Intertek Testing Services

FCC Part 15.249 Test Report
for
Preco Inc.
on the
Time Domain Radar
Model: PV2000
FCC ID:

Test Report #: J99032486b
Date of Report: March 15, 2000

Job #: J99032486
Date of Test: 1/11 & 20/00

Total No. of Pages Contained in this Report: 13 + data pages

NVLAP

Table of Contents

1.0 Summary of Test Results

MODEL: PV2000
FCC ID:

TEST	REFERENCE	RESULTS
Radiated Emission	15.249	Complies
Conducted Emission	15.207	Not Applicable
Antenna Requirement	15.203	Complies

Test Engineer: Xi-Ming Yang Date: 3-20-2000
Xi-Ming Yang

Team Leader: David Chernomordik Date: 3/20/00
David Chernomordik

2.0 General Description

2.1 Product Description

The PV2000 is designed to detect objects within 8 meters and alert user with audible and visual notification.

2.2 Related Submittal(s) Grants

This report is for use with an application for certification of a low power transmitter. One transmitter is included in the application. This specific report details the emission characteristics of transmitter.

The FCC ID for the receiver associated with this transmitter is . The receivers are subject to the notification authorization process. A notification report has been prepared for the receiver

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in Open Area Test Sites. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Justification Section" of this Application.

2.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is Site 1. This test facility and site measurement data have been fully placed on file with the FCC and NVLAP accredited.

3.0 System Test Configuration

3.1 Justification

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst case emissions.

For the measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power without modulation.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Detector function is in peak mode. 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.

3.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

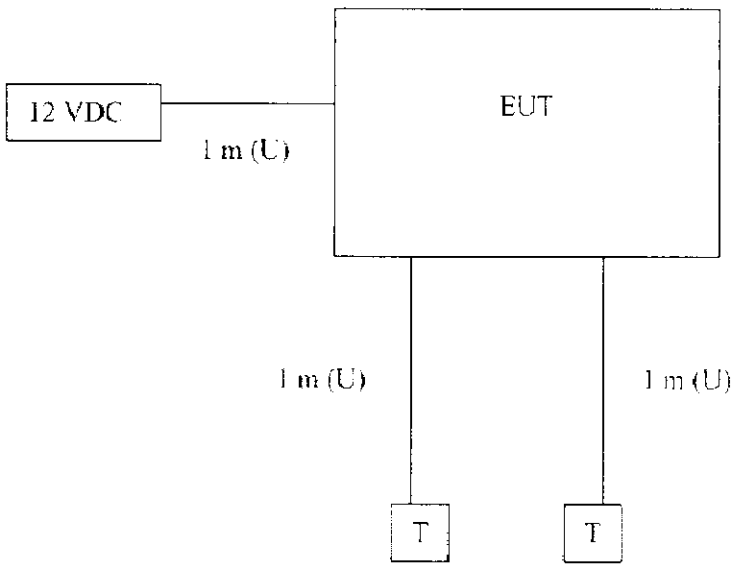
For emissions testing, the units were setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

3.3 System Test Configuration

3.3.1 Support Equipment

No support equipment needed.

3.3.2 Block Diagram of Test Setup



* = EUT ** = No ferrites on video cable	S = Shielded; U = Unshielded	F = With Ferrite

3.4 Equipment Modification

Any modifications installed previous to testing by Preco Inc. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services

3.5 Additions, deviations and exclusions from standards

No additions, exclusions or deviations were made to the standard.

4.0 Emission Results

AC line conducted emission measurements were performed from 0.45 MH to 30 MHz. Analyzer resolution is 10 kHz or greater.

Radiated emission measurements were performed from 30 MHz to 40000 MHz. Analyzer resolution is 100 kHz or greater for 30 MHz to 1000 MHz, 1 MHz for >1000 MHz.

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.

