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.

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	630005SL-01900122	0020A6341F4A
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

Spurious RF Radiated Emissions

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 11.1 dB, derived from 20log(dwell time/100ms), where the EUT's maximum dwell time in any 100mS period was measured to be 27.8 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:

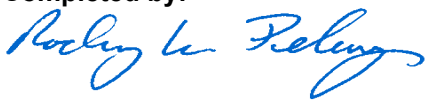
1. In-band field strength of the fundamental was measured in both polarities
2. Amplitude delta between the fundamental and highest band-edge emission was measured in both polarities.
3. For each polarity, the amplitude delta from step #2 was subtracted from the field strength level of step #1.

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:



NORTHWEST
EMC

Radiated and Conducted Emissions

Rev 4.10
07/06/01

EUT:	630005SL-01900122			Work Order:	SPAC0275
Serial Number:	A302701540020A6341F4A			Date:	11/02/01
Customer:	SpaceLabs Medical			Temperature:	22
Attendees:	N/A	Tester:	Rod Peloquin	Humidity:	42%
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

90310-A, Armstrong-Centurion antenna, Average readings reflect application of dwell time duty cycle correction factor of 11.1dB.

EUT OPERATING MODES

See Comments

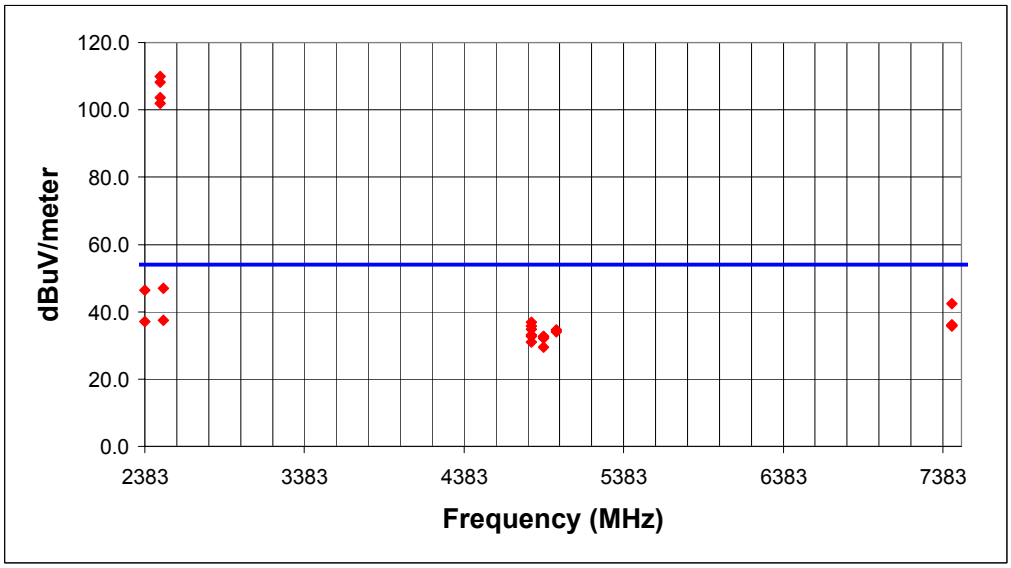
DEVIATIONS FROM TEST STANDARD

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
2383.300	47.4	AV	30.4	VHRN	34.0	2.6	79.0	1.2	46.4	54.0	-7.6	Low Frequency, EUT antenna vertical
2383.300	38.1	AV	30.4	HHRN	34.0	2.6	71.0	1.4	37.1	54.0	-16.9	Low Frequency, EUT antenna vertical
2480.000	76.8	AV	30.6	VHRN	0.0	2.6	76.0	1.1	110.0	54.0	56.0	Fundamental, High Frequency, EUT antenna vertical
2480.000	70.4	AV	30.6	VHRN	0.0	2.6	99.0	1.1	103.6	54.0	49.6	Fundamental, High Frequency, EUT antenna horizontal
2480.000	75.0	AV	30.6	HHRN	0.0	2.6	76.0	2.2	108.2	54.0	54.2	Fundamental, High Frequency, EUT antenna horizontal
2480.000	68.7	AV	30.6	HHRN	0.0	2.6	117.0	1.8	101.9	54.0	47.9	Fundamental, High Frequency, EUT antenna vertical
2499.400	47.5	AV	30.7	VHRN	33.9	2.6	77.0	1.1	46.9	54.0	-7.1	High Frequency, EUT antenna vertical
