

4.6 Transmitter Radiated Emissions  
FCC Rule 15.407(b), 15.209, 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.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength in dB $\mu$ V/m

RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$FS = RR + LF$$

Where FS = Field Strength in dB $\mu$ V/m

RR = RA - AG in dB $\mu$ V

LF = CF + AF in dB

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antennas factor of 7.4-dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

$$RA = 52.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 23 + 9 = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

**Test Result**

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

- Data sheets #1 and #2 - with antenna DFPD1-52
- Data sheets #3 and #4 - with antenna DFPD2-52
- Data sheets #5 and #6 - with antenna SSP2-52B
- Data sheets #7 and #8 - with antenna SSD8-52

<b>Radiated Emissions Test Data</b>	#1
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<b>Company:</b> Western Multiplex Corporation	<b>Model #:</b> 28010-XXXX	<b>Standard</b>	<b>FCC § 15.407</b>
<b>EUT:</b> U-NII radio w/DFPD1-52 antenna	<b>FCC ID:</b> HZB-U58-100	<b>Limits</b>	<b>11</b>
<b>Project #:</b> 3013884	<b>Test Date:</b> Novemb. 30, 2001	<b>Test Distance</b>	<b>3</b> meters
<b>Test Mode:</b> transmitting @ 5.747 GHz	<b>Engineer:</b> Xi-Ming Y.	<b>Duty Relaxation</b>	<b>0</b> dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
<b>Number:</b>	21	8	22	10	13	12	10	0	0	0
<b>Model:</b>	EMCO 3160-9	EMCO 3115	EMCO 3160-10	AFT 18855	ACO/400	ACO/180	NPS72-1	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
11494	38.5	Peak	8	10	H	39.3	39.5	7.0	0.0	46.3	74.0	-27.7
11494	31.0	Ave.	8	10	H	39.3	39.5	7.0	0.0	37.8	54.0	-16.2
17241	38.8	Peak	8	10	H	41.2	38.4	8.7	0.0	50.3	74.0	-23.7
17241	28.9	Ave.	8	10	H	41.2	38.4	8.7	0.0	40.4	54.0	-13.6
22988	39.0	Peak	21	12	H	40.3	32.2	2.0	-9.5	39.6	74.0	-34.4
22988	28.4	Ave.	21	12	H	40.3	32.2	2.0	-9.5	29.0	54.0	-25.0
28735	40.1	Peak	22	13	V	43.4	24.2	2.4	-9.5	52.1	74.0	-21.9
28735	30.1	Ave.	22	13	V	43.4	24.2	2.4	-9.5	42.1	54.0	-11.9
34482	45.3	Peak	22	13	V	43.5	25.9	2.8	-9.5	56.2	74.0	-17.8
34482	35.1	Ave.	22	13	V	43.5	25.9	2.8	-9.5	46.0	54.0	-8.0

<b>Notes:</b>	a) D.C.F.:Distance Correction Factor
	b) Insert. Loss (dB) = Cable A + Cable B + Cable C .
	c) Net (dB) = Reading + Antenna Factor - Pre-arnp + Insert. 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 3 dB below the limits.
	f) Test at frequencies above 19 GHz was made at 1m distance. Readings are noise floor.

Western Multiplex, Model No: 28010-XXXX  
FCC ID: HZB-U58-100

Date of Test: Nov. 28-30, Dec. 7, 2001

<b>Radiated Emissions Test Data</b>	#2
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<b>Company:</b> Western Multiplex Corporation	<b>Model #:</b> 28010-XXXX	<b>Standard</b>	<b>FCC § 15.407</b>
<b>EUT:</b> U-NII radio w/ DFPD1-52 antenna	<b>FCC ID:</b> HZB-U58-100	<b>Limits</b>	11
<b>Project #:</b> 3013884	<b>Test Date:</b> Novemb. 30, 2001	<b>Test Distance</b>	3 meters
<b>Test Mode:</b> transmitting @ 5.803 GHz	<b>Engineer:</b> Xi-Ming Y.	<b>Duty Relaxation</b>	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
<b>Number:</b>	21	8	22	10	13	12	12	0	0	0
<b>Model:</b>	EMCO 3160-9	EMCO 3115	EMCO 3160-10	AFT 18855	ACO/400	ACO/180	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
11606	39.8	Peak	8	10	H	40.4	39.7	7.3	0.0	47.8	74.0	-26.2
11606	30.6	Ave.	8	10	H	40.4	39.7	7.3	0.0	38.6	54.0	-15.4
17409	38.8	Peak	8	10	H	42.2	38.8	9.2	0.0	51.4	74.0	-22.6
17409	28.7	Ave.	8	10	H	42.2	38.8	9.2	0.0	41.3	54.0	-12.7
23212	39.0	Peak	21	12	H	40.4	32.2	2.2	-9.5	39.9	74.0	-34.1
23212	28.4	Ave.	21	12	H	40.4	32.2	2.2	-9.5	29.3	54.0	-24.7
29015	39.8	Peak	22	13	V	43.4	24.2	2.6	-9.5	52.1	74.0	-21.9
29015	29.5	Ave.	22	13	V	43.4	24.2	2.6	-9.5	41.8	54.0	-12.2
34818	45.0	Peak	22	13	V	43.6	23.8	3.0	-9.5	58.2	74.0	-15.8
34818	35.0	Ave.	22	13	V	43.6	23.8	3.0	-9.5	48.2	54.0	-5.8

<b>Notes:</b>	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 - 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 3 dB below the limits.
	f) Test at frequencies above 19 GHz was made at 1m distance. Readings are noise floor.