4.1 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(μV/m)
RA = Receiver Amplitude (including preamplifier) in dB(μV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB/m
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(μV/m)
RR = RA - AG in dB(μV)
LF = CF + AF in dB

Assume a receiver reading of 52.0 dB(μV) is obtained. The antenna factor of 7.4 dB/m and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB(μV/m). This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dB(μV) AF = 7.4 dB/m
RR = 23.0 dB(μV) CF = 1.6 dB
LF = 9.0 dB AG = 29.0 dB

FS = RR + LF
FS = 23 + 9 = 32 dB(μV/m)

Level in μV/m = Common Antilogarithm {[32 dB(μV/m)]/20} = 39.8 μV/m

Duty cycle was calculated as following:

PRF (Pous Repetition Frequency) = 5 MHz
Pous width = 10 nano sec. $T = 1 / 10^{6} = 2 \times 10^{-7}$ (S)

Duty cycle = t/T = $10 \times 10^{-9} / 2 \times 10^{-7} = 0.05$

Therefore, theoretical duty cycle is 26 dB only 20 dB was used.

4.2 Radiated Emission Data

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

Results:	**Passed** by 5.3 dB at 240 MHz

Note: a) All emissions not reported are at least 10 dB below the limits

ITS Intertek Testing Services

Company: Preco
Project #: J99032486
Model: Radar
Engineer: Xi-Ming Yang
Date of test: January 11, 2000

FCC15.249 Radiated Emissions

Frequency	Antenna Polarity	Reading	Antenna Factor	Cable Loss	Pre-amp	Duty Cyco	Distance Factor	Corrected Reading	Limit	Margin
MHz	H/V	dB(uV)	dB	dB	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB
5814.80	H	58.5	36.2	3.7	28.3	20.0	0.0	50.1	94.0	-43.9
5724.20	H	56.6	36.2	3.7	28.3	20.0	0.0	48.2	54.0	-5.8
5875.20	H	56.6	36.2	3.7	28.3	20.0	0.0	48.2	54.0	-5.8
11515.30	H	53.6	41.9	5.8	39.7	20.0	0.0	41.6	54.0	-12.4
17178.30	H	42.7	43.0	7.5	38.8	20.0	0.0	34.4	54.0	-19.6
23177.40	H	34.0	40.4	7.5	23.3	20.0	9.5	29.1	54.0	-24.9
28971.75	V	45.3	43.4	8.5	24.2	20.0	9.5	43.5	54.0	-10.5
34766.10	V	46.1	43.6	5.0	23.8	20.0	9.5	41.4	54.0	-12.6
40000.00	V	51.0	43.8	6.0	24.2	20.0	9.5	47.1	54.0	-6.9

Note:
1. All measurement below 18GHz were made at 3 meters. all measurements above 18GHz Were made at 1 meters.
2. Negative signs (-) in the margin column signify levels below the limit.
3. All readings are made with RBW = 1 MHz and VBW = 1MHz
4. See also plots on the following pages

