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## FCC PART 15.247 TEST REPORT

### DIGITAL SPREAD SPECTRUM

Applicant	SRI PMD, INC.	
Address	751 NORTH DRIVE	
	MELBOURNE FLORIDA 32934 USA	
FCC ID	VPT-BETALINKPLUS	
Product Description	DIGITAL TELEMETRY RADIO	
Date Sample Received	10/8/2007	
Date Tested	10/10/2007	
Tested By	JOSEPH SCOGLIO	
Approved By	MARIO DE ARANZETA	
Report Number	3298AUT7TestReport.doc	
Test Results	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL  
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**



Testing Certificate # 0955-01



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## **GENERAL REMARKS**

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

### **Summary**

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

### **Attestations**

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.



Testing Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.  
849 NW State Road 45  
Newberry, FL 32669

**Authorized Signatory Name:** *Mario de Aranzeta*

Mario de Aranzeta C.E.T.  
Compliance Engineer/ Lab. Supervisor

**Date:** 10/10/2007

APPLICANT: SRI PMD, INC  
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## GENERAL INFORMATION

### DUT Specification

The test results relate only to the items tested.			
Applicable Standard	Part 15.247		
DUT Description	DIGITAL TELEMETRY RADIO		
FCC ID	VPT-BETALINKPLUS		
Operating Frequency	TX: 902-928 MHz	RX: N/A	
Modulations	FSK with optional Digital Spread Spectrum		
DUT Power Source	<input type="checkbox"/> 110-120Vac/50- 60Hz		
	<input type="checkbox"/> DC Power		
	<input checked="" type="checkbox"/> Battery Operated Exclusively		
Test Item	<input type="checkbox"/> Prototype	<input checked="" type="checkbox"/> Pre-Production	<input type="checkbox"/> Production
Type of Equipment	<input type="checkbox"/> Fixed	<input type="checkbox"/> Mobile	<input checked="" type="checkbox"/> Portable
Antenna Connector	No antenna connector/ permanent connection		
Test Facility	Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.		
Test Conditions	Temperature: 26°C Relative humidity: 50%		
Test Exercise	The DUT was placed in continuous transmit mode of operation.		
Modifications	None		

### Test Supporting Equipment

Supporting Device	Manufacturer	Model / FCC ID	Serial Number
N/A			

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## EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/20/07	3/19/10
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	Listed 5/11/07	5/10/10
AC Voltmeter	HP	400FL	2213A14499	CAL 12/29/06	12/29/08
Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 3/30/07	3/30/09
Antenna: Dipole Kit	Electro-Metrics	TDA-30/1-4	153	CHAR 4/5/06	4/5/09
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	CAL 12/1/06	12/1/08
Modulation Analyzer	HP	8901A	3435A06868	CAL 5/9/07	5/9/09
Digital Multimeter	Fluke	FLUKE-77-3	79510405	CAL 5/14/07	5/14/09
Analyzer Open-Frame Tower Preamplifier	HP	8449B	3008A01075	CAL 6/20/07	6/20/09
Analyzer Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 10/30/06	10/30/08
Analyzer Silver Tower RF Preselector	HP	85685A	2620A00294	CAL 3/6/07	3/6/09
Analyzer Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 10/30/06	10/30/08
System One	Audio Precision	System One	SYS1-45868	CHAR 3/27/06	3/27/08
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/05	12/8/07
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 12/8/05	12/8/07
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/05	12/7/07
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/05	12/7/07
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 3/23/06	3/23/08

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## TEST PROCEDURES

**Radiation Interference:** ANSI C63.4-2003 using a spectrum analyzer, a preselector, a quasi-peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz with an appropriate sweep speed and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3 MHz above 1 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

**Formula Of Conversion Factors:** The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

Example:

$$\begin{array}{llll}
 \text{Freq (MHz)} & \text{Meter Reading} & + \text{ACF} & + \text{CL} = \text{FS} \\
 33 & 20 \text{ dBuV} & + 10.36 \text{ dB} & + 0.5 = 30.86 \text{ dBuV/m @ 3m}
 \end{array}$$

**Power Line Conducted Interference:** The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

**Occupied Bandwidth:** A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

**Bandwidth 6.0dB:** The measurements were made with the spectrum analyzer's resolution bandwidth (RBW)=1.0MHz and the video bandwidth (VBW) =3.0MHz and the span set as shown on plot.

