Intertek Testing Services

Western Multiplex, FCC ID: HZB-U5358-480

Date of Test: October 23, 2000-November 15, 2000

4.6 Transmitter Radiated Emissions in Restricted Bands FCC Rule 15.205

Radiated emission measurements were performed from 30 MHz to 40,000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz - for frequencies above 1000 MHz.

The EUT is placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing, all cables were manipulated to produce worst case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

Configuration Photograph





1365 Adams Court, Menlo Park, CA 94025

Date of Test: October 23, 2000– November 15, 2000

Test Result

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Date of Test: October 23, 2000-November 15, 2000

Raulate	ed Emis: est Data	sions										
Componie	Western	Autoria					- Anne -					
company.	vvesternin	viumpiex c	urpo	ration		Model #:			Standa	ra	FCC § 15.4 (R B)	107
EUT:	Tsunami	UNNI 4800	GHZ F	Radio		S/N #:			Limits		11	1
Project #:	J2002933	4				Test Date:	Noveber 1	2000	Test Di	stance	3	meter
Test Mode:	Tx @ 5.3	GHz				Engineer:	Xi-Ming Y.	2000	Duty	~~~~~	0	dB
			-	-					Relaxa	tion		
	Antenn	a Used			Pre-A	mailised		Capled	land		Trangelare	n liter
Number:	14	21	22		10	13	0	12	0	0	D	
Model:	EMCO	316049	31	60-10	AFTESBSS	AC07400	None	NPS366	None	None	Nobe	
	3115		1		Araratana 1919				£1000000			
Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant.	Pre-Amp	Insert	D. C.	Net	Limit	Marg
×6	100.14	14 (L) (H)				Factor		Loss	F.		@3m	
IVEFN	de(hA)	EV.994Q	#	#	Ηŵ	d#(1/m)	dB	d₿	₫₿	∂₿щ∨т	dB(µV/m)	48
1.06E+4	37.0	Peak	14	10	V	39.8	39.5	7.0	0.0	44.3	74 0	-29
1.06E+4	27.0	Ave.	14	10	V	39.8	39.5	7.0	0.0	34.3	54.0	-19
1.59E+4	37.9	Peak	14	10	V	42.3	38.4	87	0.0	50.5	74.0	-23
1.59E+4	28.0	Ave,	14	10	V	42.3	38.4	87	0.0	40.6	54.0	-13
2.12E+4	37.0	Peak	21	13	V	40.3	23.3	2.0	-9.5	46.5	74.0	-27
2.12E+4	27.0	Ave,	21	13	V	40.3	23.3	2.0	-9.5	36.5	54.0	-17
3.18E+4	45.0	Peak	22	13	Н	43.5	25.9	2.8	-9.5	55.9	74.0	-18
3.18E+4	35.9	Ave,	22	13	Н	43.5	25.9	2.8	-9.5	46.8	54.0	-7.2
	- manual -											2
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		and the second set										
			-									

otes! a) D.C.F.: Distance Correction Factor

b) Insert. Loss (dB) = Cable A + Cable B + Cable C.
c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
d) Negative signs (-) in Margin column signify levels below the limits.

e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

f) Frequency above 19 GHz was made at 1m distance

Intertek Testing Services

Western Multiplex, FCC ID: HZB-U5358-480

Date of Test: October 23, 2000-November 15, 2000

ITS Intertek Testing Services

Radiated Emissions Test Data

Company:	Western Multiplex Corporation	Model #:	StandardF	CC § 15 R.B.)	.407
EUT:	Tsunami UNNI 480GHz Radio	SIN #:	Limits	11	
Project #:	J20029334	Test Date: Noveber 1, 2000	Test Distance	3	meters
Test Mode;	Tx @ 5.775 GHz	Engineer: Xi-Ming Y.	Duty Relexation	0	dB

	Antenn	a Used		Pre-Ar	np Used		Cable U	lsed		Transduce	ar Used
Number:	14	21	22	10	13	0	12	0	0	0	
Model:	EMCO 3115	3160-9	3160-10	AFT18855	AG0/400	None	NP3366	None	None	None	

Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant,	Pre-Amp	Insert.	D.C.	Net	Limit	Margin
MH2	dB(µV)	P/A/Q	A	#	H/V	dB(1/m)	48	dB	43	d3(µV/m	dB(µV/m)	dB
1.16E+4	38.0	Peak	14	10	V	41.2	39.7	7.3	0.0	46.8	74.0	-27.2
1.16E+4	27.6	Ave.	14	10	V	41.2	39.7	7.3	0.0	36.4	54.0	-17.6
2.31E+4	27.5	Peak	21	13	V	40.4	23,3	2.2	-9.5	37.3	74.0	-36.7
2.31E+4	27.3	Ave,	21	13	V	40.4	23.3	2.2	-9.5	37.1	54.0	-16.9
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a) D.C.F.:Distance Correction Factor

 b) Insert. Loss (dB) = Cable A + Cable B + Cable C.
 c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).

d) Negative signs (-) in Margin column signify levels below the limits.

e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits. f) Frequency above 19 GHz was made at 1m distance

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Date of Test: October 23, 2000-November 15, 2000

4.7 AC Line Conducted Emission FCC Rule 15.207

Not applicable, the EUT is DC powered.

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4.8 Radiated Emissions from Digital Section FCC Rule 15.109

Test was performed as described in the section 4.6.

Test results are attached.

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Date of Test: October 23, 2000-November 15, 2000

Te	est Data	sions										
Company:	Western I	Mutiplex C	orbor	ation		Model #:	Tssunami	480	Standa	2400000	FOORIS	
EUT:	Tsunami	UNNI 480	GHz	Radio		S/N #:		100	Limits		1	•
Project #	12002033	и	202.02			Taat Datas	Marcale an O	0000	7		<u> </u>	-
Test Mode:	Tx @ 5.7	75GHz				Engineer:	Xi-Ming Y	,2000	Ditu	stance	3	HE
			1000	02-9219		Lighton	M-Marig 1,		Relaxa	lon		012
1111111111111111111111111	Antenn	atised	mm	maaa	1000076 A	MAN HIMAN		in service			1077-04-04-04-04-04-04-04-04-04-04-04-04-04-	of Lines
Number:	2	9	7		1	0 0 0	0	12		0		enoseu
Model:	EMCO	EMCO	EM	.PA-25	HP 84470	None	Nane	NPS356	Nonali	None	None	
	3143	3104										
Frequency	Reading	Detector	Ant	Amp	Ant. Pol.	Ant	Pre-Amp	Insert	DC	Net	Limit	Marour
						Factor		Loss	F		@10m	
MHz	dB(µV)	P/A/Q	#	#	H/V	cl0(14m)	dB	d₿	dB	dB(µV/m	dB(µV/m)	dB
36.87E+0	20.0	Peak	9	0	V	10.5	0.0	0.1	-10.5	20.1	30 0	-18 0
46.10E+0	21.0	Peak	9	0	v	11.4	0.0	0.3	-10.5	22.2	39.0	-16.8
62.47E+0	31.0	QP	9	0	V	10.5	0.0	0.5	-10.5	31.5	39.0	-7.5
180.00E+0	15.0	Peak	9	0	V	17.2	0.0	0.8	-10,5	22.5	43.5	-21.0
240.00E+0	34.0	Peak	7	0	V	12.1	0.0	0.9	-10.5	36.5	46.4	-9.9
250.00E+0	34.0	Peak	7	0	V	13,6	0.0	1.0	-10,5	38.1	46.4	-8.3
273.40E+0	20.0	Peak	7	0	H	15,4	0.0	1.0	-10.5	25.9	46.4	-20.5
320.00E+0	30,0	Peak		0	H	16.6	0.0	1.1	-10.5	37.2	46.4	-9.2
420.00E+0	22.0	Peak	11	0	H	16.8	0.0	1.3	-10.5	29.6	46.4	-16.8
545.00E+0	32.0	QP	1	U	H	18.9	0.0	1.4	-10.5	41,8	46.4	-4.6
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					111.00							
		-			1			-			-	
	1	and the second			1					101.00.00	1	
			dan a d			• • • • • • • • • • • • • • • • • • • •				and the second	No. of the second second	1.19950
Votes:	a) D.C.F.:	Distance (Correc	tion F	actor	1 Street					The second s	
	b) Insert I	Loss (dB)	= Cat	le A +	Cable B +	Cable C .		and an an an an				
	c) Net (dB) = Readir	1g + A	Intenn	a Factor - I	Pre-amp + In	sert. Loss	- Transduc	er Loss -	Duty Rel	axation (trar	smitter
	only).											
	d) Negativ	e signs (-)) in M	argin d	alumn sigr	nify levels be	low the limit	5.				
Votes:	a) D.C.F. b) Insert I c) Net (dB only). d) Negatiy	Distance (Loss (dB)) = Readir /e signs (-'	Correc = Cat ng + A) in M	tion F ble A + Intenn	actor Cable B + a Factor - I	Cable C Pre-amp + In	isert. Loss	- Transduc	er Loss -	Duty Rel	axation (trar

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- 4.9 Radiated Emissions from Receiver Section FCC Ref: 15.109, 15.111
- Not required EUT operation above 960 MHz only

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4.10 Transmitter Duty Cycle Calculation / Measurements FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEEP function on the analyzer was set to ZERO SPAN. The transmitter ON time was determined from the resultant time-amplitude display:

Duty cycle = Maximum ON time in 100 msec/100

Duty cycle correction, $dB = 20 * \log (DC)$

	See attached spectrum analyzer chart(s) for transmitter timing
	See transmitter timing diagram provided by manufacturer
X	Not applicable.

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4.0 List of Test Equipment

Equipment	Manufacturer	Model	Serial #	Cal. Int.	Cal. Due	Used
Biconical Antenna	EMCO	3104	3789	12	4/10/01	Х
Log Periodic Antenna	EMCO	EM LPA-25	1079	12	4/10/01	Х
Double-ridged Horn Antenna	EMCO	3115	9107-3712	12	6/25/01	Х
Horn Antenna	EMCO	3160-9	N/A	#	#	Х
Pre-amplifier	ComPower	CPPA-102	1256	12	4/28/01	Х
Pre-amplifier	CDI	P1000	N/A	12	10/14/00	Х
Pre-amplifier	Avantek	AFT18855	8723H705	12	10/14/00	Х
Pre-amplifier	CTT	ACO/400	47526	12	10/14/00	Х
Spectrum Analyzer	Hewlett Packard	HP 8566B	2416A00317	6	2/03/01	Х
w/8650 QP Adapter			2521A01021			
Spectrum Analyzer	Tektronix	2784	B3020108	12	8/4/01	Х
Peak Power Meter	Hewlett Packard	8900D	3607U00673	12	7/31/01	Х
Peak Power Sensor	Hewlett Packard	84811A	3318A05091	12	12/7/99	X

Calibration is not required