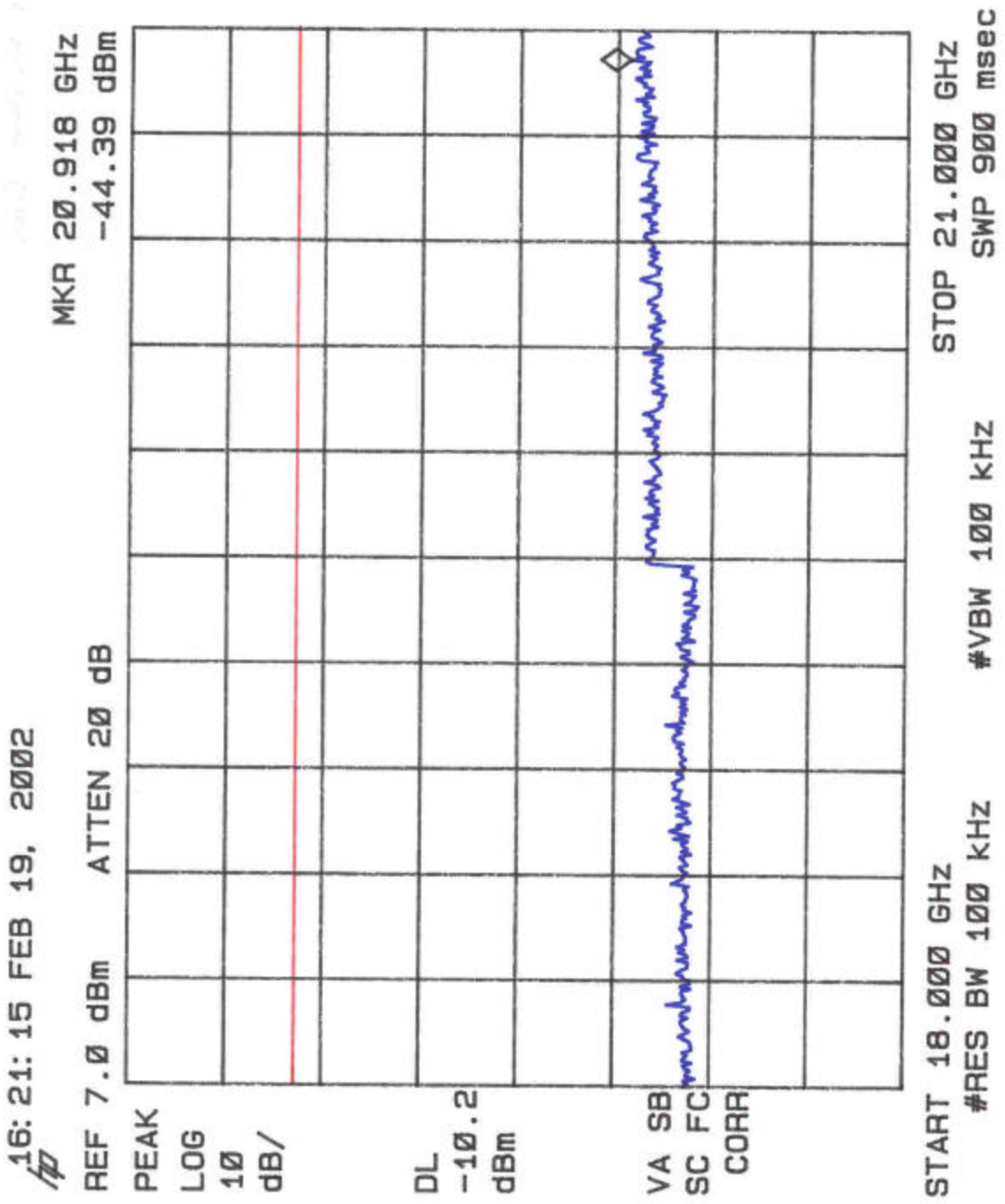

Figure 38: Conducted Spurious Emissions, High Band, Plot 10

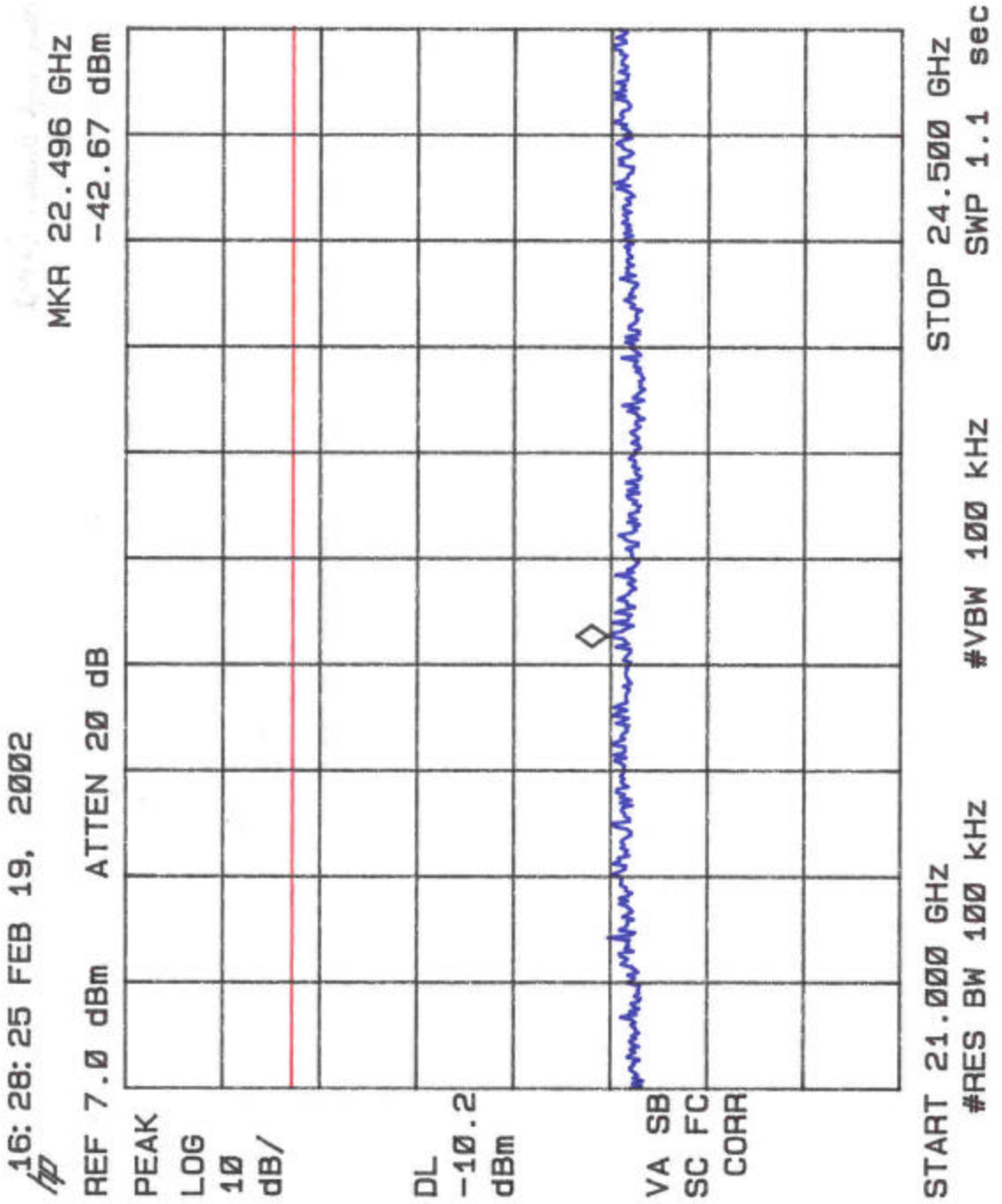

Figure 39: Conducted Spurious Emissions, High Band, Plot 12

4.5 Radiated Spurious Emissions: (FCC Part §15.247(c))

The EUT must comply with the radiated spurious emission limits of 15.209(a) for emissions that fall in the restricted bands as defined in Section 15.205(a). The limits are as shown in the following table.

