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1 GENERAL INFORMATION

1.1 Product Description

NAME, MODEL, SERIAL # OF EUT:		MTC-100T/MCPA	
DESCRIPTION OF EUT:		8-channel transmitter & power amplifier/combiner for maritime band, 150 to 174 MHz	
Components of EUT			
Description	Model Number	Serial Number	FCC ID Number
MTC-100T/MCPA Subsystem	N/A	N/A	NVSMTC-100T MCPA
Power Amplifier (2)	Maristar A8H	001, 002	None
Power Combiner	Orion-2500-8H	3025-000719	None
Power Supply (2)	Titan-2500	20F5552, 20F6402	None
Transmitter (8)	MTC-100T	504, 508, 509, 510, 512, 513, 515, 517	None
Rack	Amco	630373	None
OPERATING MODE(S):			
I/O CABLES			
CONNECTION	Control / Maintenance (Transmitter J2)		
SHIELD	Double (Foil & Braid) RS-232		
CONNECTORS	25-pin D-Sub		
TERMINATION TYPE			
LENGTH	N/A		
REMOVABLE	yes		
CONNECTION	Audio (transmitter J1)		
SHIELD	Double (Foil & Braid) RS-232		
CONNECTORS	15-pin D-Sub		
TERMINATION TYPE			
LENGTH	N/A		
REMOVABLE	yes		
CONNECTION	Antenna (Combiner Output J9)		
SHIELD	Double (Foil & Braid) RF 214/U		
CONNECTORS	N-type		
TERMINATION TYPE	50-ohms		
LENGTH			
REMOVABLE	yes		
CONNECTION	Vector Feedback (Transmitter J8 to Power Amp)		
SHIELD	Double (Foil & Braid) RG 223		
CONNECTORS	SMA		
TERMINATION TYPE	50-ohms		
LENGTH			
REMOVABLE	yes		
CONNECTION	Radio Frequency (Transmitter J5 to Power Amp to Combiner)		
SHIELD	Double (Foil & Braid) RG 223		
CONNECTORS	N-type		
TERMINATION TYPE	50-ohms		
LENGTH			
REMOVABLE	yes		

POWER INTERFACE				
FREQUENCY/AC/DC VOLTAGE:		47 - 63 Hz / 120 Vac / 220 Vac		
PHASES/CURRENT:		Single phase		
OSCILLATOR FREQUENCIES				
FREQUENCY	EUT LOCATION		DESCRIPTION OF USE	
49.152 MHz	Transmitter		DSP Clock	
10.000 MHz	Transmitter		Reference Clock	
POWER SUPPLY				
DESCRIPTION	MANUFACTURER	MODEL #	SERIAL #	SWITCHING/LINEAR FREQ.
In Rack				Switching
In MTC-100T				Switching
POWER LINE FILTERS				
MANUFACTURER	MODEL NO.	QTY.	LOCATION ON EUT	
Internal				
CRITICAL EMI COMPONENTS				
DESCRIPTION	MANUFACTURER	PART # OR VALUE	QTY.	LOCATION ON EUT
DESCRIPTION OF ENCLOSURE:		N/A		
INTERFACING AND/OR SIMULATORS PERIPHERAL EQUIPMENT:				
DESCRIPTION	MANUFACTURER	MODEL #	SERIAL #	FCC ID
Audio Signal Generator	Telulex	SG-100A	391CE318F425	
Spectrum Analyzer (TUV)	HP	8566B		
4-way 'D' Switch				
2-way 'D' Switch				
Attenuator, 30 dB	Bird			
Attenuator, 6 dB	Narda	769-6	02237	
Attenuator, 3 dB	Narda	769-3	02287	
Laptop Computer	NEC			

1 GENERAL INFORMATION (continued)

1.2 Related Submittal/Grant

None

1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the ANSI C63.4 setup.

Test Performed:

- X 1. Conducted Emissions, FCC Part 2, Paragraphs 2.1046; 2.1047(a); 2.1049; 2.1051 and Part 80, Paragraph 80.215; 80.213(e); 80.205; 80.211; 80.209(a)
- 2. Radiated Emissions EN55022: 1992 Class B limit, 30 - 1,000 MHz, 10 meters
- X 3. Radiated Emission per FCC Part 2, Paragraph 2.1053
- 4. Engineering evaluations
- X 5. Frequency Stability, Part 2, Paragraph 2.1053 and Part 80, Paragraph 80.209(a)

Both Conducted and radiated testing were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8 - M1983. Radiated testing was performed at an antenna-to-EUT distance of 3 meters (1 - 10 GHz).

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV PRODUCT SERVICE
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 619 546 3999
Fax: 619 546 0364

The Test Site Data and performance comply with ANSI 63.4 and are registered with the FCC, 7435 Oakland Mills Rd, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

1.6 Part 2 Requirements

DC Voltages / DC Currents

+9.5 V $\pm$ 0.5 V / 4 amps maximum
+17.5 V $\pm$ 0.5 V / 2 amps maximum
-17.5 V $\pm$ 0.5 V / 1 amps maximum
+28 V $\pm$ 0.4 V / 0.1 amps maximum

Equipment Specifications

Microprocessor model number: Intel386(TM) EX

TMS320C31 (DSP)

The full name and mailing address of the manufacturer of the device and the applicant for certification.

Applicant for Certification

Cubic Communications Inc.
9535 Waples Street
San Diego CA 92121-2953

MTC-100T Manufacturer

Cubic Communications Inc.
9535 Waples Street
San Diego CA 92121-2953

MCPA

Delta Sigma Inc.
7209 Arlington Ave. Unit G
Riverside, CA 92503

System Integrator

Harris Corporation
1000 Perimeter Road Bldg 21A
Palm Bay, FL 32905

Equipment does not employ digital modulation techniques.

Equipment is not an AM broadcast stereophonic exciter-generator intended for interfacing with existing certified, or formerly type accepted or notified transmitters.

Type of Emission: 13K9F3E.

Frequency Range: 156-162 MHz

Range of operating power values or specific operating power levels: N/A

Maximum power rating 20 W.

2. SYSTEM TEST CONFIGURATION

2.1 Justification

The MTC-100T/MCPA was initially tested for FCC emission in the following configuration:

See Block Diagram.

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Modification

None

2.5 Configuration of Tested System

See Block Diagram.

3 RADIATED EMISSION EQUIPMENT/DATA

The following data lists the significant emission frequencies, measured levels, correction factor (which includes cable and antenna corrections), the corrected reading, and the limit.

See following page(s).

See test setup photos for radiated emissions test setup.

SPEC: FCC Part 2.1053

TEST DIST: 3 Meters

TEST SITE: 1

BICONICAL: 738

LOG PERIODIC: 738

RCVR: 466

Temperature:	25	Relative Humidity:	45
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ver 1.8

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Radiated Electromagnetic Emissions



Test Report #: S0337 Run 01

Test Area: Canyon Site 1 3 meters
HF

Temperature: 26 °C

Test Method: Spurious Emissions 2,1053

Test Date: 24-Aug-2000

Relative Humidity: 45 %

EUT Model #: Multiple Channel Power
Amplifier System

EUT Power: 120 Vac/ 208 Vac 60 Hz

Air Pressure: 100.5 kPa

EUT Serial #:

Page: 1 of 3

Manufacturer: Cubic Communications Inc.

Level Key

EUT Description:

Pk – Peak Nb – Narrow Band

Notes:

Qp – QuasiPeak Bb – Broad Band

Av - Average

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC Part 2.1053	DELTA2 (dB) N/A
Mid Channel						
1113.00	18.2 Pk	0.0 / 23.9 / 0.0	42.1	V / 1.0 / 161.0	-40.3	N/A
1113.00	11.1 Av	0.0 / 23.9 / 0.0	35.0	V / 1.0 / 161.0	-47.4	N/A
1272.00	12.9 Pk	0.0 / 25.3 / 0.0	38.2	V / 1.0 / 95.0	-44.2	N/A
1272.00	3.9 Av	0.0 / 25.3 / 0.0	29.2	V / 1.0 / 95.0	-53.2	N/A
1431.00	16.7 Pk	0.0 / 26.1 / 0.0	42.8	V / 1.0 / 2.0	-39.6	N/A
1431.00	8.0 Av	0.0 / 26.1 / 0.0	34.1	V / 1.0 / 2.0	-48.3	N/A
1590.00	11.5 Pk	0.0 / 27.0 / 0.0	38.5	V / 1.0 / 134.0	-43.9	N/A
1590.00	1.4 Av	0.0 / 27.0 / 0.0	28.4	V / 1.0 / 134.0	-54.0	N/A
1113.00	16.9 Pk	0.0 / 23.9 / 0.0	40.8	H / 1.0 / 161.0	-41.6	N/A
1113.00	9.5 Av	0.0 / 23.9 / 0.0	33.4	H / 1.0 / 161.0	-49.0	N/A
1272.00	15.6 Pk	0.0 / 25.3 / 0.0	40.9	H / 1.0 / 95.0	-41.5	N/A
1272.00	6.2 Av	0.0 / 25.3 / 0.0	31.5	H / 1.0 / 95.0	-50.9	N/A
1431.00	10.7 Pk	0.0 / 26.1 / 0.0	36.8	H / 1.0 / 2.0	-45.6	N/A
1431.00	1.5 Av	0.0 / 26.1 / 0.0	27.6	H / 1.0 / 2.0	-54.8	N/A
1590.00	10.7 Pk	0.0 / 27.0 / 0.0	37.7	H / 1.0 / 134.0	-44.7	N/A
1590.00	1.2 Av	0.0 / 27.0 / 0.0	28.2	H / 1.0 / 134.0	-54.2	N/A
Low Channel						
1092.00	12.5 Pk	0.0 / 24.1 / 0.0	36.6	H / 1.0 / 158.0	-45.8	N/A
1092.00	5.7 Av	0.0 / 24.1 / 0.0	29.8	H / 1.0 / 158.0	-52.6	N/A
1248.00	14.7 Pk	0.0 / 25.0 / 0.0	39.7	H / 1.0 / 158.0	-42.7	N/A
1248.00	10.5 Av	0.0 / 25.0 / 0.0	35.5	H / 1.0 / 158.0	-46.9	N/A
1560.00	10.5 Pk	0.0 / 26.7 / 0.0	37.2	H / 1.0 / 158.0	-45.2	N/A
1560.00	2.0 Av	0.0 / 26.7 / 0.0	28.7	H / 1.0 / 158.0	-53.7	N/A
1092.00	10.7 Pk	0.0 / 24.1 / 0.0	34.8	V / 1.0 / 158.0	-47.6	N/A
1092.00	3.6 Av	0.0 / 24.1 / 0.0	27.7	V / 1.0 / 158.0	-54.7	N/A
1248.00	10.4 Pk	0.0 / 25.0 / 0.0	35.4	V / 1.0 / 158.0	-47.0	N/A
1248.00	0.7 Av	0.0 / 25.0 / 0.0	25.7	V / 1.0 / 158.0	-56.7	N/A
1404.00	9.9 Pk	0.0 / 25.5 / 0.0	35.4	V / 1.0 / 158.0	-47.0	N/A

