

5.1 Test Data

5.2 Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 156.050 MHz
CHANNEL: 01 (Low)
MEASURED OUTPUT POWER: 30.000 dBm = 1.000 W
MODULATION SIGNAL: FM (Internal)
DISTANCE: 3 meters
LIMIT: $43 + 10 \log_{10} (W) =$ 43.00 dBc

FREQ . (MHz)	LEVEL (dBm)	POL (H /V)	(dBc)
312.100	-63.0	V	62.4
468.150	-79.5	V	74.5
624.200	-82.7	V	74.5
780.250	-87.9	V	77.1
936.300	-103.0	V	84.4
1092.350	< -130		

NOTES:

Radiated Spurious Emission Measurements by Substitution Method:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

5.1 Test Data (continued)

5.3 Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 156.80 MHz
 CHANNEL: 16
 MEASURED OUTPUT POWER: 30.000 dBm = 1.000 W
 MODULATION SIGNAL: FM (Internal)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 43.00 dBc

FREQ . (MHz)	LEVEL (dBm)	POL (H /V)	(dBc)
313.600	-63.3	H	62.7
470.400	-79.2	H	74.2
627.200	-82.8	H	74.6
784.000	-88.0	H	77.2
940.800	-102.0	H	89.2
1097.600	< -130		

NOTES:

Radiated Spurious Emission Measurements by Substitution Method:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

5.1 Test Data (continued)

5.4 Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 157.425 MHz
 CHANNEL: 88 (High)
 MEASURED OUTPUT POWER: 30.000 dBm = 1.000 W
 MODULATION SIGNAL: FM (Internal)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 43.00 dBc

FREQ . (MHz)	LEVEL (dBm)	POL (H /V)	(dBc)
314.850	-64.00	V	63.3
472.275	-79.80	V	74.8
629.700	-83.00	V	74.8
787.125	-87.50	V	76.7
944.550	-103.0	V	84.4
1101.975	< -130		

NOTES:

Radiated Spurious Emission Measurements by Substitution Method:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

5.1 Test Data (continued)

5.5 Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 156.05 MHz
 CHANNEL: 01 (Low)
 MEASURED OUTPUT POWER: 37.000 dBm = 5.012 W
 MODULATION SIGNAL: FM (Internal)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 50.00 dBc

FREQ . (MHz)	LEVEL (dBm)	POL (H /V)	(dBc)
312.100	-56.30	V	62.7
468.150	-75.70	V	77.7
624.200	-75.80	V	74.6
780.250	-80.90	V	77.1
936.300	-97.5	V	85.9
1092.350	< -130		

NOTES:

Radiated Spurious Emission Measurements by Substitution Method:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

5.1 Test Data (continued)

5.6 Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 156.80 MHz
 CHANNEL: 16
 MEASURED OUTPUT POWER: 37.000 dBm = 5.012 W
 MODULATION SIGNAL: CDMA (Internal)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 50.00 dBc

FREQ . (M H z)	LEVEL (dBm)	POL (H /V)	(dBc)
313.60	-56.00	H	62.3
470.40	-75.60	H	77.6
627.20	-75.90	H	74.7
784.00	-80.90	H	77.1
940.80	-97.5	H	91.7
1097.60	< -130		

NOTES:

Radiated Spurious Emission Measurements by Substitution Method:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

5.1 Test Data (continued)

5.7 Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 157.43 MHz
 CHANNEL: 88 (High)
 MEASURED OUTPUT POWER: 37.000 dBm = 5.012 W
 MODULATION SIGNAL: CDMA (Internal)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 50.00 dBc

FREQ . (M H z)	LEVEL (dBm)	POL (H /V)	(dBc)
314.85	-57.00	V	63.3
472.28	-72.80	V	74.8
629.70	-76.00	V	74.8
787.13	-82.50	V	78.7
944.55	-94.0	V	88.2
1101.98	< -130		

NOTES:

Radiated Spurious Emission Measurements by Substitution Method:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

