.95	74.00
12064.00	8.40	38.59	31.32	32.99	48.65	25.35	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Harmonic Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna (Channel 6)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
=====							

Horizontal

Peak Detector:

4876.000	4.27	31.32	31.95	35.55	39.19	34.81	74.00
7309.000	5.67	36.09	32.60	35.22	44.37	29.63	74.00
9748.000	7.07	38.07	31.66	33.90	47.38	26.62	74.00
12189.00	8.47	38.51	31.21	32.86	48.62	25.38	74.00

Vertical

Peak Detector:

1214.000	2.18	24.54	31.91	39.21	34.01	39.99	74.00
4874.200	4.27	31.32	31.95	35.76	39.40	34.60	74.00
7310.900	5.67	36.09	32.60	34.55	43.70	30.30	74.00
9748.000	7.07	38.07	31.66	33.46	46.94	27.06	74.00
12185.00	8.47	38.51	31.21	32.79	48.55	25.45	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Harmonic Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna (Channel 11)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

4926.000	4.30	31.41	31.96	35.67	39.43	34.57	74.00
7390.000	5.72	36.26	32.51	35.08	44.54	29.46	74.00
9804.000	7.10	38.08	31.55	35.22	48.85	25.15	74.00
12312.00	8.54	38.42	31.09	33.39	49.26	24.74	74.00

Vertical

Peak Detector:

4920.000	4.30	31.41	31.96	36.18	39.94	34.06	74.00
7386.000	5.72	36.26	32.51	35.19	44.65	29.35	74.00
9826.000	7.12	38.09	31.48	35.50	49.23	24.77	74.00
12310.00	8.53	38.43	31.10	33.19	49.05	24.95	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Harmonic Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (Channel 1)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

4824.000	4.24	31.31	31.95	36.11	39.71	34.29	74.00
7236.000	5.63	36.54	32.67	36.14	45.64	28.36	74.00
9647.990	7.01	37.98	31.88	35.56	48.68	25.32	74.00
12059.99	8.40	38.59	31.32	32.99	48.66	25.34	74.00

Vertical

Peak Detector:

4823.900	4.24	31.31	31.95	35.96	39.56	34.44	74.00
7236.000	5.63	36.54	32.67	35.81	45.31	28.69	74.00
9648.000	7.01	37.98	31.88	33.87	46.99	27.01	74.00
12059.99	8.40	38.59	31.32	32.45	48.12	25.88	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Harmonic Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (Channel 6)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

1378.000	2.27	25.11	31.93	38.72	34.17	39.83	74.00
4874.000	4.27	31.37	31.95	36.30	39.99	34.01	74.00
7311.000	5.67	36.56	32.60	35.20	44.83	29.17	74.00
9748.300	7.07	38.13	31.66	33.20	46.74	27.26	74.00
12184.89	8.47	38.51	31.21	32.30	48.06	25.94	74.00

Vertical

Peak Detector:

4874.000	4.27	31.37	31.95	35.22	38.91	35.09	74.00
7311.000	5.67	36.56	32.60	36.62	46.25	27.75	74.00
9748.000	7.07	38.13	31.66	34.02	47.56	26.44	74.00
12185.00	8.47	38.51	31.21	33.30	49.06	24.94	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Harmonic Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (Channel 11)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

1152.000	2.14	24.25	31.90	37.75	32.23	41.77	74.00
4926.000	4.30	31.43	31.96	36.09	39.87	34.13	74.00
7384.000	5.72	36.58	32.51	33.85	43.64	30.36	74.00
9846.000	7.12	38.18	31.48	33.84	47.66	26.34	74.00
12314.00	8.54	38.42	31.09	33.18	49.05	24.95	74.00

Vertical

Peak Detector:

1448.000	2.30	25.03	31.94	36.71	32.10	41.90	74.00
4926.000	4.30	31.43	31.96	34.73	38.51	35.49	74.00
7388.000	5.72	36.58	32.51	34.80	44.59	29.41	74.00
9848.000	7.12	38.18	31.48	32.40	46.22	27.78	74.00
12314.00	8.54	38.42	31.09	33.70	49.57	24.43	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : General Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 1: Secure Outdoor Etherent Radio Link W/Procell Antenna (Channel 1)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
MHz	Loss	Factor		Level	Level		
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

139.610	1.47	8.27	22.60	43.80	30.94	12.56	43.50
* 299.660	2.12	13.53	22.60	47.40	40.45	5.55	46.00
497.540	2.94	17.80	22.60	37.60	35.74	10.26	46.00
597.450	3.35	21.04	22.60	36.00	37.79	8.21	46.00
697.360	3.76	17.25	22.60	35.80	34.21	11.79	46.00
895.240	4.57	24.93	22.60	32.00	38.90	7.10	46.00

Vertical

* 103.720	1.32	15.97	22.60	44.40	39.09	4.41	43.50
146.400	1.50	15.45	22.60	39.40	33.74	9.76	43.50
299.660	2.12	17.53	22.60	35.40	32.45	13.55	46.00
498.510	2.94	16.94	22.60	32.40	29.68	16.32	46.00
697.360	3.76	18.22	22.60	33.40	32.77	13.23	46.00
895.240	4.57	22.78	22.60	34.00	38.75	7.25	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss - PreAMP.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : General Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna Channel 6)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
MHz	Loss	Factor		Level	Level		
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

144.460	1.49	8.71	22.60	42.40	30.00	13.50	43.50
* 299.660	2.12	13.53	22.60	47.40	40.45	5.55	46.00
497.540	2.94	17.80	22.60	37.00	35.14	10.86	46.00
598.420	3.35	21.00	22.60	35.00	36.75	9.25	46.00
695.420	3.75	17.21	22.60	35.40	33.75	12.25	46.00
895.240	4.57	24.93	22.60	31.00	37.90	8.10	46.00

Vertical

* 103.720	1.32	15.97	22.60	43.00	37.69	5.81	43.50
299.660	2.12	17.53	22.60	35.00	32.05	13.95	46.00
498.510	2.94	16.94	22.60	31.80	29.08	16.92	46.00
598.420	3.35	17.92	22.60	30.60	29.27	16.73	46.00
695.420	3.75	18.19	22.60	33.80	33.14	12.86	46.00
895.240	4.57	22.78	22.60	35.00	39.75	6.25	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss - PreAMP.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : General Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 1: Secure Outdoor Etherent Radio Link W/Procell Antenna (Channel 11)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
MHz	Loss	Factor		Level	Level		
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

139.610	1.47	8.27	22.60	43.80	30.94	12.56	43.50
* 299.660	2.12	13.53	22.60	47.40	40.45	5.55	46.00
497.540	2.94	17.80	22.60	38.00	36.14	9.86	46.00
596.480	3.34	21.08	22.60	35.20	37.02	8.98	46.00
697.360	3.76	17.25	22.60	35.40	33.81	12.19	46.00
895.240	4.57	24.93	22.60	31.40	38.30	7.70	46.00

Vertical

* 104.690	1.32	15.49	22.60	42.80	37.01	6.49	43.50
164.830	1.57	21.10	22.60	35.40	35.47	8.03	43.50
299.660	2.12	17.53	22.60	35.00	32.05	13.95	46.00
497.540	2.94	16.88	22.60	32.20	29.42	16.58	46.00
695.420	3.75	18.19	22.60	33.80	33.14	12.86	46.00
895.240	4.57	22.78	22.60	34.60	39.35	6.65	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss - PreAMP.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : General Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 2: Secure Outdoor Etherent Radio Link W/ZyXEL Antenna (Channel 1)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

143.490	1.48	8.62	22.60	42.80	30.31	13.19	43.50
* 298.690	2.12	13.52	22.60	47.60	40.64	5.36	46.00
497.540	2.94	17.80	22.60	37.40	35.54	10.46	46.00
597.450	3.35	21.04	22.60	37.00	38.79	7.21	46.00
697.360	3.76	17.25	22.60	34.80	33.21	12.79	46.00
895.240	4.57	24.93	22.60	29.60	36.50	9.50	46.00

Vertical

98.870	1.30	16.77	22.60	40.60	36.07	7.43	43.50
164.830	1.57	21.10	22.60	35.20	35.27	8.23	43.50
299.660	2.12	17.53	22.60	37.20	34.25	11.75	46.00
598.420	3.35	17.92	22.60	33.40	32.07	13.93	46.00
696.390	3.75	18.20	22.60	34.20	33.56	12.44	46.00
* 895.240	4.57	22.78	22.60	35.20	39.95	6.05	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss - PreAMP.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : General Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna Channel 6)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