4.5.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-1992. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

Frequency Range	Resolution Bandwidth	Video Bandwidth
30MHz-1000 MHz	100kHz	>100kHz
>1000 MHz	1 MHz	10Hz (avg), 1MHz (peak)

Harmonic and spurious emissions that were identified as coming from the EUT were checked in Peak and in Average Mode. It was verified that the peak-to-average ratio did not exceed 20dB for the restricted bands.

For the spurious emissions testing the hopping was stopped and the device was set to continuous transmission. No duty cycle correction was applied to the measurements.

Emissions were measured to the 10^{th} harmonic of the transmit frequency.

The following is a sample calculation used in the data tables for calculating the final field strength of spurious emissions and comparing these levels to the specified limits.

Sample Calculation:

Spectrum Analyzer Voltage (SA Level): V dBµV

Antenna Factor (Ant Corr): AFdB/m

Cable Loss Correction (Cable Corr): CCdB

Amplifier Gain*: GdB

Electric Field (Corr Level): EdBµV/m = VdBµV + AFdB/m + CCdB - GdB

To convert to linear units: EµV/m = antilog (EdBµV/m/20)

*Note: In certain setups the amplifier gain is programmed into the spectrum analyzer and therefore already accounted for in the SA Level reading. In this situation the Amplifier Gain would be set to 0 dB in the table heading. Data is recorded in Table 7.

Table 7: Radiated Emission Test Data (§15.205 Restricted Bands)

CLIENT: EKA Systems DATE: 2/20/2002
TESTER: Steve Koster JOB #: 6959x

EUT: BlueMeter Hub
CONFIGURATION: EUT Transmitting on set channels
CLOCKS: Transmit freq. 2402 MHz.

Test Equipment/Limit: **Test Requirements:**
ANTENNA: A_00004 TEST STANDARD: FCC Part 15.247
CABLE: CSITE2_HF DISTANCE: 3m
LIMIT: LFCC_3m_Class_B CLASS: B
AMPLIFIER (dB) 34

Peak Emissions Data

Freq. (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (Peak) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB	Notes
4804.00	V	157.5	1.0	55.1	32.8	4.2	58.1	801.6	5000.0	-15.9	
12010.0	V	180.0	1.0	45.3	41.3	5.1	57.6	762.7	5000.0	-16.3	
19216.0	V	0.0	1.0	36.3	39.4	3.5	45.2	182.0	5000.0	-28.8	NF Peak
4804.0	H	135.0	1.0	55.6	32.8	4.2	58.5	846.1	5000.0	-15.4	
12010.0	H	135.0	1.0	43.3	41.3	5.1	55.6	605.8	5000.0	-18.3	
19216.0	H	0.0	1.0	36.3	39.4	3.5	45.2	182.0	5000.0	-28.8	NF Peak

Average Data

Freq. (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (AVG) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB	Notes
4804.00	V	157.5	1.0	39.7	32.8	4.2	42.6	135.7	500.0	-11.3	
12010.00	V	180.0	1.0	28.9	41.3	5.1	41.2	115.4	500.0	-12.7	
19216.00	H	0.0	1.0	36.3	39.4	3.5	45.2	182.0	500.0	-8.8	NF/Peak
4804.00	H	135.0	1.0	43.1	32.8	4.2	46.0	200.7	500.0	-7.9	
12010.00	H	135.0	1.0	31.9	41.3	5.1	44.2	163.1	500.0	-9.7	
19216.00	H	0.0	1.0	36.3	39.4	3.5	45.2	182.0	500.0	-8.8	NF/Peak

NF = Noise Floor

Table 6: Radiated Emission Test Data Continued (§15.205 Restricted Bands)

CLIENT:	EKA Systems	DATE:	2/21/2002
TESTER:	Steve Koster	JOB #:	6959x
EUT:	BlueMeter Hub		
CONFIGURATION:	EUT Transmitting on set channels		
CLOCKS:	Transmit freq. 2441 MHz.		