2499.400	38.2	AV	30.7	HHRN	33.9	2.6	68.0	1.1	37.6	54.0	-16.5	High Frequency, EUT antenna vertical
4804.000	28.3	AV	34.6	VHRN	34.3	4.4	167.0	1.2	33.0	54.0	-21.0	Low Frequency, EUT antenna horizontal
4804.000	32.2	AV	34.6	HHRN	34.3	4.4	197.0	1.2	36.9	54.0	-17.1	Low Frequency, EUT antenna horizontal
4804.000	28.0	AV	34.6	VHRN	34.3	4.4	91.0	1.1	32.7	54.0	-21.3	Low Frequency, EUT antenna vertical
4804.000	30.1	AV	34.6	HHRN	34.3	4.4	204.0	1.1	34.8	54.0	-19.2	Low Frequency, EUT antenna vertical
4804.000	31.0	AV	34.6	HHRN	34.3	4.4	203.0	1.1	35.7	54.0	-18.3	Low Frequency, EUT antenna horizontal
4804.000	26.3	AV	34.6	VHRN	34.3	4.4	136.0	1.1	31.0	54.0	-23.1	Low Frequency, EUT antenna horizontal
4880.000	24.7	AV	34.8	VHRN	34.3	4.4	122.0	1.4	29.6	54.0	-24.5	Mid Frequency, EUT antenna horizontal
4880.000	27.3	AV	34.8	HHRN	34.3	4.4	205.0	1.2	32.2	54.0	-21.9	Mid Frequency, EUT antenna horizontal
4880.000	27.6	AV	34.8	HHRN	34.3	4.4	115.0	1.2	32.5	54.0	-21.5	Mid Frequency, EUT antenna Vertical
4880.000	27.8	AV	34.8	VHRN	34.3	4.4	91.0	1.1	32.7	54.0	-21.4	Mid Frequency, EUT antenna Vertical
4960.000	28.9	AV	35.0	VHRN	34.3	4.5	77.0	1.3	34.1	54.0	-20.0	High Frequency, EUT antenna vertical
4960.000	29.4	AV	35.0	HHRN	34.3	4.5	140.0	1.4	34.6	54.0	-19.4	High Frequency, EUT antenna vertical
7440.000	30.0	AV	37.9	VHRN	31.4	5.9	318.0	1.2	42.4	54.0	-11.7	High Frequency, EUT antenna horizontal
7440.000	23.5	AV	37.9	HHRN	31.4	5.9	90.0	1.1	35.9	54.0	-18.1	High Frequency, EUT antenna vertical
7440.000	23.3	AV	37.9	HHRN	31.4	5.9	2.0	1.2	35.7	54.0	-18.3	High Frequency, EUT antenna horizontal
7440.000	23.7	AV	37.9	VHRN	31.4	5.9	319.0	1.2	36.1	54.0	-17.9	High Frequency, EUT antenna vertical

NORTHWEST EMC

Radiated and Conducted Emissions

Rev 4.10
07/06/01

EUT:	630005SL-01900122			Work Order:	SPAC0275
Serial Number:	A302701540020A6341F4A			Date:	11/02/01
Customer:	SpaceLabs Medical			Temperature:	22
Attendees:	N/A	Tester:	Rod Peloquin	Humidity:	42%
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

90310-A, Armstrong-Centurion antenna, Average readings reflect application of dwell time duty cycle correction factor of 11.1dB.