142.520	1.48	8.53	22.60	43.40	30.81	12.69	43.50
* 297.720	2.12	13.51	22.60	47.40	40.42	5.58	46.00
497.540	2.94	17.80	22.60	37.20	35.34	10.66	46.00
598.420	3.35	21.00	22.60	36.80	38.55	7.45	46.00
697.360	3.76	17.25	22.60	35.80	34.21	11.79	46.00
895.240	4.57	24.93	22.60	29.80	36.70	9.30	46.00

Vertical

99.840	1.30	17.11	22.60	40.40	36.21	7.29	43.50
299.660	2.12	17.53	22.60	37.60	34.65	11.35	46.00
497.540	2.94	16.88	22.60	33.40	30.62	15.38	46.00
598.420	3.35	17.92	22.60	33.40	32.07	13.93	46.00
697.360	3.76	18.22	22.60	34.40	33.77	12.23	46.00
* 895.240	4.57	22.78	22.60	35.20	39.95	6.05	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss - PreAMP.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : General Radiated Emission
 Test Site : No.1 OATS
 Test Mode : Mode 2: Secure Outdoor Etherent Radio Link W/ZyXEL Antenna (Channel 11)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

143.490	1.48	8.62	22.60	43.00	30.51	12.99	43.50
* 298.690	2.12	13.52	22.60	47.40	40.44	5.56	46.00
497.540	2.94	17.80	22.60	37.40	35.54	10.46	46.00
597.450	3.35	21.04	22.60	36.80	38.59	7.41	46.00
697.360	3.76	17.25	22.60	35.20	33.61	12.39	46.00
895.240	4.57	24.93	22.60	29.80	36.70	9.30	46.00

Vertical

98.870	1.30	16.77	22.60	40.20	35.67	7.83	43.50
299.660	2.12	17.53	22.60	38.20	35.25	10.75	46.00
497.540	2.94	16.88	22.60	33.00	30.22	15.78	46.00
598.420	3.35	17.92	22.60	32.80	31.47	14.53	46.00
697.360	3.76	18.22	22.60	34.40	33.77	12.23	46.00
* 895.240	4.57	22.78	22.60	35.00	39.75	6.25	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss - PreAMP.

5. Band Edge

5.1. Test Equipment

The following test equipment are used during the test:

RF Conducted Measurement:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
1	Spectrum Analyzer	R & S	FSP / 100561	Mar., 2004	
2	No.1 OATS			Sep., 2003	

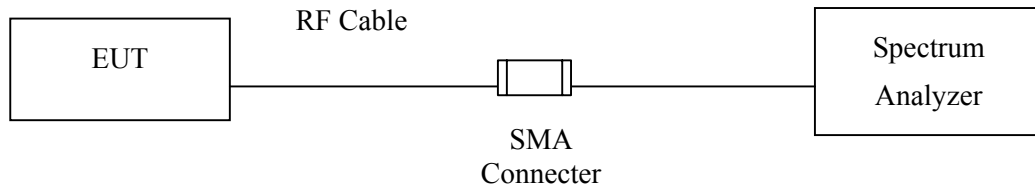
RF Radiated Measurement:

Item		Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	X	Spectrum Analyzer	R & S	FSP40 / 100005	Aug., 2003
2		Pre-Amplifier	HP	8449B / 3008A01123	Feb., 2004
3		Pre-Amplifier	HP	8447D / 2944A09276	N/A
4		Loop Antenna	R & S	HFH2-Z2 / 833799/004	Sep., 2003
5		BiconiLog Antenna	Schwarzbeck	VULB 9166 / 1061	Sep., 2003
6		Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2003
7	X	Horn Antenna	Schwarzbeck	BBHA 9120D / BBHA9120D312	Jul., 2003
8		No.1 OATS			Sep., 2003

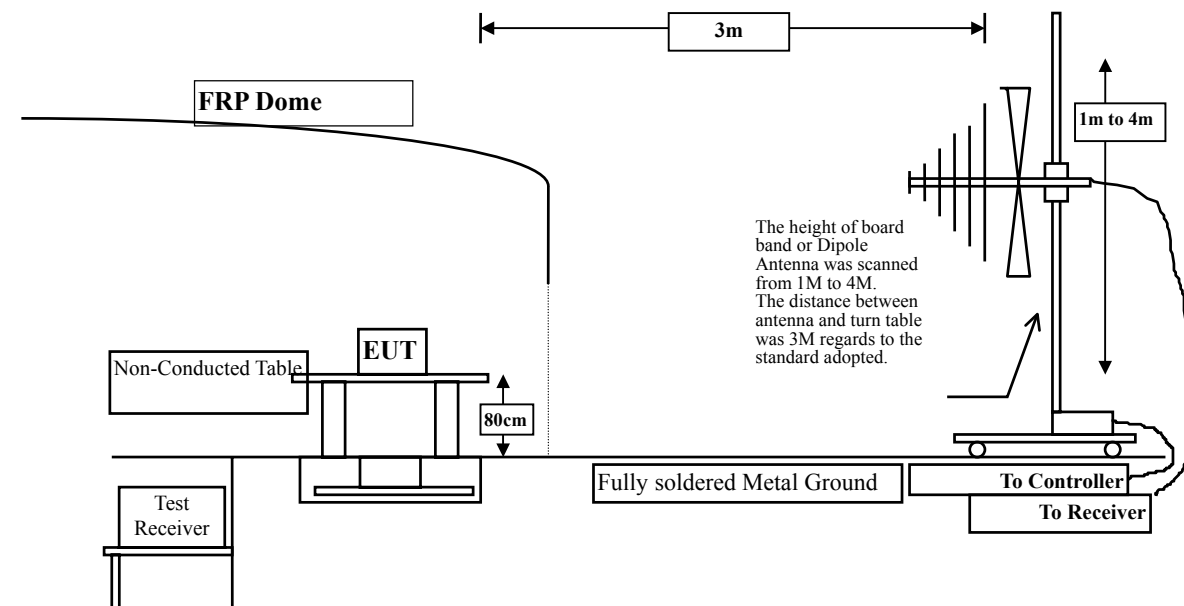
- Note:
1. All equipments that need to calibrate are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

5.2. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:2001 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30)is 120 kHz, above 1GHz are 1 MHz.

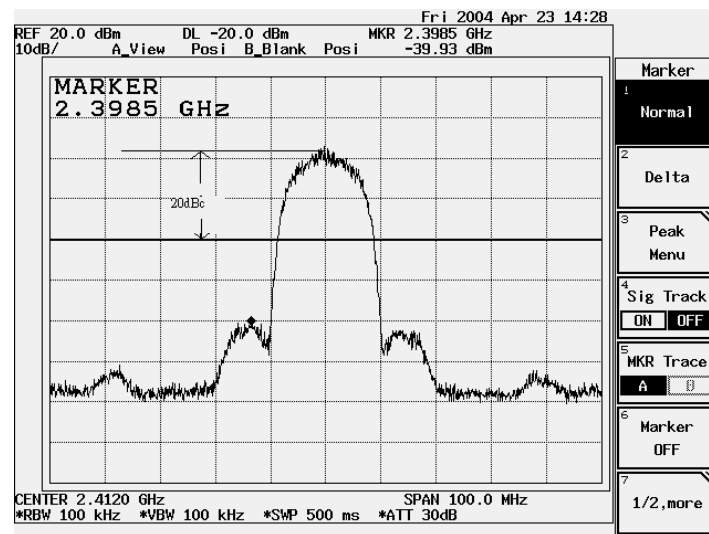
5.5. Test Result of Band Edge

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Band Edge
 Test Site : No.1 OATS
 Test Mode : Normal Operation

RF Conducted Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
1	<2400	>20	Pass

Figure Channel 1:



Product : Secure Outdoor Ethernet Radio Link
 Test Item : Band Edge
 Test Site : No.1 OATS
 Test Mode : Mode 1: Secure Outdoor Etherent Radio Link W/Procell Antenna(Channel 11)

RF Radiated Measurement: (Peak Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
11(Horizontal)	2488.800	25.21	27.58	2.91	0.00	55.70	74	Pass
11 (Vertical)	2489.200	26.38	27.58	2.91	0.00	56.87	74	Pass

Figure Channel 11:

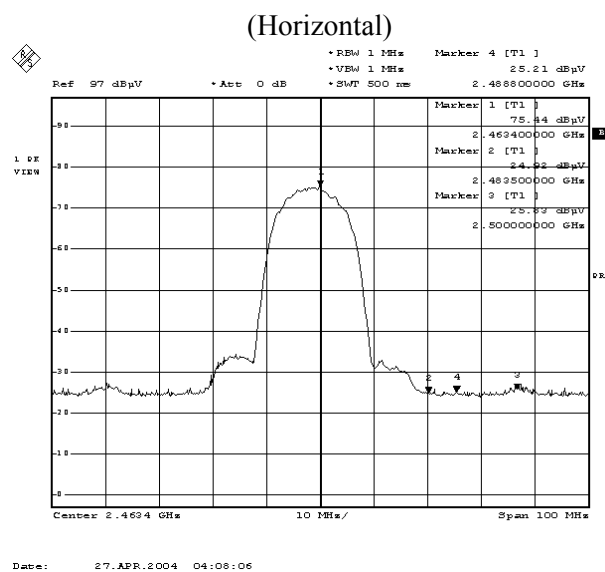
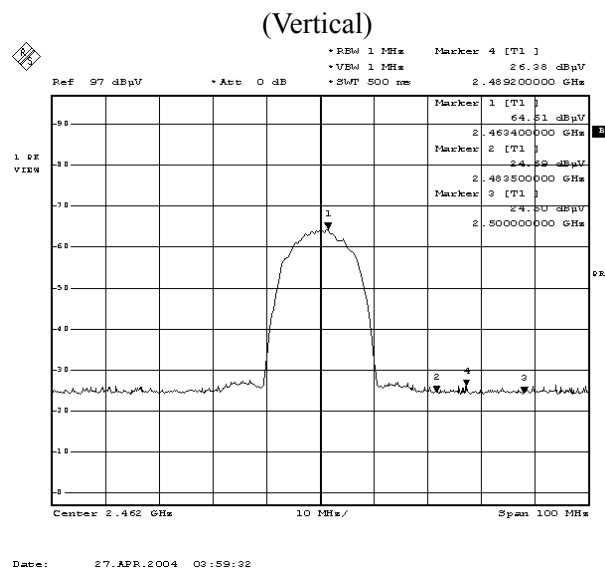


Figure Channel 11:



Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Band Edge
 Test Site : No.1 OATS
 Test Mode : Mode 1: Secure Outdoor Etherent Radio Link W/Procell Antenna (Channel 11)

RF Radiated Measurement: (Average Detector)

Channel No.	Frequency (MHz)	Reading Level (dBUV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBUV/m)	Limit (dBUV/m)	Result
11(Horizontal)	2488.800	13.28	27.58	2.91	0.00	43.77	54	Pass
11 (Vertical)	2483.500	13.15	27.58	2.91	0.00	43.64	54	Pass

Figure Channel 11:

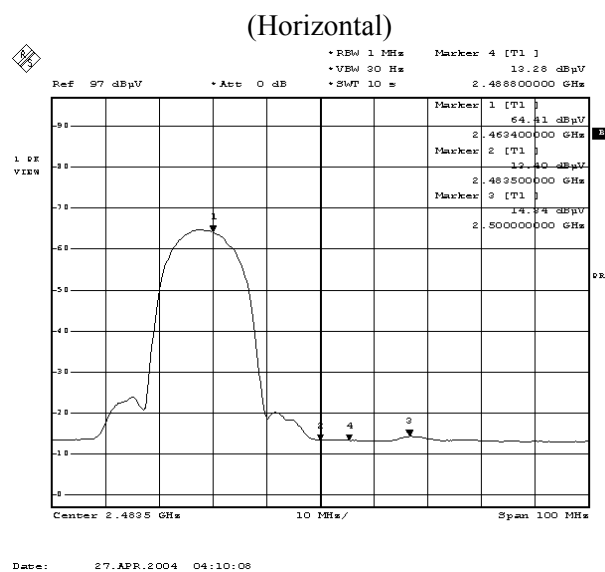
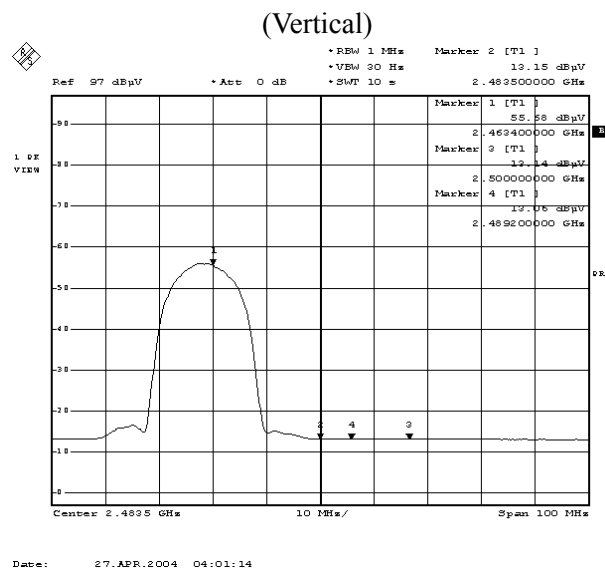


Figure Channel 11:



Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Band Edge
 Test Site : No.1 OATS
 Test Mode : Mode 2: Secure Outdoor Etherent Radio Link W/ZyXEL Antenna (Channel 11)

RF Radiated Measurement: (Peak Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
11(Horizontal)	2492.400	22.90	27.58	2.91	0.00	53.39	74	Pass
11 (Vertical)	2492.200	25.94	27.58	2.91	0.00	56.43	74	Pass

Figure Channel 11:

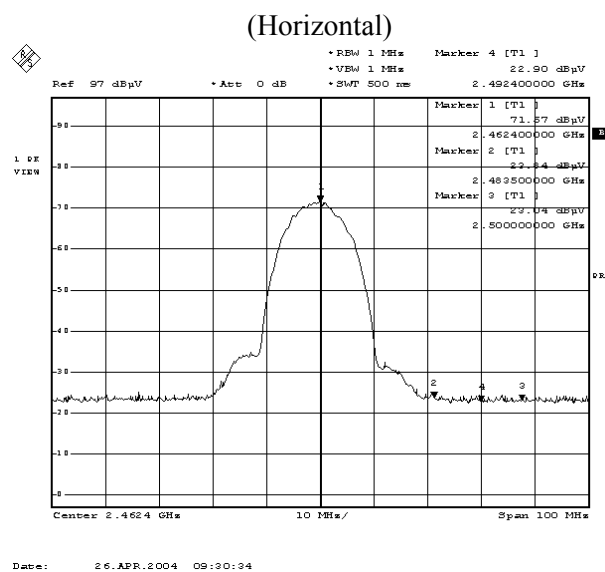
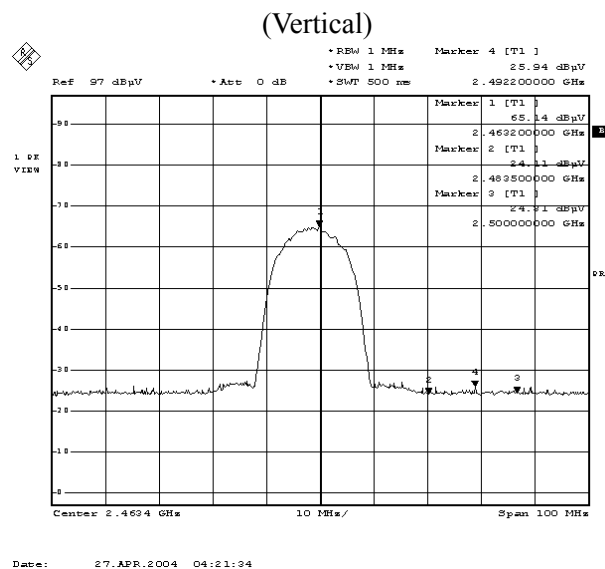


Figure Channel 11:



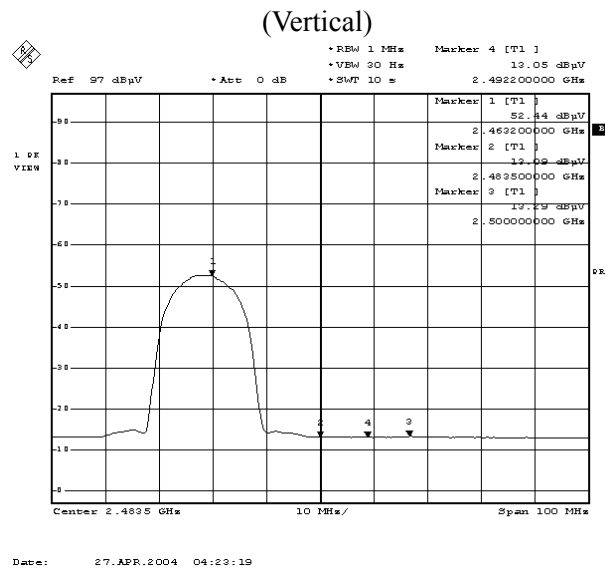
Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Secure Outdoor Ethernet Radio Link
 Test Item : Band Edge
 Test Site : No.1 OATS
 Test Mode : Mode 2: Secure Outdoor Etherent Radio Link W/ZyXEL Antenna (Channel 11)