Western Multiplex, Model No: 28010-XXXX  
FCC ID: HZB-U58-100

Date of Test: Nov. 28-30, Dec. 7, 2001

<b>Radiated Emissions Test Data</b>	#3
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<b>Company:</b> Western Multiplex Corporation	<b>Model #:</b> 28010-XXXX	<b>Standard</b>	<b>FCC § 15.407</b>
<b>EUT:</b> U-NII radio w/ DFPD2-52 antenna	<b>FCC ID:</b> HZB-U58-100	<b>Limits</b>	11
<b>Project #:</b> 3013884	<b>Test Date:</b> Novemb. 30, 2001	<b>Test Distance</b>	3 meters
<b>Test Mode:</b> transmitting @ 5.747GHz	<b>Engineer:</b> Xi-Ming Y.	<b>Duty Relaxation</b>	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
<b>Number:</b>	21	8	22	10	13	12	10	0	0	0
<b>Model:</b>	EMCO 3160-9	EMCO 3115	EMCO 3160-10	AFT 18855	ACO/400	ACO/180	NPS72-1	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
11494	40.6	Peak	8	10	H	39.3	39.5	7.0	0.0	47.4	74.0	-26.6
11494	31.0	Ave.	8	10	H	39.3	39.5	7.0	0.0	37.8	54.0	-16.2
17241	38.8	Peak	8	10	H	41.2	38.4	8.7	0.0	50.3	74.0	-23.7
17241	29.0	Ave.	8	10	H	41.2	38.4	8.7	0.0	40.5	54.0	-13.5
22988	38.0	Peak	21	12	H	40.3	32.2	2.0	-9.5	38.6	74.0	-35.4
22988	28.0	Ave.	21	12	H	40.3	32.2	2.0	-9.5	28.6	54.0	-25.4
28735	40.5	Peak	22	13	V	43.4	24.2	2.4	-9.5	52.5	74.0	-21.5
28735	30.1	Ave.	22	13	V	43.4	24.2	2.4	-9.5	42.1	54.0	-11.9
34482	45.0	Peak	22	13	V	43.5	25.9	2.8	-9.5	55.9	74.0	-18.1
34482	35.0	Ave.	22	13	V	43.5	25.9	2.8	-9.5	45.9	54.0	-8.1

<b>Notes:</b>	a) D.C.F.:Distance Correction Factor
	b) Insert. Loss (dB) = Cable A + Cable B + Cable C .
	c) Net (dB) = Reading + Antenna Factor - Pre-arp + Insert. 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 3 dB below the limits.
	f) Test at frequencies above 19 GHz was made at 1m distance. Readings are noise floor.

Western Multiplex, Model No: 28010-XXXX  
FCC ID: HZB-U58-100

Date of Test: Nov. 28-30, Dec. 7, 2001

<b>Radiated Emissions Test Data</b>	#4
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<b>Company:</b> Western Multiplex Corporation	<b>Model #:</b> 28010-XXXX	<b>Standard</b>	<b>FCC § 15.407</b>
<b>EUT:</b> U-NII radio w/ DFPD2-52 antenna	<b>FCC ID:</b> HZB-U58-100	<b>Limits</b>	<b>11</b>
<b>Project #:</b> 3013884	<b>Test Date:</b> Novemb. 30, 2001	<b>Test Distance</b>	<b>3</b> meters
<b>Test Mode:</b> transmitting @ 5.803 GHz	<b>Engineer:</b> Xi-Ming Y.	<b>Duty Relaxation</b>	<b>0</b> dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
<b>Number:</b>	21	8	22	10	13	12	12	0	0	0
<b>Model:</b>	EMCO 3160-9	EMCO 3115	EMCO 3160-10	AFT 18855	ACO/400	ACO/180	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
11606	40.2	Peak	8	10	H	40.4	39.7	7.3	0.0	48.2	74.0	-25.7
11606	30.1	Ave.	8	10	H	40.4	39.7	7.3	0.0	38.1	54.0	-15.9
17409	39.0	Peak	8	10	H	42.2	38.8	9.2	0.0	51.6	74.0	-22.4
17409	28.8	Ave.	8	10	H	42.2	38.8	9.2	0.0	41.4	54.0	-12.6
23212	40.0	Peak	21	12	H	40.4	32.2	2.2	-9.5	40.9	74.0	-33.1
23212	29.0	Ave.	21	12	H	40.4	32.2	2.2	-9.5	29.9	54.0	-24.1
29015	39.8	Peak	22	13	V	43.4	24.2	2.6	-9.5	52.1	74.0	-21.9
29015	30.0	Ave.	22	13	V	43.4	24.2	2.6	-9.5	42.3	54.0	-11.7
34818	45.0	Peak	22	13	V	43.6	23.8	3.0	-9.5	58.2	74.0	-15.8
34818	35.0	Ave.	22	13	V	43.6	23.8	3.0	-9.5	48.2	54.0	-5.8
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<b>Notes:</b>	a) D.C.F.:Distance Correction Factor
	b) Insert. Loss (dB) = Cable A + Cable B + Cable C .
	c) Net (dB) = Reading + Antenna Factor - Pre-arnp + Insert. 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 3 dB below the limits.
	f) Test at frequencies above 19 GHz was made at 1m distance. Readings are noise floor.

