Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated:
No Hop

Antennas Investigated:
Armstrong-Centurion

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
120 VAC, 60 Hz.

Frequency Range Investigated			
Start Frequency	30 MHz	Stop Frequency	25GHz

Software\Firmware Applied During Test			
Exercise software	Special Test Software	Version	Unknown
Description			
The system was tested using special software developed to test all functions of the device during the test. The special software allowed the device to be placed in a no hop mode at each of the required low, mid, and high transmit channels			

Equipment Modifications

No EMI suppression devices were added or modified. The EUT was tested as delivered.

SPAC0264

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
Power Supply	SpaceLabs Medical	90486	486-101522
Host System	SpaceLabs Medical	90310-1A	PAR327-1
EUT	Proxim	6330	A30549980020A6386465
Ethernet Board	SpaceLabs Medical	670-0829-00	N3112-95B-040
Antenna	Centurion Wireless Technologies	CAF 94103	010306

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.8	No	Power Supply	AC Mains
DC Power	Yes	.96	Yes	Power Supply	Host System
Antenna	Yes	2.83	No	Antenna	Host System

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	03/23/2001	12 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	03/23/2001	12 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	12/03/2001	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	11/26/2001	12 mo
High Pass Filter	RLC Electronics	F-100-4000-5-R (HPF>	HFD	02/04/2002	12 mo
Antenna, Horn	EMCO	3115	AHC	08/24/2001	12 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	12 mo
Spectrum Analyzer	Tektronix	2784	AAO	03/08/01	12 mo
Antenna, Horn	EMCO	3160-09	AHG	01/15/01	24 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	01/17/01	24 mo

Test Description

Requirement: The field strength of any spurious emissions or modulation products that fall in a restricted band, as defined in 47 CFR 15.205, is measured. The peak level must comply with the limits specified in 47 CFR 15.35(b). The average level (taken with a 10Hz VBW) must comply with the limits specified in 15.209.

Configuration: The antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. The EUT was transmitting at its maximum data rate in a no hop mode. For each configuration, the spectrum was scanned from 30 MHz to 25 GHz. In addition, measurements were made in the restricted band of 2.4835 to 2.5 GHz to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity. Since the dwell time per channel of the hopping signal was less than 100 ms, the readings obtained with the 10 Hz VBW were further reduced by a "duty cycle correction factor" of 11.44 dB, derived from 20log(dwell time/100ms), where the EUT's maximum dwell time in any 100mS period was measured to be 26.8 mS.

Band-edge compliance for emissions in the restricted band of 2.4835 GHz to 2.5 GHz was confirmed by using the "marker-delta" method described in FCC Public Notice DA 00-705:

> 1. In-band field strength of the fundamental was measured in both polarities
> 2. Amplitude delta between the fundamental and highest band-edge emission was measured in both polarities.
> 3. For each polarity, the amplitude delta from step #2 was subtracted from the field strength level of step #1.

The resultant field strengths were used to determine compliance of emissions with band-edge requirements.
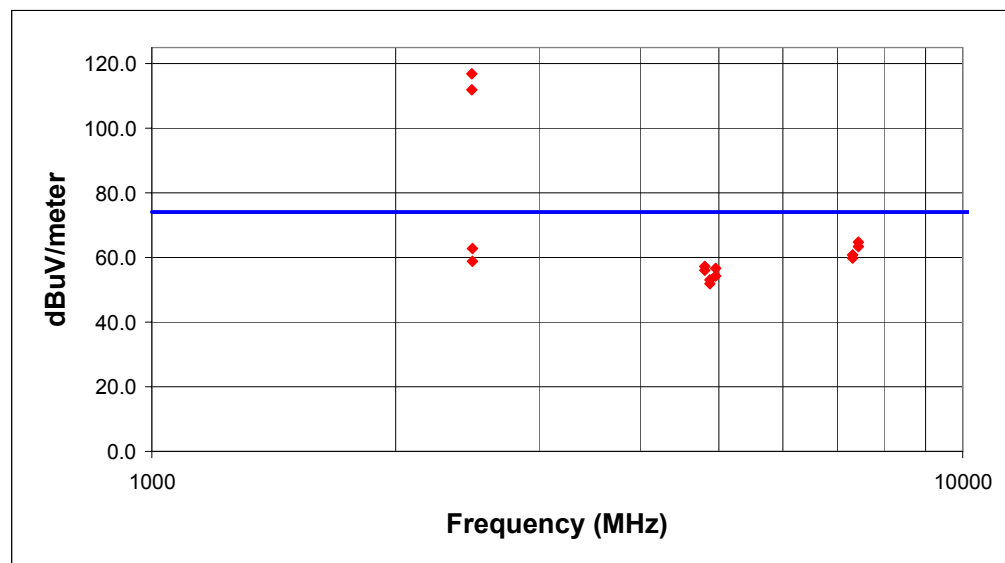
Bandwidths Used for Measurements

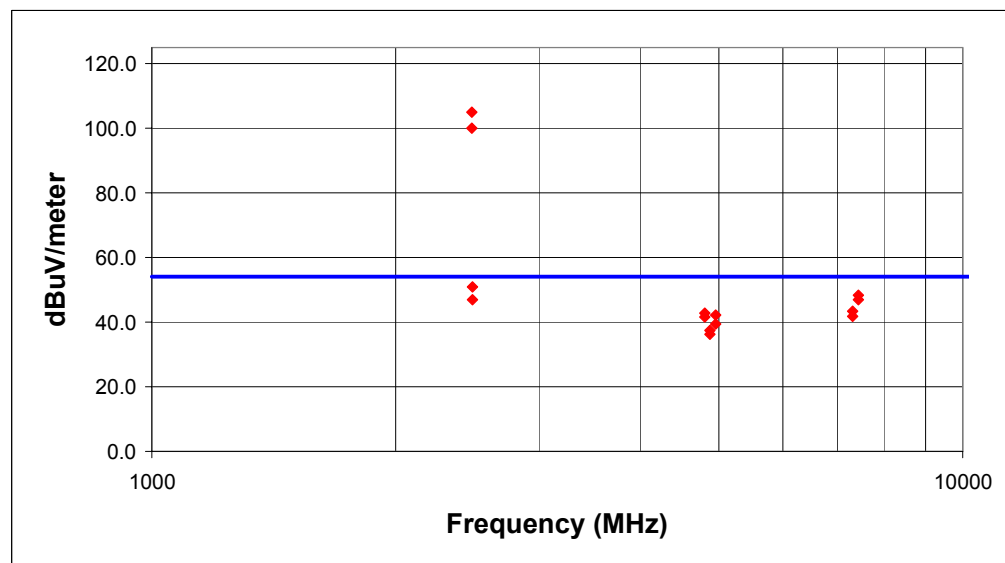| Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 – 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.			

Completed by:

_____

SPAC0264

NORTHWEST EMC

Radiated and Conducted Emissions

Rev 4.10
07/06/01

EUT: 6330		**Work Order:** SPAC0264	
Serial Number: A30549980020A6386465		**Date:** 08/18/01	
Customer: SpaceLabs Medical		**Temperature:** 21	
Attendees: N/A	**Tester:** Rod Peloquin	**Humidity:** 37%	
Customer Ref. No.: N/A	**Power:** N/A	**Job Site:** EV01	

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(c)	**Year:**	2000	**Method:** ANSI C63.4	**Year:**	1992

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Attenuation Factor - Amplifier Gain
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

No hop, Armstrong-Centurion antenna horizontal.

EUT OPERATING MODES

See Comments

DEVIATIONS FROM TEST STANDARD

None

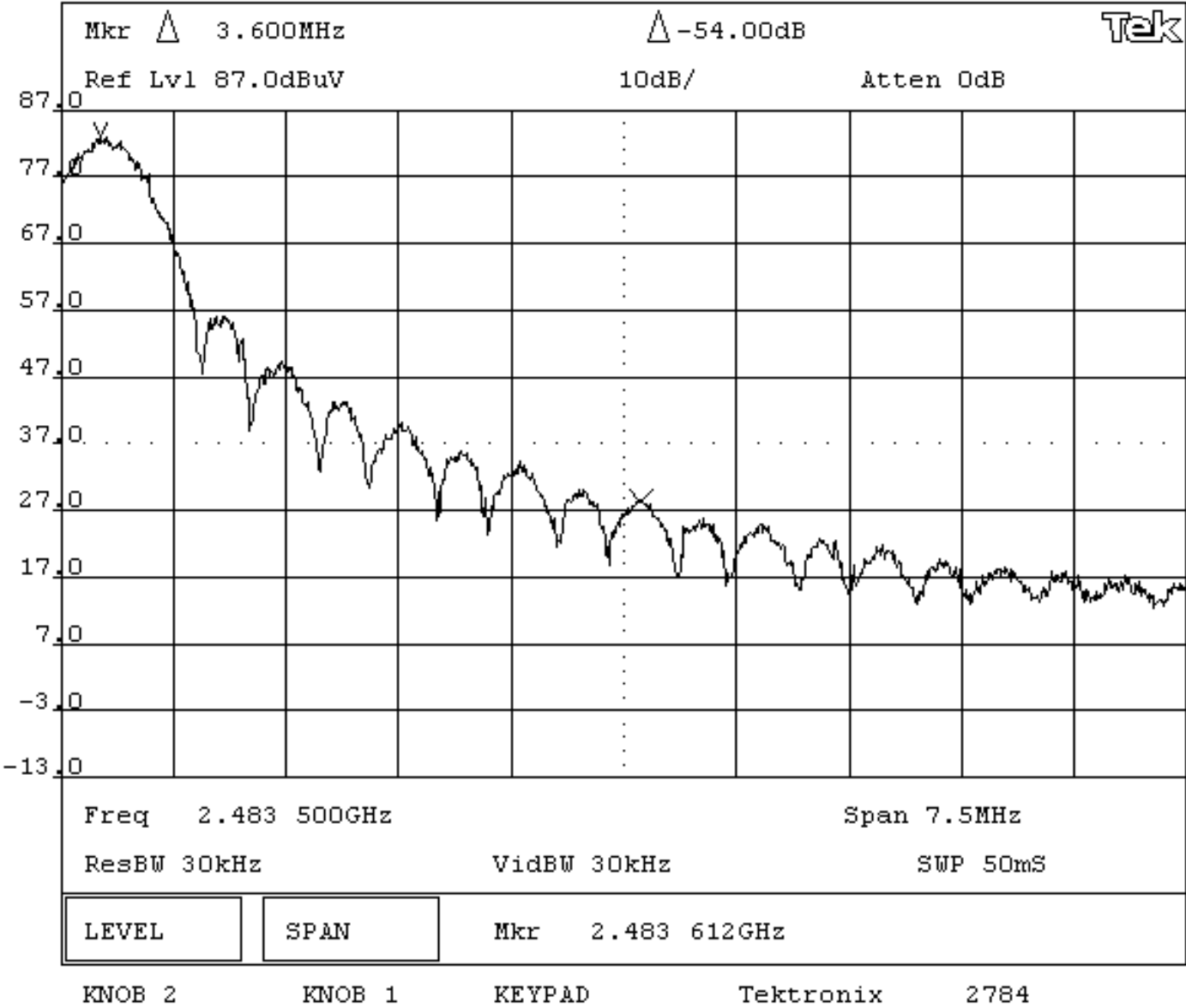| RESULTS		DISTANCE (m)	LINE	RUN
FAIL		3		

OTHER

Tested By

Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor (dB/m)	Antenna Polarity	Preamp Gain (dB)	Cable Loss (dB)	Table Azimuth (degrees)	Antenna Height (meters)	Adjusted Level (dBuV/m)	Spec. Limit (dBuV/m)	Margin (dB)	Comment
2480.000	83.6	PK	30.6	HHRN	0.0	2.6	79.0	2.2	116.8	74.0	42.8	Fundamental emission - High Xmit Frequency
2480.000	78.7	PK	30.6	VHRN	0.0	2.6	360.0	1.8	111.9	74.0	37.9	Fundamental emission - High Xmit Frequency
2483.612	N/A	PK	N/A	HHRN	N/A	N/A	79.0	2.2	62.8	74.0	-11.2	High frequency. Marker-Delta method used to calculate Adjusted Level. Adjusted level = 116.8 dBuV/m - 54 dB
2483.605	N/A	PK	N/A	VHRN	N/A	N/A	360.0	1.8	58.9	74.0	-15.1	High frequency. Marker-Delta method used to calculate Adjusted Level. Adjusted level = 111.9 dBuV/m - 53 dB
4804.000	52.6	PK	34.6	HHRN	34.3	4.4	200.0	1.3	57.3	74.0	-16.8	Low frequency
4804.000	51.3	PK	34.6	VHRN	34.3	4.4	239.0	1.2	56.0	74.0	-18.0	Low frequency
4880.000	47.1	PK	34.8	HHRN	34.3	4.4	213.0	1.7	52.0	74.0	-22.1	Mid frequency
4880.000	48.2	PK	34.8	VHRN	34.3	4.4	110.0	1.4	53.1	74.0	-21.0	Mid frequency
4960.000	51.5	PK	35.0	HHRN	34.3	4.5	212.0	1.4	56.7	74.0	-17.4	High frequency
4960.000	49.1	PK	35.0	VHRN	34.3	4.5	93.0	1.1	54.3	74.0	-19.7	High frequency
7320.000	49.0	PK	37.7	VHRN	31.8	5.9	212.0	1.4	60.8	74.0	-13.3	Mid frequency
7320.000	48.0	PK	37.7	HHRN	31.8	5.9	156.0	1.5	59.8	74.0	-14.3	Mid frequency
7440.000	52.4	PK	37.9	VHRN	31.4	5.9	227.0	1.4	64.8	74.0	-9.3	High frequency
7440.000	51.0	PK	37.9	HHRN	31.4	5.9	147.0	1.1	63.4	74.0	-10.7	High frequency

Radiated and Conducted Emissions

Rev 4.10
07/06/01

EUT: 6330		**Work Order:** SPAC0264	
Serial Number: A30549980020A6386465		**Date:** 08/18/01	
Customer: SpaceLabs Medical		**Temperature:** 21	
Attendees: N/A	**Tester:** Rod Peloquin	**Humidity:** 37%	
Customer Ref. No.: N/A	**Power:** N/A	**Job Site:** EV01	

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(c)	**Year:**	2000	**Method:** ANSI C63.4	**Year:**	1992

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Attenuation Factor - Amplifier Gain
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

No hop, Armstrong-Centurion antenna horizontal. Average reading reflects the application of duty cycle correction factor of 11.44dB

EUT OPERATING MODES

See Comments

DEVIATIONS FROM TEST STANDARD

None

RESULTS	**DISTANCE (m)**	**LINE**	**RUN**
FAIL	3		

OTHER

Tested By

Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor (dB/m)	Antenna Polarity	Preamp Gain (dB)	Cable Loss (dB)	Table Azimuth (degrees)	Antenna Height (meters)	Adjusted Level (dBuV/m)	Spec. Limit (dBuV/m)	Margin (dB)	Comment
2480.000	71.8	AV	30.6	HHRN	0.0	2.6	79.0	2.2	105.0	54.0	51.0	Fundamental emission - High Xmit Frequency
2480.000	66.8	AV	30.6	VHRN	0.0	2.6	360.0	1.8	100.0	54.0	46.0	Fundamental emission - High Xmit Frequency
2483.612	N/A	AV	N/A	HHRN	N/A	N/A	79.0	2.2	51.0	54.0	-3.0	High frequency. Marker-Delta method used to calculate Adjusted Level. Adjusted level = 105.0 dBuV/m - 54 dB
2483.605	N/A	AV	N/A	VHRN	N/A	N/A	360.0	1.8	47.0	54.0	-7.0	High frequency. Marker-Delta method used to calculate Adjusted Level. Adjusted level = 100.0 dBuV/m - 53 dB
4804.000	36.9	AV	34.6	VHRN	34.3	4.4	239.0	1.2	41.6	54.0	-12.4	Low frequency
4804.000	38.1	AV	34.6	HHRN	34.3	4.4	200.0	1.3	42.8	54.0	-11.2	Low frequency
4880.000	31.3	AV	34.8	HHRN	34.3	4.4	213.0	1.7	36.2	54.0	-17.8	Mid frequency
4880.000	32.6	AV	34.8	VHRN	34.3	4.4	110.0	1.4	37.5	54.0	-16.5	Mid frequency
4960.000	37.1	AV	35.0	HHRN	34.3	4.5	212.0	1.4	42.3	54.0	-11.7	High frequency
4960.000	34.3	AV	35.0	VHRN	34.3	4.5	93.0	1.1	39.5	54.0	-14.5	High frequency
7320.000	31.7	AV	37.7	VHRN	31.8	5.9	212.0	1.4	43.5	54.0	-10.5	Mid frequency
7320.000	30.0	AV	37.7	HHRN	31.8	5.9	156.0	1.5	41.8	54.0	-12.2	Mid frequency
7440.000	36.0	AV	37.9	VHRN	31.4	5.9	227.0	1.4	48.4	54.0	-5.6	High frequency
7440.000	34.5	AV	37.9	HHRN	31.4	5.9	147.0	1.1	46.9	54.0	-7.1	High frequency

Band Edge compliance, Marker Delta Method, SPAC0264 Horizontal

Band Edge compliance, Marker Delta Method, SPAC0264 Vertical

Mkr △ 3.578MHz   △−53.00dB   Tek

Ref Lvl 87.0dBuV   10dB/   Atten 0dB

87.0

77.0

67.0

57.0

47.0

37.0

27.0

17.0

7.0

−3.0

−13.0

Freq   2.483 500GHz   Span 7.5MHz

ResBW 30kHz   VidBW 30kHz   SWP 50mS

LEVEL   SPAN   Mkr   2.483 605GHz

KNOB 2   KNOB 1   KEYPAD   Tektronix   2784