RF Radiated Measurement: (Average Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
11 (Vertical)	2492.200	13.05	27.58	2.91	0.00	43.54	54	Pass

Figure Channel 11:



Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

6. Occupied Bandwidth

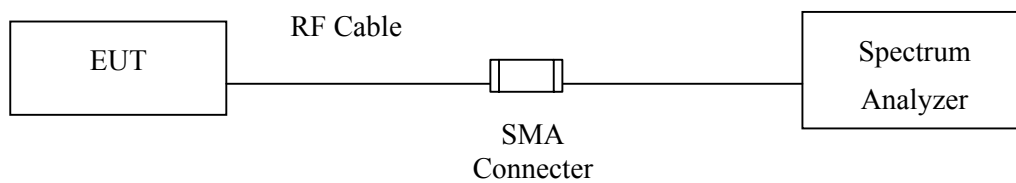
6.1. Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
1	Spectrum Analyzer	R & S	FSP / 100561	Mar., 2004	
2	No.1 OATS			Sep., 2003	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

6.2. Test Setup



6.3. Limits

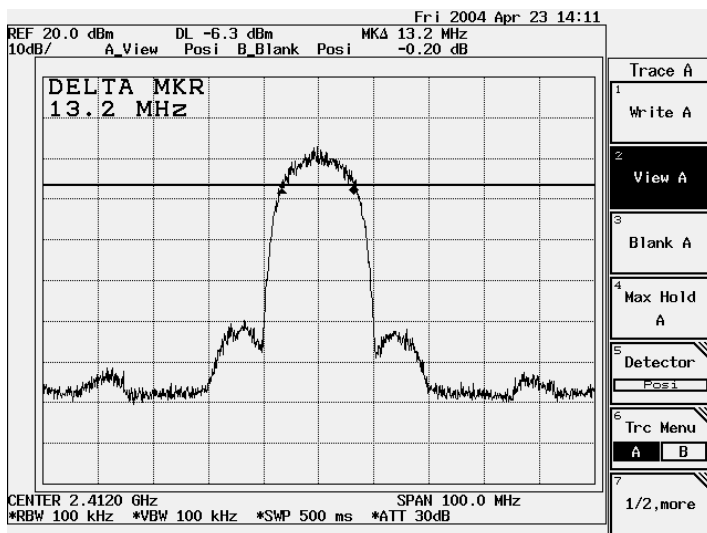
The minimum 6dB bandwidth shall be at least 500kHz.

6.4. Test Result of Occupied Bandwidth

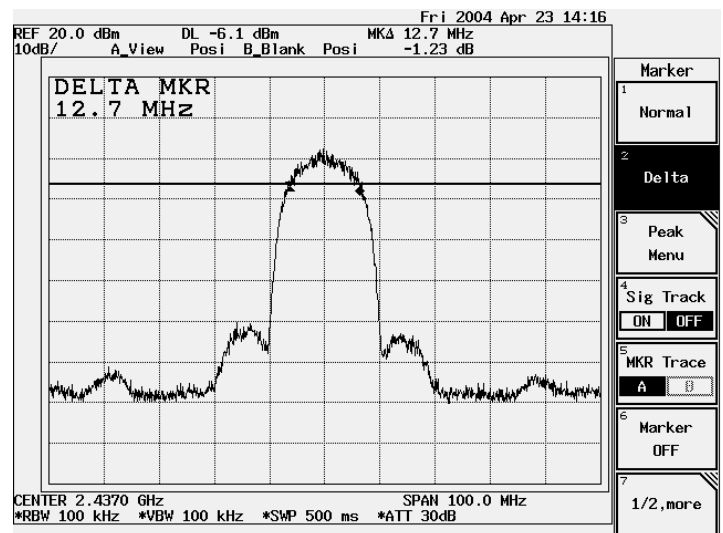
Product : Secure Outdoor Ethernet Radio Link
 Test Item : Occupied Bandwidth
 Test Site : No.1 OATS
 Test Mode : Normal Operation

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1	2412	13200	>500	Pass
6	2437	12700	>500	Pass
11	2462	12900	>500	Pass

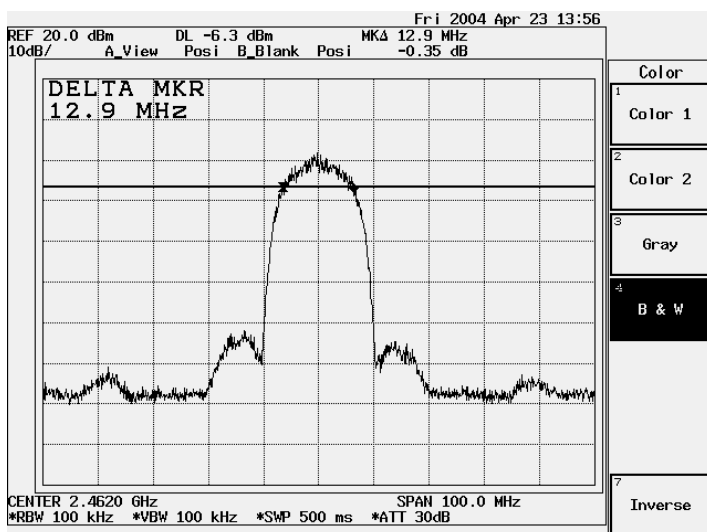
Channel 1:



Channel 6:



Channel 11:



7. Power Density

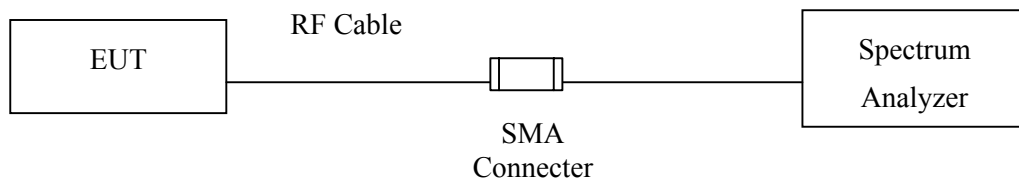
7.1. Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
1	Spectrum Analyzer	R & S	FSP / 100561	Mar., 2004	
2	No.1 OATS			Sep., 2003	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

7.2. Test Setup



7.3. Limits

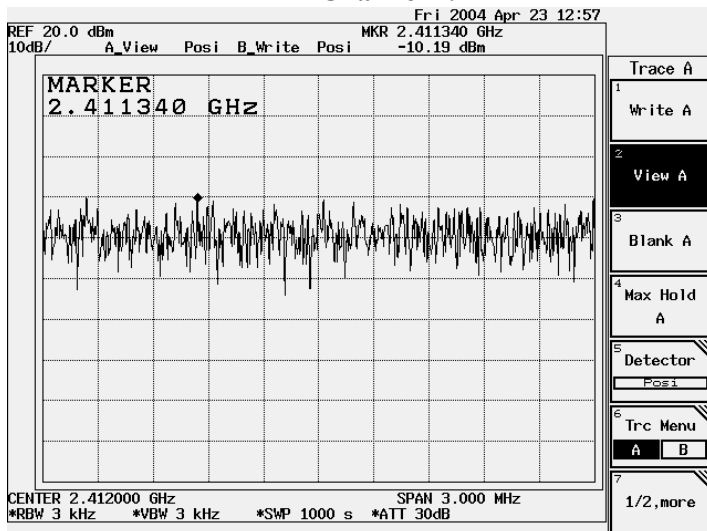
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

7.4. Test Result of Power Density

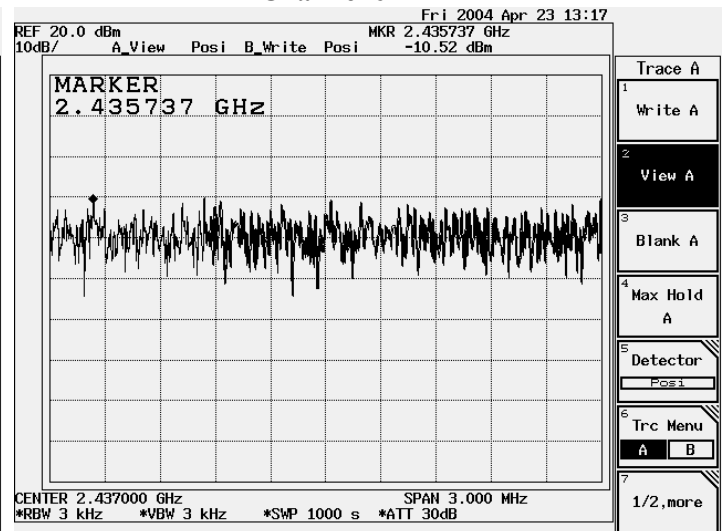
Product : Secure Outdoor Ethernet Radio Link
 Test Item : Power Density
 Test Site : No.1 OATS
 Test Mode : Normal Operation