**Power Output:** The RF power output was measured at the antenna feed point using a peak power meter.

**Antenna Conducted Emissions:** The RBW=100 kHz, VBW=300 kHz and the span set to 10 MHz and the spectrum was scanned from 30 MHz to the 10<sup>th</sup> Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

**ANSI C63.4-2003 10.1 Measurement Procedures:** The DUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The DUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

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## RADIATION INTERFERENCE

**Rules Part No.:** 15.247, 15.209

**Requirements:**

Frequency	Limits
Part 15.209	
9 to 490 kHz	2400/F (kHz) $\mu$ V/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) $\mu$ V/m @ 30 meters
1705 kHz to 30 MHz	29.54 dB $\mu$ V/m @ 30 meters
30 – 88	40.0 dB $\mu$ V/m @ 3 meters
80 – 216	43.5 dB $\mu$ V/m @ 3 meters
216 – 960	46.0 dB $\mu$ V/m @ 3 meters
Above 960	54.0 dB $\mu$ V/m @ 3 meters
Part 15.249	
Fundamental 902 – 928 MHz	127.37 dB $\mu$ V/m @ 3 meters
Fundamental 2.4 – 2.4835 MHz	127.37 dB $\mu$ V/m @ 3 meters
Harmonics	54.0 dB $\mu$ V/m @ 3 meters

Any emissions that fall in the restricted bands (15.205) must be less than or equal to 54 dB $\mu$ V/m. Spurious emissions not in a restricted band must be 20 dBc.

**Test Data:**

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dB $\mu$ V	Ant. Pol	Coax Loss dB	Correction Factor  dB/m	Field Strength dB $\mu$ V/m	Margin dB
906.8	906.80	72.0	H	1.96	23.37	97.33	30.04
906.8	906.80	84.3	V	1.96	22.63	108.89	18.48
906.8	1,813.60	16.7	V	2.75	30.01	49.46	39.43
915.0	915.00	71.8	H	1.97	23.35	97.12	30.25
915.0	915.00	84.7	V	1.97	22.60	109.27	18.10
915.0	1,830.00	17.0	V	2.76	30.11	49.87	39.40
922.1	922.10	71.5	H	1.98	23.34	96.82	30.55
922.1	922.10	84.7	V	1.98	22.62	109.30	18.07
922.1	1,844.30	16.8	V	2.78	30.20	49.78	39.52

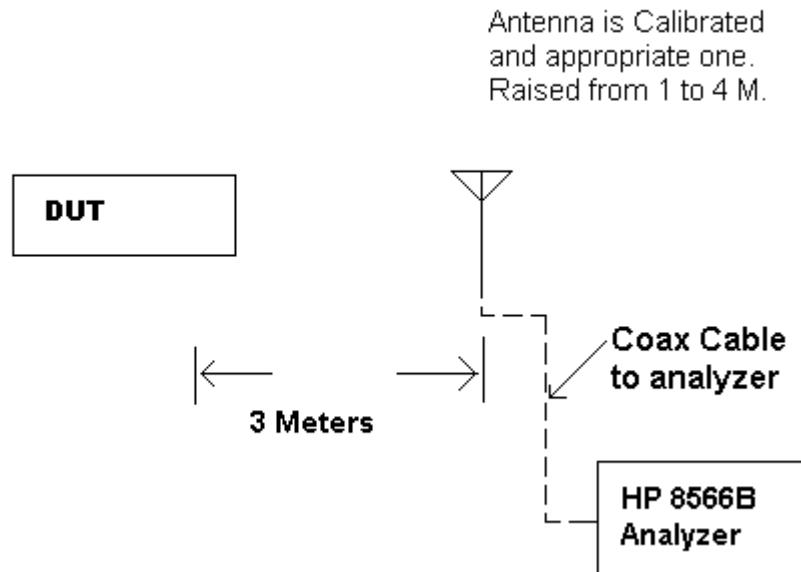
\*Harmonics were checked through the 10<sup>th</sup> harmonic

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**Method of Measuring Radiated Spurious Emissions**



**METHOD OF MEASUREMENT:** The procedure used was ANSI C63.4-2003 & the FCC/OET Guidance on Measurements for Direct Sequence Spread Spectrum Systems – Public Notice 54797 Dated July 12, 1995. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669.