EUT OPERATING MODES

See Comments

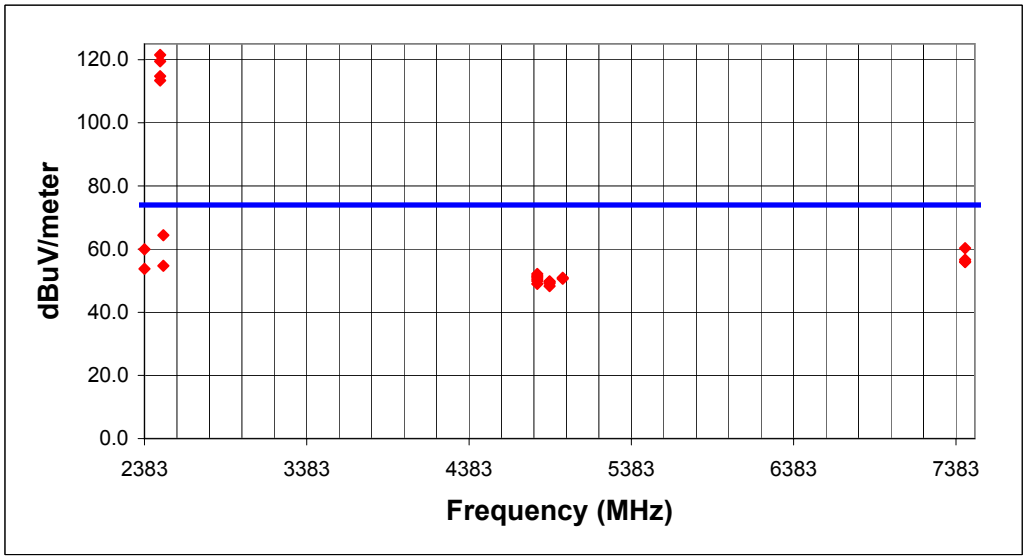
DEVIATIONS FROM TEST STANDARD

None

RESULTS	DISTANCE (m)	LINE	RUN
FAIL	3		

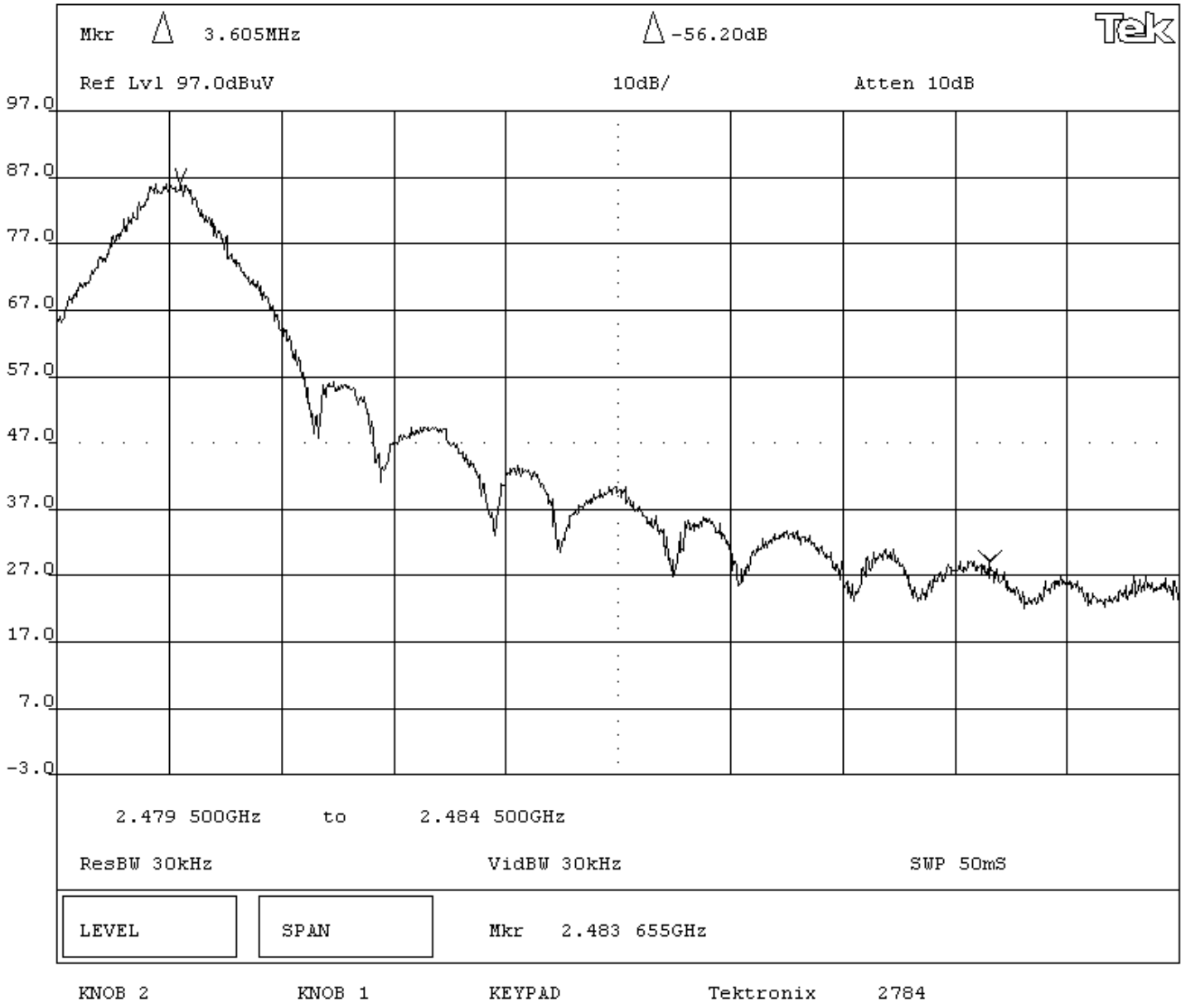
OTHER

Tested By

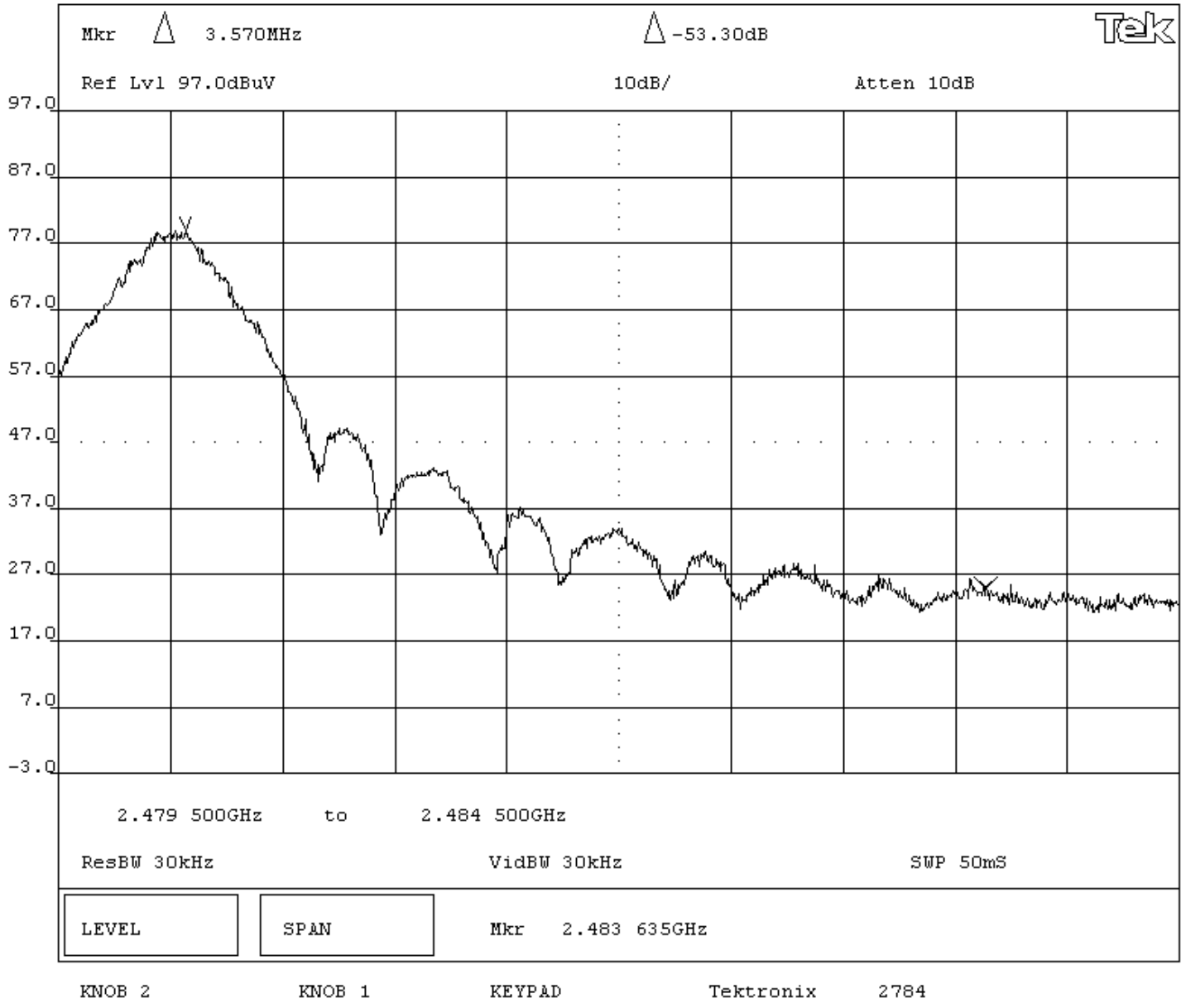


Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor (dB/m)	Antenna Polarity	Preamp Gain (dB)	Cable Loss (dB)	Table Azimuth (degrees)	Antenna Height (meters)	Adjusted Level (dBuV/m)	Spec. Limit (dBuV/m)	Margin (dB)	Comment
2383.300	61.0	PK	30.4	VHRN	34.0	2.6	79.0	1.2	60.0	74.0	-14.1	Low Frequency, EUT antenna vertical
2383.300	54.8	PK	30.4	HHRN	34.0	2.6	71.0	1.4	53.8	74.0	-20.3	Low Frequency, EUT antenna vertical
2480.000	88.3	PK	30.6	VHRN	0.0	2.6	76.0	1.1	121.5	74.0	47.5	Fundamental, High Frequency, EUT antenna vertical
2480.000	81.6	PK	30.6	VHRN	0.0	2.6	99.0	1.1	114.8	74.0	40.8	Fundamental, High Frequency, EUT antenna horizontal
2480.000	86.3	PK	30.6	HHRN	0.0	2.6	76.0	2.2	119.5	74.0	45.5	Fundamental, High Frequency, EUT antenna horizontal
2480.000	80.2	PK	30.6	HHRN	0.0	2.6	117.0	1.8	113.4	74.0	39.4	Fundamental, High Frequency, EUT antenna vertical
2499.400	65.0	PK	30.7	VHRN	33.9	2.6	77.0	1.1	64.4	74.0	-9.6	High Frequency, EUT antenna vertical
2499.400	55.3	PK	30.7	HHRN	33.9	2.6	68.0	1.1	54.7	74.0	-19.3	High Frequency, EUT antenna vertical
4804.000	45.2	PK	34.6	VHRN	34.3	4.4	167.0	1.2	49.9	74.0	-24.1	Low Frequency, EUT antenna horizontal
4804.000	47.5	PK	34.6	HHRN	34.3	4.4	197.0	1.2	52.2	74.0	-21.9	Low Frequency, EUT antenna horizontal
4804.000	45.8	PK	34.6	VHRN	34.3	4.4	91.0	1.1	50.5	74.0	-23.5	Low Frequency, EUT antenna vertical
4804.000	46.4	PK	34.6	HHRN	34.3	4.4	204.0	1.1	51.1	74.0	-22.9	Low Frequency, EUT antenna vertical
4804.000	46.9	PK	34.6	HHRN	34.3	4.4	203.0	1.1	51.6	74.0	-22.5	Low Frequency, EUT antenna horizontal
4804.000	44.3	PK	34.6	VHRN	34.3	4.4	136.0	1.1	49.0	74.0	-25.0	Low Frequency, EUT antenna horizontal
4880.000	43.4	PK	34.8	VHRN	34.3	4.4	122.0	1.4	48.3	74.0	-25.7	Mid Frequency, EUT antenna horizontal
4880.000	44.3	PK	34.8	HHRN	34.3	4.4	205.0	1.2	49.2	74.0	-24.9	Mid Frequency, EUT antenna horizontal
4880.000	44.9	PK	34.8	HHRN	34.3	4.4	115.0	1.2	49.8	74.0	-24.2	Mid Frequency, EUT antenna Vertical
4880.000	44.7	PK	34.8	VHRN	34.3	4.4	91.0	1.1	49.6	74.0	-24.5	Mid Frequency, EUT antenna Vertical
4960.000	45.4	PK	35.0	VHRN	34.3	4.5	77.0	1.3	50.6	74.0	-23.4	High Frequency, EUT antenna vertical
4960.000	45.7	PK	35.0	HHRN	34.3	4.5	140.0	1.4	50.9	74.0	-23.1	High Frequency, EUT antenna vertical
7440.000	47.9	PK	37.9	VHRN	31.4	5.9	318.0	1.2	60.3	74.0	-13.7	High Frequency, EUT antenna horizontal
7440.000	44.3	PK	37.9	VHRN	31.4	5.9	319.0	1.2	56.7	74.0	-17.4	High Frequency, EUT antenna vertical
7440.000	43.5	PK	37.9	HHRN	31.4	5.9	2.0	1.2	55.9	74.0	-18.1	High Frequency, EUT antenna horizontal
7440.000	43.7	PK	37.9	HHRN	31.4	5.9	90.0	1.1	56.1	74.0	-18.0	High Frequency, EUT antenna vertical

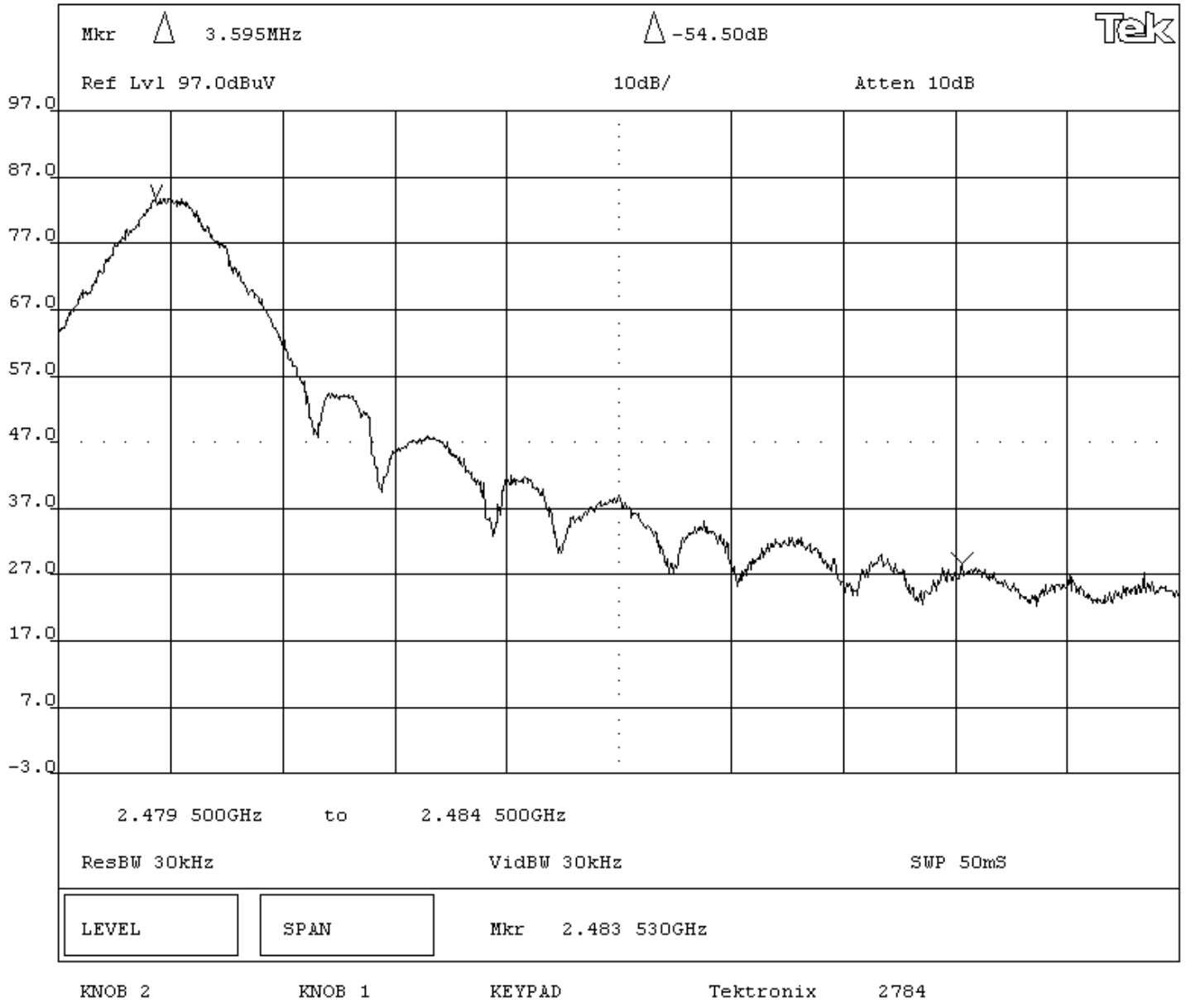
SPAC0275 Radiated Spurious Emissions Band Edge compliance
High frequency, Receive Antenna Vertical, EUT antenna vertical



High frequency, Receive Antenna Horizontal, EUT antenna vertical



High frequency, Receive Antenna Horizontal, EUT antenna horizontal



High frequency, Receive Antenna Vertical, EUT antenna horizontal