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
1	2411.340	-10.19	< 8dBm	Pass
6	2435.737	-10.52	< 8dBm	Pass
11	2460.737	-10.98	< 8dBm	Pass

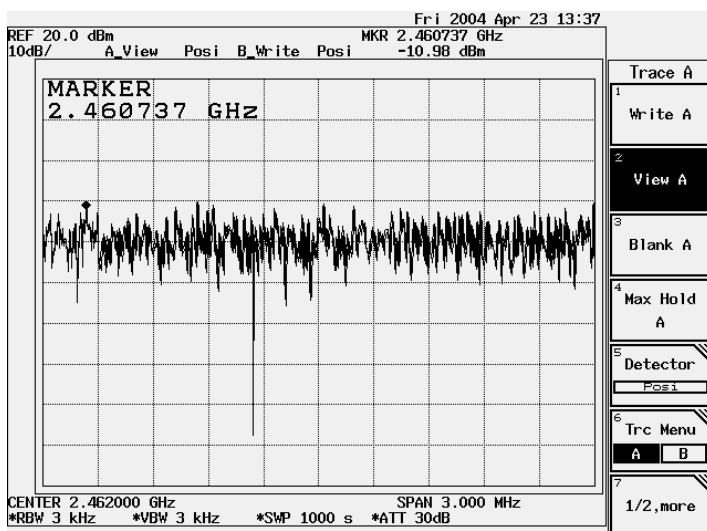
Channel 1:



Channel 6



Channel 11:



8. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 1: EUT Test Setup Photographs

Front View of Conducted Test (Mode 1)



Back View of Conducted Test (Mode 1)



Front View of Conducted Test (Mode 2)



Back View of Conducted Test (Mode 2)



Front View of Radiated Test (Mode 1)



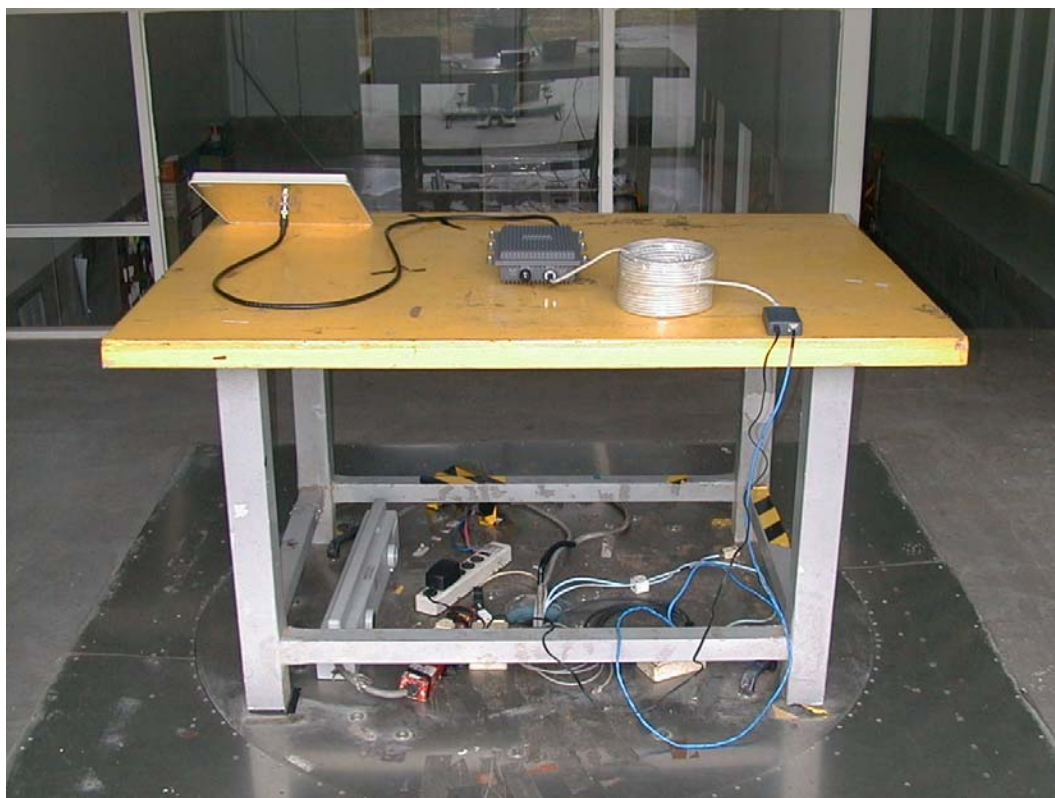
Back View of Radiated Test (Mode 1)



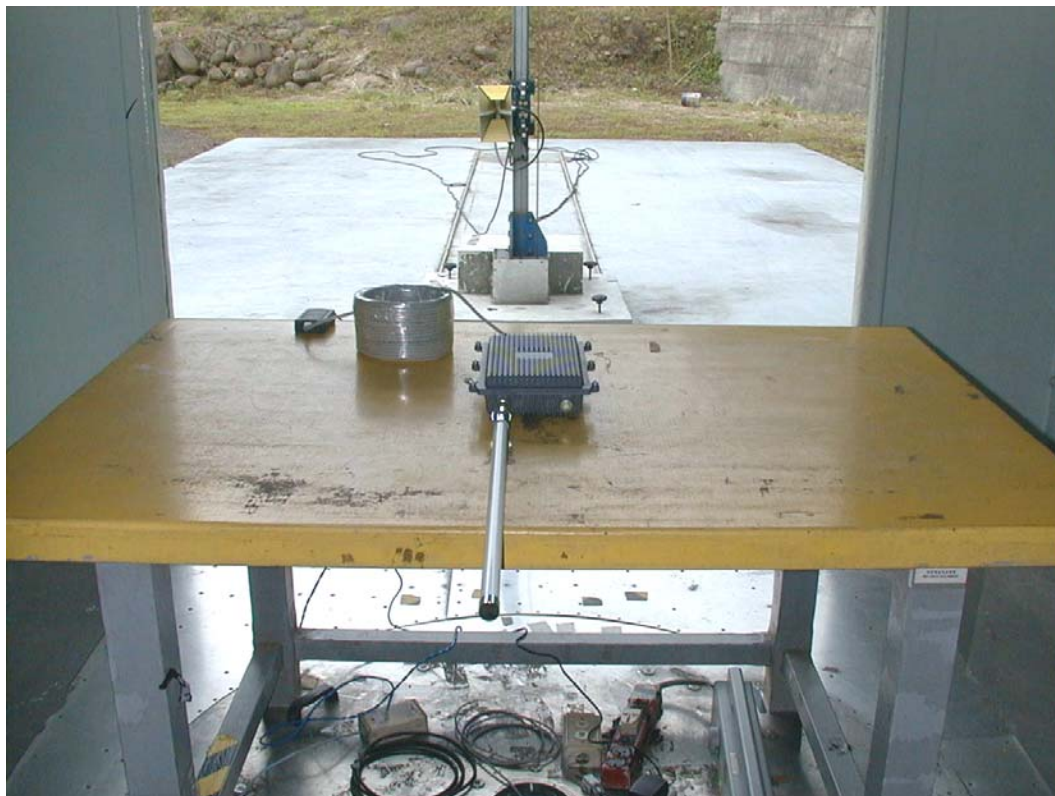
Front View of Radiated Test (Mode 2)