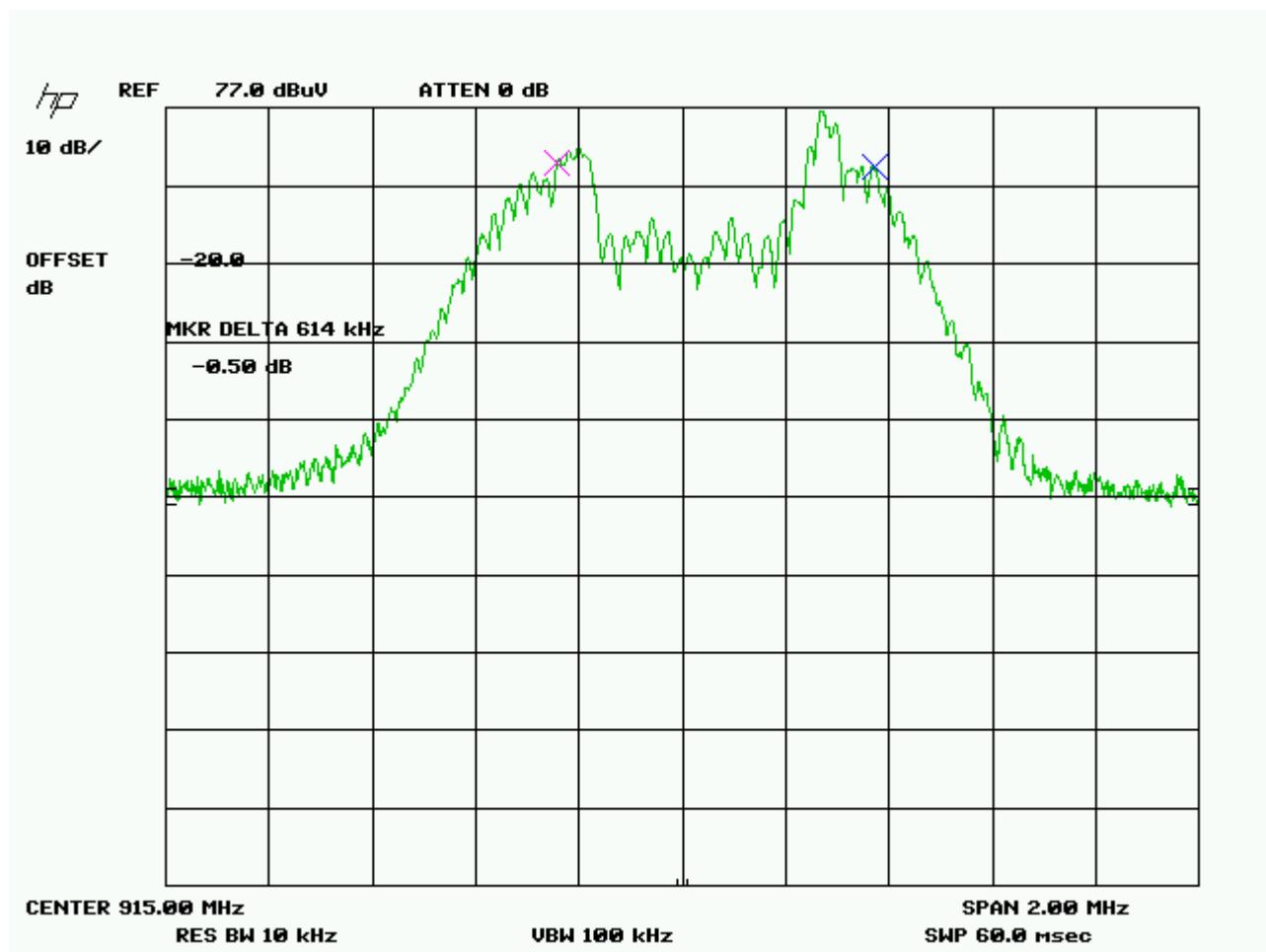
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## OCCUPIED BANDWIDTH

**Rules Part No.:** 15.247(a)(2)

**Requirements:** The 6 dB bandwidth must be greater than 500 kHz.

**Test Data:**



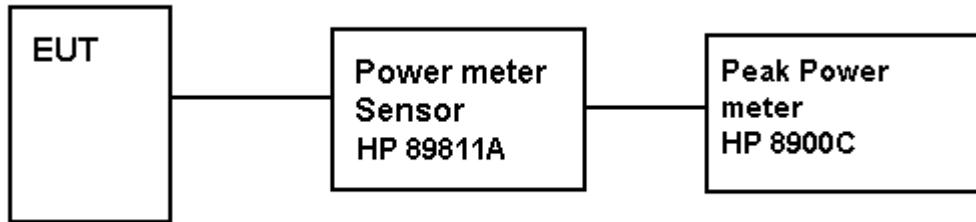
**6 dB OCCUPIED BANDWIDTH PLOT**

**3 places in the band were tested and the worst case is being reported.**

## POWER OUTPUT

**Rules Part :** 15.247(b) 1.0Watt conducted, 4W ERP

TEST SET UP:



\*Harmonics were checked through the 10<sup>th</sup> harmonic\*

**Test Results:** 0.016W ERP (worst case)

### Conducted output power:

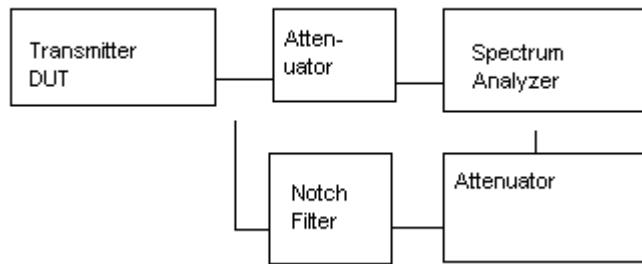
MHz	dBm
906.8	9.6
915	9.5
922.1	9.4

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

**Requirements:** Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

**Test Data:** Not applicable. Antenna permanently installed

### 15.247(c)    Method of Measuring RF Conducted Spurious Emissions



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## POWER LINE CONDUCTED INTERFERENCE

**Rules Part No.:** 15.207

**Requirements:**

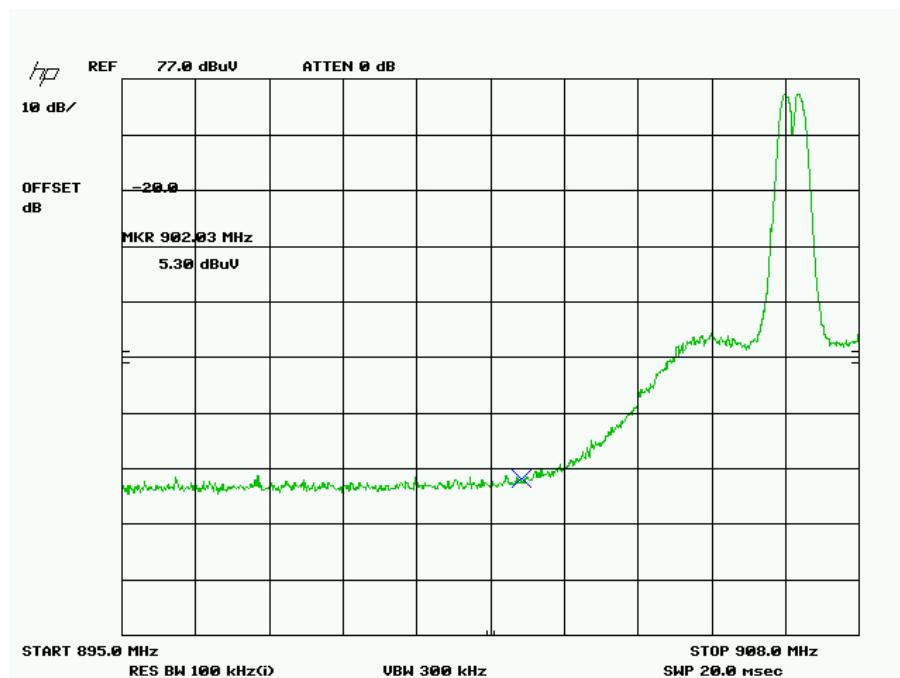
Frequency (MHz)	Quasi Peak Limits (dBuv)	Average Limits (dBuV)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