Tested by: J Owen
Printed

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Radiated Electromagnetic Emissions



Test Report #:	S0337 Run 01	Test Area:	Canyon Site 1 3 meters HF	Temperature:	26 °C
Test Method:	Spurious Emissions 2.1053	Test Date:	24-Aug-2000	Relative Humidity:	45 %
EUT Model #:	Multiple Channel Power Amplifier System	EUT Power:	120 Vac/ 208 Vac 60 Hz	Air Pressure:	100.5 kPa
EUT Serial #:					
Manufacturer:	Cubic Communications Inc.				
EUT Description:					
Notes:					

Page: 2 of 3

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC Part 2.1053	DELTA2 (dB) N/A
1404.00	0.0 Av	0.0 / 25.5 / 0.0	25.5	V / 1.0 / 158.0	-56.9	N/A
1560.00	9.4 Pk	0.0 / 26.7 / 0.0	36.1	V / 1.0 / 158.0	-46.3	N/A
1560.00	-0.2 Av	0.0 / 26.7 / 0.0	26.5	V / 1.0 / 158.0	-55.9	N/A
High Channel						
1134.00	11.3 Pk	0.0 / 24.1 / 0.0	35.4	V / 1.0 / 84.0	-47.0	N/A
1134.00	3.5 Av	0.0 / 24.1 / 0.0	27.6	V / 1.0 / 84.0	-54.8	N/A
1296.00	9.5 Pk	0.0 / 25.4 / 0.0	34.9	V / 1.0 / 67.0	-47.5	N/A
1296.00	0.4 Av	0.0 / 25.4 / 0.0	25.8	V / 1.0 / 67.0	-56.6	N/A
1134.00	14.3 Pk	0.0 / 24.1 / 0.0	38.4	H / 1.0 / 84.0	-44.0	N/A
1134.00	8.8 Av	0.0 / 24.1 / 0.0	32.9	H / 1.0 / 84.0	-49.5	N/A
1296.00	14.0 Pk	0.0 / 25.4 / 0.0	39.4	H / 1.0 / 67.0	-43.0	N/A
1296.00	9.2 Av	0.0 / 25.4 / 0.0	34.6	H / 1.0 / 67.0	-47.8	N/A

Tested by: J Owen
Printed

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Radiated Electromagnetic Emissions



Test Report #: **S0337 Run 01**
 Test Method: Spurious Emissions **2.1053**
 EUT Model #: Multiple Channel Power Amplifier System
 EUT Serial #: _____
 Manufacturer: Cubic Communications Inc.

Test Area: Canyon Site 1 3 meters HF
 Test Date: 24-Aug-2000
 EUT Power: 120 Vac/ 208 Vac 60 Hz

Temperature: 26 °C
 Relative Humidity: 45 %
 Air Pressure: 100.5 kPa

Page: 3 of 3

EUT Description: _____

Notes: _____

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC Part 2.1053	DELTA2 (dB) N/A
***** Measurement Summary *****						
1431.00	16.7 Pk	0.0 / 26.1 / 0.0	42.8	V / 1.0 / 2.0	-39.6	N/A
1113.00	18.2 Pk	0.0 / 23.9 / 0.0	42.1	V / 1.0 / 161.0	-40.3	N/A
1272.00	15.6 Pk	0.0 / 25.3 / 0.0	40.9	H / 1.0 / 95.0	-41.5	N/A
1248.00	14.7 Pk	0.0 / 25.0 / 0.0	39.7	H / 1.0 / 158.0	-42.7	N/A
1296.00	14.0 Pk	0.0 / 25.4 / 0.0	39.4	H / 1.0 / 67.0	-43.0	N/A
1590.00	11.5 Pk	0.0 / 27.0 / 0.0	38.5	V / 1.0 / 134.0	-43.9	N/A
1134.00	14.3 Pk	0.0 / 24.1 / 0.0	38.4	H / 1.0 / 84.0	-44.0	N/A
1560.00	10.5 Pk	0.0 / 26.7 / 0.0	37.2	H / 1.0 / 158.0	-45.2	N/A
1092.00	12.5 Pk	0.0 / 24.1 / 0.0	36.6	H / 1.0 / 158.0	-45.8	N/A
1404.00	9.9 Pk	0.0 / 25.5 / 0.0	35.4	V / 1.0 / 158.0	-47.0	N/A

Tested by: J Owen
 Printed

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Emissions Test Conditions: RADIATED EMISSIONS, FCC Part 2, Paragraph 2.1053

The *RADIATED EMISSIONS* measurements were performed at the following test location :

☐ - Test not applicable

■ - Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego (Calibration Due Date: 03 September 2003)

Testing was performed at a test distance of:

☐ - 1 meters

■ - 3 meters

☐ - 10 meters

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
8566B	407	Spectrum Analyzer	Hewlett Packard	2311A02209	10/00
85662B	406	Spectrum Analyzer Display	Hewlett Packard	2309A04682	10/00
3115	453	Antenna, Double Ridge Guide	EMCO	9412-4363	10/00
AMF-3D-010180-35-10P752	752	Pre-Amplifier (20 dB gain), 1 to 18 GHz	Miteq, Inc.	614344	*
LPB 2520/A	738	Antenna, LPB	Antenna Research	1169	05/01
ESVS 30	466	Receiver	Rohde & Schwarz	833825/003	12/00

Remarks: (*) Verified internally

Field Strength Calculation

If a preamplifier was used during the Radiated Emission Testing, it is required that the amplifier gain must be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna , cable used and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. In the automatic measurement, these considerations are automatically presented as a part of the print out. In the case of manual measurements and for greater efficiency and convenience, instead of using these correlation factors for each meter reading, the specification limit was modified to reflect these correlation factors at each frequency value so that the meter readings can be compared directly to the modified specification limit. This modified specification limit is referred to as the "Corrected Meter Reading Limit" or simply the CMRL, which is the actual field strength present at the antenna. The quantity can be derived in the following manner:

$$\text{Corrected Meter Reading Limit (CMRL)} = \text{SAR} + \text{AF} + \text{CL} - \text{AG} - \text{DC}$$

Where, SAR = Spectrum Analyzer Reading

AF = Antenna Factor

CL = Cable Loss

AG = Amplifier Gain (if any)

DC = Distance Correction (if any)

Assume the following situation: A meter reading of 29.4 dBuV was obtained from a Class A computing device measured at 83 MHz. Assume an antenna factor of 9.2 dB, a cable loss of 1.4 dB and amplifier gain of 20.0 dB at 83 MHz. The final field strength would be determined as follows:

$$\text{CMRL} = 29.4 \text{ dBuV} + 9.2 \text{ dB} - 1.4 \text{ dB} - 20 \text{ dB/M} - 0.0 \text{ dB}$$

$$\text{CMRL} = 20.0 \text{ dBuV/M}$$

This result is well below the FCC and CSA Class A limit of 29.5 dbuV/m at 83 MHz.

For the manual mode of measurement, a table of corrected meter reading limit was used to permit immediate comparison of the meter reading to determine if the measure emission amplitude exceeded the specification limit at that specific frequency.

4 CONDUCTED EMISSION EQUIPMENT/DATA

See following page(s).

CLIENT: CUBIC COMMUNICATIONS

SPECIFICATION: Part 2, Paragraph 2.1047; Part 80, Paragraph 80.213(e)