6.1 Test Data

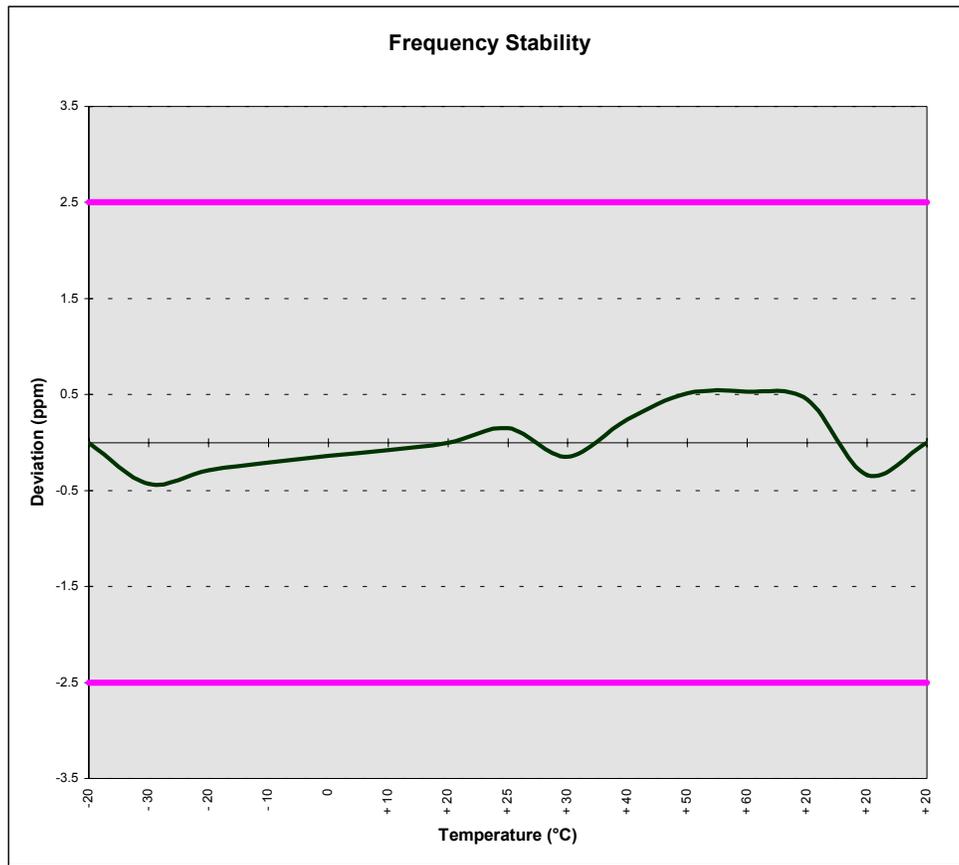
6.2 FREQUENCY STABILITY

OPERATING FREQUENCY: 156,800,005 Hz
 CHANNEL: 16
 REFERENCE VOLTAGE: 9.0 VDC
 DEVIATION LIMIT: ± 0.0005 % or 5.0 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQ. (Hz)	Deviation (%)
100 %	9.00	+ 20 (Ref)	156,800,005	0.000000
100 %		- 30	156,800,072	-0.000043
100 %		- 20	156,800,050	-0.000029
100 %		- 10	156,800,038	-0.000021
100 %		0	156,800,027	-0.000014
100 %		+ 10	156,800,018	-0.000008
100 %		+ 20	156,800,005	0.000000
100 %		+ 25	156,799,981	0.000015
100 %		+ 30	156,800,029	-0.000015
100 %		+ 40	156,799,967	0.000024
100 %		+ 50	156,799,925	0.000051
100 %		+ 60	156,799,922	0.000053
85 %		7.65	+ 20	156,799,934
115 %	10.35	+ 20	156,800,058	-0.000034
BATT. ENDPOINT	6.98	+ 20	156,800,005	0.000000

6.1 Test Data (Continued)

6.3 FREQUENCY STABILITY



9.1 SAMPLE CALCULATIONS

A. ERP Sample Calculation

$$\text{Level } \mu\text{V/m @ 3 meters} = \frac{\text{Log } 10^{-1} (\text{dBm} + 107 + \text{AFCL})}{20}$$

$$\frac{\text{Log } 10^{-1} (-14 + 107 + 31.7)}{20}$$

1717908.4 $\mu\text{V/m}$ @ 3 meters

Sample Calculation (relative to a dipole)

$$\text{ERP (dBm)} = 10 \text{ Log}_{10} \left(\frac{(r(\mu\text{V/m})1 \times 10^6)^2}{49.2/1 \times 10^{-3}} \right)$$

$$\text{ERP (dBm)} = 10 \text{ Log}_{10} \left(\frac{(3(1717908.4)1 \times 10^6)^2}{49.2/1 \times 10^{-3}} \right)$$

$$\text{ERP (dBm)} = 27.32$$

B. Emission Designator

2M + 2DK

F = Frequency Modulation

3 = A single channel containing quantized or digital information

E = Telephony (including sound broadcasting)

Emission Designator = 16K0F3E

10.1 CONCLUSION

The data collected shows that the **UNIDEN 2-Way Portable VHF Marine Radio Transceiver (GMDSS)**
FCC ID: AMWOVP2001610888 complies with all the requirements of Parts 2 and 80 of the FCC rules.

ATTACHMENT B – TEST PLOTS

RF Output Power & DC Voltage & Current into Final Amplifying Device

FULL POWER MODE		TX FINAL TRANSISTOR	
FREQUENCY (MHz)	OUTPUT POWER (WATTS)	COLLECTOR VOLTAGE (V)	COLLECTOR CURRENT (A)
156.050	5.0	7.2	1.1
156.800	5.0	7.2	1.1
157.425	4.9	7.2	1.2

REDUCED POWER MODE		TX FINAL TRANSISTOR	
FREQUENCY (MHz)	OUTPUT POWER (WATTS)	COLLECTOR VOLTAGE (V)	COLLECTOR CURRENT (A)
156.050	0.98	7.4	0.38
156.800	0.98	7.4	0.38
157.425	1.0	7.4	0.41

Carrier Power

FREQUENCY (MHz)	FULL POWER (WATTS)	REDUCED POWER (WATTS)
156.050	5.0	0.98
156.800	5.0	0.98
157.425	4.9	1.00

Spurious & Harmonics Emission at Antenna Terminal

1. TX

Full Power - 5 W

HARMONICS OF CARRIER	156.05 MHz (dBc)	156.8 MHz (dBc)	157.425 MHz (dBc)
1			
2	-58.5	-59.0	-58.5
3	-88.0	-88.0	-88.5
4	-90.0	-90.0	-87.8
5	< -90	< -90	< -90
6	< -90	< -90	< -90
7	< -90	< -90	< -90
8	< -90	< -90	< -90
9	< -90	< -90	< -90
10	< -90	< -90	< -90

