

FCC TEST REPORT

Report No. :F431601

Site : 03CH03-HY
Condition : FCC CLASS-B 3m HORN-ANT-6741 VERTICAL
EUT : Wireless Firewall
Power : 110Vac/60Hz
Model : Fortiwifi-60
Memo : 11b TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	4926.000	50.03	-23.97	74.00	56.79	33.28	2.47	42.51	Peak	100	6
2	4926.000	48.26	-5.74	54.00	55.02	33.28	2.47	42.51	Average	100	6

For 4.926GHz ~ 25GHz

Frequency from 4926MHz to 25000MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency	Antenna	Cable	Reading	Preamp	Limits	Emission	Margin	Detect	
Polarity	Factor	Loss		Factor					
(MHz)	(dB/m)	(dB)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	Mode	
2463.33	H	28.35	1.79	71.37	0.00	-	101.51	-	Peak
2463.33	H	28.35	1.79	60.16	0.00	-	90.30	-	AV
2463.33	V	28.35	1.79	75.79	0.00	-	105.93	-	Peak
2463.33	V	28.35	1.79	64.49	0.00	-	94.63	-	AV
4926.00	V	33.28	2.47	56.79	42.51	74.00	50.03	-23.97	Peak
4926.00	V	33.28	2.47	55.02	42.51	54.00	48.26	-5.74	AV
7236.000	V/H	-	-	-	-	-	-	-	AV/Peak
9648.000	V/H	-	-	-	-	-	-	-	AV/Peak
12060.000	V/H	-	-	-	-	-	-	-	AV/Peak
14472.000	V/H	-	-	-	-	-	-	-	AV/Peak
16884.000	V/H	-	-	-	-	-	-	-	AV/Peak
19296.000	V/H	-	-	-	-	-	-	-	AV/Peak
21708.000	V/H	-	-	-	-	-	-	-	AV/Peak
24120.000	V/H	-	-	-	-	-	-	-	AV/Peak

Remark:

1. The emission emitted by the EUT is too low to be measured except the emission listed above,
2. Reading = Reading on SA-Preamp Factor

Test Engineer : 

Jay

7.4.4 Test Mode: Mode 4 (11g TX CH01)

- Test Distance : 3 m
- Temperature : 23 °C
- Relative Humidity :51 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test that passed at minimum margin was marked by the frame in the following table.

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 HORIZONTAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH01 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1198.000	52.85	-21.15	74.00	67.34	24.60	1.22	40.31	Peak	127	189
2	1198.000	48.60	-5.40	54.00	63.09	24.60	1.22	40.31	Average	127	189
3	1334.000	51.57	-22.43	74.00	65.74	24.93	1.35	40.45	Peak	100	279
4	1334.000	46.86	-7.14	54.00	61.03	24.93	1.35	40.45	Average	100	279

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 HORIZONTAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
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	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2390.000	58.32	-15.68	74.00	28.40	28.20	1.72	0.00	Peak	---	---
2	2390.000	44.49	-9.51	54.00	14.57	28.20	1.72	0.00	Average	---	---
3 X	2413.440	99.48			69.49	28.25	1.74	0.00	Peak	---	---
4 X	2413.440	77.90			47.91	28.25	1.74	0.00	Average	---	---
5	2483.500	51.64	-22.36	74.00	21.46	28.39	1.79	0.00	Peak	---	---
6	2483.500	42.07	-31.93	74.00	11.89	28.39	1.79	0.00	Average	---	---

Remark: The "X" represent a fundamental frequency.

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Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 HORIZONTAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH01 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	4822.000	39.36	-34.64	74.00	46.20	33.06	2.47	42.37	Peak	100	317
2	4822.000	34.04	-19.96	54.00	40.88	33.06	2.47	42.37	Average	100	317

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 VERTICAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH01 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1198.000	53.44	-20.56	74.00	67.93	24.60	1.22	40.31	Peak	200	202
2	1198.000	49.13	-4.87	54.00	63.62	24.60	1.22	40.31	Average	200	202
3	1468.000	52.39	-21.61	74.00	66.25	25.26	1.46	40.58	Peak	145	222
4	1468.000	48.18	-5.82	54.00	62.04	25.26	1.46	40.58	Average	145	222
5	2374.000	51.18	-22.82	74.00	62.43	28.17	1.71	41.13	Peak	100	141
6	2374.000	40.93	-13.07	54.00	52.18	28.17	1.71	41.13	Average	100	141

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 VERTICAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH01 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2389.990	65.03	-8.97	74.00	35.11	28.20	1.72	0.00	Peak	---	---
2	2389.990	50.25	-3.75	54.00	20.33	28.20	1.72	0.00	Average	---	---
3	2413.740	106.82			76.83	28.25	1.74	0.00	Peak	---	---
4	2413.740	84.85			54.86	28.25	1.74	0.00	Average	---	---
5	2488.980	53.27	-20.73	74.00	23.08	28.40	1.79	0.00	Peak	---	---
6	2488.980	44.30	-9.70	54.00	14.11	28.40	1.79	0.00	Average	---	---

Remark: The "X" represent a fundamental frequency.

SPORTON International Inc.

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FCC ID : RZW-FortiWiFi-60

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Site : 03CH03-HY
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Model : Fortiwifi-60
Memo : 11g TX CH01 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	4822.000	44.56	-29.44	74.00	51.40	33.06	2.47	42.37	Peak	137	25
2	4822.000	44.88	-9.12	54.00	51.72	33.06	2.47	42.37	Average	137	25

For 4.822GHz ~ 25GHz

Frequency from 4822MHz to 25000MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency	Antenna	Cable	Reading	Preamp	Limits	Emission	Margin	Detect	
Polarity	Factor	Loss		Factor					
(MHz)	(dB/m)	(dB)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	Mode	
2413.74	H	28.25	1.74	69.49	0.00	-	99.48	-	Peak
2413.74	H	28.25	1.74	47.91	0.00	-	77.90	-	Av
2413.74	V	28.25	1.74	76.83	0.00	-	106.82	-	Peak
2413.74	V	28.25	1.74	54.86	0.00	-	84.85	-	Av
4822.00	H	33.06	2.47	46.20	42.37	74.00	39.36	-34.64	Peak
4822.00	H	33.06	2.47	40.88	42.37	54.00	34.04	-19.96	AV
4822.00	V	33.06	2.47	51.40	42.37	74.00	44.56	-29.44	Peak
4822.00	V	33.06	2.47	51.72	42.37	54.00	44.88	-9.12	AV
7236.000	V/H	-	-	-	-	-	-	-	AV/Peak
9648.000	V/H	-	-	-	-	-	-	-	AV/Peak
12060.000	V/H	-	-	-	-	-	-	-	AV/Peak
14472.000	V/H	-	-	-	-	-	-	-	AV/Peak
16884.000	V/H	-	-	-	-	-	-	-	AV/Peak
19296.000	V/H	-	-	-	-	-	-	-	AV/Peak
21708.000	V/H	-	-	-	-	-	-	-	AV/Peak
24120.000	V/H	-	-	-	-	-	-	-	AV/Peak

Remark:

1. The emission emitted by the EUT is too low to be measured except the emission listed above,
2. Reading = Reading on SA-Preamp Factor

Test Engineer : 

Jay

7.4.5 Test Mode: Mode 5 (11g TX CH06)

- Test Distance : 3 m
- Temperature : 23 °C
- Relative Humidity :51 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test that passed at minimum margin was marked by the frame in the following table.

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 HORIZONTAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH06 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1198.000	52.37	-21.63	74.00	66.86	24.60	1.22	40.31	Peak	128	189
2	1198.000	48.60	-5.40	54.00	63.09	24.60	1.22	40.31	Average	128	189
3	1334.000	51.24	-22.76	74.00	65.41	24.93	1.35	40.45	Peak	100	74
4	1334.000	49.39	-4.61	54.00	63.56	24.93	1.35	40.45	Average	100	74

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 HORIZONTAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH06 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2321.780	52.96	-21.04	74.00	23.17	28.06	1.73	0.00	Peak	---	---
2	2321.780	41.38	-12.62	54.00	11.59	28.06	1.73	0.00	Average	---	---
3	X 2431.410	98.85			68.80	28.29	1.76	0.00	Peak	---	---
4	X 2431.410	76.54			46.49	28.29	1.76	0.00	Average	---	---
5	2498.290	53.55	-20.45	74.00	23.36	28.40	1.79	0.00	Peak	---	---
6	2498.290	41.94	-12.06	54.00	11.75	28.40	1.79	0.00	Average	---	---

Remark: The "X" represent a fundamental frequency.

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 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH06 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	3876.000	43.28	-30.72	74.00	50.67	32.29	1.78	41.46	Peak	200	147
2	3876.000	37.74	-16.26	54.00	45.13	32.29	1.78	41.46	Average	200	147

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 VERTICAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH06 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1198.000	54.30	-19.70	74.00	68.79	24.60	1.22	40.31	Peak	200	197
2 !	1198.000	49.99	-4.01	54.00	64.48	24.60	1.22	40.31	Average	200	197
3	1468.000	53.60	-20.40	74.00	67.46	25.26	1.46	40.58	Peak	143	223
4 !	1468.000	49.04	-4.96	54.00	62.90	25.26	1.46	40.58	Average	143	223
5	2340.000	52.23	-21.77	74.00	63.55	28.10	1.69	41.11	Peak	100	0
6	2340.000	33.14	-20.86	54.00	44.46	28.10	1.69	41.11	Average	100	0

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 VERTICAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH06 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2367.570	53.10	-20.90	74.00	23.24	28.16	1.70	0.00	Peak	---	---
2	2367.570	43.15	-10.85	54.00	13.29	28.16	1.70	0.00	Average	---	---
3 X	2438.820	105.15			75.08	28.30	1.77	0.00	Peak	---	---
4 X	2438.820	83.26			53.19	28.30	1.77	0.00	Average	---	---
5	2483.850	52.66	-21.34	74.00	22.48	28.39	1.79	0.00	Peak	---	---
6	2483.850	43.95	-10.05	54.00	13.77	28.39	1.79	0.00	Average	---	---

Remark: The "X" represent a fundamental frequency.

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 VERTICAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH06 2437MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	3876.000	43.92	-30.08	74.00	51.31	32.29	1.78	41.46	Peak	200	83
2	3876.000	39.00	-15.00	54.00	46.39	32.29	1.78	41.46	Average	200	83

For 3.876GHz ~ 25GHz

Frequency from 3876MHz to 25000MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency	Antenna	Cable	Reading	Preamp	Limits	Emission	Margin	Detect
Polarity	Factor	Loss		Factor				
(MHz)	(dB/m)	(dB)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	Mode
2431.41	H	28.29	1.76	68.80	0.00	-	98.85	- Peak
2431.41	H	28.29	1.76	46.49	0.00	-	76.54	- Av
2438.82	V	28.3	1.77	75.08	0.00	-	105.15	- Peak
2438.82	V	28.3	1.77	53.19	0.00	-	83.26	- Av
3876.00	H	32.29	1.78	50.67	41.46	74.00	43.28	-30.72 Peak
3876.00	H	32.29	1.78	45.13	41.46	54.00	37.74	-16.26 AV
3876.00	V	32.29	1.78	51.31	41.46	74.00	43.92	-30.08 Peak
3876.00	V	32.29	1.78	46.39	41.46	54.00	39.00	-15.00 AV
7236.000	V/H	-	-	-	-	-	-	- AV/Peak
9648.000	V/H	-	-	-	-	-	-	- AV/Peak
12060.000	V/H	-	-	-	-	-	-	- AV/Peak
14472.000	V/H	-	-	-	-	-	-	- AV/Peak
16884.000	V/H	-	-	-	-	-	-	- AV/Peak
19296.000	V/H	-	-	-	-	-	-	- AV/Peak
21708.000	V/H	-	-	-	-	-	-	- AV/Peak
24120.000	V/H	-	-	-	-	-	-	- AV/Peak

Remark:

1. The emission emitted by the EUT is too low to be measured except the emission listed above,
2. Reading = Reading on SA-Preamp Factor

Test Engineer : 
Jay

7.4.6 Test Mode: Mode 6 (11g TX CH11)

- Test Distance : 3 m
- Temperature : 23°C
- Relative Humidity :51 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test that passed at minimum margin was marked by the frame in the following table.

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m BIC-9124--301 HORIZONTAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	71.990	29.68	-10.32	40.00	47.21	8.99	1.43	27.95	Peak	---	---
2	99.870	27.91	-15.59	43.50	44.25	9.78	1.78	27.90	Peak	---	---
3	167.020	31.97	-11.53	43.50	44.31	13.09	2.34	27.77	Peak	---	---

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m LOG-9111-221 HORIZONTAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	900.000	40.28	-5.72	46.00	42.16	21.08	5.34	28.30	Peak	---	---
2 !	912.800	41.30	-4.70	46.00	42.93	21.27	5.39	28.29	Peak	121	52
3	960.800	40.83	-13.17	54.00	41.48	21.92	5.67	28.24	Peak	---	---

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	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1198.000	55.64	-18.36	74.00	70.13	24.60	1.22	40.31	Peak	144	220
2	1198.000	46.08	-7.92	54.00	60.57	24.60	1.22	40.31	Average	144	220
3	1334.000	50.66	-23.34	74.00	64.83	24.93	1.35	40.45	Peak	---	---
4	1334.000	47.35	-6.65	54.00	61.52	24.93	1.35	40.45	Average	---	---

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	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2344.580	53.02	-20.98	74.00	23.23	28.11	1.68	0.00	Peak	---	---
2	2344.580	41.09	-12.91	54.00	11.30	28.11	1.68	0.00	Average	---	---
3 X	2463.900	100.27			70.13	28.35	1.79	0.00	Peak	---	---
4 X	2463.900	78.76			48.62	28.35	1.79	0.00	Average	---	---
5	2488.220	62.65	-11.35	74.00	32.46	28.40	1.79	0.00	Peak	---	---
6	2488.220	42.13	-11.87	54.00	11.94	28.40	1.79	0.00	Average	---	---

Remark: The "X" represent a fundamental frequency.

Site : 03CH03-HY
 Condition : FCC CLASS-B 3m HORN-ANT-6741 HORIZONTAL
 EUT : Wireless Firewall
 Power : 110Vac/60Hz
 Model : Fortiwifi-60
 Memo : 11g TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	4924.000	42.85	-31.15	74.00	49.62	33.27	2.47	42.51	Peak	200	54
2	4924.000	38.22	-15.78	54.00	44.99	33.27	2.47	42.51	Average	200	54

FCC TEST REPORT

Report No. :F431601

Site : 03CH03-HY
Condition : FCC CLASS-B 3m BIC-9124--301 VERTICAL
EUT : Wireless Firewall
Power : 110Vac/60Hz
Model : Fortiwifi-60
Memo : 11g TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	33.060	25.08	-14.92	40.00	38.69	13.44	0.99	28.04	Peak	---	---
2	73.180	32.78	-7.22	40.00	50.26	9.03	1.44	27.95	Peak	---	---
3	133.190	24.22	-19.28	43.50	38.53	11.49	2.03	27.83	Peak	---	---

Site : 03CH03-HY
Condition : FCC CLASS-B 3m LOG-9111-221 VERTICAL
EUT : Wireless Firewall
Power : 110Vac/60Hz
Model : Fortiwifi-60
Memo : 11g TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	374.400	39.68	-6.32	46.00	48.62	15.35	3.38	27.67	Peak	---	---
2 !	668.000	41.39	-4.61	46.00	46.33	19.15	4.64	28.73	Peak	125	130
3 !	875.200	40.27	-5.73	46.00	42.45	20.97	5.27	28.42	Peak	---	---

Site : 03CH03-HY
Condition : FCC CLASS-B 3m HORN-ANT-6741 VERTICAL
EUT : Wireless Firewall
Power : 110Vac/60Hz
Model : Fortiwifi-60
Memo : 11g TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1198.000	51.74	-22.26	74.00	66.23	24.60	1.22	40.31	Peak	---	---
2 !	1198.000	48.62	-5.38	54.00	63.11	24.60	1.22	40.31	Average	---	---
3 !	1404.000	51.38	-2.62	54.00	65.36	25.10	1.44	40.52	Average	100	13
4	1404.000	53.10	-20.90	74.00	67.08	25.10	1.44	40.52	Peak	100	13
5	1468.000	52.61	-21.39	74.00	66.47	25.26	1.46	40.58	Peak	---	---
6 !	1468.000	49.73	-4.27	54.00	63.59	25.26	1.46	40.58	Average	---	---
7	1534.000	51.49	-22.51	74.00	65.16	25.50	1.46	40.63	Peak	---	---
8 !	1534.000	48.62	-5.38	54.00	62.29	25.50	1.46	40.63	Average	---	---

SPORTON International Inc.

TEL : 886-2-2696-2468

FAX : 886-2-2696-2255

FCC ID : RZW-FortiWiFi-60

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Issued Date : Apr. 14, 2004

FCC TEST REPORT

Report No. :F431601

Site : 03CH03-HY
Condition : FCC CLASS-B 3m HORN-ANT-6741 VERTICAL
EUT : Wireless Firewall
Power : 110Vac/60Hz
Model : Fortiwifi-60
Memo : 11g TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2324.250	55.41	-18.59	74.00	25.62	28.07	1.72	0.00	Peak	---	---
2	2324.250	42.86	-11.14	54.00	13.07	28.07	1.72	0.00	Average	---	---
3 X	2463.900	107.45			77.31	28.35	1.79	0.00	Peak	---	---
4 X	2463.900	85.31			55.17	28.35	1.79	0.00	Average	---	---
5 !	2487.650	68.90	-5.10	74.00	38.71	28.40	1.79	0.00	Peak	---	---
6	2487.650	44.59	-9.41	54.00	14.40	28.40	1.79	0.00	Average	---	---

Remark: The "X" represent a fundamental frequency.

Site : 03CH03-HY
Condition : FCC CLASS-B 3m HORN-ANT-6741 VERTICAL
EUT : Wireless Firewall
Power : 110Vac/60Hz
Model : Fortiwifi-60
Memo : 11g TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	4924.000	47.93	-26.07	74.00	54.70	33.27	2.47	42.51	Peak	137	355
2	4924.000	45.00	-9.00	54.00	51.77	33.27	2.47	42.51	Average	137	355

For 4.924GHz ~ 25GHz

Frequency from 4924MHz to 25000MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency	Antenna	Cable	Reading	Preamp	Limits	Emission	Margin	Detect	
Polarity	Factor	Loss		Factor					
(MHz)	(dB/m)	(dB)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	Mode	
2463.90	H	28.35	1.79	70.13	0.00	-	100.27	-	Peak
2463.90	H	28.35	1.79	48.62	0.00	-	78.76	-	Av
2463.90	V	28.35	1.79	77.31	0.00	-	107.45	-	Peak
2463.90	V	28.35	1.79	55.17	0.00	-	85.31	-	Av
4924.00	H	33.27	2.47	49.62	42.51	74.00	42.85	-31.15	Peak
4924.00	H	33.27	2.47	44.99	42.51	54.00	38.22	-15.78	AV
4924.00	V	33.27	2.47	54.70	42.51	74.00	47.93	-26.07	Peak
4924.00	V	33.27	2.47	51.77	42.51	54.00	45.00	-9.00	AV
7236.000	V/H	-	-	-	-	-	-	-	AV/Peak
9648.000	V/H	-	-	-	-	-	-	-	AV/Peak
12060.000	V/H	-	-	-	-	-	-	-	AV/Peak
14472.000	V/H	-	-	-	-	-	-	-	AV/Peak
16884.000	V/H	-	-	-	-	-	-	-	AV/Peak
19296.000	V/H	-	-	-	-	-	-	-	AV/Peak
21708.000	V/H	-	-	-	-	-	-	-	AV/Peak
24120.000	V/H	-	-	-	-	-	-	-	AV/Peak

Remark:

1. The emission emitted by the EUT is too low to be measured except the emission listed above,
2. Reading = Reading on SA-Preamp Factor

Test Engineer : 

Jay

8. Antenna Requirements

The EUT use a 5dBi dipole antenna with reverse SMA connector. It is considered to meet antenna requirement of FCC.

8.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no other antenna except assembled by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

8.2. Antenna Connected Construction

The antenna used in this product is a dipole antenna with reverse SMA connector.

9. RF Exposure

FCC Rules and Regulations Part 1.1307,1.1310,2.1091,2.1093:

RF Exposure Compliance

9.1. Limit For Maximum Permissible Exposure (MPE)

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

F=frequency in MHz

*Plane-wave equivalent power density

9.2. MPE Calculations

Power Density =Pd (mW/cm²) = EIRP/4 π d²

EIRP = P · G

P=Peak output power (mW)

G=Antenna numeric gain (numeric)

d=Separation distance (cm)

Because the EUT belongs to General Population/ Uncontrolled Exposure, the limit of power density is 1.0 mW/cm².

Channel NO.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Calculated RF Exposure at d=20cm (mW/cm ²)	Limit (mW/cm ²)
Channel 01	5.00	3.16	16.05	40.27	0.03	1.00
Channel 06	5.00	3.16	17.40	54.95	0.03	1.00
Channel 11	5.00	3.16	17.56	57.02	0.04	1.00

➤ The worst case of MPE is 802.11b mode.

9.3. FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm during normal operation.

10. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100132	9 KHz – 2.75 GHz	Jun. 12, 2003	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001-008	9 KHz – 30 MHz	Apr. 30, 2003	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001-009	9 KHz – 30 MHz	Apr. 30, 2003	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450 Hz	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 ~ 60 Hz	N/A	Conduction (CO01-HY)
RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9KHz~30MHz	Dec. 24, 2003	Conduction (CO01-HY)
50 ohm BNC type Terminal	NOBLE	50ohm	TM013	50 ohm	Apr. 24, 2003	Conduction (CO01-HY)

※ Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2003	Radiation (03CH03-HY)
Spectrum analyzer	R&S	FSP40	100004	9KHZ~40GHz	Aug. 23, 2003	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 05, 2003	Radiation (03CH03-HY)
Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz –200MHz	Jul. 24, 2003	Radiation (03CH03-HY)
Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz -1GHz	Jul. 24, 2003	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Dec. 03, 2003	Radiation (03CH03-HY)
Amplifier	MITEQ	AFS44	879981	100MHz~26.5GHz	Jul. 23, 2003	Radiation (03CH03-HY)
Horn Antenna	COM-POWER	3115	6741	1GHz – 18GHz	Apr. 08, 2004	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Horn Antenna	Schwarzbeck	BBHA9170	154	15GHz~40GHz	Jun. 02, 2003	Radiation (03CH03-HY)
RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Dec. 05, 2003	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year, except for Horn Antenna, BBHA9170.

※ Calibration Interval of Horn Antenna, BBHA9170, is three years.

11. Uncertainty Measurement

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of x_i		$u(x_i)$
	dB	Probability Distribution	
Receiver reading	0.10	Normal(k=2)	0.05
Cable loss	0.10	Normal(k=2)	0.05
AMN insertion loss	2.50	Rectangular	0.63
Receiver Spec	1.50	Rectangular	0.43
Site imperfection	1.39	Rectangular	0.80
Mismatch Receiver VSWR Γ_1 = LISN VSWR Γ_2 = Uncertainty= $20\log(1-\Gamma_1*\Gamma_2)$	+0.34/-0.35	U-shape	0.24
combined standard uncertainty Uc(y)	1.13		
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)	2.26		

$$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 0.5^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.2 \text{ for 10m test distance}$$

$$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 3^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.7 \text{ for 3m test distance}$$

Uncertainty of Radiated Emission Measurement (30MHz ~ 1000MHz)

Contribution	Uncertainty of x_i		$u(x_i)$
	dB	Probability Distribution	
Receiver reading	0.15	Normal(k=2)	0.08
Antenna factor calibration	1.12	Normal(k=2)	0.56
Cable loss calibration	0.12	Normal(k=2)	0.06
Pre Amplifier Gain calibration	0.13	Normal(k=2)	0.07
RCV/SPA specification	2.5	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1	Rectangular	0.29
Site imperfection	2.1	Rectangular	1.21
Mismatch Receiver VSWR Γ_1 = 0.20 Antenna VSWR Γ_2 = 0.23 Uncertainty= $20\log(1-\Gamma_1*\Gamma_2)$	+0.39/-0.41	U-shaped	0.28
combined standard uncertainty Uc(y)	1.58		
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)	3.16		

Uncertainty of Radiated Emission Measurement (1GHz ~ 40GHz)

Contribution	Uncertainty of x_i		$u(x_i)$	C_i	$C_i * u(x_i)$
	dB	Probability Distribution			
Receiver reading	± 0.10	Normal(k=1)	0.10	1	0.10
Antenna factor calibration	± 1.70	Normal(k=2)	0.85	1	0.85
Cable loss calibration	± 0.50	Normal(k=2)	0.25	1	0.25
Receiver Correction	± 2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	± 1.50	Rectangular	0.87	1	0.87
Site imperfection	± 2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20 \log(1 - \Gamma_1 * \Gamma_2 * \Gamma_3)$	+0.34/-0.35	U-shaped	0.244	1	0.244
Combined standard uncertainty $U_c(y)$	2.36				
Measuring uncertainty for a level of confidence of 95% $U = 2U_c(y)$	4.72				

$$U = \sqrt{\{(0.3/2)^2 + (2^2 + 1.5^2 + 0.2^2)/3 + (0.2)^2/2\}} = 1.66$$