NOTE(S): 1. Low channel, 156 MHz

2. EUT consists of: (8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner

RANGE: -9 dBV

STATUS: PAUSED

Mary Washington

PEAK: 2213

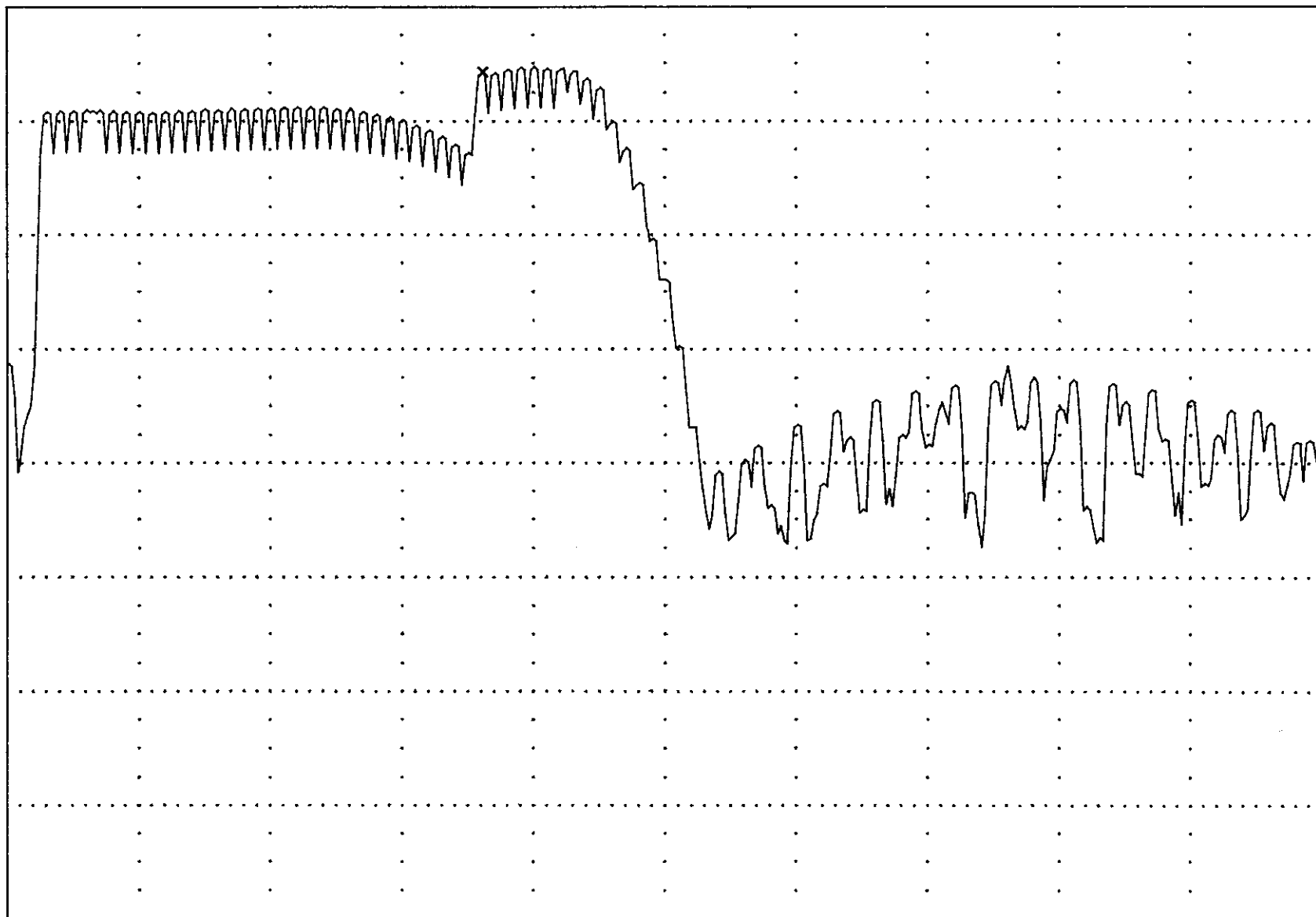
OVLD

A: MAG

0
dBV

10
dB
/DIV

-80



START: 0 Hz

BW: 95.485 Hz

STOP: 10 000 Hz

X: 3600 Hz

Y: -5.71 dBV

17

CLIENT: CUBIC COMMUNICATIONS

SPECIFICATION: Part 2, Paragraph 2.1047(a); Part 80, Paragraph 80.213(e)

NOTE(S): 1. Mid channel, 156 MHz

2. EUT consists of: (8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner

RANGE: -9 dBV

STATUS: PAUSED

A: MAG

may Washington

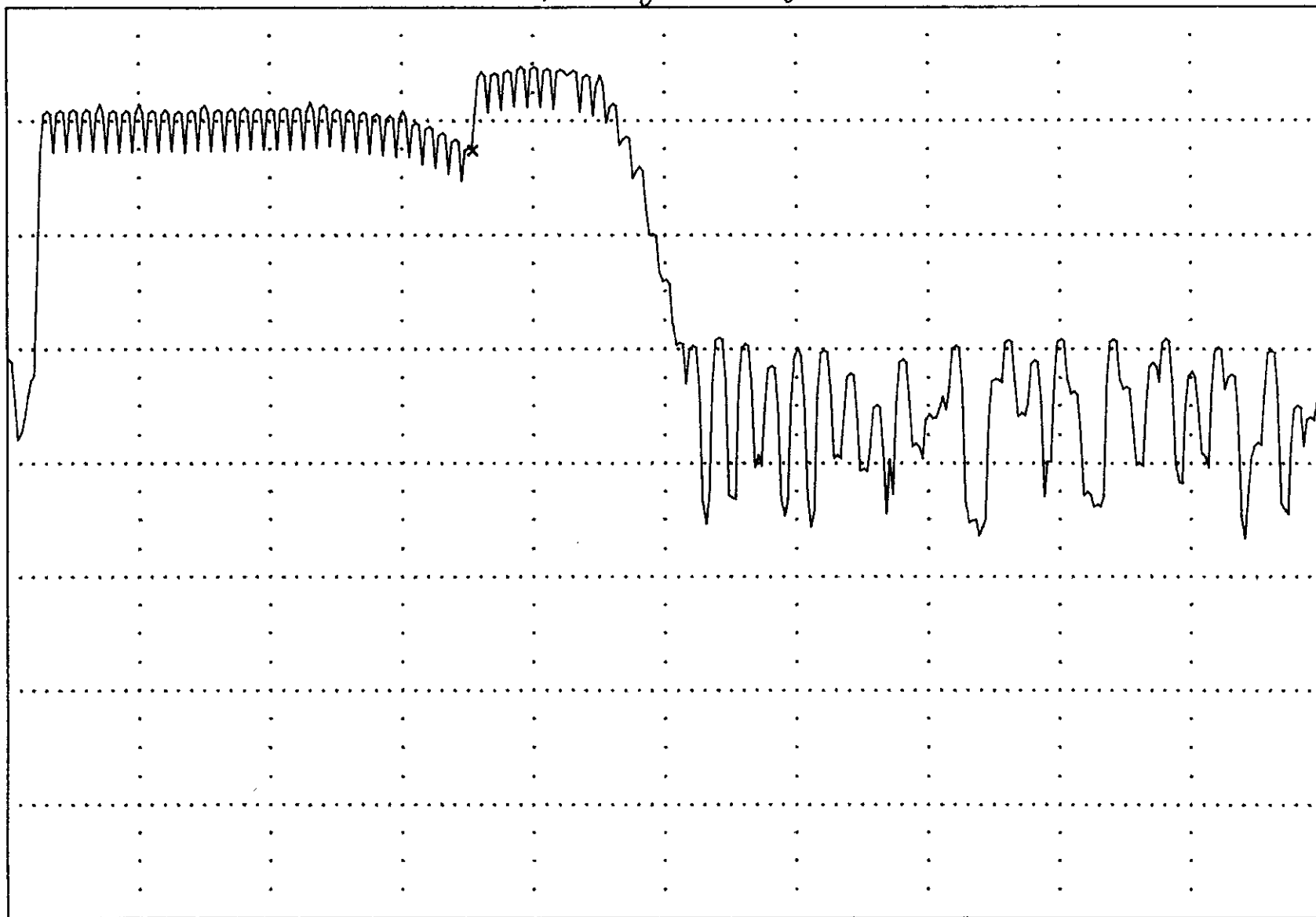
PEAK: 4694

OVLD

0
dBV

10
dB
/DIV

-80



START: 0 Hz

BW: 95.485 Hz

STOP: 10 000 Hz

X: 3525 Hz

Y: -12.66 dBV

18

CLIENT: CUBIC COMMUNICATIONS

SPECIFICATION: Part 2, Paragraph 2.1047(a); Part 80, Paragraph 80.213(e)

