

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 . (M H z)	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 . (M H z)	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 . (M H z)	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 . (M H z)	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

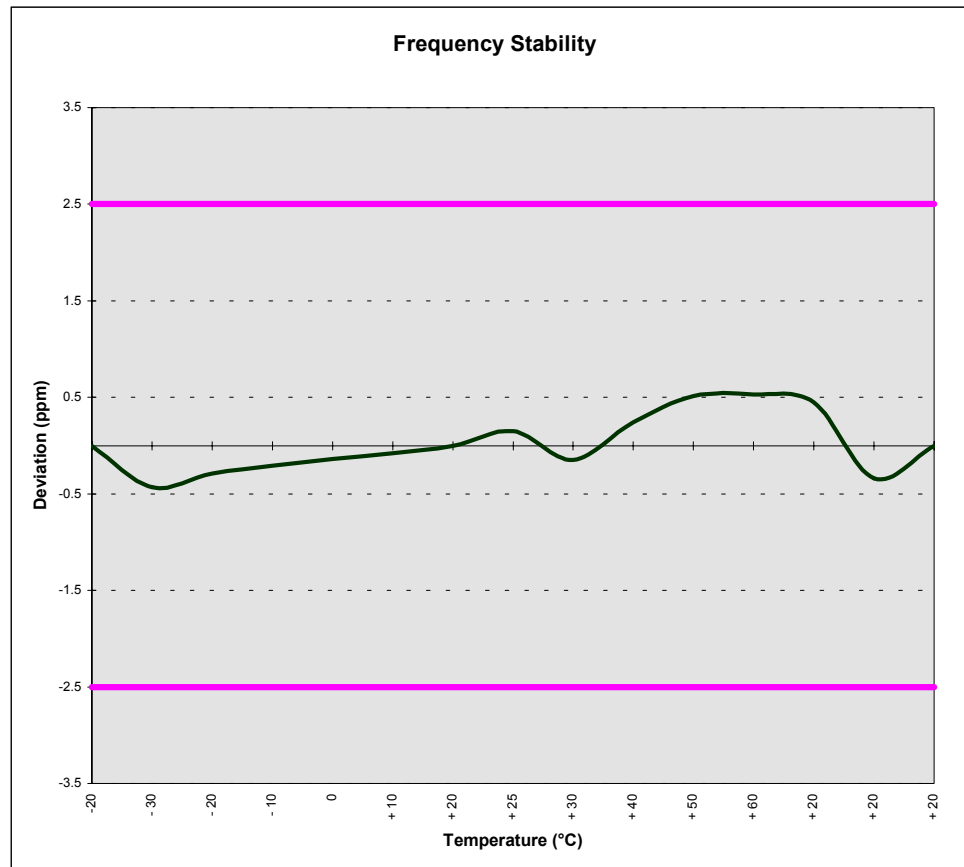
6.2 FREQUENCY STABILITY

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	0.000045
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)

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

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

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

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 (M H z)	OUTPUT POWER (W ATTS)	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 (M H z)	OUTPUT POWER (W ATTS)	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 (M H z)	FULL POWER (W ATTS)	REDUCED POWER (W ATTS)
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