Western Multiplex, Model No: 28010-XXXX  
FCC ID: HZB-U58-100

Date of Test: Nov. 28-30, Dec. 7, 2001

<b>Radiated Emissions Test Data</b>	#5
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<b>Company:</b> Western Multiplex Corporation	<b>Model #:</b> 28010-XXXX	<b>Standard</b>	<b>FCC § 15.407</b>
<b>EUT:</b> U-NII radio w/ SSP2-52B antenna	<b>FCC ID:</b> HZB-U58-100	<b>Limits</b>	11
<b>Project #:</b> 3013884	<b>Test Date:</b> Novemb. 30, 2001	<b>Test Distance</b>	3 meters
<b>Test Mode:</b> transmitting @ 5.747 GHz	<b>Engineer:</b> Xi-Ming Y.	<b>Duty Relaxation</b>	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
<b>Number:</b>	21	8	22	10	13	12	12	0	0	0
<b>Model:</b>	EMCO 3160-9	EMCO 3115	EMCO 3160-10	AFT 18855	ACO/400	ACO/180	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
11494	40.3	Peak	8	10	H	39.3	39.5	7.0	0.0	47.2	74.0	-26.8
11494	31.0	Ave.	8	10	H	39.3	39.5	7.0	0.0	37.8	54.0	-16.2
17241	39.1	Peak	8	10	H	41.2	38.4	8.7	0.0	50.6	74.0	-23.4
17241	29.2	Ave.	8	10	H	41.2	38.4	8.7	0.0	40.7	54.0	-13.3
22988	38.0	Peak	21	12	H	40.3	32.2	2.0	-9.5	38.6	74.0	-35.4
22988	28.0	Ave.	21	12	H	40.3	32.2	2.0	-9.5	28.6	54.0	-25.4
28735	40.0	Peak	22	13	V	43.4	24.2	2.4	-9.5	52.0	74.0	-22.0
28735	30.1	Ave.	22	13	V	43.4	24.2	2.4	-9.5	42.1	54.0	-11.9
34482	45.0	Peak	22	13	V	43.5	25.9	2.8	-9.5	55.9	74.0	-18.1
34482	35.0	Ave.	22	13	V	43.5	25.9	2.8	-9.5	45.9	54.0	-8.1

<b>Notes:</b>	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 - 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 3 dB below the limits.
	f) Test at frequencies above 19 GHz was made at 1m distance. Readings are noise floor.

<b>Radiated Emissions Test Data</b>	#6
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<b>Company:</b> Western Multiplex Corporation	<b>Model #:</b> 28010-XXXX	<b>Standard</b>	<b>FCC § 15.407</b>
<b>EUT:</b> U-NII radio w/ SSP2-52B antenna	<b>FCC ID:</b> HZB-U58-100	<b>Limits</b>	11
<b>Project #:</b> 3013884	<b>Test Date:</b> Novemb. 30, 2001	<b>Test Distance</b>	3 meters
<b>Test Mode:</b> transmitting @ 5.803 GHz	<b>Engineer:</b> Xi-Ming Y.	<b>Duty Relaxation</b>	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
<b>Number:</b>	21	8	22	10	13	12	12	0	0	0
<b>Model:</b>	EMCO 3160-9	EMCO 3115	EMCO 3160-10	AFT 18855	ACO/400	ACO/180	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
11606	39.8	Peak	8	10	H	40.4	39.7	7.3	0.0	47.8	74.0	-26.2
11606	30.8	Ave.	8	10	H	40.4	39.7	7.3	0.0	38.8	54.0	-15.2
17409	39.5	Peak	8	10	H	42.2	38.8	9.2	0.0	52.1	74.0	-21.9
17409	28.5	Ave.	8	10	H	42.2	38.8	9.2	0.0	41.1	54.0	-12.9
23212	40.5	Peak	21	12	H	40.4	32.2	2.2	-9.5	41.4	74.0	-32.6
23212	29.0	Ave.	21	12	H	40.4	32.2	2.2	-9.5	29.9	54.0	-24.1
29015	39.8	Peak	22	13	V	43.4	24.2	2.6	-9.5	52.1	74.0	-21.9
29015	30.1	Ave.	22	13	V	43.4	24.2	2.6	-9.5	42.4	54.0	-11.6
34818	45.0	Peak	22	13	V	43.6	23.8	3.0	-9.5	58.2	74.0	-15.8
34818	35.2	Ave.	22	13	V	43.6	23.8	3.0	-9.5	48.4	54.0	-5.6

<b>Notes:</b>	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 - 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 3 dB below the limits.
	f) Test at frequencies above 19 GHz was made at 1m distance. Readings are noise floor.