NOTE(S): 1. High channel, 156 MHz

2. EUT consists of: (8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner

RANGE: -9 dBV

STATUS: PAUSED

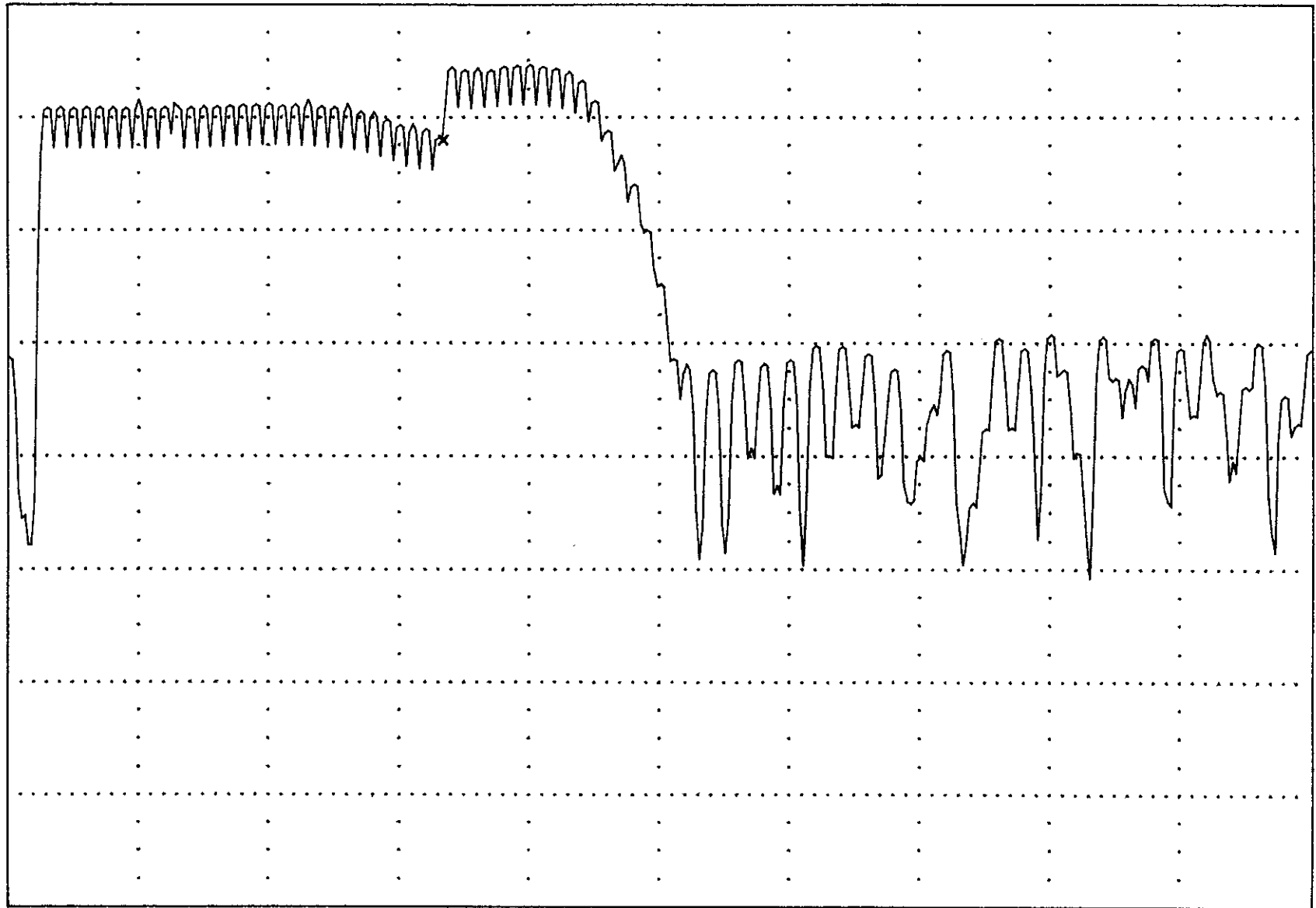
PEAK: 3729

OVLD

A: MAG

0
dBV

10
dB
/DIV



START: 0 Hz

BW: 95.485 Hz

STOP: 10 000 Hz

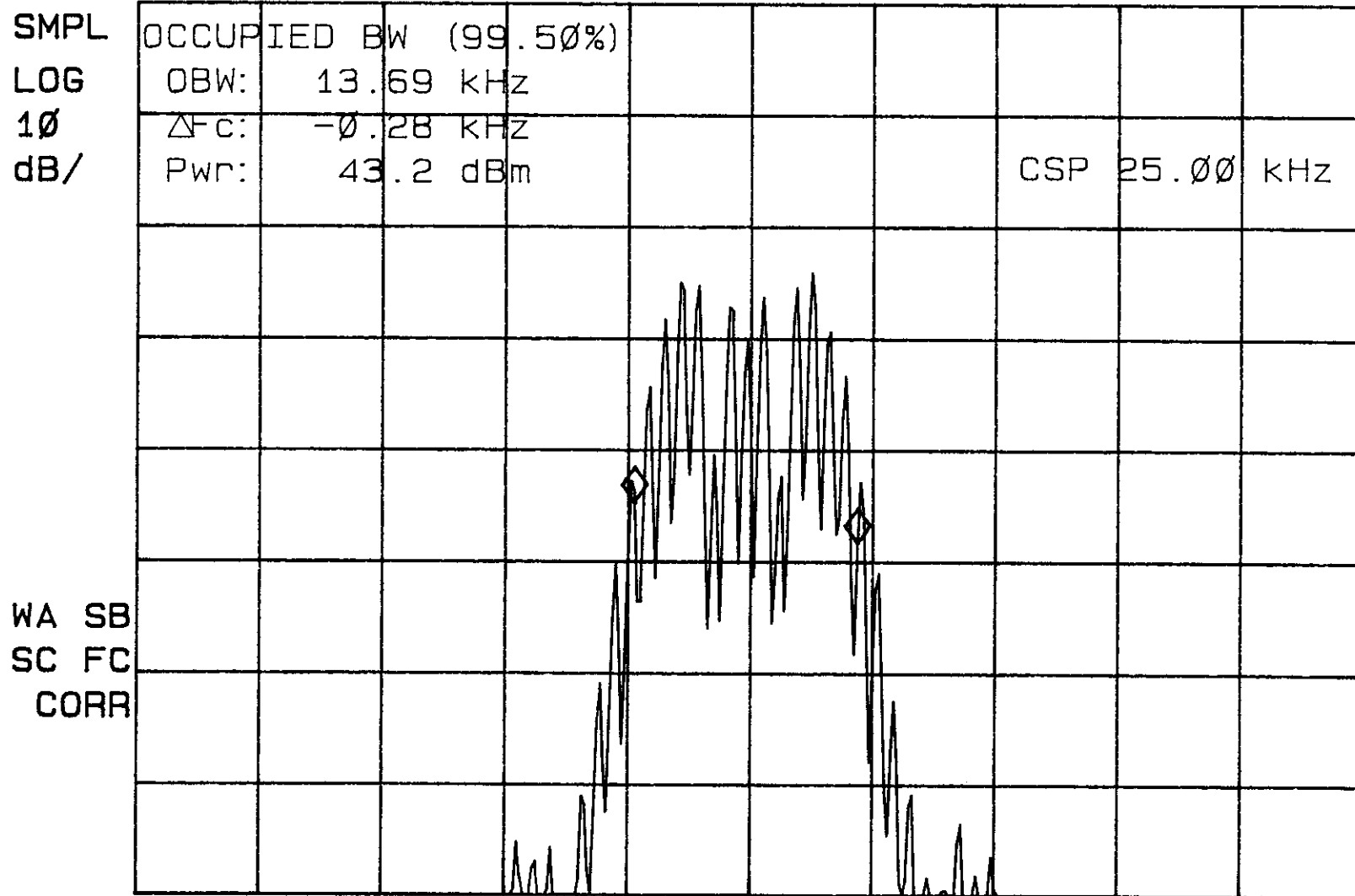
X: 3325 Hz

Y: -12.06 dBV

19

16: 26: 26 AUG 21, 2000
 hp

REF 59.5 dBm #AT 30 dB PG -39.5 dB

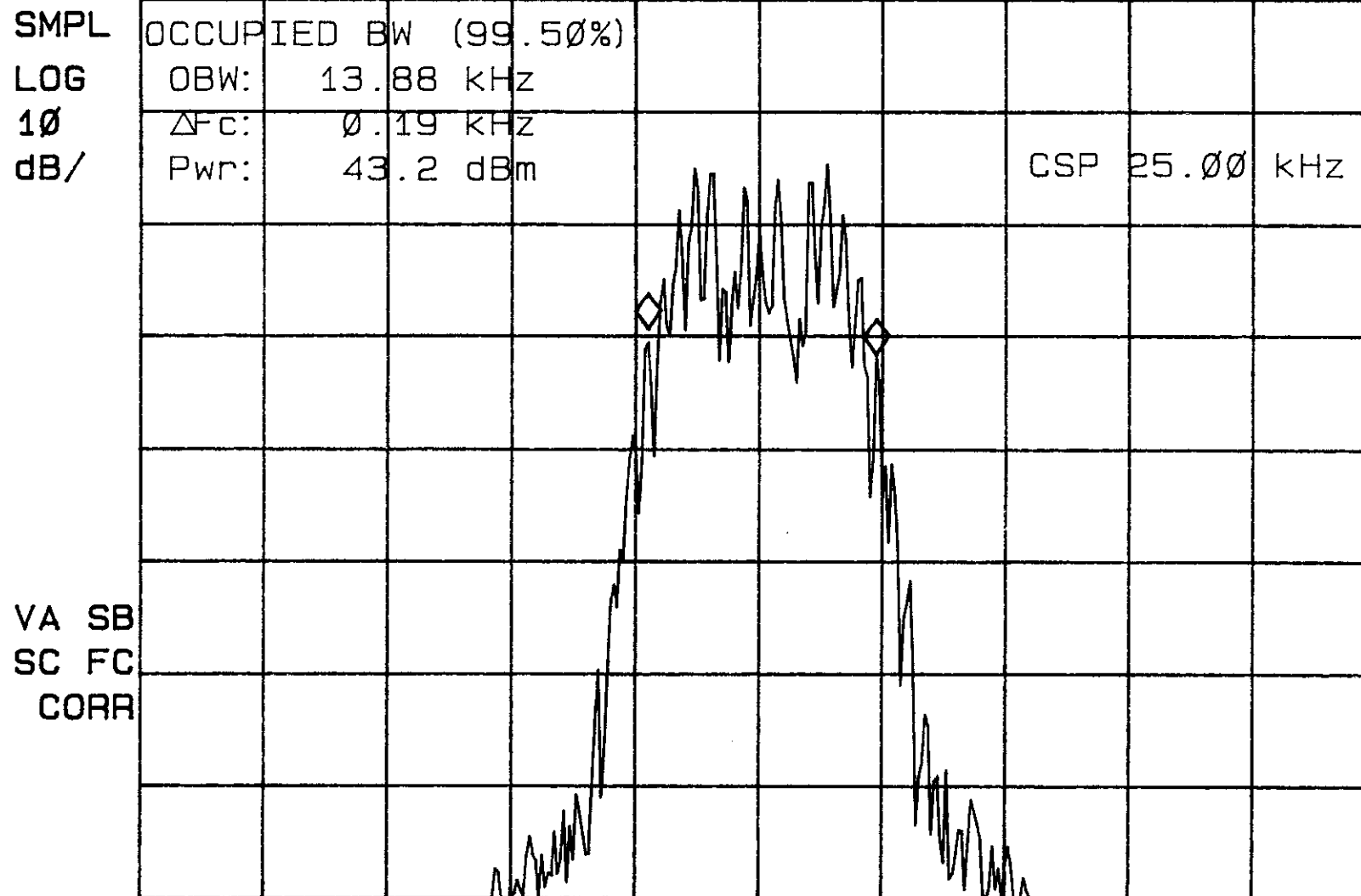


CENTER 156.00000 MHz SPAN 75.00 kHz
 #RES BW 300 Hz #VBW 3 kHz SWP 2.50 sec
 20

09: 28: 37 AUG 23, 2000
 17

REF 49.5 dBm

#AT 20 dB PG -39.5 dB



CENTER 159.00000 MHz

SPAN 75.00 KHz

#RES BW 300 Hz

#VBW 3 KHz

SWP 2.50 sec

CLIENT: CUBIC COMMUNICATIONS

NOTE(S): 1. High channel (occupied bandwidth)

2. EUT consists of:

SPECIFICATION: Part 2, Paragraph 2.1049; Part 80, Paragraph 80.205

Part 2, Paragraph 2.1046; Part 80, Paragraph 80.215(c)(1)

(8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner

09: 32: 13 AUG 23, 2000

REF 49.5 dBm

#AT 20 dB PG -39.5 dB

SMPL

OCCUPIED BW (99.50%)