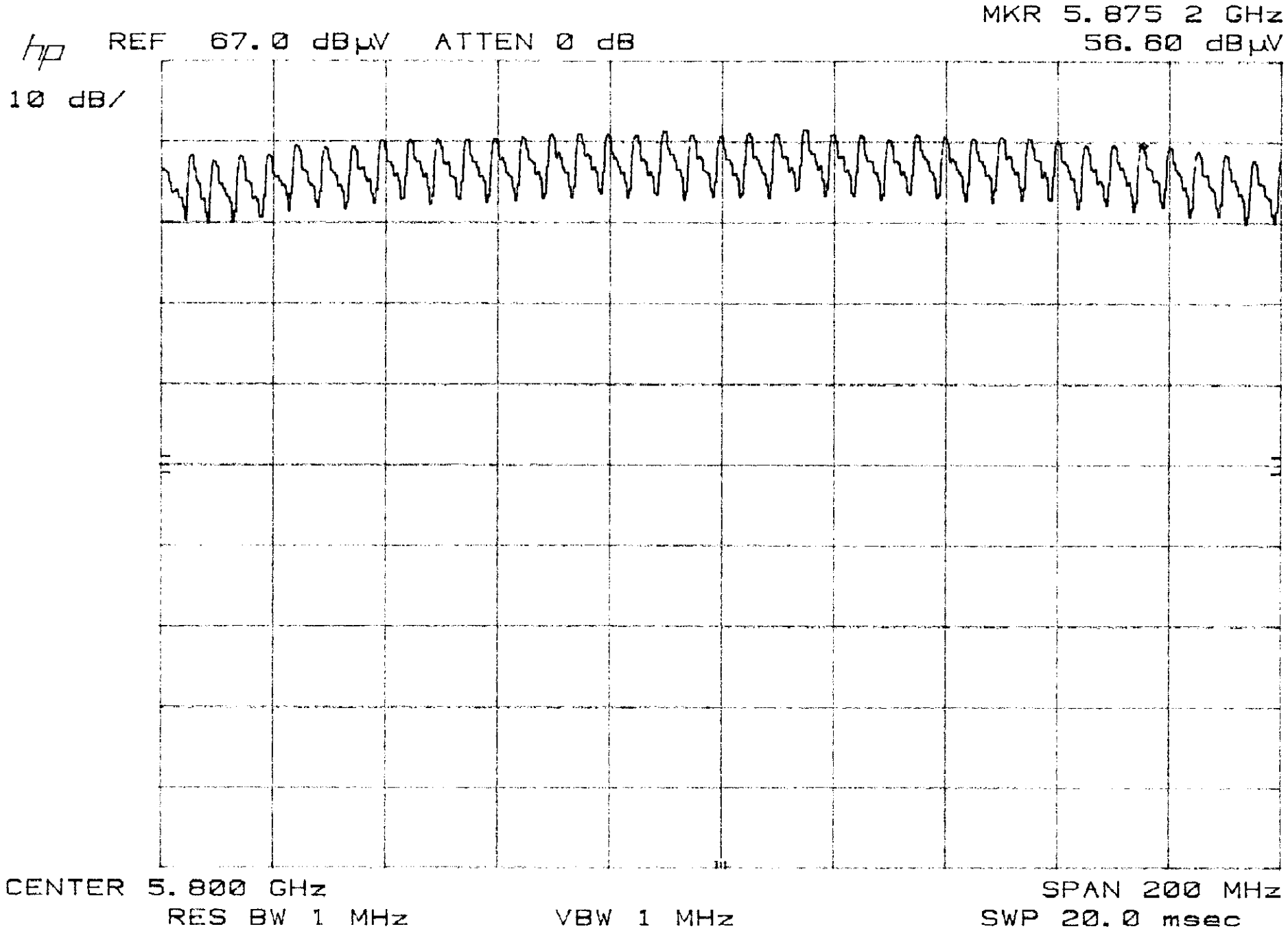
ITS Intertek Testing Services

Job No.:	J99032486
Company:	Preco
Model:	Radar Unit # 1
Test Mode:	Tx/Rx