**Test Data:** N/A. Battery powered DUT.

## RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

**Requirements:** Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54 dBuV/m).

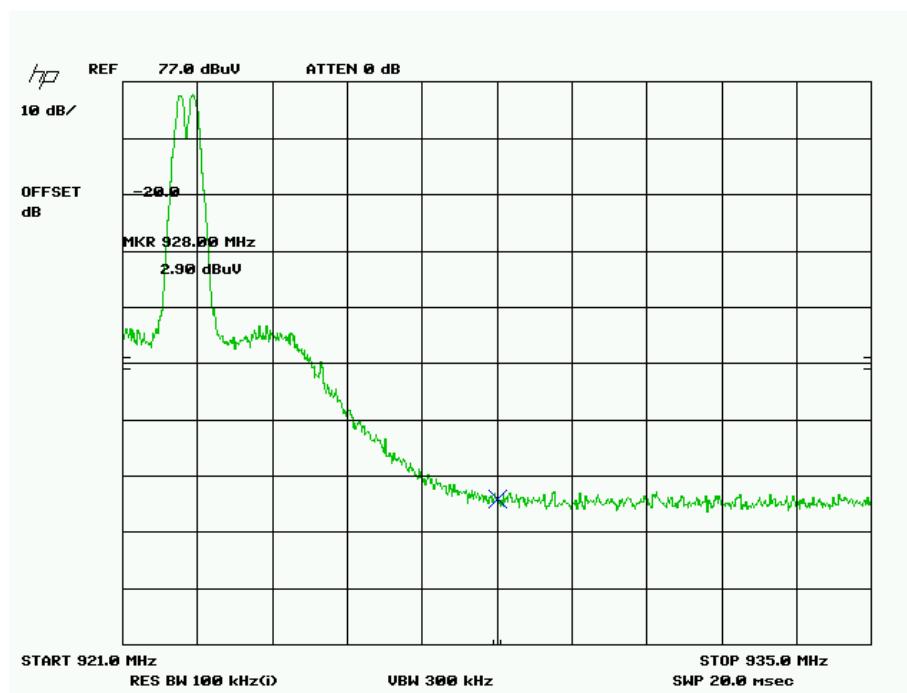
**Test Procedure:** An in band field strength measurement of the fundamental Emission using the RBW and detector function required by C63.4-2000 and FCC Rules. The procedure was repeated with an average detector and a plot made. The calculated field strength in the adjacent restricted band is presented below.



**BANDEdge LOWER PEAK 1 10dB PAD**

FS from plot	5.3dBuV
Attenuator	10 dB
ACF	23.3 dB/m
Coax loss	<u>1.96dB</u>
Total	40.56 dBuV/m

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**UPPER BANDEDGE PEAK 10dB PAD**

FS from plot	2.9 dBuV
Attenuator	10 dB
ACF	22.62 dB/m
Coax loss	<u>1.99dB</u>
Total	37.51 dBuV/m

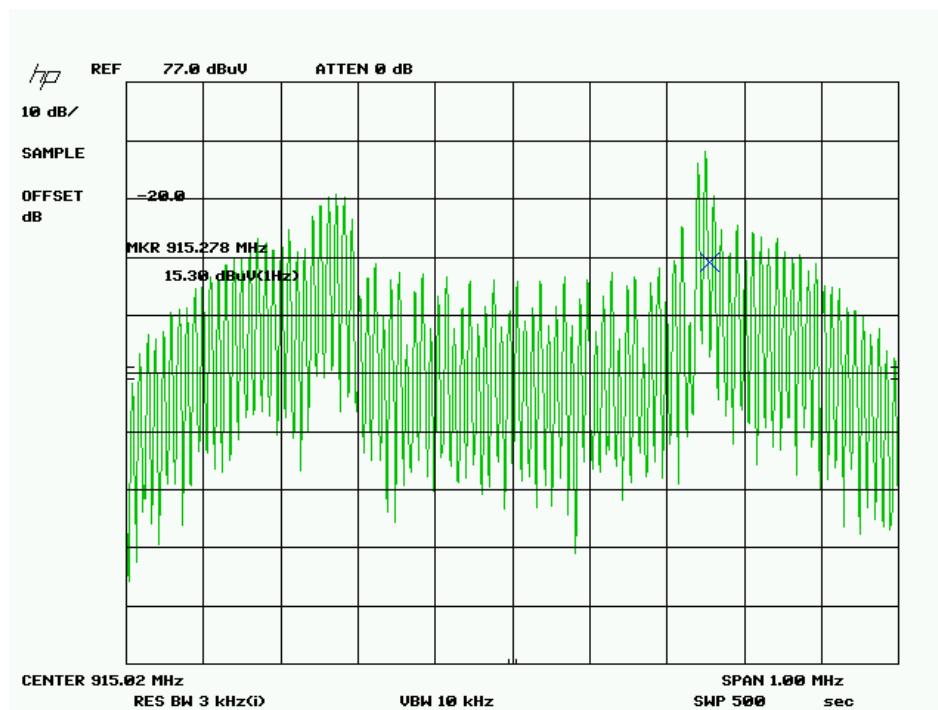
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## POWER SPECTRAL DENSITY

**Rules Part No.:** 15.247(d)

**Requirements:** The peak level measured must be no greater than +8.0 dBm.

**Test Data:** SEE THE FOLLOWING PLOT



From plot	15.3 dBuV
Attenuator	50 dB
CF (1 Hz)	<u>35 dB</u>
Total	<u>100.3 dBuV</u>
-107	-6.7 dBm

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