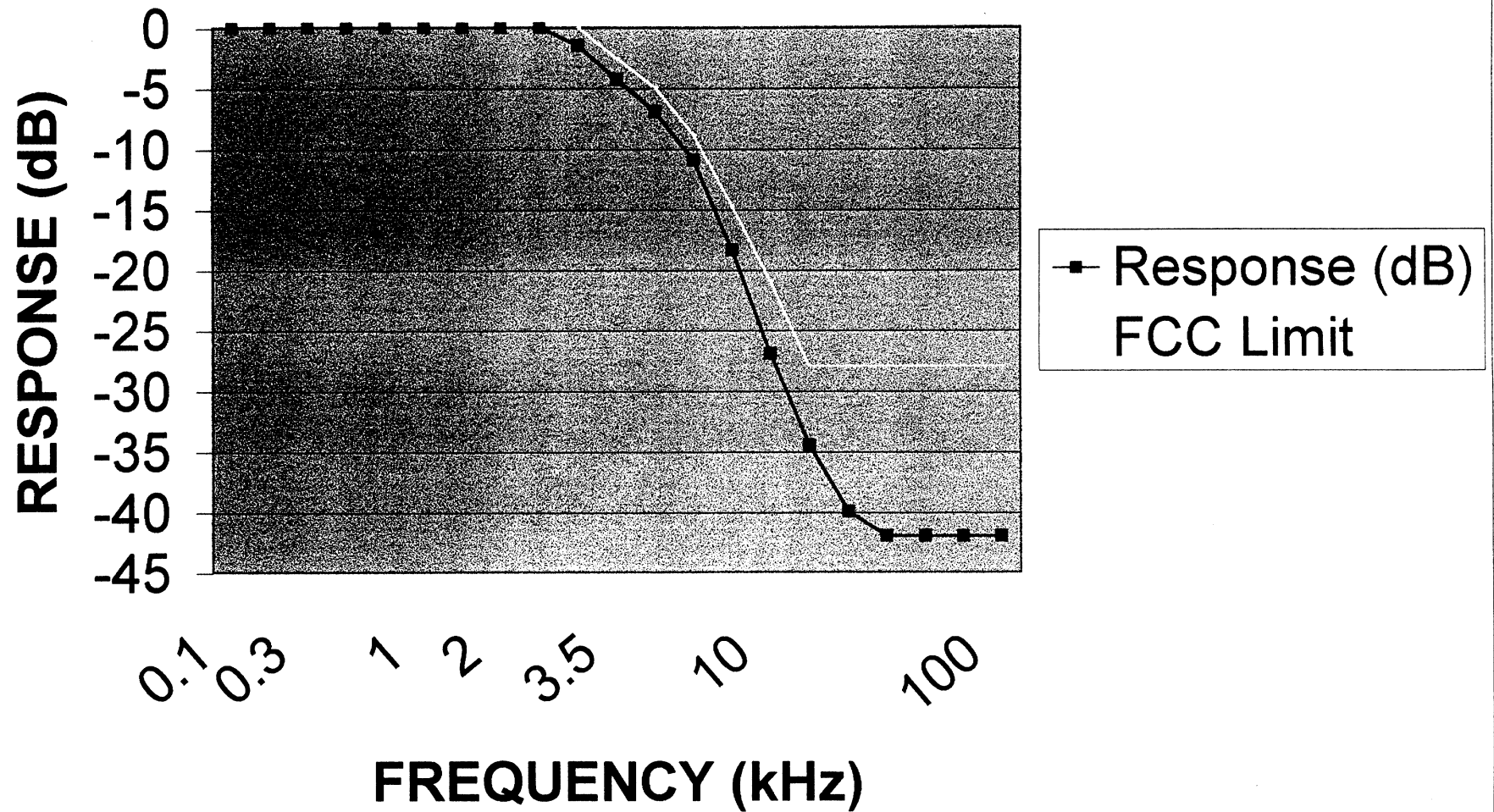
Reduced Power - 1 W

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

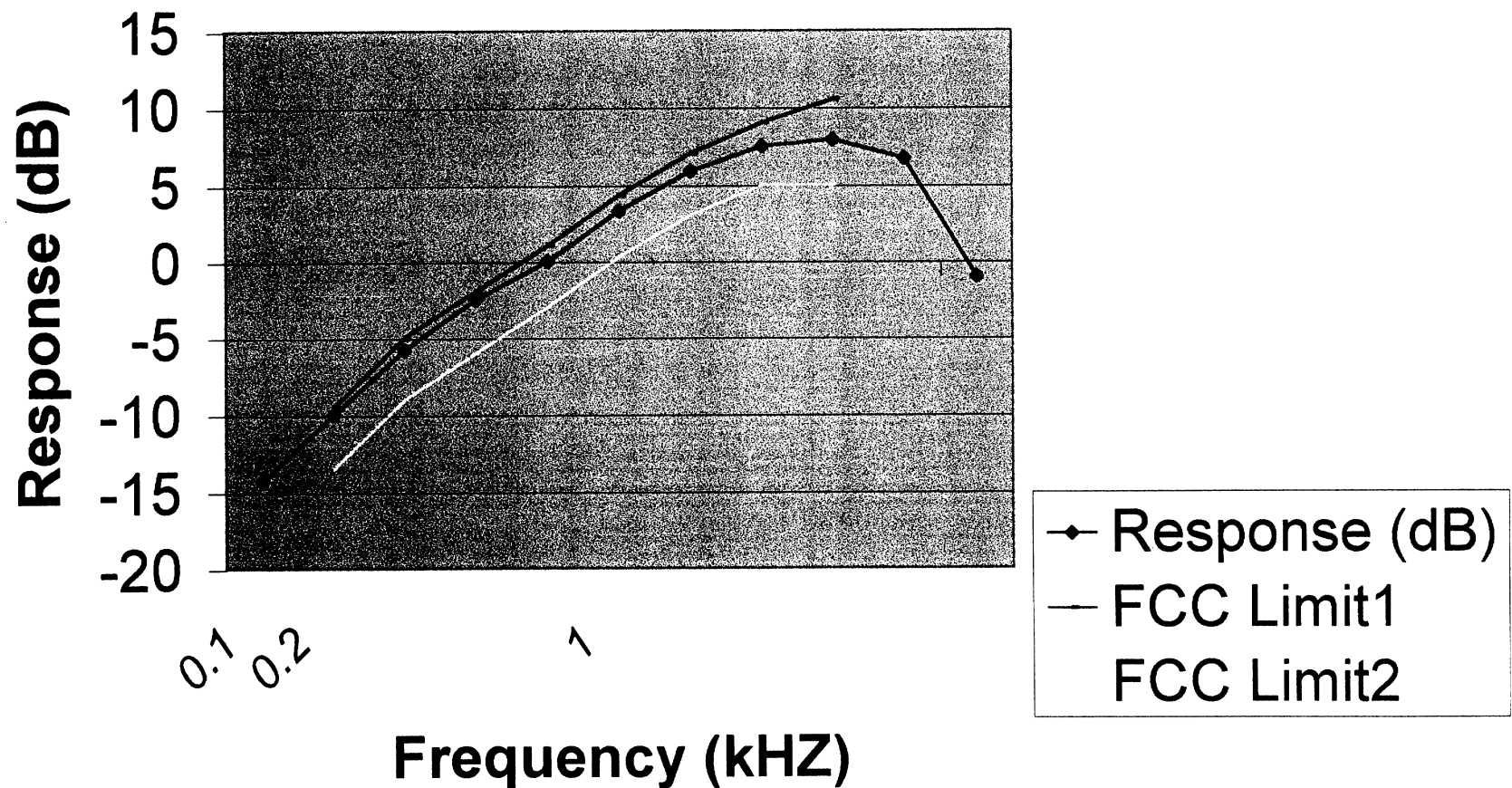
2. RX

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

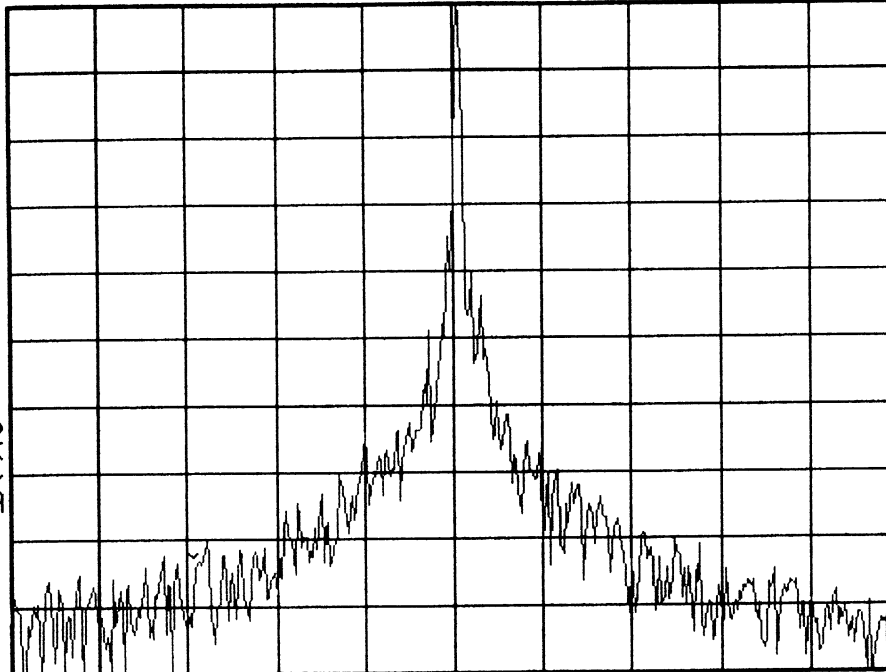
dB/