Engineer:	Ollie Moyrong
Date:	February_17_2000

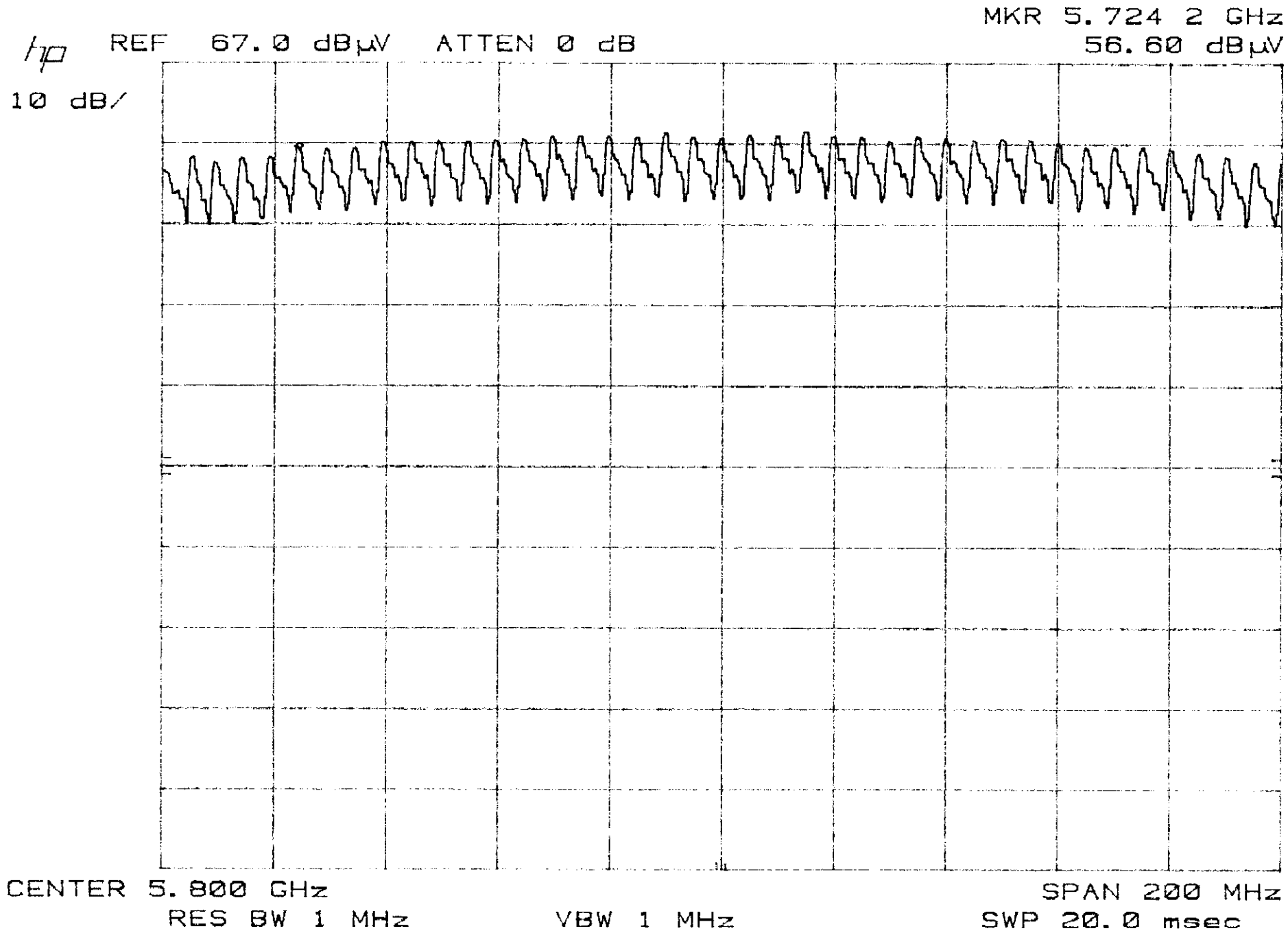
FCC Part 15.109 Class B Radiated Emissions