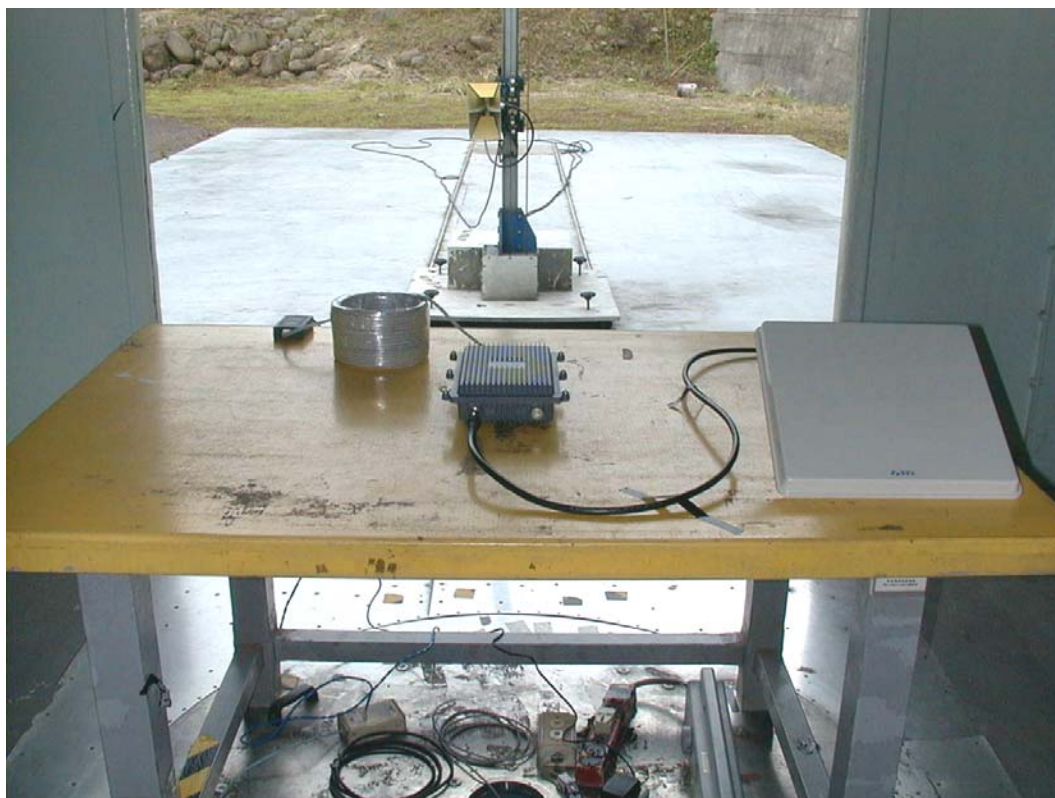
Back View of Radiated Test (Mode 2)



Front View of Radiated Test (Horn) (Mode 1)



Front View of Radiated Test (Horn) (Mode 2)



Attachment 2: EUT Detailed Photographs

Attachment 2 : EUT Detailed Photographs

Mode 1: Secure Outdoor Ethernet Radio Link W/Procell Antenna (8 dBi)