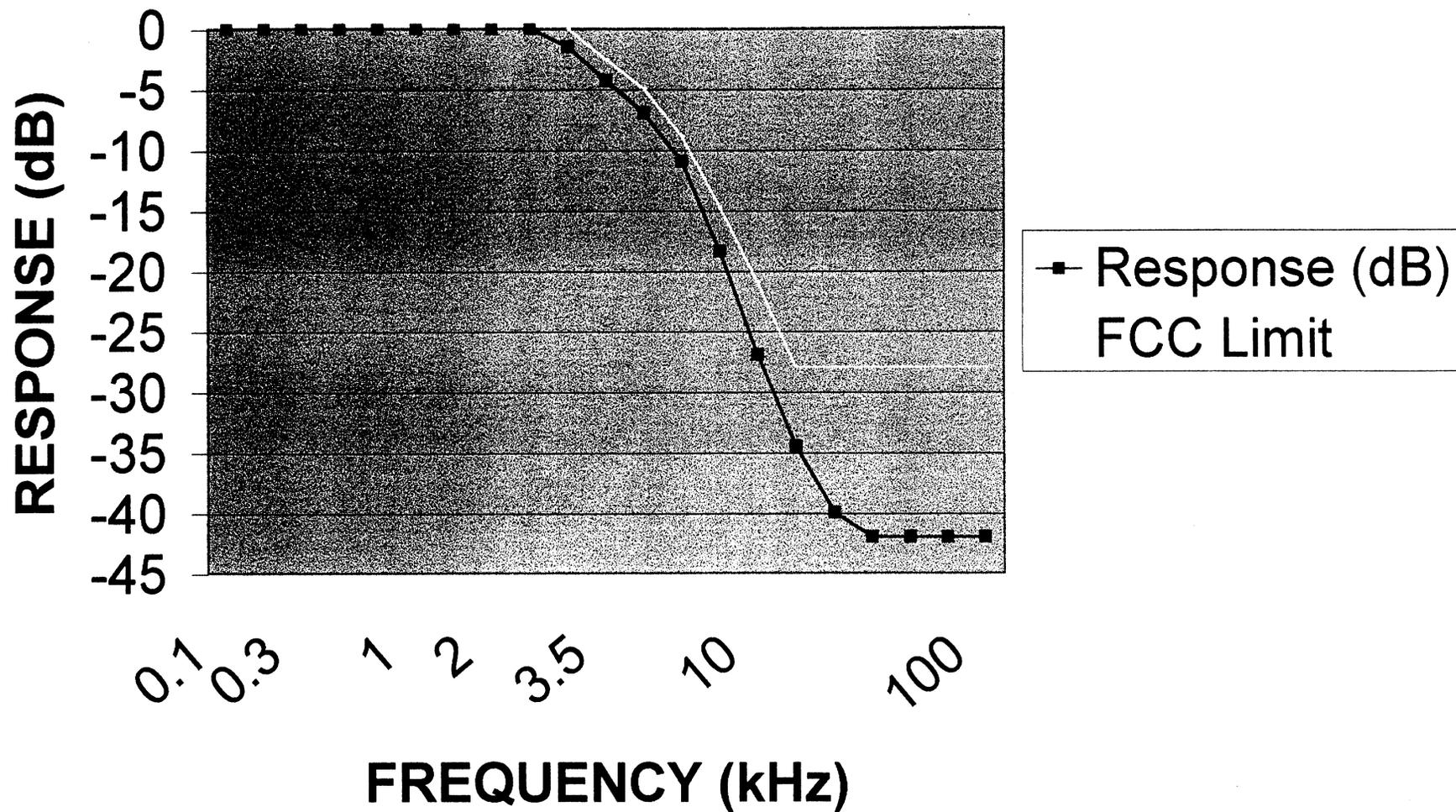
Reduced Power - 1 W

HARMONICS OF CARRIER	156.05 MHz (dBc)	156.8 MHz (dBc)	157.425 MHz (dBc)
1			
2	-65.0	-64.0	-65.0
3	-86.0	-86.0	-85.0
4	-90.0	-90.0	-90.0
5	< -90	< -90	< -90
6	< -90	< -90	< -90
7	< -90	< -90	< -90
8	< -90	< -90	< -90
9	< -90	< -90	< -90
10	< -90	< -90	< -90

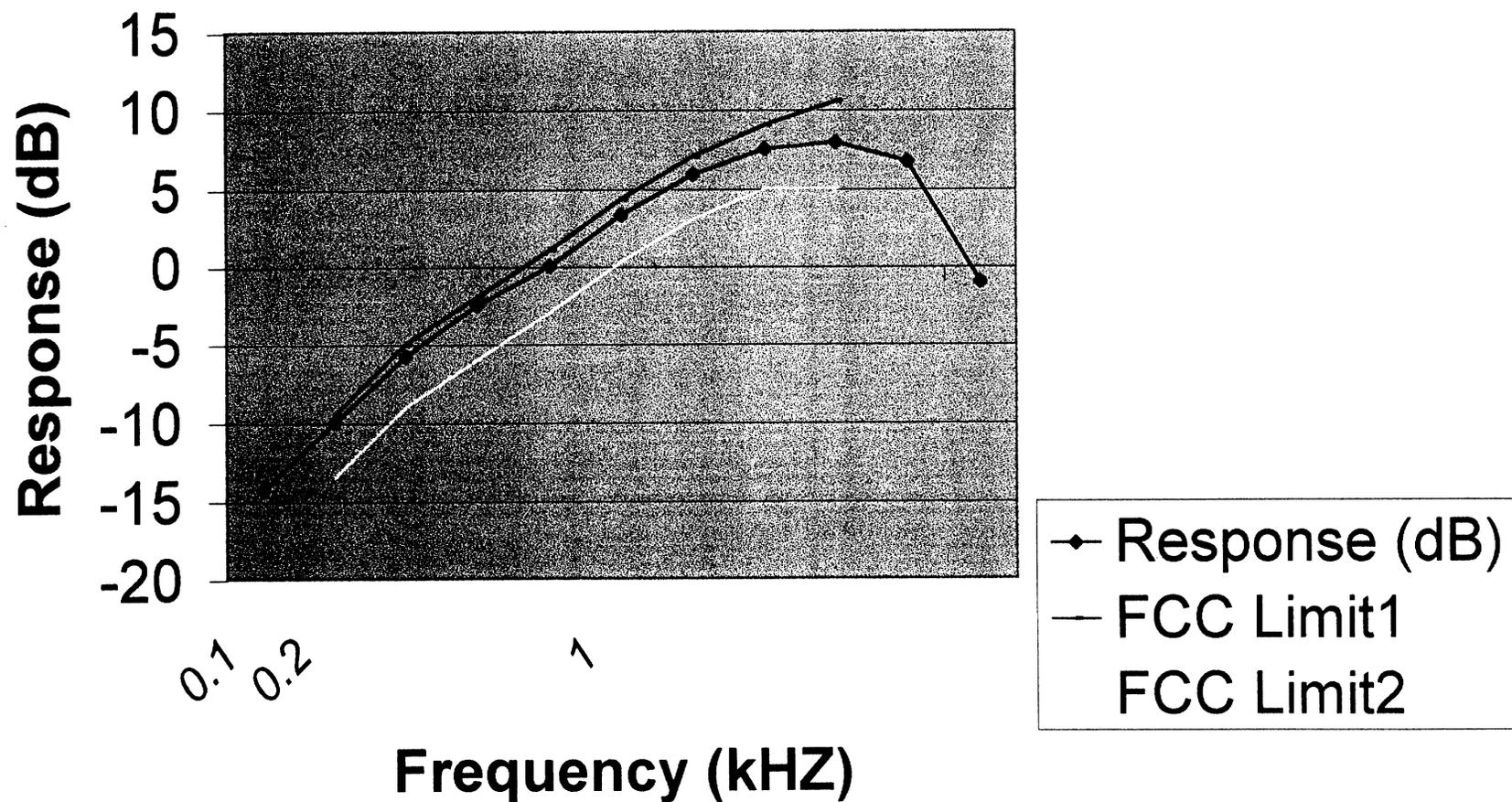
2. RX

CONDUCTED	156.05 MHz (dBm)	156.8 MHz (dBm)	157.425 MHz (dBm)
1			
2	< -90	< -90	< -90
3	< -90	< -90	< -90
4	< -90	< -90	< -90
5	< -90	< -90	< -90
6	< -90	< -90	< -90
7	< -90	< -90	< -90
8	< -90	< -90	< -90
9	< -90	< -90	< -90
10	< -90	< -90	< -90