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

10.0000000 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

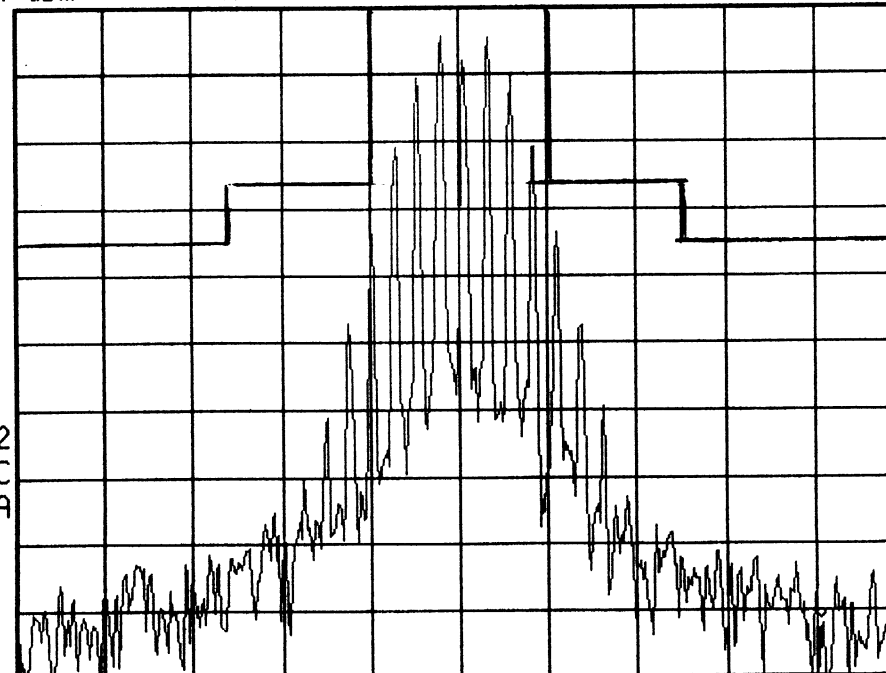
dB/

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

10.0000000 kHz

Auto

Man

Freq Offset

0.00000000 Hz

Signal Track

On