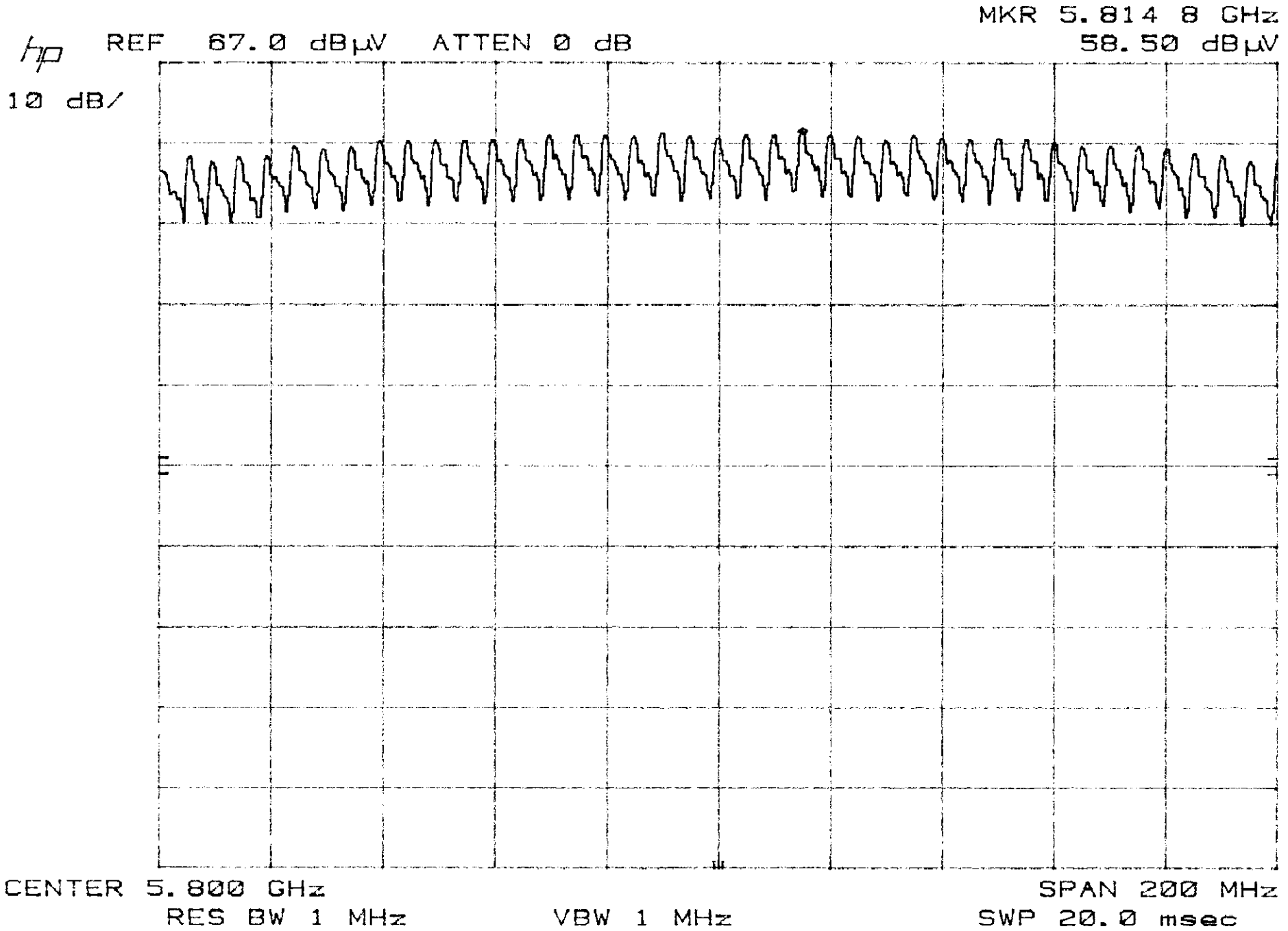
Frequency (MHz)	Antenna Location (m)	Antenna Polariz. (H/V)	Reading (dBuV)	Antenna Factor (dB/m)	Preamp (dB)	Correction Factor (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	Limit At 3 m (dBuV/m)	Margin (dB)	
160.0	3.0	H	26.5	8.6	0.0	0.0	1.2	36.3	43.5	-7.2	*
180.0	3.0	H	24.6	9.6	0.0	0.0	1.2	35.4	43.5	-8.1	
240.0	3.0	H	26.4	12.7	0.0	0.0	1.6	40.7	46.0	-5.3	
250.0	3.0	H	25.9	12.9	0.0	0.0	1.6	40.4	46.0	-5.6	
255.0	3.0	H	25.6	12.9	0.0	0.0	1.6	40.1	46.0	-5.9	*
260.0	3.0	H	25.1	13.2	0.0	0.0	1.6	39.9	46.0	-6.1	*
265.0	3.0	H	24.2	13.5	0.0	0.0	1.6	39.3	46.0	-6.7	
275.0	3.0	H	23.8	13.4	0.0	0.0	1.6	38.8	46.0	-7.2	
310.0	3.0	H	22.8	13.6	0.0	0.0	1.8	38.2	46.0	-7.8	
350.0	3.0	V	18.5	14.5	0.0	0.0	2.2	35.2	46.0	-10.8	