AUDIO ROLL-OFF



Carrier Frequency=156.8MHz
PWR=1.0W



Agilent 07:01:23 May 30, 2001

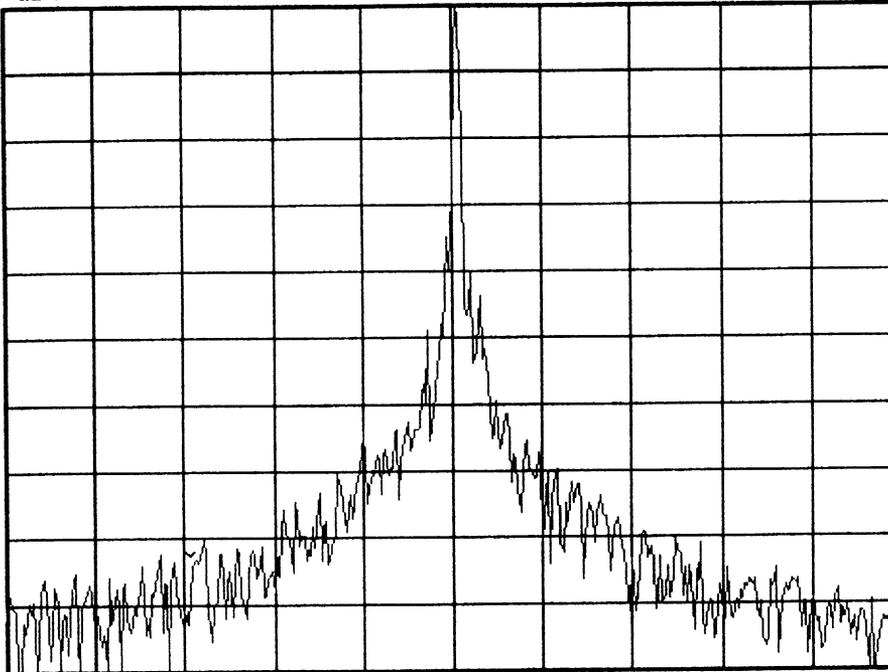
FCC ID:AMW0VP2001610888 C-16 5 WATTS

Ref 37 dBm

Atten 35 dB

Peak
Log
10
dB/
Offst
16
dB

V1 S2
S3 FC
AA



Center 156.8 MHz

Span 100 kHz

*Res BW 300 Hz

*VBW 300 Hz

Sweep 4.452 s (401 pts)

Freq/Channel

Center Freq
156.800000 MHz

Start Freq
156.750000 MHz

Stop Freq
156.850000 MHz

CF Step
10.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

Agilent 07:03:40 May 30, 2001

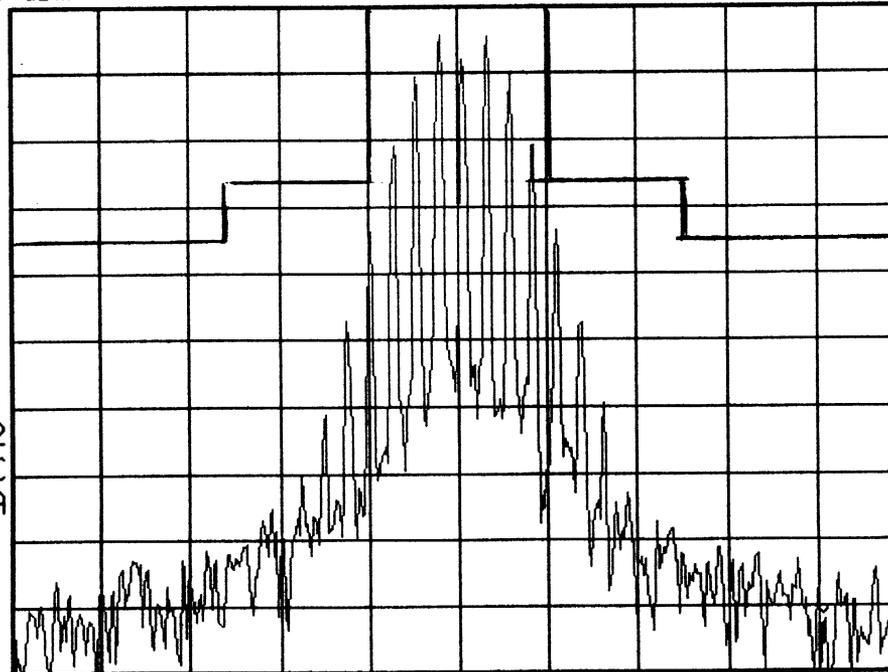
FCC ID:AMW0VP2001610888 C-16 5 WATTS

Ref 37 dBm

Atten 35 dB

Peak
Log
10
dB/
Offst
16
dB

V1 S2
S3 FC
AA



Center 156.8 MHz

Span 100 kHz

*Res BW 300 Hz

*VBW 300 Hz

Sweep 4.452 s (401 pts)