Off

* Agilent 06:41:02 May 30, 2001

FCC ID:AMW0VP2001610888 C-01 1 WATT

Ref 30 dBm

Atten 25 dB

Peak

Log

10

dB/

Offst

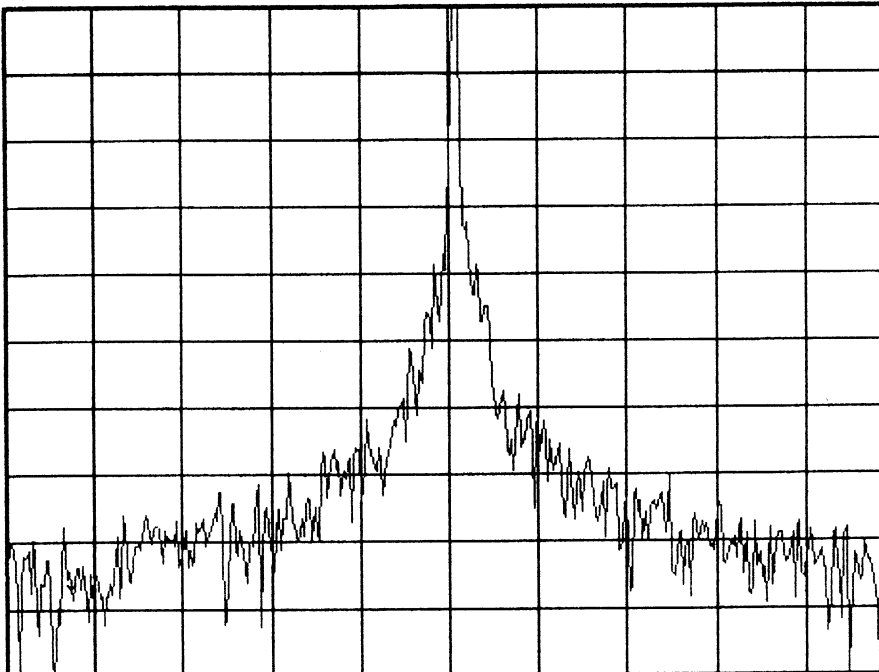
16

dB

V1 S2

S3 FC

AA



Center 156.1 MHz

Span 100 kHz

*Res BW 300 Hz

*VBW 300 Hz

Sweep 4.452 s (401 pts)