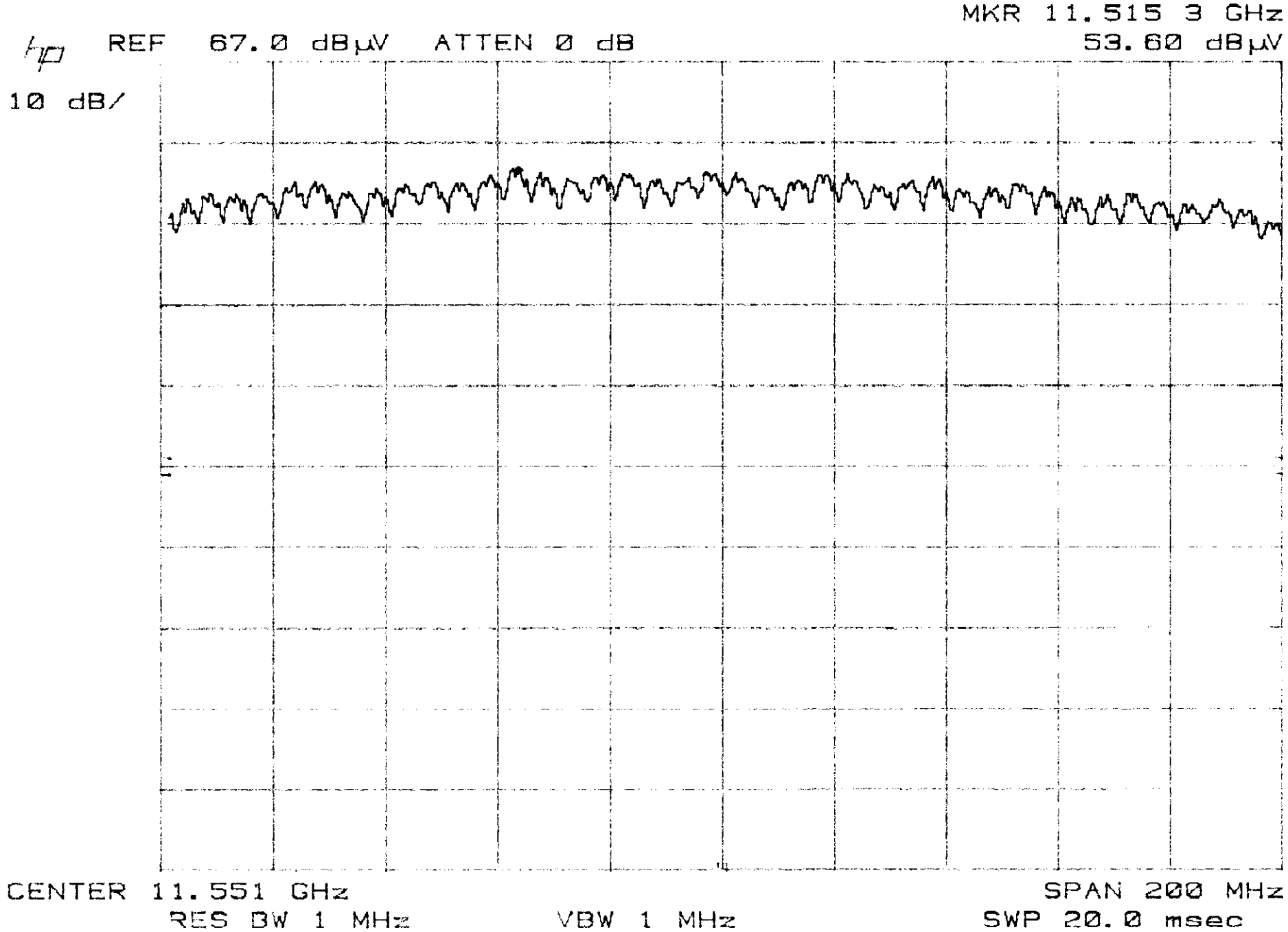
Notes: Negative signs (-) in the Margin column signify levels below the limit.
Readings followed by a '*' are Quasi-peak measurements. All other readings are peak measurements.