Test Equipment/Limit:		**Test Requirements:**	
ANTENNA:	A_00004	TEST STANDARD:	FCC Part 15.247
CABLE:	CSITE2_HF	DISTANCE:	3m
LIMIT:	LFCC_3m_Class_B	CLASS:	B
AMPLIFIER (dB) 34			

Peak Emissions Data

Freq. (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (Peak) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB	Notes
4882.00	V	180.0	1.0	58.9	32.9	4.3	62.1	1268.6	5000.0	-11.9	
7323.00	V	202.5	1.0	56.6	37.9	4.6	65.0	1786.9	5000.0	-8.9	
12205.00	V	0.0	1.0	33.4	40.6	5.4	45.5	188.2	5000.0	-28.5	NF/Peak
19528.00	V	0.0	1.0	34.8	39.6	3.8	44.2	162.2	5000.0	-29.8	NF/Peak
4882.00	H	180.0	1.0	54.7	32.9	4.3	57.9	782.2	5000.0	-16.1	
7323.00	H	135.0	1.0	57.5	37.9	4.6	65.9	1982.0	5000.0	-8.0	
12205.00	H	0.0	1.0	33.4	40.6	5.4	45.5	188.2	5000.0	-28.5	NF/Peak
19528.00	H	0.0	1.0	34.8	39.6	3.8	44.2	162.2	5000.0	-29.8	NF/Peak

Average Data

Freq. (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (AVG) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB	Notes
4882.00	V	180.0	1.0	40.8	32.9	4.3	44.0	157.9	500.0	-10.0	
7323.00	V	202.5	1.0	42.7	37.9	4.6	51.1	360.7	500.0	-2.8	
12205.00	V	0.0	1.0	33.4	40.6	5.4	45.5	188.2	500.0	-8.5	NF/Peak
19528.00	V	0.0	1.0	34.8	39.6	3.8	44.2	162.2	500.0	-9.8	NF/Peak
4882.00	H	180.0	1.0	39.2	32.9	4.3	42.4	131.9	500.0	-11.6	
7323.00	H	135.0	1.0	43.6	37.9	4.6	52.0	397.7	500.0	-2.0	
12205.00	H	0.0	1.0	33.6	40.6	5.4	45.7	192.6	500.0	-8.3	NF/Peak
19528.00	H	0.0	1.0	34.8	39.6	3.8	44.2	162.2	500.0	-9.8	NF/Peak

NF = Noise Floor

Table 6: Radiated Emission Test Data Continued (§15.205 Restricted Bands)

CLIENT:	EKA Systems	DATE:	2/21/2002
TESTER:	Steve Koster	JOB #:	6959x
EUT:	BlueMeter Hub		
CONFIGURATION:	EUT Transmitting on set channels		
CLOCKS:	Transmit freq. 2480 MHz.		
Test Equipment/Limit:		**Test Requirements:**	
ANTENNA:	A_00004	TEST STANDARD:	FCC Part 15.247
CABLE:	CSITE2_HF	DISTANCE:	3m
LIMIT:	LFCC_3m_Class_B	CLASS:	B
AMPLIFIER (dB) 34			

Peak Emissions Data

Freq. (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (Peak) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB	Notes
4960.00	V	112.5	1.0	61.1	33.0	4.4	64.5	1675.2	5000.0	-9.5	
7440.00	V	270.0	1.0	47.5	38.0	4.6	56.1	638.0	5000.0	-17.9	
12400.00	V	0.0	1.0	33.2	40.0	5.8	45.0	178.7	5000.0	-28.9	NF/Peak
19840.00	V	0.0	1.0	34.6	39.6	3.8	44.0	158.5	5000.0	-30.0	NF/Peak
22320.00	V	0.0	1.0	35.8	40.5	4.0	46.3	206.5	5000.0	-27.7	NF/Peak
4960.00	H	135.0	1.0	62.8	33.0	4.4	67.4	2347.3	5000.0	-6.6	
7440.00	H	135.0	1.0	51.9	38.0	4.6	60.5	1060.1	5000.0	-13.5	
12400.00	H	0.0	1.0	32.8	40.0	5.8	45.0	178.7	5000.0	-28.9	NF/Peak
19840.00	H	0.0	1.0	34.0	39.6	3.8	43.4	147.9	5000.0	-30.6	NF/Peak
22320.00	H	0.0	1.0	36.2	40.5	4.0	46.7	216.3	5000.0	-27.3	NF/Peak