Western Multiplex, Model No: 28010-XXXX  
FCC ID: HZB-U58-100

Date of Test: Nov. 28-30, Dec. 7, 2001

<b>Radiated Emissions Test Data</b>	#7
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<b>Company:</b> Western Multiplex Corporation	<b>Model #:</b> 28010-XXXX	<b>Standard</b>	<b>FCC § 15.407</b>
<b>EUT:</b> U-NII radio w/SSD8-52 antenna	<b>FCC ID:</b> HZB-U58-100	<b>Limits</b>	<b>11</b>
<b>Project #:</b> 3013884	<b>Test Date:</b> Novemb 29, 2001	<b>Test Distance</b>	<b>3</b> meters
<b>Test Mode:</b> transmitting at 5.747GHz	<b>Engineer:</b> Barry Smith	<b>Duty Relaxation</b>	<b>0</b> dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
<b>Number:</b>	21	8	22	10	12	13	12	0	0	0
<b>Model:</b>	EMCO 3160-9	EMCO 3115	EMCO 3160-10	AFT 18855	ACO/180	ACO/400	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
11494	41.0	Peak	8	10	V	40.6	39.7	7.3	0.0	49.2	74.0	-24.8
11494	31.9	Ave.	8	10	V	40.6	39.7	7.3	0.0	40.1	54.0	-13.9
17241	39.0	Peak	8	10	V	42.0	38.8	9.2	0.0	51.4	74.0	-22.6
17241	32.1	Ave.	8	10	V	42.0	38.8	9.2	0.0	44.5	54.0	-9.5
22988	38.0	Peak	21	12	V	40.4	32.2	2.2	-9.5	36.7	74.0	-35.1
22988	29.2	Ave.	21	12	H	40.4	32.2	2.2	-9.5	27.9	54.0	-23.9
28735	41.3	Peak	22	13	H	43.4	24.2	2.6	-9.5	51.0	74.0	-20.4
28735	29.9	Ave.	22	13	H	43.4	24.2	2.6	-9.5	39.6	54.0	-11.8
34482	41.5	Peak	22	13	H	43.6	23.8	3.0	-9.5	51.7	74.0	-19.3
34482	32.4	Ave.	22	13	H	43.6	23.8	3.0	-9.5	42.6	54.0	-8.4

<b>Notes:</b>	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 - 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 3 dB below the limits.
	f) Test at frequencies above 19 GHz was made at 1m distance. Readings are noise floor.

Western Multiplex, Model No: 28010-XXXX  
FCC ID: HZB-U58-100

Date of Test: Nov. 28-30, Dec. 7, 2001

<b>Radiated Emissions Test Data</b>	#8
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<b>Company:</b> Western Multiplex Corporation	<b>Model #:</b> 28010-XXXX	<b>Standard</b>	<b>FCC § 15.407</b>
<b>EUT:</b> U-NII radio w/SSD8-52 antenna	<b>FCC ID</b> HZB-U58-100	<b>Limits</b>	<b>11</b>
<b>Project #:</b> 3013884	<b>Test Date:</b> Novemb. 29, 2001	<b>Test Distance</b>	<b>3</b> meters
<b>Test Mode:</b> transmitting at 5.803 GHz	<b>Engineer:</b> Barry Smith	<b>Duty Relaxation</b>	<b>0</b> dB

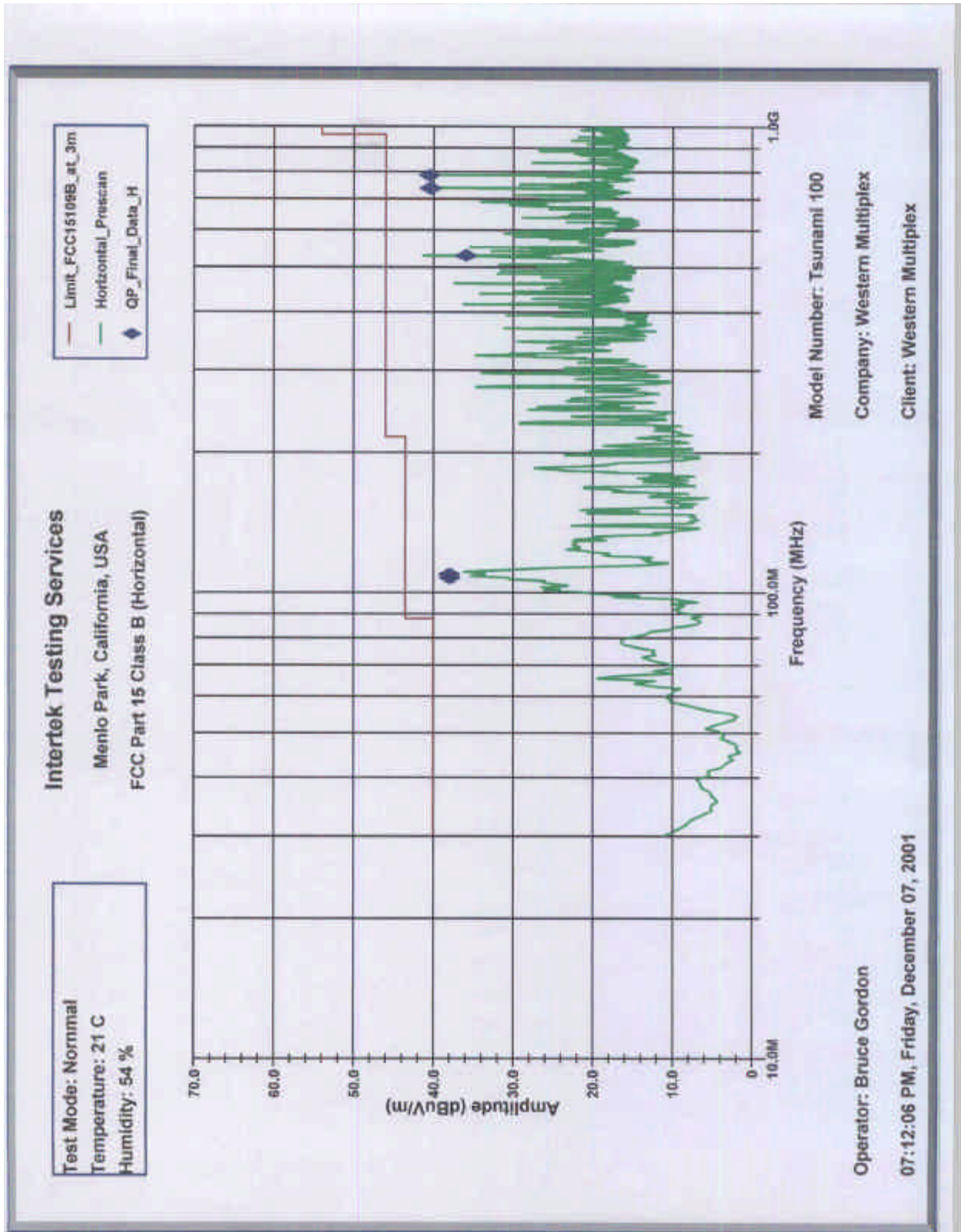
	Antenna Used				Pre-Amp Used			Cable Used			Transducer Used
<b>Number:</b>	21	8	22	10	12	13	12	0	0	0	
<b>Model:</b>	EMCO 3160-9	EMCO 3115	EMCO 3160-10		AFT 18855	ACO/180	ACO/400	NPS366	None	None	None

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
11606	41.2	Peak	8	10	V	40.6	39.7	7.3	0.0	49.4	74.0	-24.6
11606	32.3	Ave.	8	10	V	40.6	39.7	7.3	0.0	40.5	54.0	-13.5
17409	39.5	Peak	8	10	V	42.0	38.8	9.2	0.0	51.9	74.0	-22.1
17409	32.3	Ave.	8	10	V	42.0	38.8	9.2	0.0	44.7	54.0	-9.3
23212	38.0	Peak	21	12	V	40.4	32.2	2.2	-9.5	36.7	74.0	-35.1
23212	29.2	Ave.	21	12	H	40.4	32.2	2.2	-9.5	27.9	54.0	-23.9
29015	41.3	Peak	22	13	H	43.4	24.2	2.6	-9.5	51.0	74.0	-20.4
29015	29.9	Ave.	22	13	H	43.4	24.2	2.6	-9.5	39.6	54.0	-11.8
34818	41.5	Peak	22	13	H	43.6	23.8	3.0	-9.5	51.7	74.0	-19.3
34818	32.4	Ave.	22	13	H	43.6	23.8	3.0	-9.5	42.6	54.0	-8.4

<b>Notes:</b>	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 - 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 3 dB below the limits.
	f) Test at frequencies above 19 GHz was made at 1m distance. Readings are noise floor.

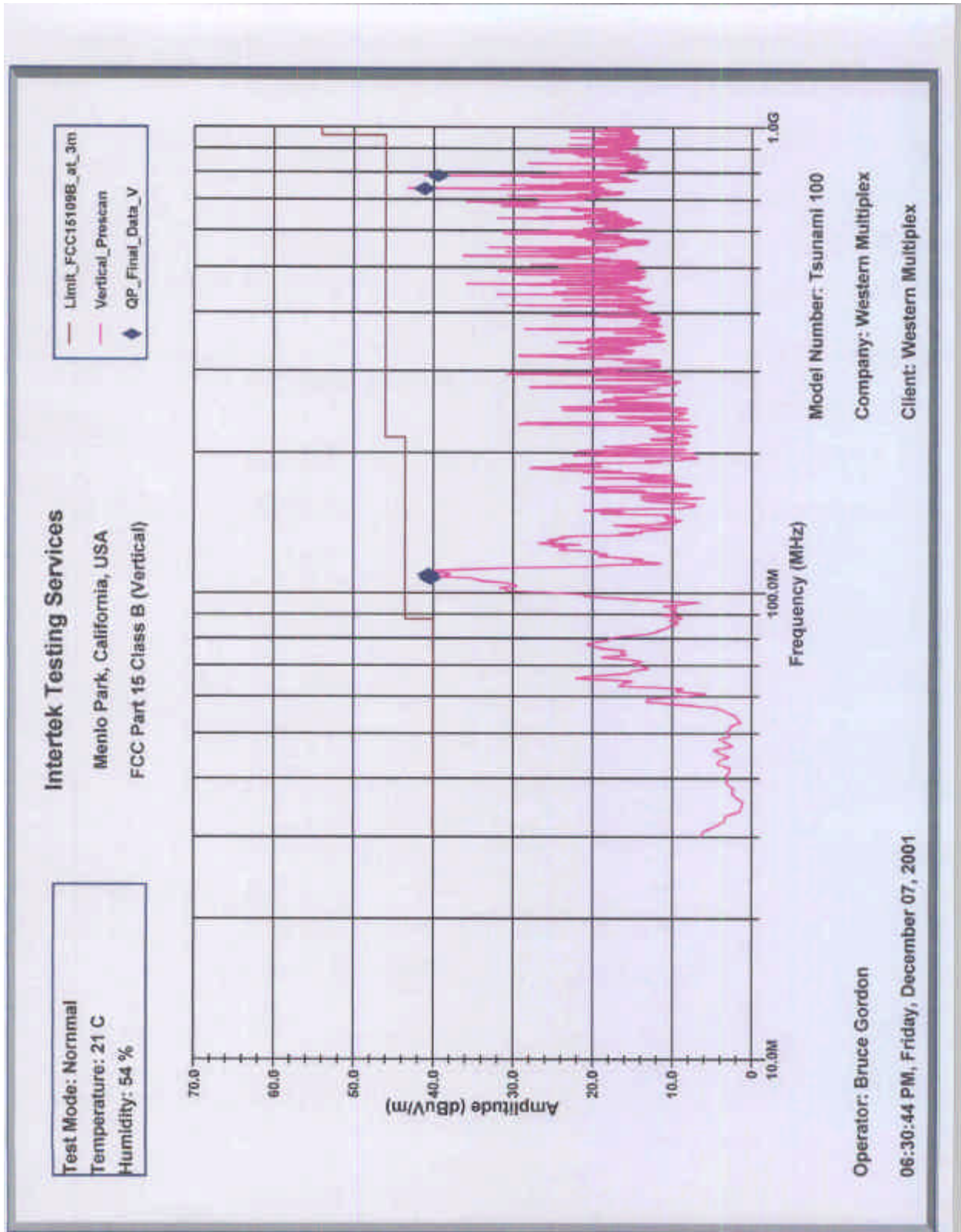
4.7 Radiated Emissions from Digital Section and Receiver  
FCC Rule 15.209

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





Intertek Testing Services Menlo Park, California, USA FCC Part 15 Class B (Horizontal)		Model Number: Tsunami 100 Client: Western Multiplex Company: Western Multiplex	
Operator: Bruce Gordon		07:15:20 PM, Friday, December 07, 2001	
Frequency (MHz)	QP Level (dBuV/m)	Limit (dBuV/m)	
30.0 MHz		40.0	
88.0 MHz		40.0	
107.5175 MHz	37.9	43.5	
109.5655 MHz	38.0	43.5	
216.0 MHz		43.5	
528.985 MHz	35.9	46.0	
737.2839 MHz	40.4	46.0	
786.4338 MHz	40.5	46.0	
960.0 MHz		46.0	
5.0 GHz		54.0	
Test Mode: Normal			
Temperature: 21 °C			
Humidity: 54 %			







<p>Operator: Bruce Gordon</p> <p>06:50:04 PM, Friday, December 07, 2001</p>		<p>Intertek Testing Services Menlo Park, California, USA FCC Part 15 Class B (Vertical)</p>		<p>Model Number: Tsunami 100 Client: Western Multiplex Company: Western Multiplex</p>	
1	2	1	2	1	2
Frequency (MHz)	Amplitude in QP (dBuV/m)	Limit (dBuV/m)			
107.5175 MHz	40.4	43.5			
109.5655 MHz	40.6	43.5			
737.2839 MHz	41.1	46.0			
786.4338 MHz	39.4	46.0			
<p>Test Mode: Normal Temperature: 21 C Humidity: 54 %</p>					
Page 1					

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Western Multiplex, Model No: 28010-XXXX  
FCC ID: HZB-U58-100