LOG

OBW: 13.88 kHz

10

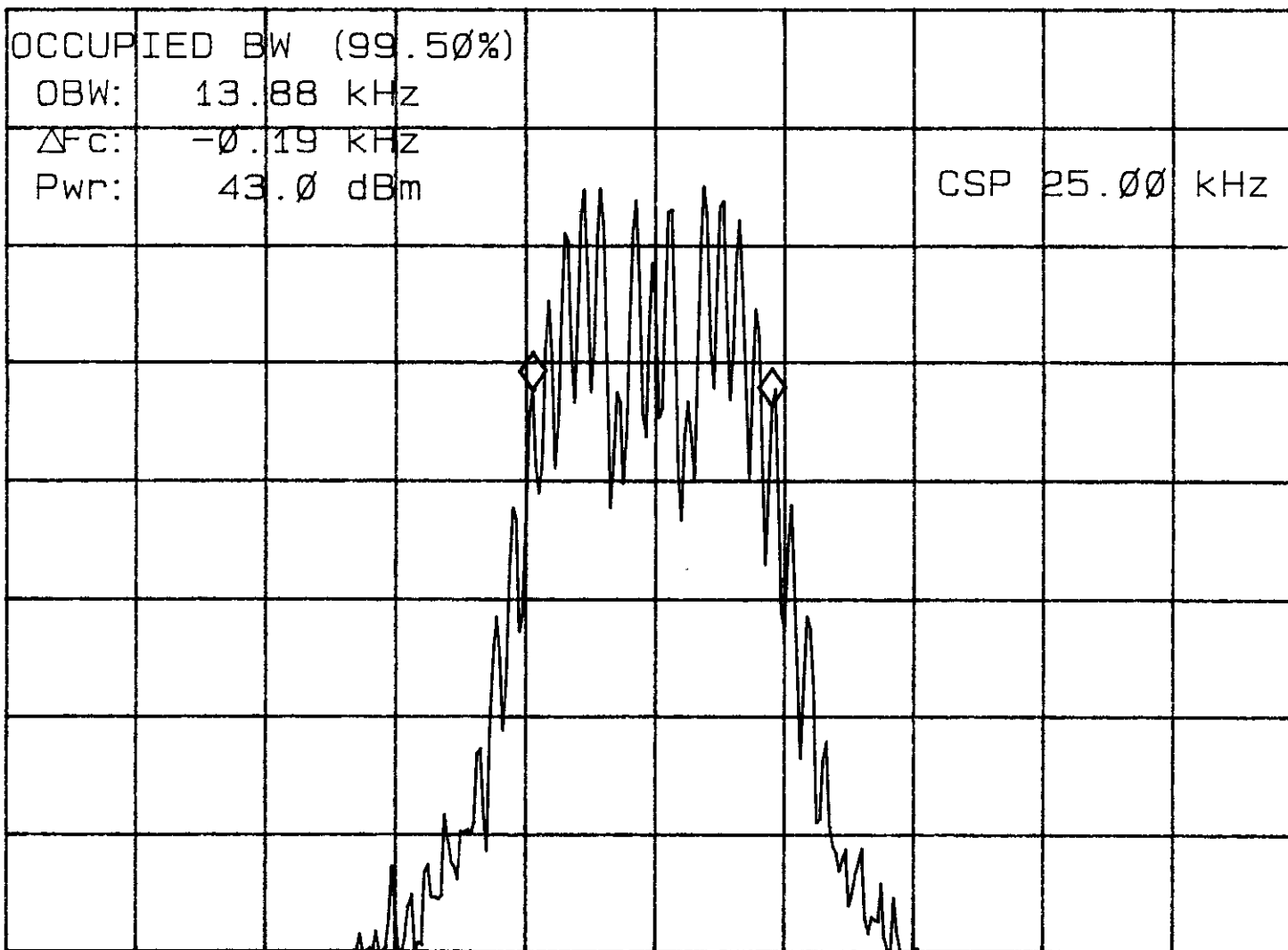
ΔF_c : -0.19 kHz

dB/

Pwr: 43.0 dBm

CSP 25.00 kHz

VA SB
SC FC
CORR



CENTER 162.00000 MHz

SPAN 75.00 kHz

#RES BW 300 Hz

#VBW 3 kHz

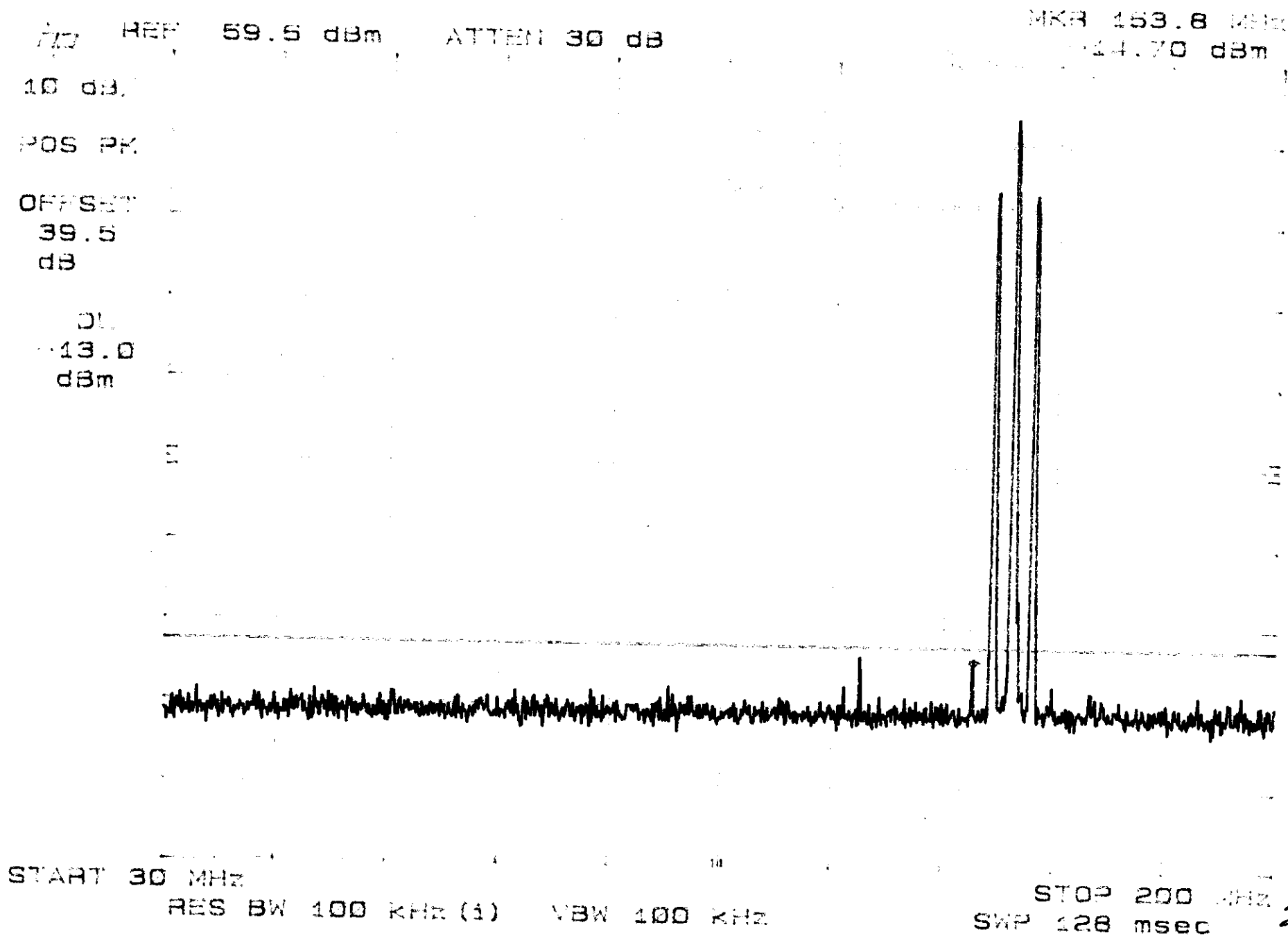
SWP 2.50 sec

CLIENT: CUBIC COMMUNICATIONS

SPECIFICATION: Part 2, Paragraph 2.1051; Part 80, Paragraph 80.211

NOTE(S): 1. Low channel (conducted spurious)

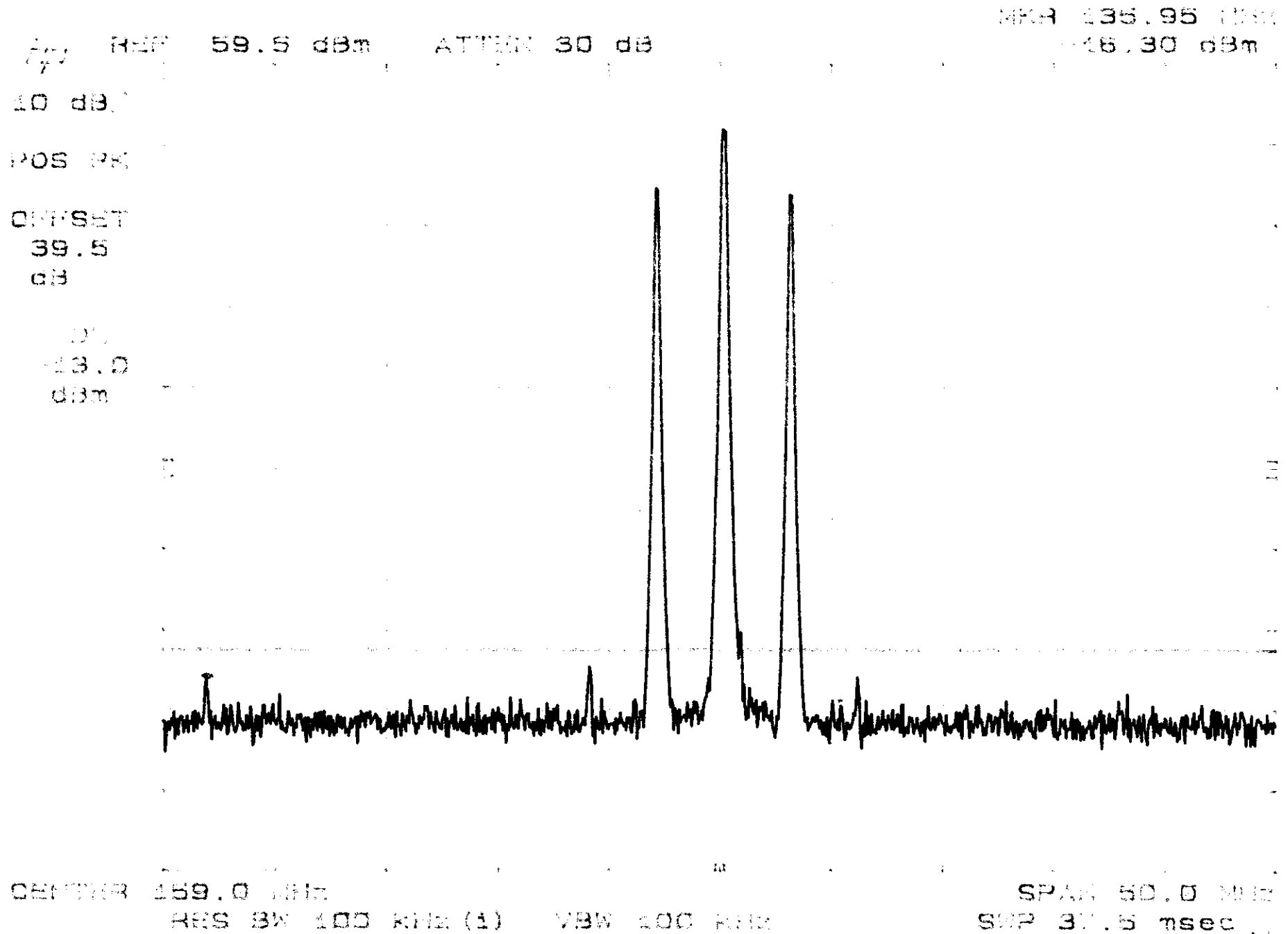
2. EUT consists of: (8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner



CLIENT: CUBIC COMMUNICATIONS
NOTE(S): 1. Low channel (conducted spurious)

SPECIFICATION: Part 2, Paragraph 2.1051; Part 80, Paragraph 80.211

2. EUT consists of: (8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner

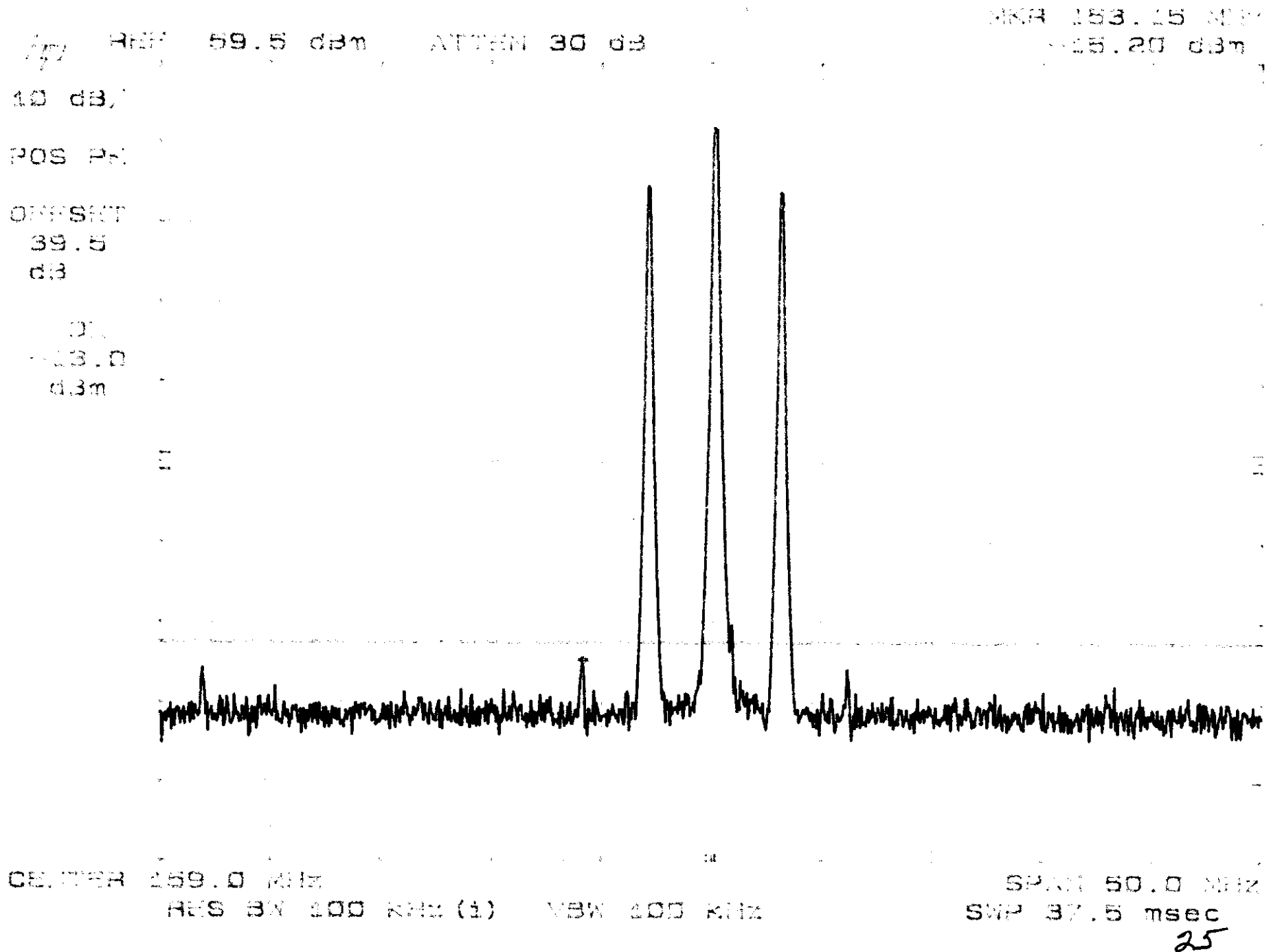


CLIENT: CUBIC COMMUNICATIONS

SPECIFICATION: Part 2, Paragraph 2.1051; Part 80, Paragraph 80.211

NOTE(S): 1. Low channel (conducted suprious)

2. EUT consists of: (8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner

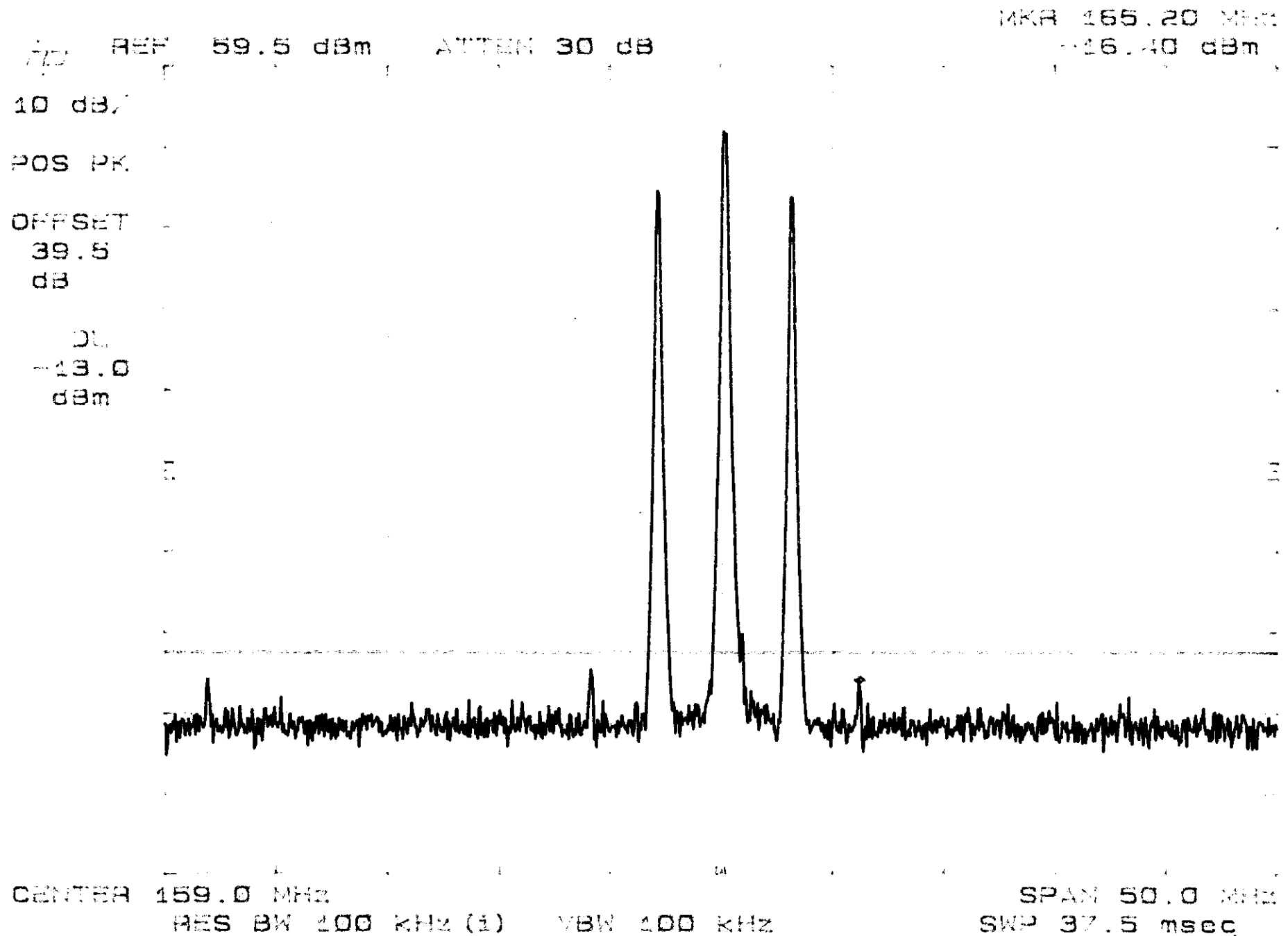


CLIENT: CUBIC COMMUNICATIONS

SPECIFICATION: Part 2, Paragraph 2.1051; Part 80, Paragraph 80.211

NOTE(S): 1. Low channel (conducted suprious)

2. EUT consists of: (8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner



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NOTE(S): 1. Low channel (conducted suprious)

2. EUT consists of: (8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner

13: 37: 23 AUG 23, 2000

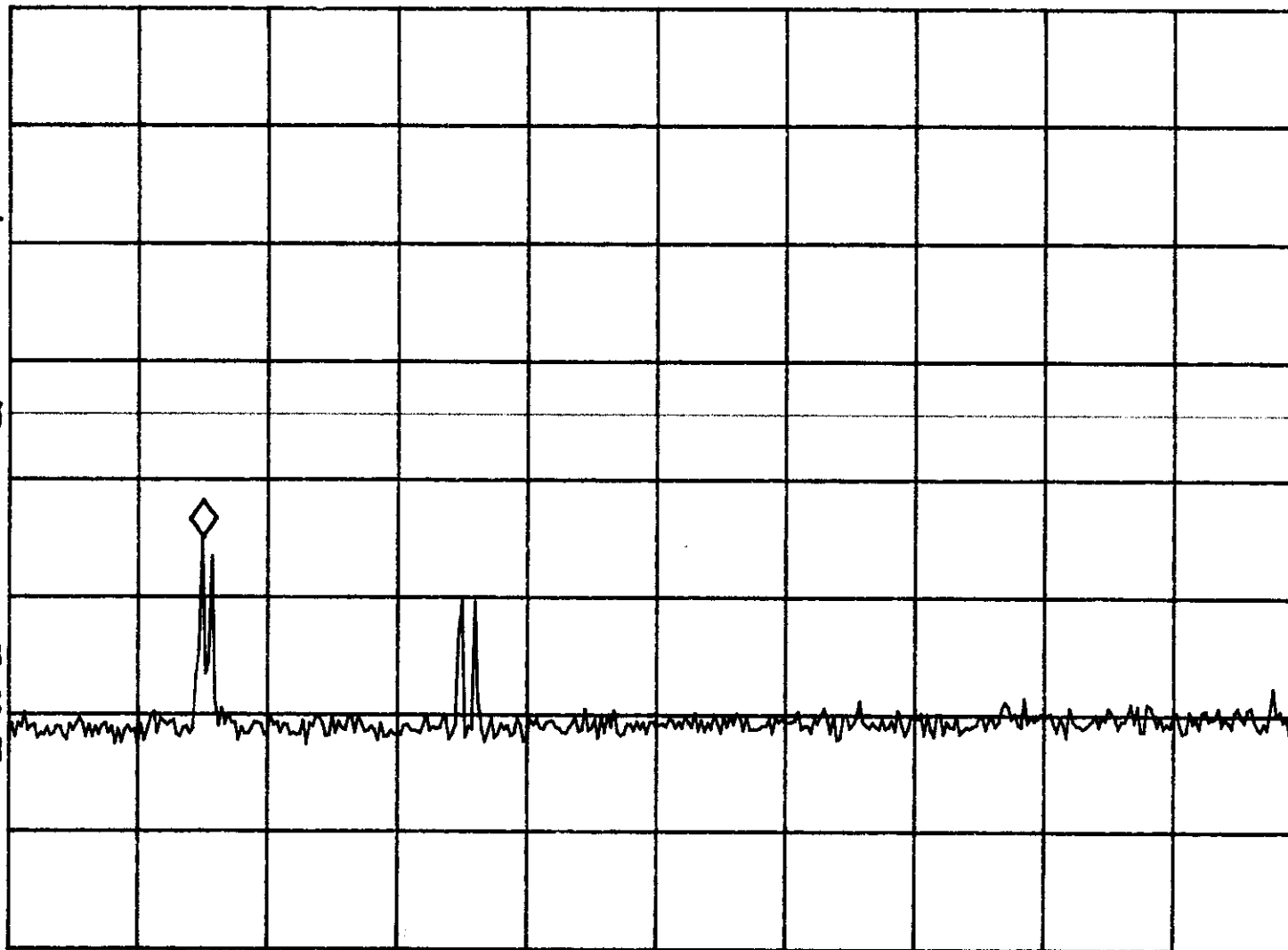
MKR 320.0 MHz

REF 21.5 dBm

AT 10 dB PG -39.5 dB

-23.50 dBm

PEAK
LOG
10
dB/
OFFST
1.5
dB
DL
-13.0
dBm
VA SB
SC FC
CORR



START 200.0 MHz

STOP 1.0000 GHz

#RES BW 100 kHz

VBW 100 kHz

SWP 240 msec

CLIENT: CUBIC COMMUNICATIONS
NOTE(S): 1. Low channel (conducted suprious)

SPECIFICATION: Part 2, Paragraph 2.1051; Part 80, Paragraph 80.211

2. EUT consists of: (8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner

13: 41: 37 AUG 23, 2000
hp

MKR 480.0 MHz

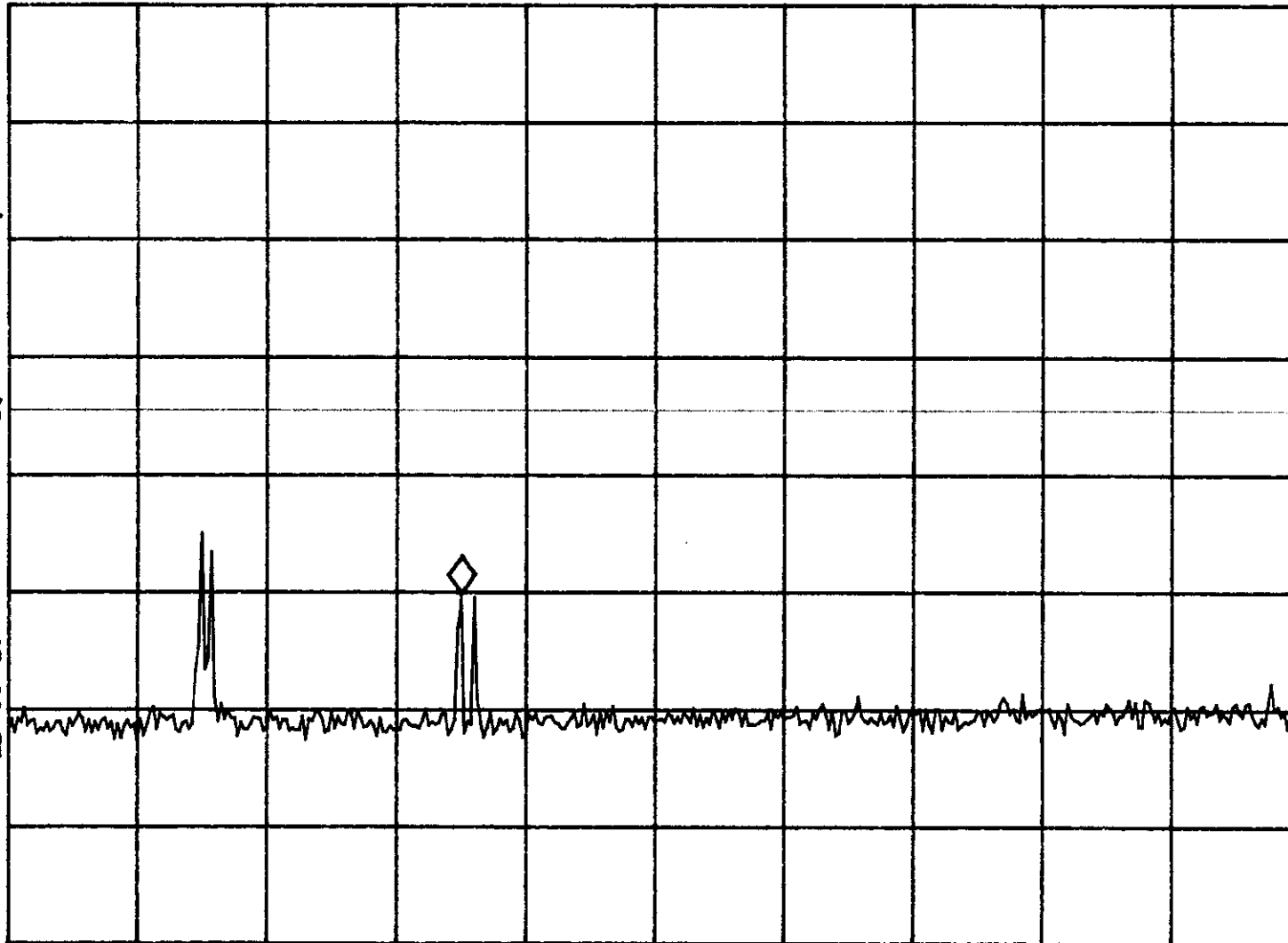
REF 21.5 dBm

AT 10 dB PG -39.5 dB

-28.65 dBm

PEAK
LOG
10
dB/
OFFST
1.5
dB
DL
-13.0
dBm

VA SB
SC FC
CORR



START 200.0 MHz

#RES BW 100 kHz

VBW 100 kHz

STOP 1.0000 GHz

SWP 240 msec

NOTE(S): 1. Low channel (conducted suprious)