Freq/Channel

Center Freq
156.800000 MHz

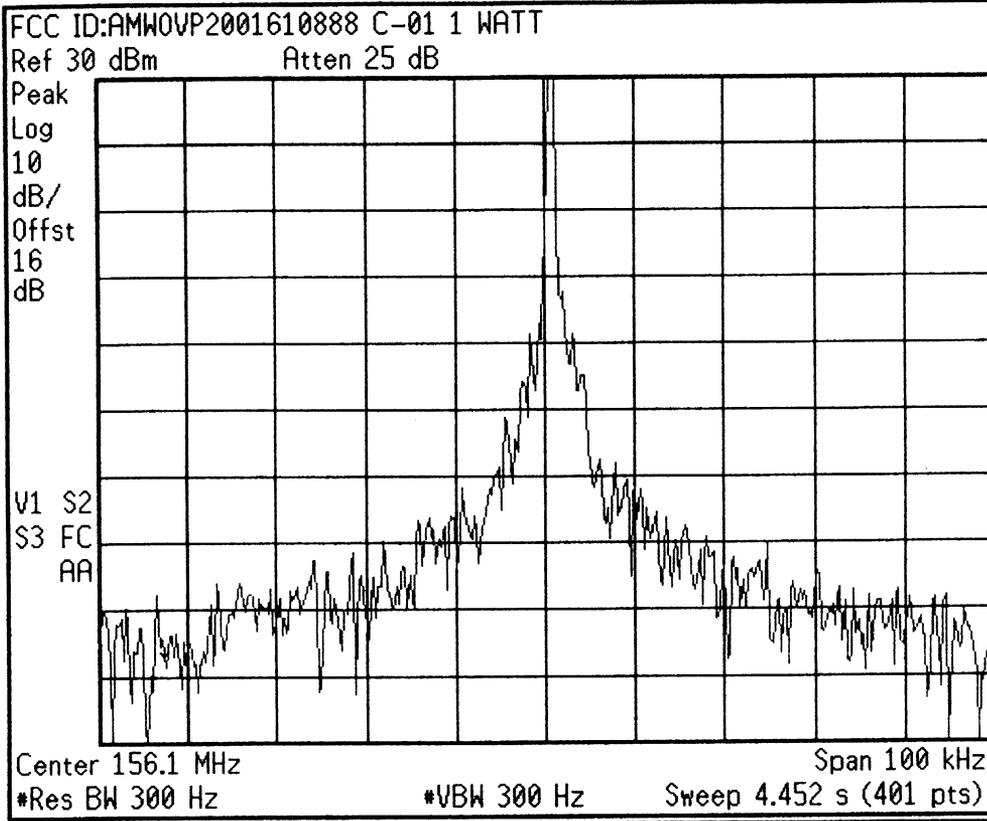
Start Freq
156.750000 MHz

Stop Freq
156.850000 MHz

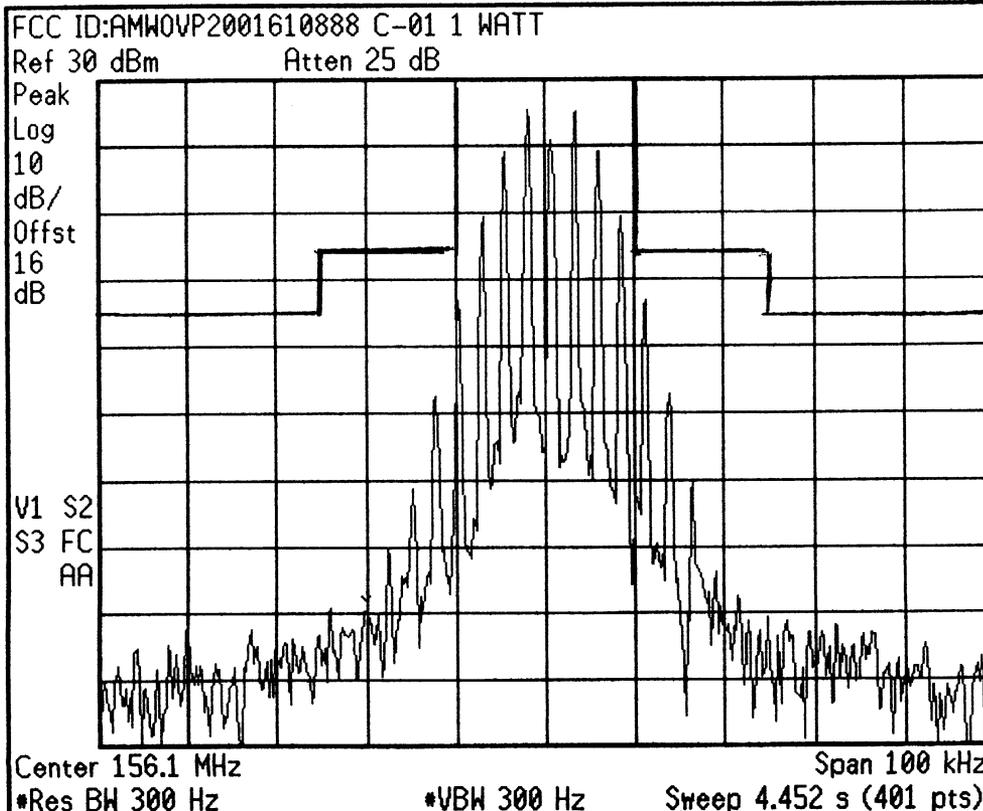
CF Step
10.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off



Freq/Channel
Center Freq 156.050000 MHz
Start Freq 156.000000 MHz
Stop Freq 156.100000 MHz
CF Step 10.0000000 kHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

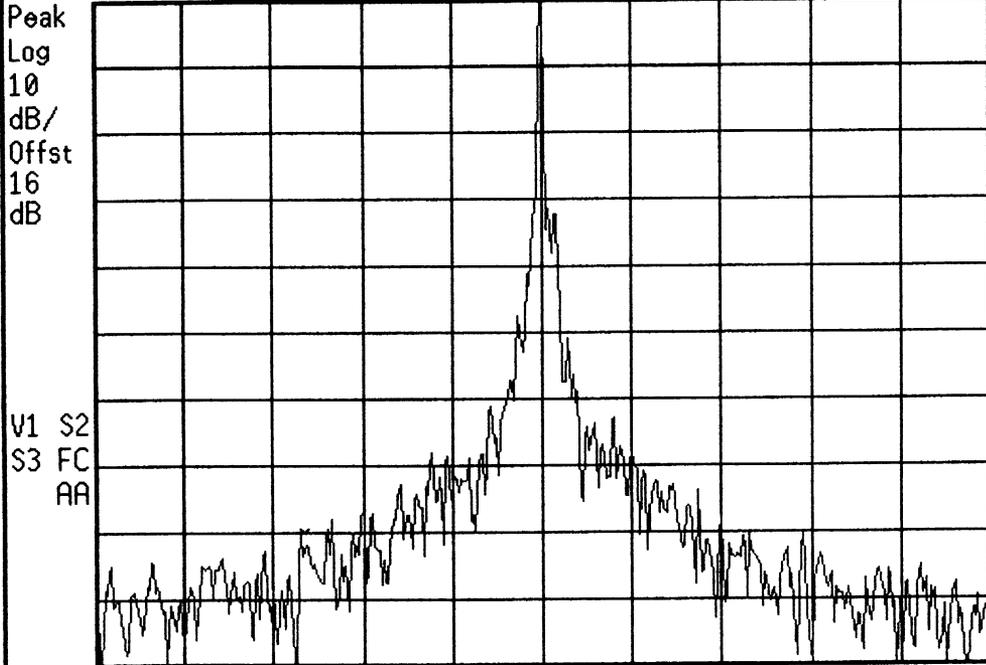


Trace
Trace 1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More 1 of 2

* Agilent 07:11:40 May 30, 2001

FCC ID:AMW0VP2001610888 C-01 5 WATTS

Ref 37 dBm Atten 35 dB



Center 156.1 MHz Span 100 kHz
*Res BW 300 Hz *VBW 300 Hz Sweep 4.452 s (401 pts)