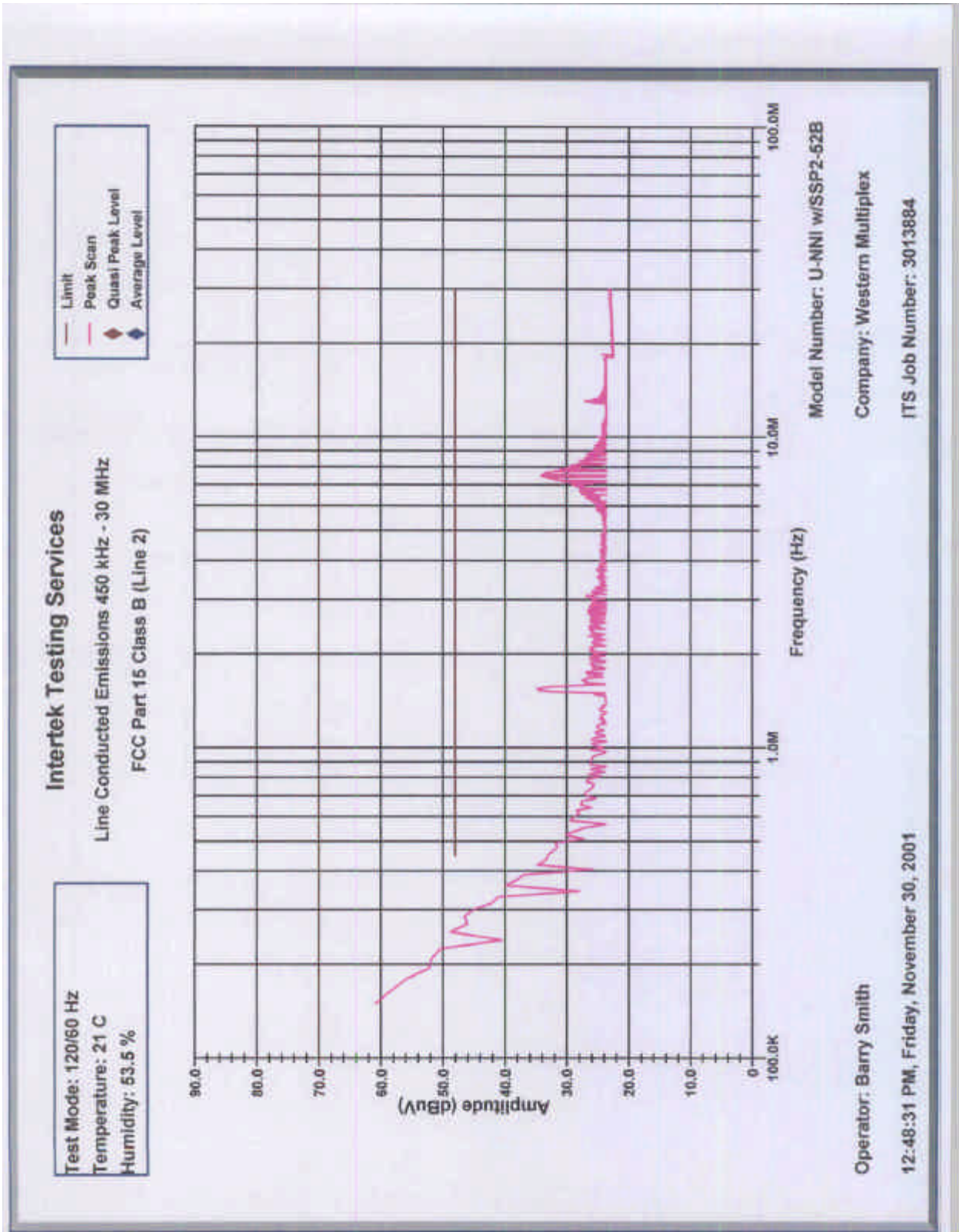
Date of Test: Nov. 28-30, Dec. 7, 2001

4.8 AC Line Conducted Emission  
FCC Rule 15.207

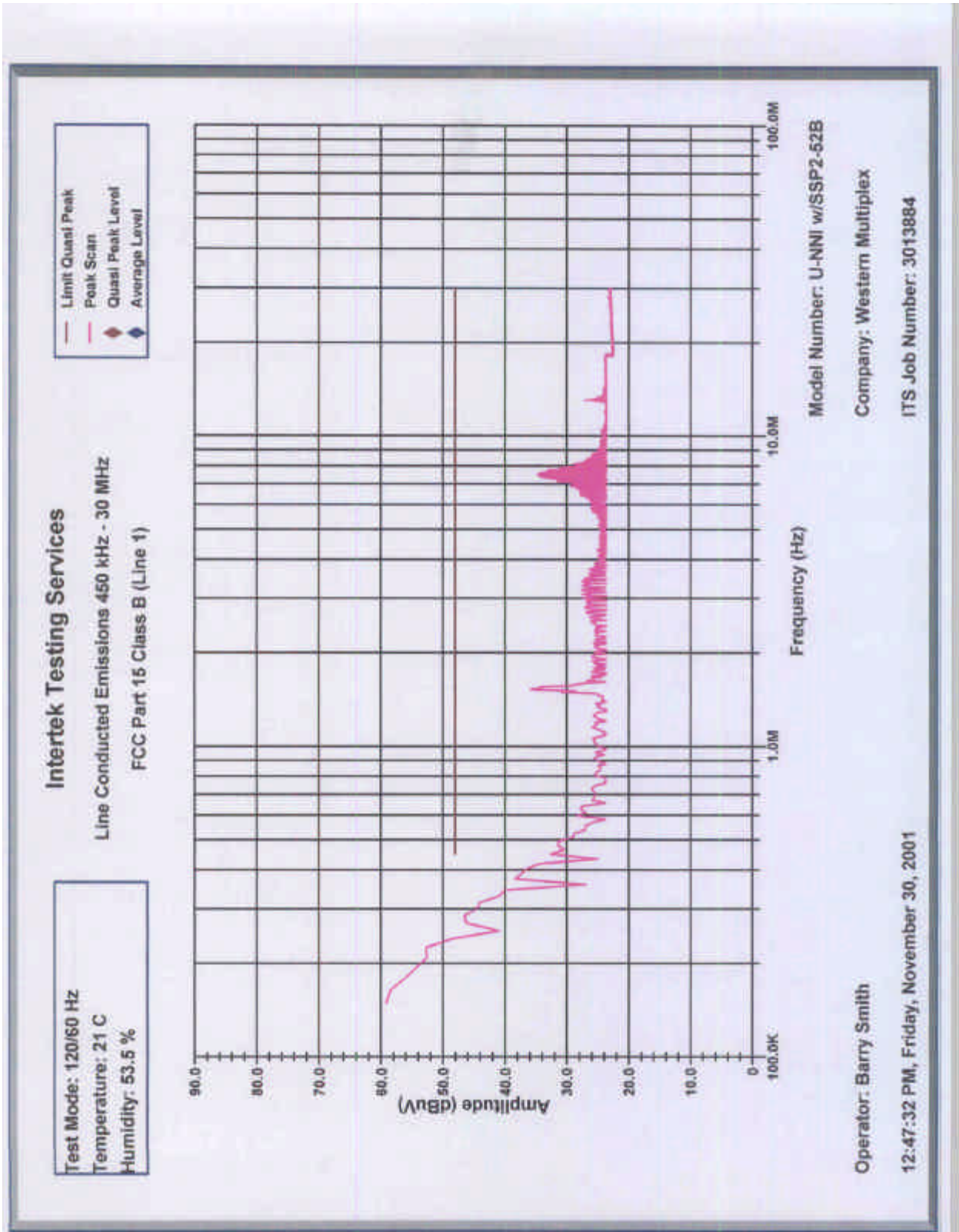
AC line conducted emission test was performed according the ANSI C63.4 standard. The EUT was connected to DC Power Supply which was connected to AC Line through the LISNs.

For the test result, see attached plot.









Intertek Testing Services  
Line Conducted Emissions 450 kHz - 30 MHz  
FCC Part 15 Class B (Line 1)

Operator: Barry Smith  
12:47:33 PM, Friday, November 30, 2001  
Model Number: U-NNI w/SSP2-52B  
ITS Job Number: 3013884  
Company: Western Multiplex

1	2	3	4	5
Frequency MHz	Pk Level (dBuV)	OF Level (dBuV)	Limit (dBuV)	Pk Margin OF Margin (dBuV)
1.5231 MHz	35.8		48.0	-12.2
7.090125 MHz	30.4		48.0	-17.6
7.239375 MHz	31.6		48.0	-16.4
7.28415 MHz	32.9		48.0	-15.1
7.388625 MHz	34.2		48.0	-13.8
7.448325 MHz	34.3		48.0	-13.7
7.508025 MHz	34.7		48.0	-13.3
7.687125 MHz	33.2		48.0	-14.8
7.836375 MHz	31.2		48.0	-16.8
Test Mode: 120/60 Hz				
Temperature: 21 C				
Humidity: 53.5 %				

Page 1

Western Multiplex, Model No: 28010-XXXX  
FCC ID: HZB-U58-100

Date of Test: Nov. 28-30, Dec. 7, 2001

4.9 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.



Western Multiplex, Model No: 28010-XXXX  
 FCC ID: HZB-U58-100

Date of Test: Nov. 28-30, Dec. 7, 2001

**5.0 List of Test Equipment**

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. INTERVAL	CAL. DUE
Spectrum Analyzer w/85650 QP Adapter	Hewlett Packard	8566B	2416A00317 2043A00251	12	4/6/02
Spectrum Analyzer w/8650 QP Adapter	Hewlett Packard	8568B	1912A0053 2521A01021	12	2/23/02
Spectrum Analyzer	Tektronix	2784	B3020108	12	8/8/02
Double-ridged Horn Antenna	EMCO	3115	9107-3712	12	3/17/02
BI-Log Antenna	EMCO	3143	9509-1164	12	3/4/03
Horn Antenna	EMCO	3160-09	Not Labeled	#	#
Horn Antenna	EMCO	3160-10	Not Labeled	#	#
Pre-Amplifier	CDI	P950	ITS009	12	7/2/02
Pre-Amplifier	Sonoma Inst.	310	185634	12	4/25/02
Pre-Amplifier	CDI	P1000	N/A	12	12/06/02
Pre-Amplifier	Avantek	AFT-18855	8723H705	12	12/5/02
Pre-amplifier	CTT	ACO/400	47526	12	12/5/02
Power Meter	Hewlett Packard	8900D	3607U00673	12	8/8/02
LISN	Solar Electronics	8025-50-TS-24-BNC	912434	12	6/11/02
LISN	Solar Electronics	8028-50-TS-24-BNC	941502	12	2/7/02

# No Calibration Required

**Appendix**



1196 Borregas Ave., Sunnyvale, CA 94089-1302, USA  
Tel: +1 (408) 542-5200, Fax: +1 (408) 542-5300

January 22, 2002

**Subject: Statement of Compliance to FCC 15.407 (C)**

To Whom It May Concern:

The HZB-U58-100 radio was designed with networking capability, which demands the radio to carry networking traffic (polling, reporting) on a constant basis. Therefore, the radio is designed to transmit all the time (when operational). We designed the product in such a way that whenever a radio hardware failure is detected, the system firmware turns off the radio transmitter.

A handwritten signature in black ink, appearing to read "Caroline Yu". The signature is fluid and cursive, with a long horizontal stroke at the end.

Caroline Yu

Homologation Product Manager  
Western Multiplex Corporation



FCC ID: HZB-U58-100

**Compliance with 15.407( g ) frequency stability**

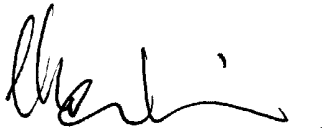
The following table shows the specifications of the determining oscillators and the total frequency stability of the equipment at 5.725-5.825 GHz band over the full operating temperature range. The data shown on the table covers the worst frequency shift situation within the full operating temperature range of -30 to +65°C specified for the equipment under application. The oscillators are crystal types.

	<b>5.747 GHz Transmitter</b>	<b>5.803 GHz Transmitter</b>
Fundamental Oscillator	140MHz±10ppm or ±1.4 kHz	140MHz±10ppm or ±1.4 kHz
Secondary Oscillator	(109MHz±30ppm)x5 or ±16.4kHz	(109MHz±30ppm) x5 or ±16.4kHz
RF reference Oscillator	(105.4583MHz±10ppm)x48 or ±50.62kHz	(106.6250MHz±10ppm)x48 or 51.18kHz
Total Frequency Stability	±11.91ppm or ±68.42kHz	±11.83ppm or ±68.98kHz

The supporting reasoning for the claim is as follows:

- a) The lowest channel center frequency is 5747 MHz, with a 26dBc width of 29.1 MHz. The margin below the 26dBc points to the band edge is 8 MHz.
- b) The highest channel center frequency is 5803 MHz with a 26dBc width of 29.4 MHz. The margin above 26dBc points to the band edge is 7 MHz.
- c) Therefore, the frequency stability of the frequency-determining element must be no worse than 0.139% (8 MHz/5747 MHz) over the normal operating range to maintain the emissions within the allowed band. From the above table, it can be seen that the frequency-determining components offer much superior stability to ensure the compliance to 15.407(g).

Caroline Yu



Homologation Product Manager  
Western Multiplex Corporation