2. EUT consists of: (8) MTC-100T transmitters; (2) racked mounted power supplies, and (1) power combiner

13: 48: 39 AUG 23, 2000

hp

MKR 1.368 GHz

REF 21.5 dBm

AT 10 dB PG -39.5 dB

-36.11 dBm

PEAK

LOG

10

dB/

DL

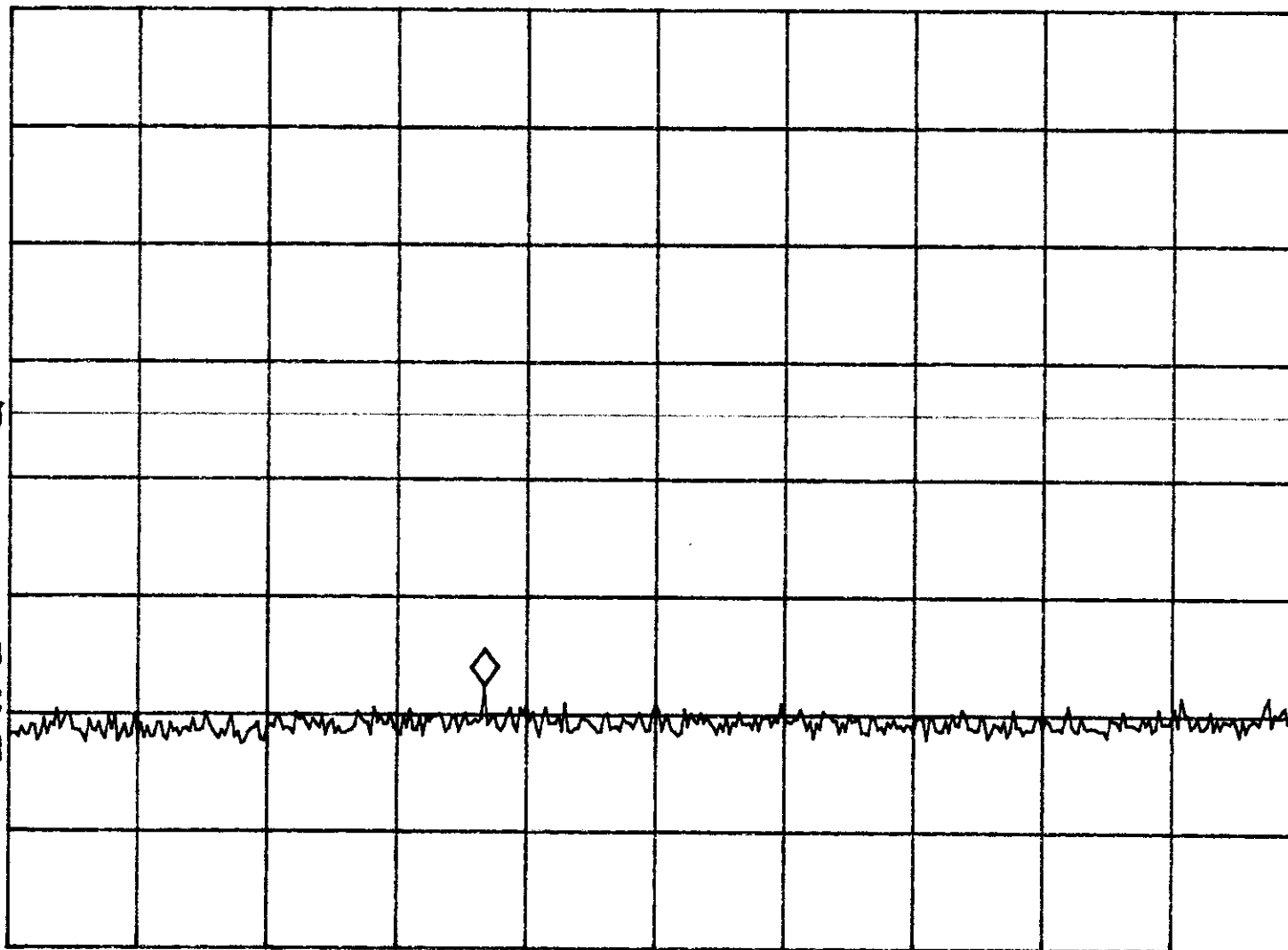
-13.0

dBm

VA SB

SC FC

CORR



START 1.000 GHz

#RES BW 100 KHz

VBW 100 KHz

STOP 2.000 GHz

SWP 300 msec

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Emissions Test Conditions: CONDUCTED EMISSIONS, FCC Part 2, Paragraphs 2.1046; 2.1047; 2.1049; 2.1051 and Part 80, Paragraphs 80.215(c)(1); 80.213(e); 80.205; 80.211

The *RADIATED EMISSIONS* measurements were performed at the following test location :

☐ - Test not applicable

■ - SR-5, Shielded Room, 16' x 28' x 15', Metal, Semi-Anechoic Chamber

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
8566B	407	Spectrum Analyzer	Hewlett Packard	2311A02209	10/00
85662B	406	Spectrum Analyzer Display	Hewlett Packard	2309A04682	10/00
8594E	430	Spectrum Analyzer	Hewlett Packard	3303A00365	05/01
BHP-100	--	100 MHz High Pass Filter	Minicircuits*	--	*
BHP-150	--	MHz High Pass Filter	Minicircuits*	--	*
BHP-200	--	MHz High Pass Filter	Minicircuits*	--	*
BHP-250	--	MHz High Pass Filter	Minicircuits*	--	*
8329-300	--	Attenuator	Bird	4218	N/A
769-6	--	Attenuator	Narda	02237	*
769-3	--	Attenuator	Narda	02287	*
HP 8901A	--	Modulation Analyzer	Hewlett Packard	--	12/00
3561A	--	Dynamic Signal Analyzer	Hewlett Packard	--	06/01
SG-100/A	--	21.5 MHz Synthesized Function/Arb Generator	Telux	--	04/01
8329-300	--	Coaxial Attenuator, 30 dB	Tenuline	--	*

Remarks: _____

5 FREQUENCY STABILITY EQUIPMENT/DATA

See following page(s).

Emissions Test Conditions: FREQUENCY STABILITY, FCC Part 2, Paragraphs 2.1055 and Part 80, Paragraphs 80.209(a)

The *Frequency Stability* measurements were performed at the following test location :

☐ - Test not applicable

■ - Frequency Stability Chamber

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
769-6	--	Attenuator	Narda	02237	*
769-3	--	Attenuator	Narda	02287	*
3PN1520	6146	Variac	Staco Energy Products Co.	--	**
--	--	Frequency Counter	Hewlett Packard	--	01/01
3478A	800	Multimeter	Hewlett Packard	--	03/03
6843A	580	AC Power Source	Hewlett Packard	3531A00115	08/01
8329-300	--	Coaxial Attenuator, 30 dB	Tenuline	--	*

Remarks: (*) Verified by customer; (**) Verified internally

TUV Product Service, San Diego
Frequency Stability Test Log
Tested 28 August 2000

Measurement Time	Deviation from 159 MHz	Reference Temperature
Ambient Temperature 25C	Deviation in hertz	Chamber indicates +28.3C
"10:17:29"	-352	21.058
"10:18:35"	-352	21.047
"10:19:40"	-352	21.059
"10:20:45"	-368	21.078
"10:21:50"	-352	21.089
"10:22:55"	-400	21.114
"10:24:00"	-352	21.109
"10:25:05"	-368	21.135
"10:26:09"	-352	21.179
"10:27:14"	-352	21.188
Temperature -20C	Deviation in hertz	Chamber indicates -20.6C
"12:00:47"	-848	-22.51
"12:01:52"	-816	-22.441
"12:02:57"	-768	-22.475
"12:04:02"	-800	-22.479
"12:05:07"	-768	-22.445
"12:06:12"	-768	-22.404
"12:07:17"	-800	-22.382
"12:08:22"	-768	-22.347
"12:09:27"	-816	-22.259
"12:10:32"	-752	-22.245
Temperature -10C	Deviation in hertz	Chamber indicates -10.2C
"13:10:47"	-768	-12.7
"13:11:52"	-768	-12.689
"13:12:57"	-752	-12.731
"13:14:02"	-720	-12.671
"13:15:07"	-672	-12.581
"13:16:12"	-672	-12.569
"13:17:17"	-704	-12.512
"13:18:22"	-672	-12.509
"13:19:27"	-672	-12.505
"13:20:32"	-672	-12.506
Temperature 0C	Deviation in hertz	Chamber indicates -0.2C
"14:20:47"	-672	-3.217
"14:21:52"	-672	-3.195
"14:22:57"	-656	-3.151
"14:24:02"	-656	-3.112
"14:25:07"	-624	-3.056
"14:26:12"	-576	-3.044
"14:27:17"	-544	-3.017
"14:28:21"	-512	-2.998
"14:29:26"	-576	-3.021
"14:30:31"	-576	-2.964

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TUV Product Service
10040 Mesa Rim Road
San Diego, CA 92121
858/546-3999

Tested by J Owen



TUV Product Service, San Diego
Frequency Stability Test Log
Tested 28 August 2000

Temperature +10C	Deviation in hertz	Chamber indicates +9.7C
"15:30:46"	-512	6.13
"15:31:51"	-512	6.163
"15:32:56"	-512	6.238
"15:34:02"	-512	6.23
"15:35:07"	-496	6.277
"15:36:11"	-496	6.306
"15:37:16"	-464	6.358
"15:38:21"	-464	6.436
"15:39:26"	-464	6.431
"15:40:31"	-496	6.447
Temperature +20C	Deviation in hertz	Chamber indicates +19.7C
"16:40:46"	-464	15.14
"16:41:51"	-496	15.146
"16:42:56"	-464	15.212
"16:44:02"	-464	15.31
"16:45:07"	-416	15.31
"16:46:12"	-448	15.319
"16:47:16"	-448	15.348
"16:48:21"	-448	15.411
"16:49:26"	-448	15.445
"16:50:31"	-416	15.477
Temperature +30C	Deviation in hertz	Chamber indicates +28.8C
"17:50:46"	-448	23.919
"17:51:51"	-464	23.983
"17:52:56"	-464	24.019
"17:54:01"	-448	24.025
"17:55:06"	-400	24.077
"17:56:11"	-448	24.148
"17:57:16"	-448	24.191
"17:58:21"	-448	24.25
"17:59:26"	-416	24.3
"18:00:31"	-416	24.352
Temperature +40C	Deviation in hertz	Chamber indicates 40.1C
"19:00:46"	-496	35.79
"19:01:51"	-512	35.78
"19:02:56"	-496	35.77
"19:04:01"	-496	35.78
"19:05:06"	-512	35.81
"19:06:11"	-512	35.82
"19:07:16"	-512	35.79
"19:08:21"	-496	35.78
"19:09:26"	-512	35.82
"19:10:31"	-512	35.87

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TUV Product Service, San Diego
Frequency Stability Test Log
Tested 28 August 2000

Temperature +50C	Deviation in hertz	Chamber indicates 50.1C
"20:10:46"	-464	45.35
"20:11:51"	-576	45.35
"20:12:56"	-576	45.39
"20:14:01"	-512	45.41
"20:15:06"	-576	45.39
"20:16:11"	-576	45.44
"20:17:16"	-3072 (device shut down)	45.45 See Note
"20:18:21"	-4720 (device shut down)	45.44 See Note
"20:19:26"	-1312 (device shut down)	45.48 See Note
"20:20:31"	-3808 (device shut down)	45.45 See Note

Note: The EUT is only designed for operation between -20 degree C to +40 degrees C.

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Frequency Stability

Minute	Nominal Voltage (Hz)	115% of Nominal (Hz)	85% Nominal (Hz)
Start up	+30	+45	+65
+2	+45	+45	+55
+5	+50	+50	+60
+10	+45	+65	+75

7 SIGNATURE PAGE

GENERAL REMARKS:

SUMMARY:

All tests according to *FCC Part 2, Paragraphs, 2.1046; 2.1047(a); 2.1049; 2.1051; 2.1053; 2.1055; Part 80, Paragraphs 80.205; 80.209(a); 80.211; 80.213(e); 80.215(c)(1)* were.

■ - Performed

□ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** *FCC Part 2, Paragraphs, 2.1046; 2.1047(a); 2.1049; 2.1051; 2.1053; 2.1055; and Part 80, Paragraphs 80.205; 80.209(a); 80.211; 80.213(e); 80.215(c)(1).*

□ - **Does not** fulfill the general approval requirements cited on page 1.

- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:

A handwritten signature in black ink, appearing to read "Jim Owen", with a stylized, cursive script.

Jim Owen
(EMC Engineer)