(1) EUT Photo



(2) EUT Photo



(3) EUT Photo



(4) EUT Photo



Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (16 dBi)
(5) EUT Photo



(6) EUT Photo



(7) EUT Photo



(8) EUT Photo



Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna (12 dBi)
(9) EUT Photo



(10) EUT Photo



(11) EUT Photo



(12) EUT Photo



(13) EUT Photo



(14) EUT Photo



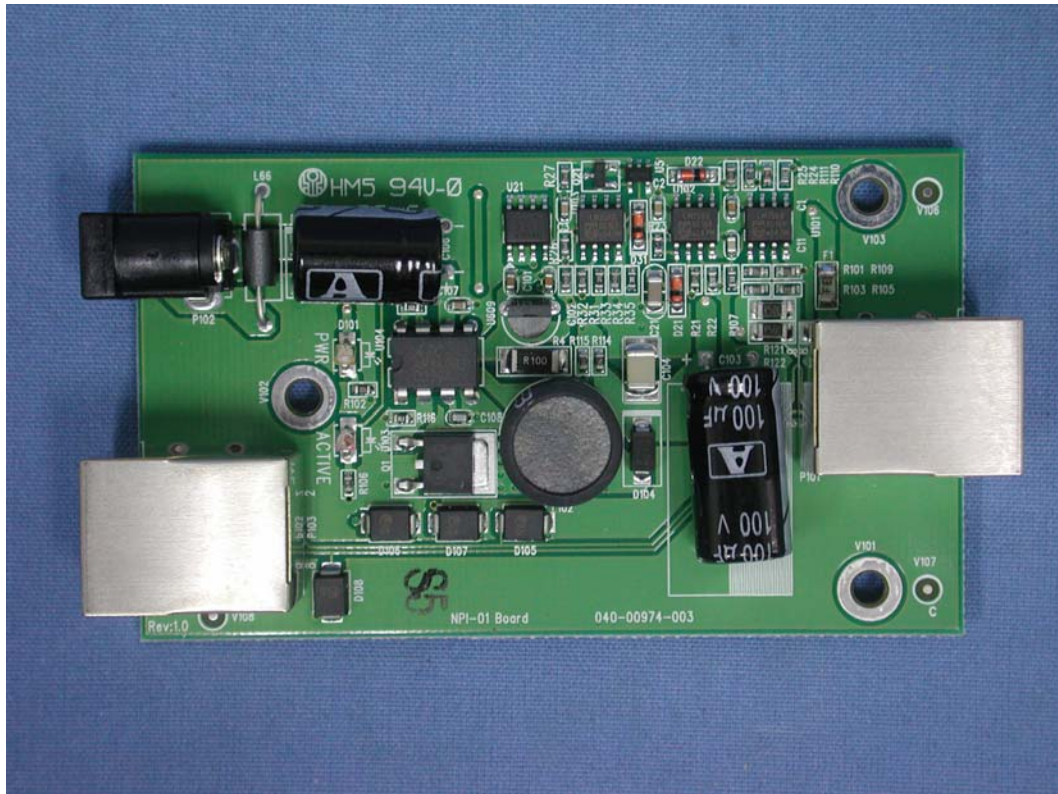
(15) EUT Photo



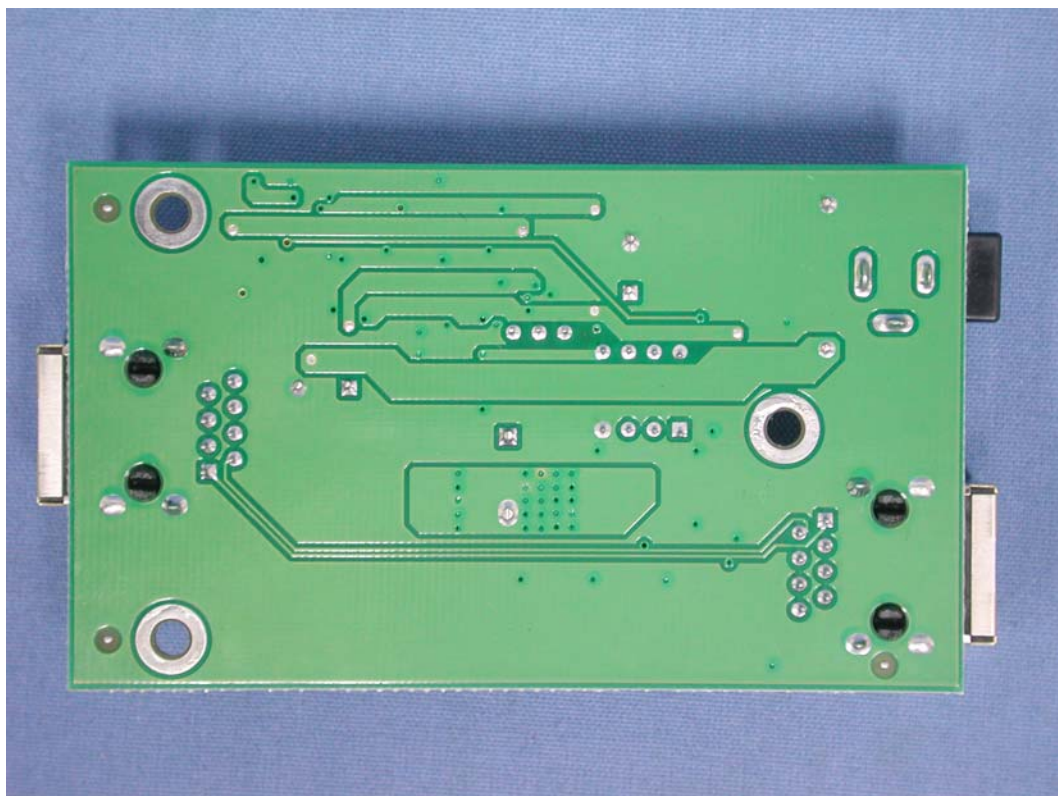
(16) EUT Photo



(17) EUT Photo



(18) EUT Photo



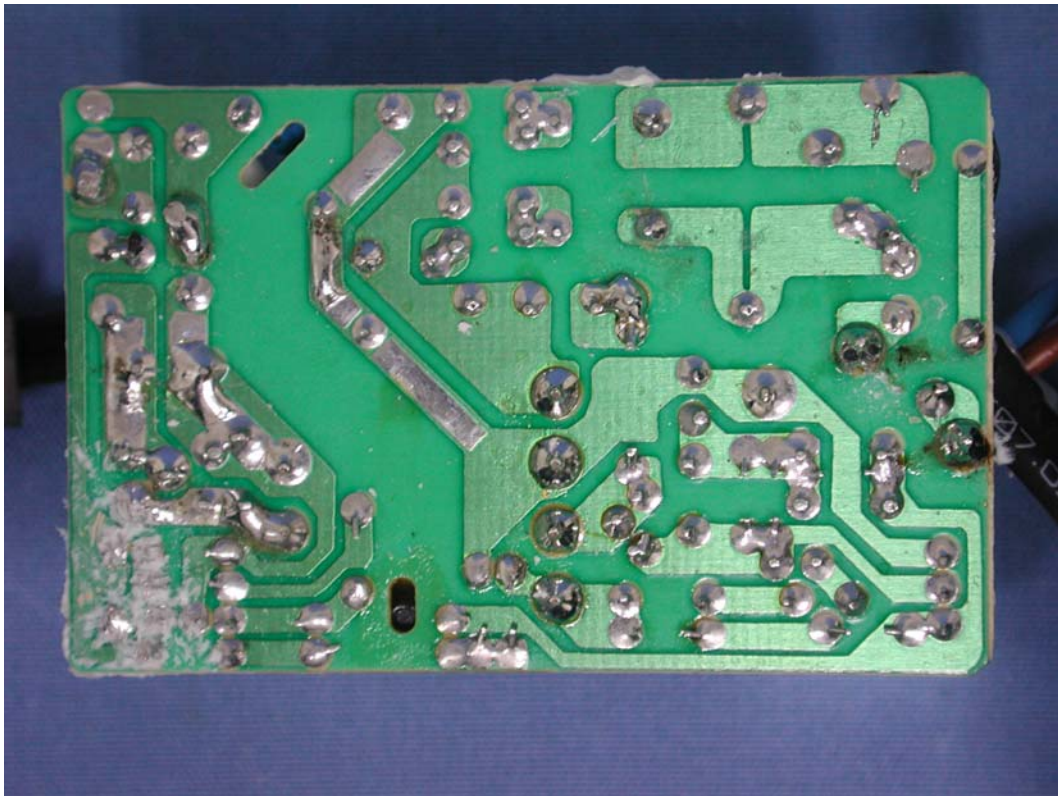
(19) EUT Photo



(20) EUT Photo



(21) EUT Photo



(22) EUT Photo



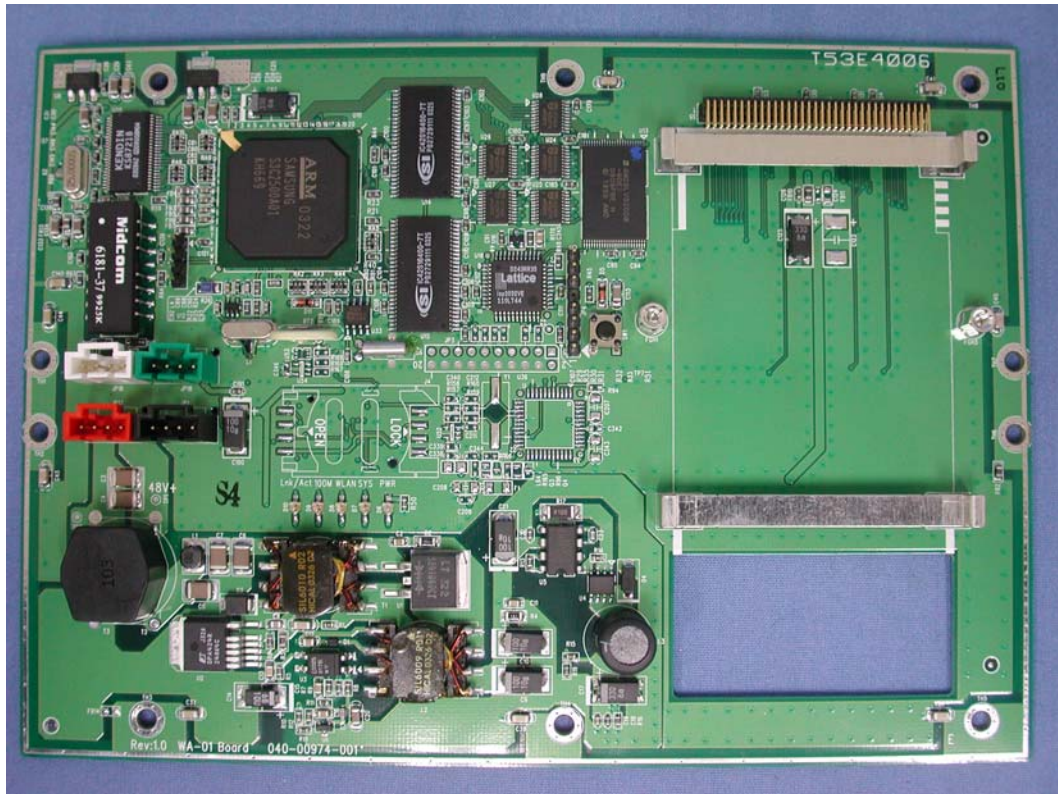
(23) EUT Photo



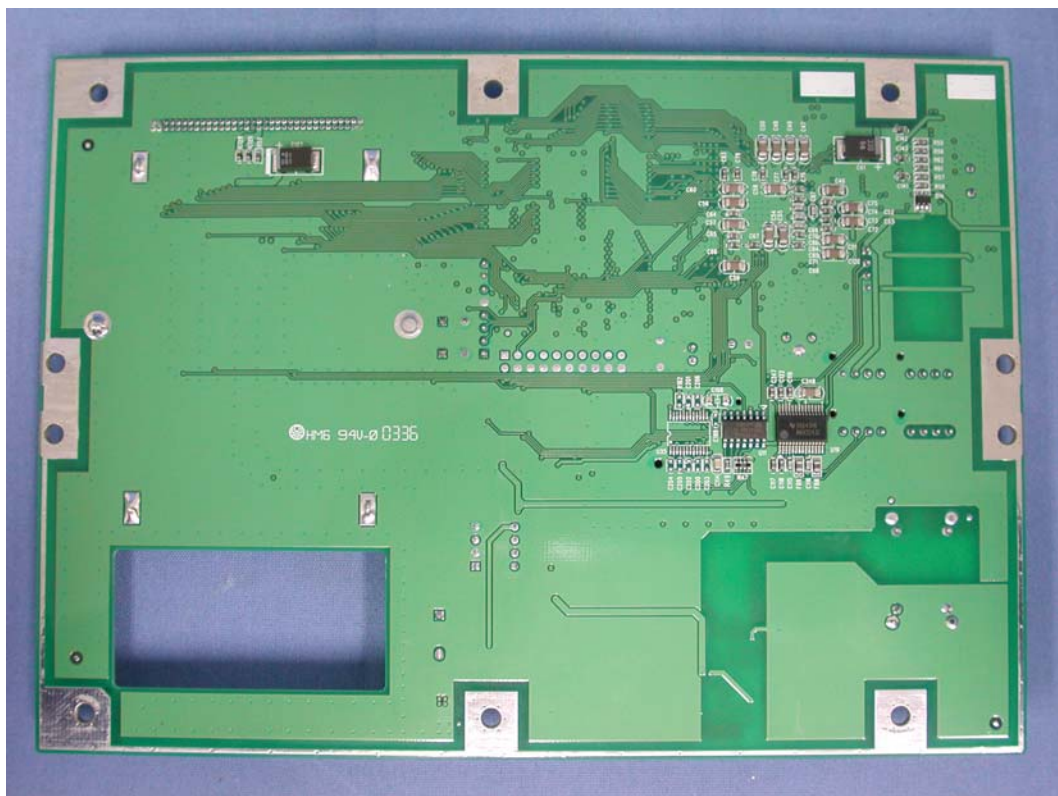
(24) EUT Photo



(25) EUT Photo



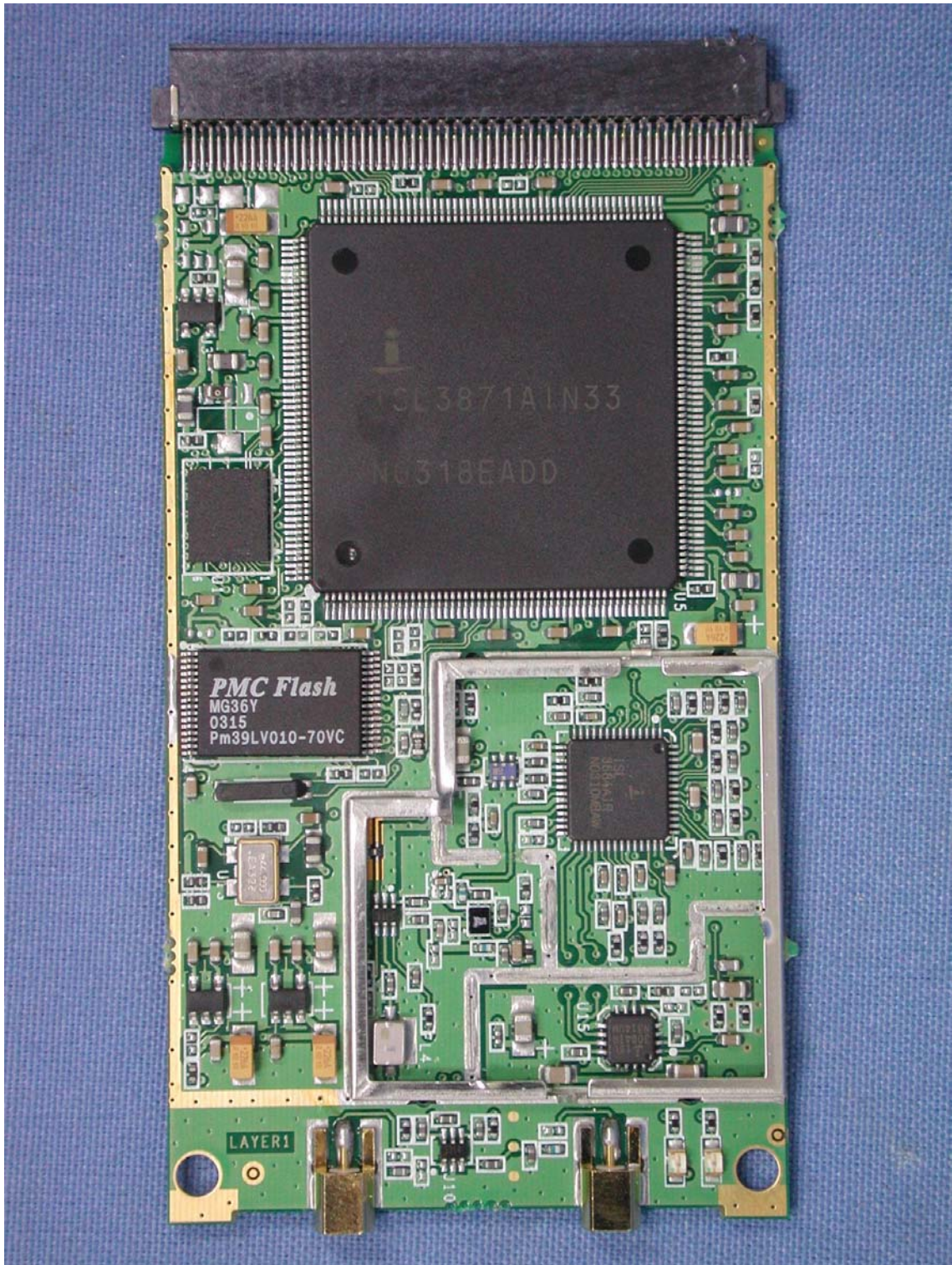
(26) EUT Photo



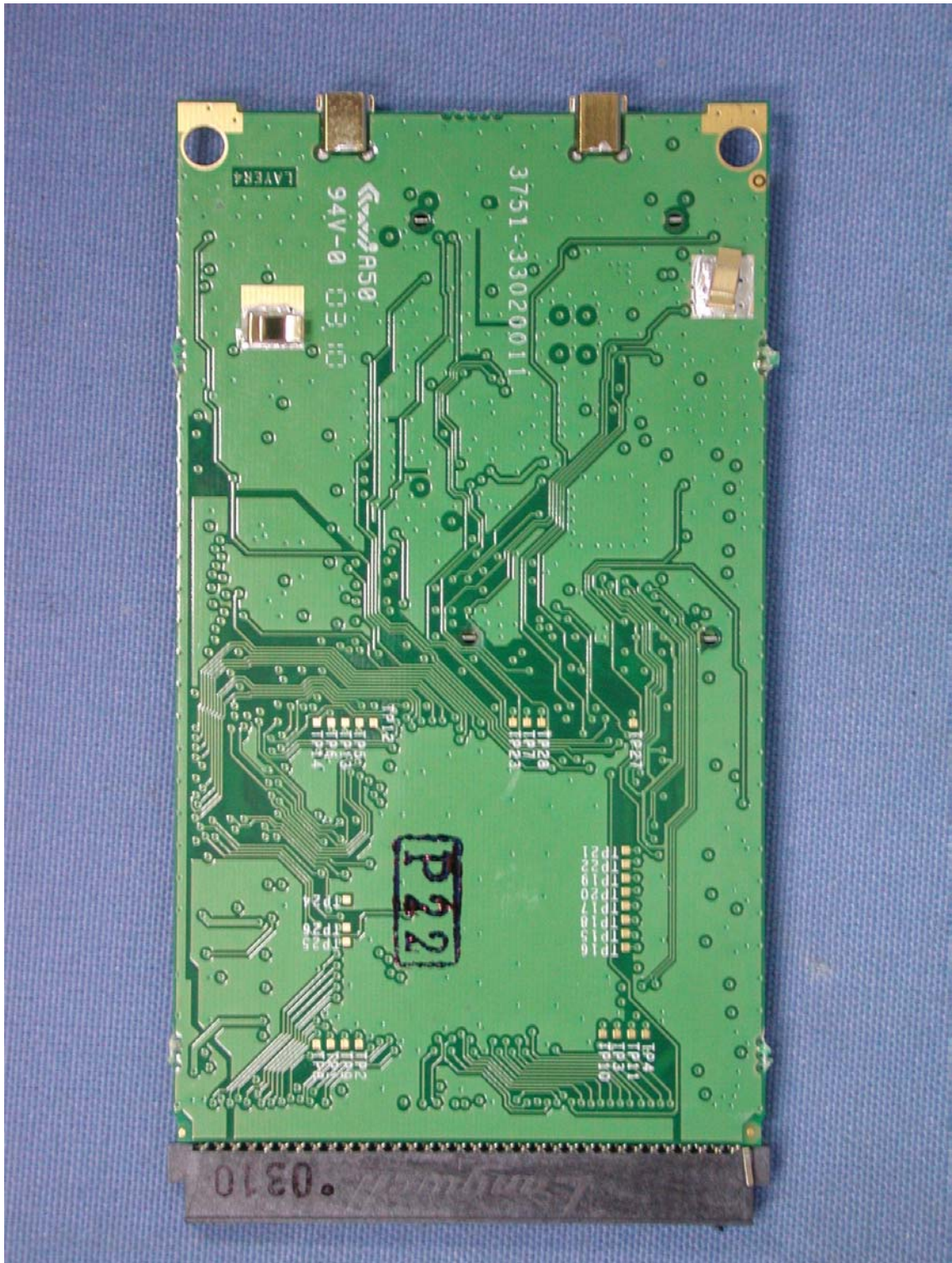
(27) EUT Photo



(28) EUT Photo



(29) EUT Photo



RF Exposure Evaluation declaration

Product Name : Secure Outdoor Ethernet Radio Link

Model No.: ExpWave 240B, GateOne 240B

FCC ID.: R3N-GATEONE240B

Applicant : ZyGATE Communications Inc.

Address : 2F No. 48, Lung-Chin Road Lung-Tan, Taoyuan, Taiwan, R.O.C.

Date of Receipt : Apr. 21, 2004

Date of Declaration : Apr. 29, 2004

Report No. : 044H050FI

The declaration results relate only to the samples calculated.

The declaration shall not be reproduced except in full without the written approval of QuieTek Corporation.

1. RF Exposure Evaluation

1.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

1.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 18°C and 78% RH.

1.3. Test Result of RF Exposure Evaluation

Product : Secure Outdoor Ethernet Radio Link
 Test Item : RF Exposure Evaluation
 Test Site : No.1 OATS
 Test Mode : Mode 1: Secure Outdoor Etherent Radio Link W/Procell Antenna

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 8.0dBi or 6.31 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
1	2412.0	24.3781	0.0306
6	2437.0	22.5944	0.0284
11	2462.0	20.7491	0.0260

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm².

Product : Secure Outdoor Ethernet Radio Link
 Test Item : RF Exposure Evaluation
 Test Site : No.1 OATS
 Test Mode : Mode 2: Secure Outdoor Ethernet Radio Link W/ZyXEL Antenna

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 16.0dBi or 39.81 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
1	2412.0	24.3781	0.1931
6	2437.0	22.5944	0.1789
11	2462.0	20.7491	0.1643

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm².