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

Test Result

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

ITS Intertek Testing Services

Radiated Emissions Test Data

Company:	Western Multiplex Corporation	**Model #:**		**Standard**	FCC § 15.407 (R.B.)
EUT:	Tsunami UNNI 480GHz Radio	**S/N #:**		**Limits**	11
Project #:	J20029334	**Test Date:**	Noveber 1, 2000	**Test Distance**	3 meters
Test Mode:	Tx @ 5.3 GHz	**Engineer:**	Xi-Ming Y.	**Duty Relaxation**	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	14	21	22	10	13	0	12	0	0	0
Model:	EMCO 3115	3160-9	3160-10	AFT18B55	AGD/40D	None	NPS366	None	None	None

Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C F.	Net	Limit @3m	Margin
MHz	dB(uV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB
1.06E+4	37.0	Peak	14	10	V	39.8	39.5	7.0	0.0	44.3	74.0	-29.7
1.06E+4	27.0	Ave.	14	10	V	39.8	39.5	7.0	0.0	34.3	54.0	-19.7
1.59E+4	37.9	Peak	14	10	V	42.3	38.4	8.7	0.0	50.5	74.0	-23.5
1.59E+4	28.0	Ave.	14	10	V	42.3	38.4	8.7	0.0	40.6	54.0	-13.4
2.12E+4	37.0	Peak	21	13	V	40.3	23.3	2.0	-9.5	46.5	74.0	-27.5
2.12E+4	27.0	Ave.	21	13	V	40.3	23.3	2.0	-9.5	36.5	54.0	-17.5
3.18E+4	45.0	Peak	22	13	H	43.5	25.9	2.8	-9.5	55.9	74.0	-18.1
3.18E+4	35.9	Ave.	22	13	H	43.5	25.9	2.8	-9.5	46.8	54.0	-7.2

Notes:

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

ITS Intertek Testing Services

Radiated Emissions Test Data

Company:	Western Multiplex Corporation	**Model #:**		**Standard**	FCC § 16.407 (R.B.)
EUT:	Tsunami UNNI 480GHz Radio	**S/N #:**		**Limits**	11
Project #:	J20029334	**Test Date:**	Noveber 1, 2000	**Test Distance**	3 meters
Test Mode:	Tx @ 5.775 GHz	**Engineer:**	Xi-Ming Y.	**Duty Relaxation**	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	14	21	22	10	13	0	12	0	0	0
Model	EMCO 3115	3160-9	3160-10	AFT#8855	AGC7400	None	NPS366	None	None	None

Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(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

Notes:

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

4.7 AC Line Conducted Emission
FCC Rule 15.207

Not applicable, the EUT is DC powered.

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.

ITS Intertek Testing Services

Radiated Emissions Test Data

Company:	Western Mutiplex Corporation	Model #:	Tssunami 480	Standard	FCC § 15A
EUT:	Tsunami UNNI 480 GHz Radio	S/N #:		Limits	1
Project #:	J20029334	Test Date:	Noveber 3,2000	Test Distance	3 meters
Test Mode:	Tx @ 5.775GHz	Engineer:	Xi-Ming Y.	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	2	9	7	1	0	0	12	0	0	0
Model:	EMCO 3143	EMCO 3104	EM LPA-25	HP 8447D	None	None	NFS360	None	None	None

Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @10m	Margin
MHz	dB(uV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	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	39.0	-18.9
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	7	0	H	16.6	0.0	1.1	-10.5	37.2	46.4	-9.2
420.00E+0	22.0	Peak	7	0	H	16.8	0.0	1.3	-10.5	29.6	46.4	-16.8
545.00E+0	32.0	QP	7	0	H	18.9	0.0	1.4	-10.5	41.8	46.4	-4.6

Notes:

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.

4.9 Radiated Emissions from Receiver Section
FCC Ref: 15.109, 15.111

Not required - EUT operation above 960 MHz only

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.

4.0 List of Test Equipment

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

Calibration is not required