Freq/Channel

Center Freq

156.050000 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

* Agilent 06:46:12 May 30, 2001

FCC ID:AMW0VP2001610888 C-01 1 WATT

Ref 30 dBm

Atten 25 dB

Peak

Log

10

dB/

Offst

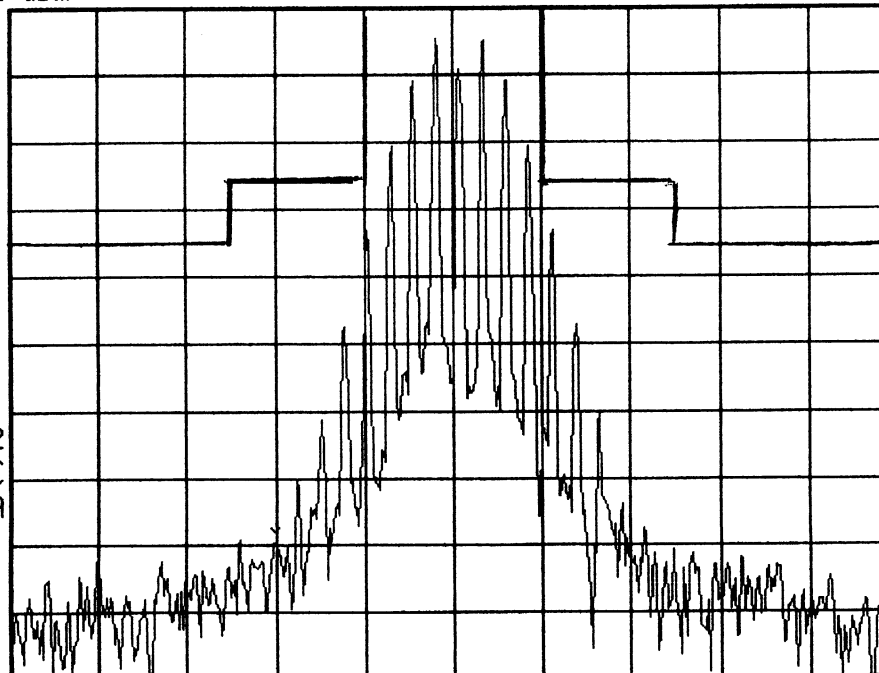
16

dB

V1 S2

S3 FC

AA



Center 156.1 MHz

Span 100 kHz

*Res BW 300 Hz

*VBW 300 Hz

Sweep 4.452 s (401 pts)