Average Data

Freq. (MHz)	Pol. H/V	Azimuth Degree	Ant. Ht (m)	SA Level (AVG) (dBuV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBuV/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin dB	Notes
4960.00	V	112.5	1.0	42.7	33.0	4.4	46.1	163.1	500.0	-7.9	
7440.00	V	270.0	1.0	35.9	38.0	4.6	44.4	166.7	500.0	-9.5	
12400.00	V	0.0	1.0	33.2	40.0	5.8	45.0	178.7	500.0	-8.9	NF/Peak
19840.00	V	0.0	1.0	34.6	39.6	3.8	44.0	158.5	500.0	-10.0	NF/Peak
22320.00	V	0.0	1.0	35.8	40.5	4.0	46.3	206.5	500.0	-7.7	NF/Peak
4960.00	H	135.0	1.0	43.9	33.0	4.4	47.3	231.2	500.0	-6.7	
7440.00	H	135.0	1.0	39.1	38.0	4.6	47.7	242.3	500.0	-6.3	
12400.00	H	0.0	1.0	32.8	40.0	5.8	44.6	170.7	500.0	-9.3	NF/Peak
19840.00	H	0.0	1.0	34.0	39.6	3.8	43.4	147.9	500.0	-10.6	NF/Peak
22320.00	H	0.0	1.0	36.2	40.5	4.0	46.7	216.3	500.0	-7.3	NF/Peak

NF = Noise Floor

5 Transmitter Environmental Assessment, Maximum Permissible Exposure (MPE)

5.1 SCOPE

This testing applies to RF transmitters used more than 20 cm of a human body.

5.2 REFERENCE

OET Bulletin 65

Table 8. Evaluation of Maximum Permissible Exposure

EUT	$Power_{[Watt]}$ (max rated)	
	Frequency tested, MHz	
	Supply Voltage, Vdc / Vac	
	Operating Mode (if > 1)	
	$Gain_{[dBi]}$ (antenna)	__ 2.15, __ other:
Instruments	Radiation Meter	
	E-field probe	CF =
47 CFR 1.1310 Table 1, (B)	0.3-1.34 MHz: $Limit_{[mW/cm^2]} = 100$	
	1.34-30 MHz: $Limit_{[mW/cm^2]} = (180/f^2)$	
	30-300 MHz: $Limit_{[mW/cm^2]} = 0.2$	
	300-1500 MHz: $Limit_{[mW/cm^2]} = f/1500$	
	1500-100000 MHz: $Limit_{[mW/cm^2]} = 1.0$	
Pre-test Calculations	$Power_{[W\ EIRP]} = P_{[Watts]} \times 10^{(Gain_{[dBi]} / 10)}$ =	
	$Limit_{[mW/cm2]}$ =	
	$Limit_{[W/m^2]} = 10 \times Limit_{[mW/cm2]}$ =	
	$R_{[m]} = [(P_{[W]}) / (4\pi \times Limit_{[W/m^2]})]^{1/2}$ =	
	$R_{[inches]} = R_{[m]} \times 39.4$ =	

MPE Data	Probe Height, m	Power Density, mW/cm^2
(Measured at the calculated distance $R_{[m]}$).	2.0	
	1.8	
	1.6	
	1.4	
	1.2	
	1.0	
	0.8	
	0.6	
	0.4	
	0.2	

Post-test Calculations		
	Whole body average (0.2 - 2.0m)	=
	Lower body average (0.2 - 0.8 m)	=
	Upper body average (1.0 - 2.0 m)	=