MKR 5.875 2 GHz
56.60 dBµV
REF 67.0 dBµV
ATTEN 0 dB
10 dB/
CENTER 5.800 GHz
SPAN 200 MHz
RES BW 1 MHz
VBW 1 MHz
SWP 20.0 msec

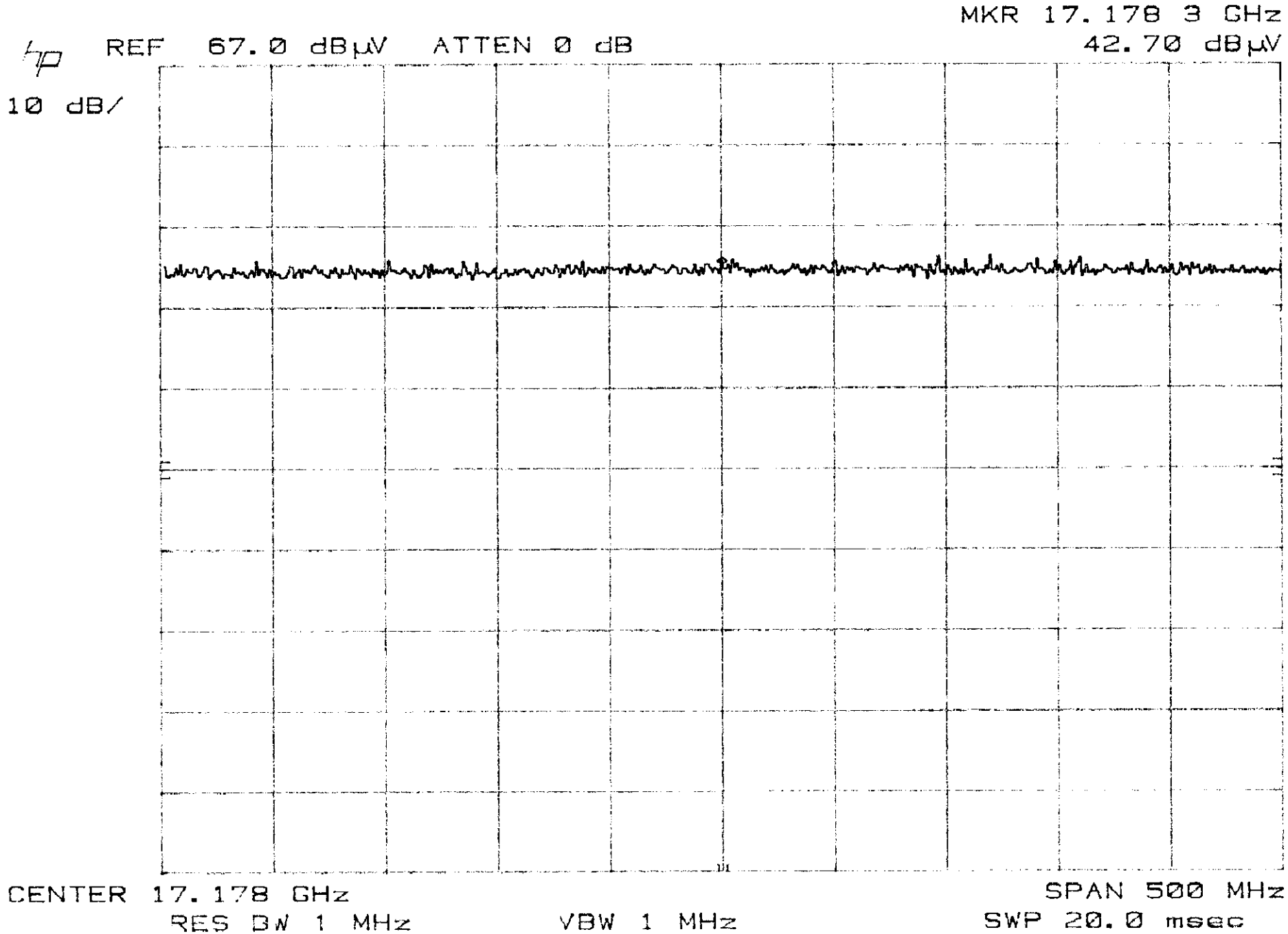
#1


MKR 5.724 2 GHz
56.60 dBµV
hp REF 67.0 dBµV ATTEN 0 dB
10 dB/
CENTER 5.800 GHz
SPAN 200 MHz
RES BW 1 MHz
VBW 1 MHz
SWP 20.0 msec


MKR 5.814 8 GHz
58.50 dBµV
REF 67.0 dBµV ATTEN 0 dB
10 dB/
CENTER 5.800 GHz
SPAN 200 MHz
RES BW 1 MHz
VBW 1 MHz
SWP 20.0 msec


MKR 11.515 3 GHz
53.60 dBµV
REF 67.0 dBµV ATTEN 0 dB
10 dB/
CENTER 11.551 GHz
SPAN 200 MHz
RES BW 1 MHz
VBW 1 MHz
SWP 20.0 msec

#1


MKR 17.178 3 GHz
42.70 dBµV
REF 67.0 dBµV ATTEN 0 dB
10 dB/
CENTER 17.178 GHz
SPAN 500 MHz
RES BW 1 MHz
VBW 1 MHz
SWP 20.0 msec

4.3 Conducted Emission Data

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

Results:	**Not Applicable. EUT is battery operated**

Note: a) A complete scan from 0.45 - 30 MHz was made.

5.0 Out of Band Emission Plot

Not Applicable. All signal levels are below FCC 15.209 requirements.

6.0 Antenna Requirement

X	The transmitter uses a permanently connected antenna.
	The antenna is affixed to the EUT using a unique connector which allows for replacement of a broken antenna, but does NOT use a standard antenna jack or electrical connector.
	The EUT requires professional installation. Please refer to the attached documentation for details).