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

Peak

Log

10

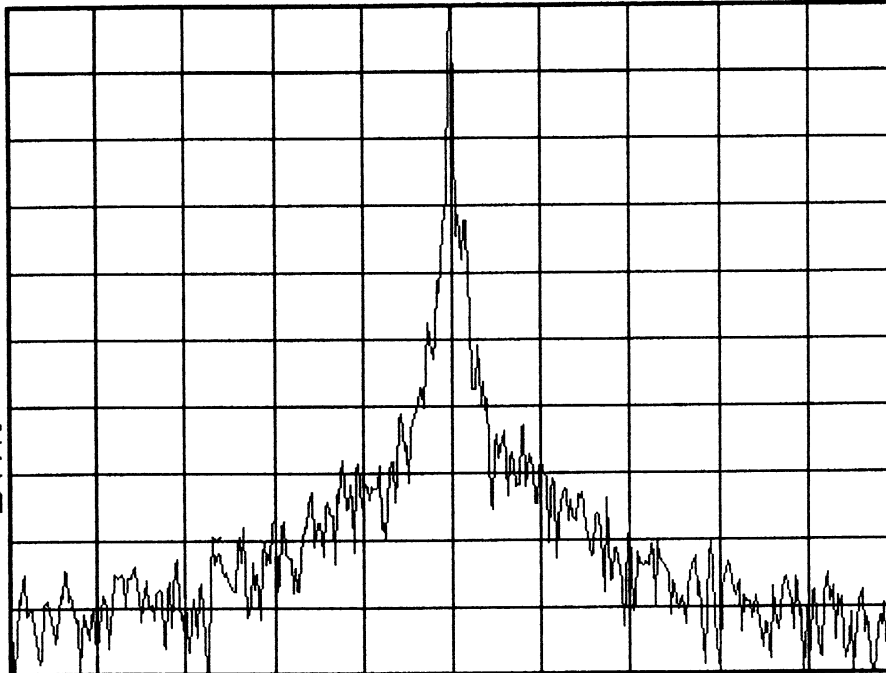
dB/

Offst

16

dB

V1 S2
S3 FC
AA



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 07:13:06 May 30, 2001

FCC ID:AMW0VP2001610888 C-01 5 WATTS

Ref 37 dBm

Atten 35 dB

Peak

Log

10

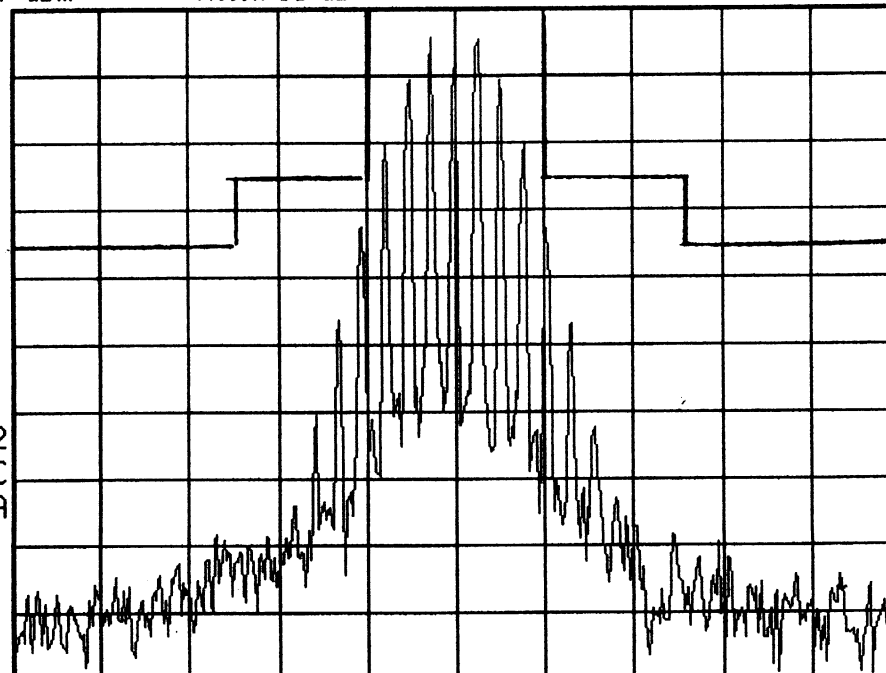
dB/

Offst

16

dB

V1 S2
S3 FC
AA



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

FCC ID:AMW0VP2001610888 C-88 5 WATTS

Ref 37 dBm

Atten 35 dB

Peak

Log

10

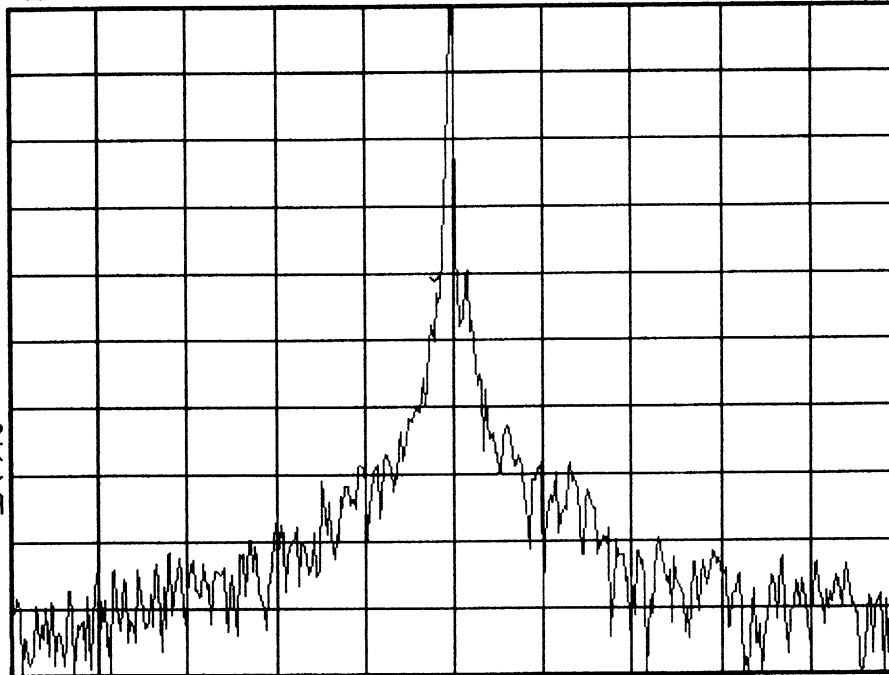
dB/

Offst

16

dB

V1 S2
S3 FC
AA



Center 157.4 MHz

Span 100 kHz

*Res BW 300 Hz

*VBW 300 Hz

Sweep 4.452 s (401 pts)

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

✱ Agilent 06:57:32 May 30, 2001

FCC ID:AMW0VP2001610888 C-88 5 WATTS