Freq/Channel

Center Freq
156.050800 MHz

Start Freq
156.000800 MHz

Stop Freq
156.100800 MHz

CF Step
10.0000000 kHz
Auto Man

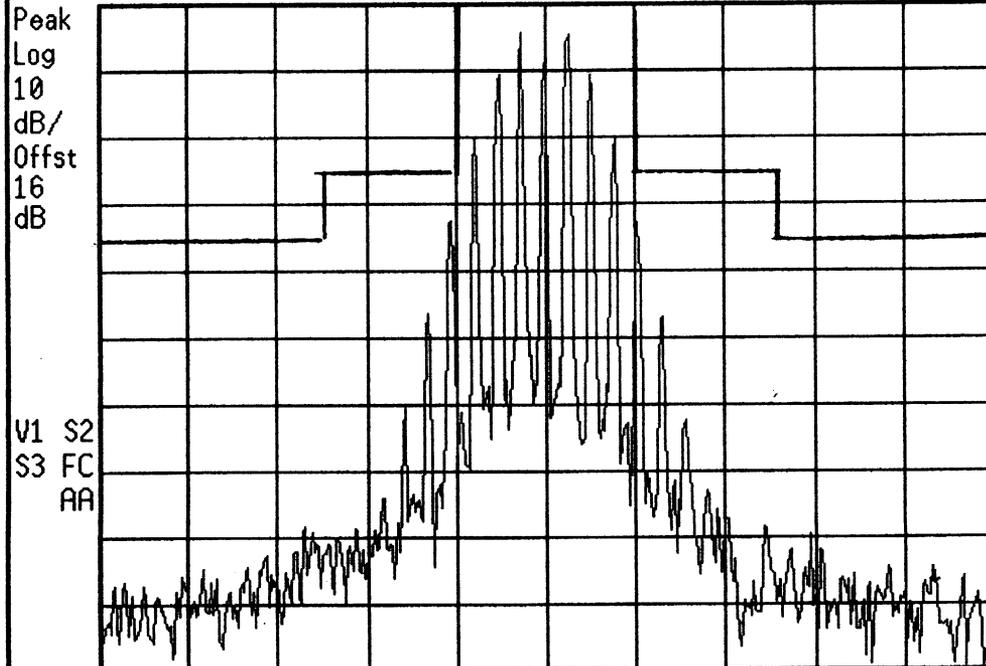
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Signal Track
On Off

* Agilent 07:13:06 May 30, 2001

FCC ID:AMW0VP2001610888 C-01 5 WATTS

Ref 37 dBm Atten 35 dB



Center 156.1 MHz Span 100 kHz
*Res BW 300 Hz *VBW 300 Hz Sweep 4.452 s (401 pts)

Freq/Channel

Center Freq
156.050800 MHz

Start Freq
156.000800 MHz

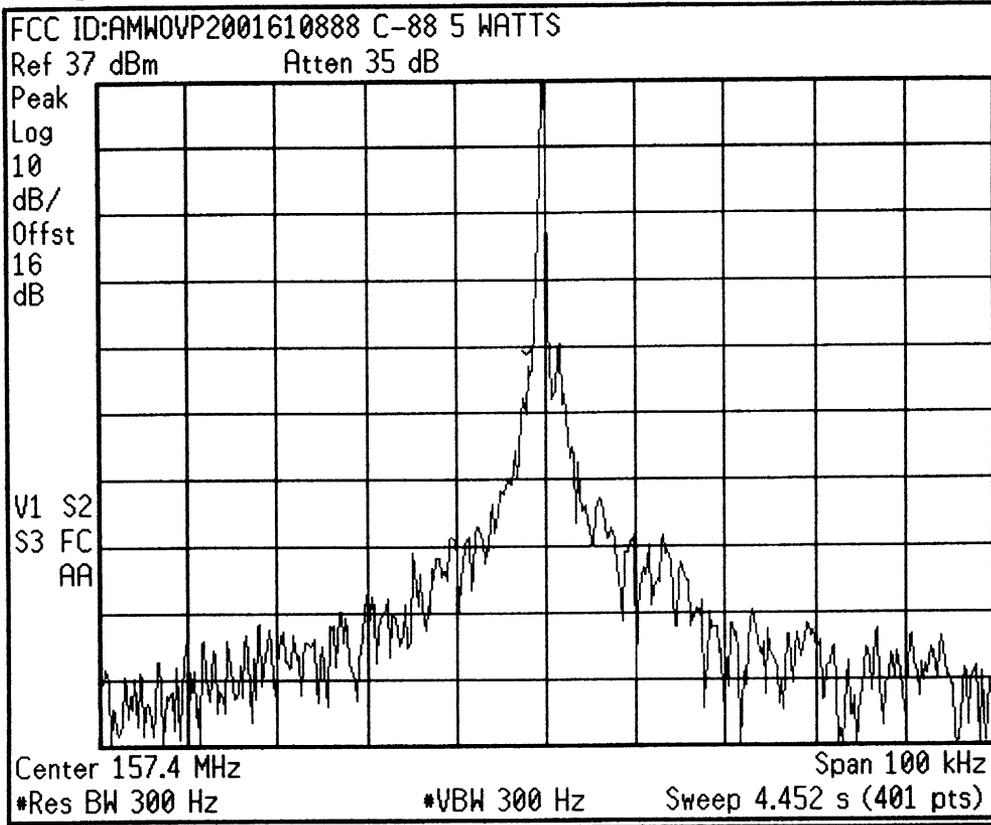
Stop Freq
156.100800 MHz

CF Step
10.0000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

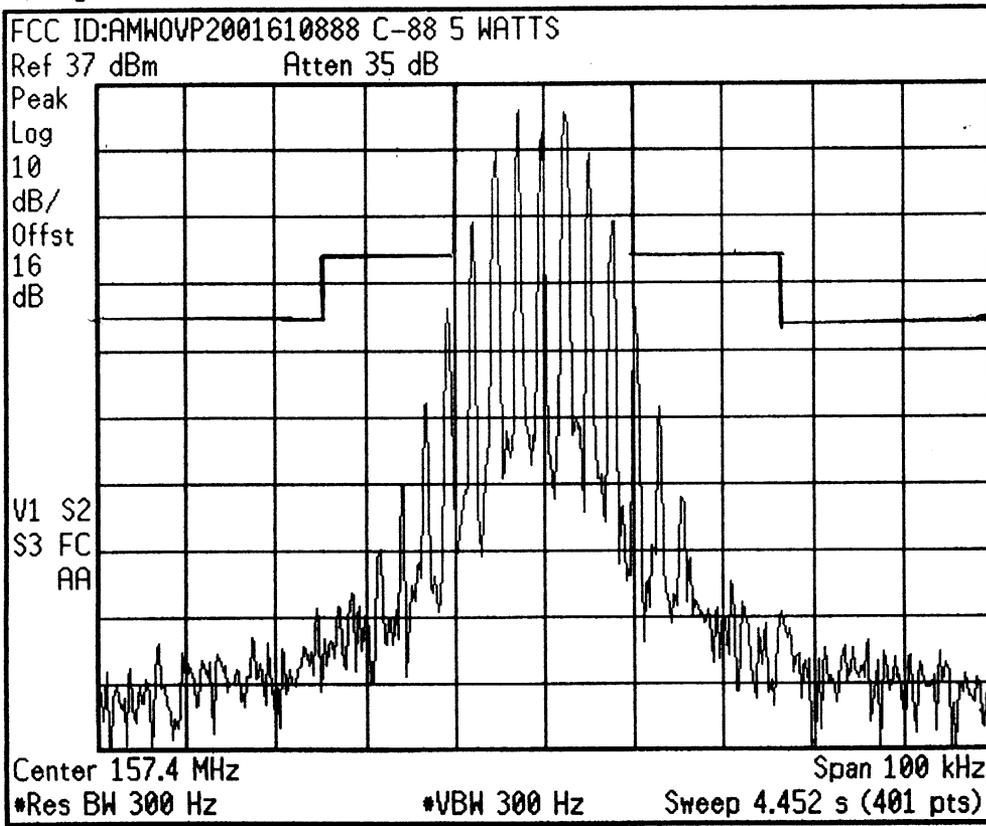
Signal Track
On Off

* Agilent 06:56:07 May 30, 2001



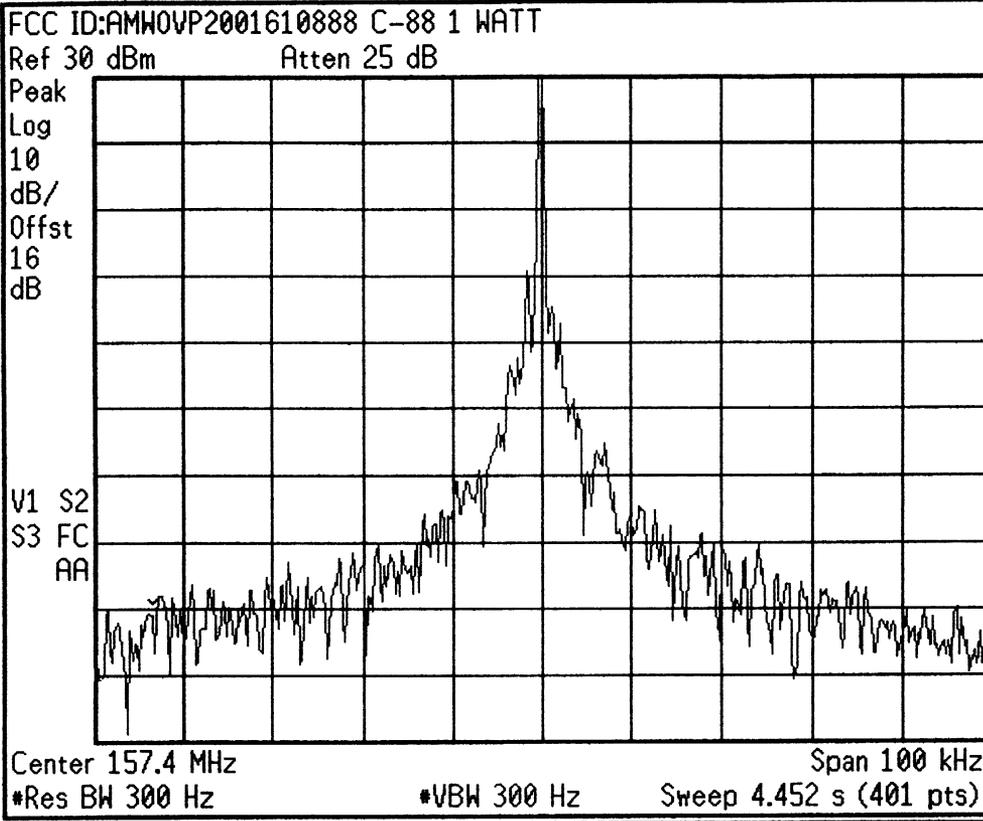
Freq/Channel
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Start Freq 157.375800 MHz
Stop Freq 157.475800 MHz
CF Step 10.0000000 kHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

* Agilent 06:57:32 May 30, 2001



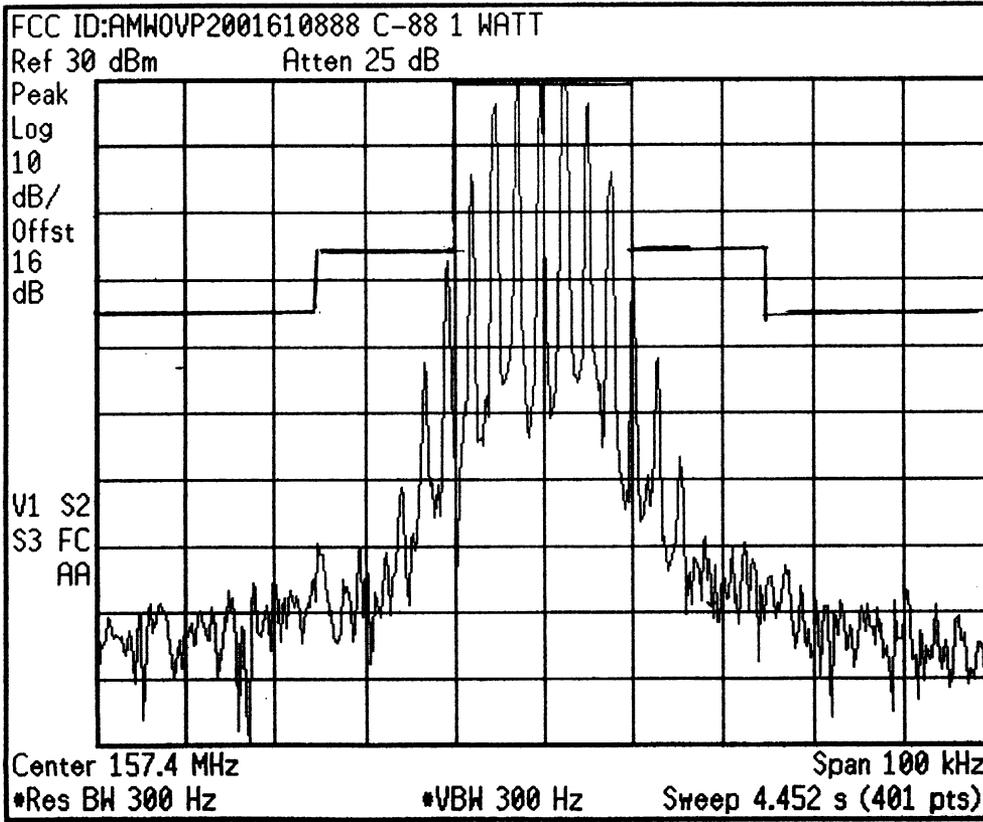
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Start Freq 157.375800 MHz
Stop Freq 157.475800 MHz
CF Step 10.0000000 kHz Auto Man
Freq Offset 0.00000000 Hz
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* Agilent 06:50:25 May 30, 2001



Freq/Channel
Center Freq 157.425800 MHz
Start Freq 157.375800 MHz
Stop Freq 157.475800 MHz
CF Step 10.0000000 kHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

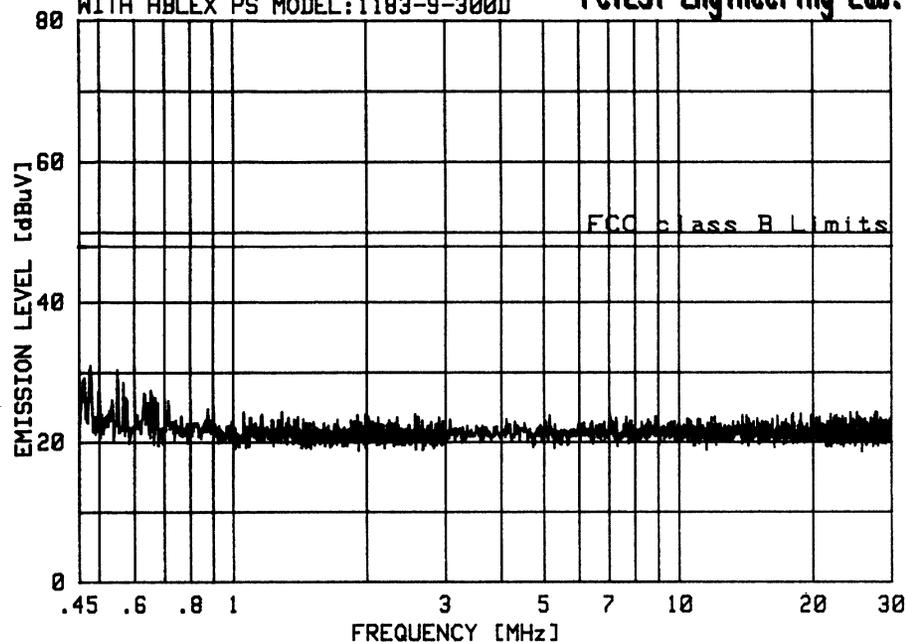
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Trace
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Clear Write
Max Hold
Min Hold
View
Blank
More 1 of 2

FCC ID:AMWVOP2001610888 LINE A
WITH ABLEX PS MODEL:1183-9-300D

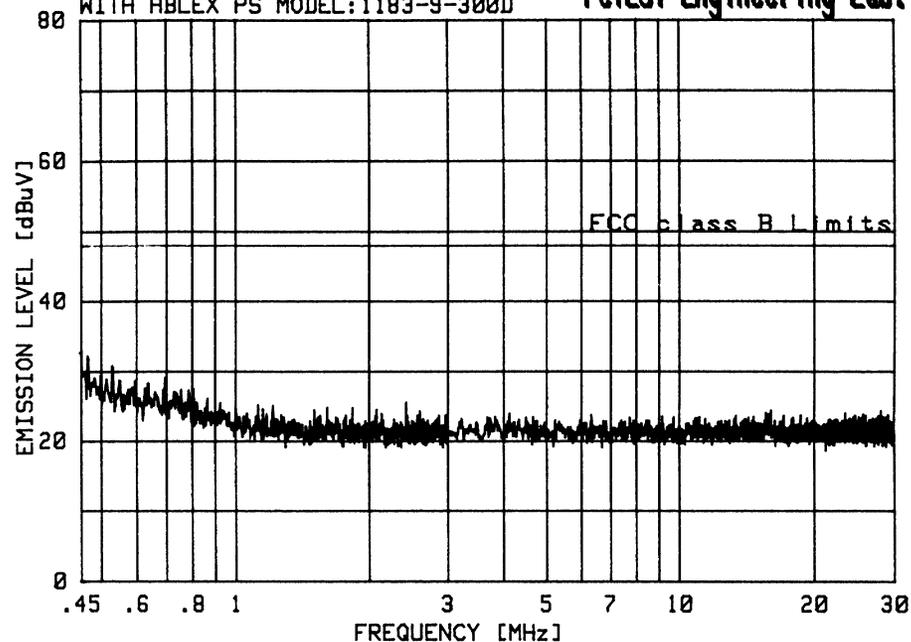
PCTEST Engineering Lab.



No.	Freq. [MHz]	Quasi-Pk [dBuV]	Average [dBuV]	QP-AV [dB]	Emission [dBuV]	Limit [dBuV]	Margin [dB]
1	.452	23.94	-	-	23.94	48.00	-24.06
2	.534	22.59	-	-	22.59	48.00	-25.41
3	.459	23.80	-	-	23.80	48.00	-24.20
4	.554	22.70	-	-	22.70	48.00	-25.30
5	.626	22.41	-	-	22.41	48.00	-25.59
6	.495	23.35	-	-	23.35	48.00	-24.65
7	.615	22.43	-	-	22.43	48.00	-25.57
8	.640	22.49	-	-	22.49	48.00	-25.51
9	.505	23.01	-	-	23.01	48.00	-24.99
10	.692	21.94	-	-	21.94	48.00	-26.06

FCC ID:AMWVOP2001610888 LINE B
WITH ABLEX PS MODEL:1183-9-300D

PCTEST Engineering Lab.



No.	Freq. [MHz]	Quasi-Pk [dBuV]	Average [dBuV]	QP-AV [dB]	Emission [dBuV]	Limit [dBuV]	Margin [dB]
1	.451	27.43	-	-	27.43	48.00	-20.57
2	.501	25.87	-	-	25.87	48.00	-22.13
3	.667	24.22	-	-	24.22	48.00	-23.78
4	.486	27.43	-	-	27.43	48.00	-20.57
5	.548	25.47	-	-	25.47	48.00	-22.53
6	.607	25.14	-	-	25.14	48.00	-22.86
7	.777	23.29	-	-	23.29	48.00	-24.71
8	.750	23.58	-	-	23.58	48.00	-24.42
9	.836	23.44	-	-	23.44	48.00	-24.56
10	2.416	21.73	-	-	21.73	48.00	-26.27