Ref 37 dBm

Atten 35 dB

Peak

Log

10

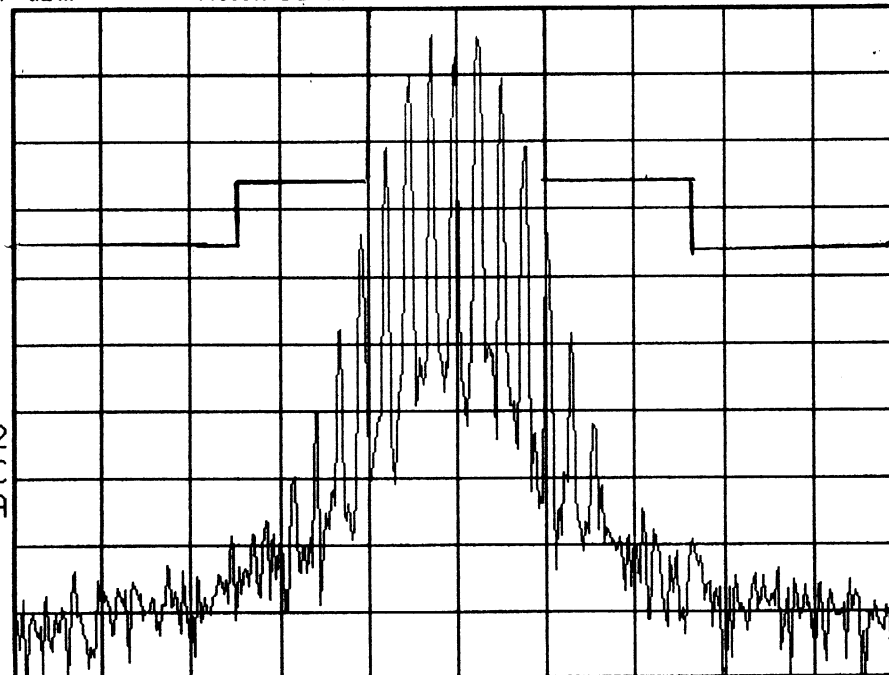
dB/

Offst

16

dB

V1 S2
S3 FC
AA



Center 157.4 MHz

Span 100 kHz

*Res BW 300 Hz

*VBW 300 Hz

Sweep 4.452 s (401 pts)

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

* Agilent 06:50:25 May 30, 2001

FCC ID:AMW0VP2001610888 C-88 1 WATT

Ref 30 dBm

Atten 25 dB

Peak

Log

10

dB/

Offst

16

dB

V1 S2

S3 FC

AA

Center 157.4 MHz

*Res BW 300 Hz

*VBW 300 Hz

Span 100 kHz

Sweep 4.452 s (401 pts)

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

* Agilent 06:53:00 May 30, 2001

FCC ID:AMW0VP2001610888 C-88 1 WATT

Ref 30 dBm

Atten 25 dB

Peak

Log

10

dB/

Offst

16

dB

V1 S2

S3 FC

AA

Center 157.4 MHz

*Res BW 300 Hz

*VBW 300 Hz

Span 100 kHz

Sweep 4.452 s (401 pts)

Trace

Trace

1

2

3

Clear Write

Max Hold

Min Hold

View

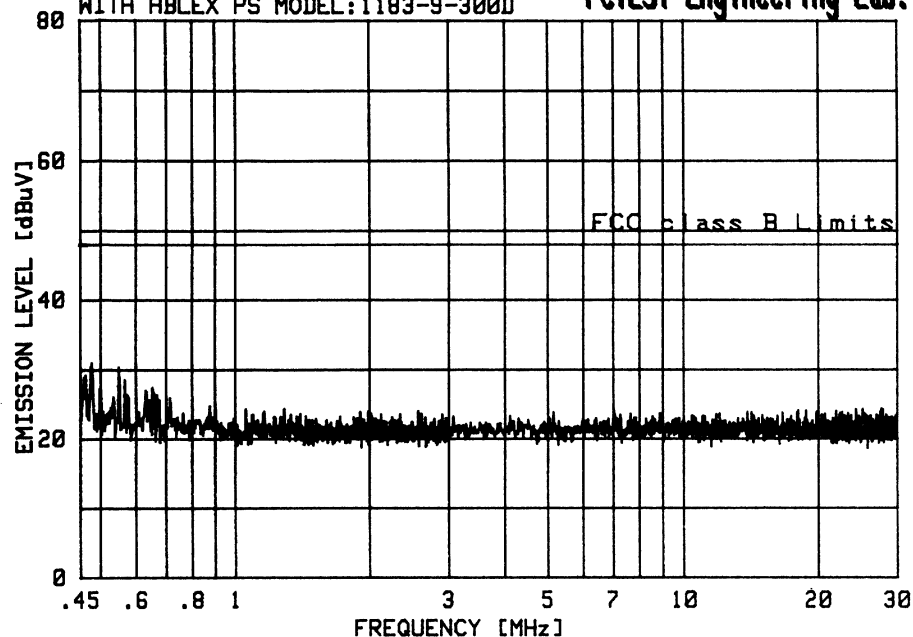
Blank

More

1 of 2

FCC ID:AMW0VP2001610888 LINE A
WITH ABLEX PS MODEL:1183-9-300D

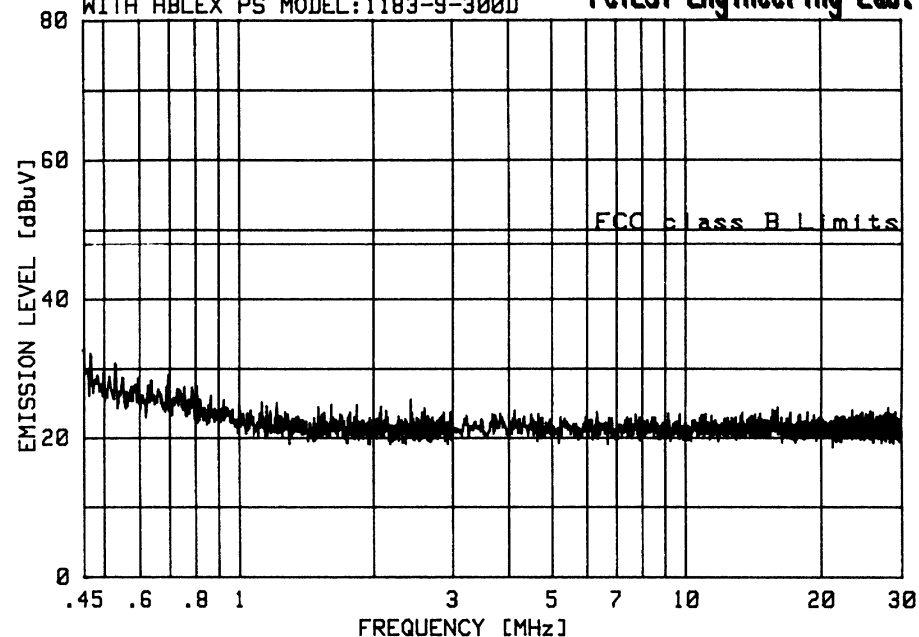
PCTEST Engineering Lab.



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:AMW0VP2001610888 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