MEASUREMENT AND TECHNICAL REPORT

GTCO CALCOMP
14555 N 82 Street
Scottsdale, AZ 85260

DATE: 07 November 2002

This Report Concerns:	Original Grant: X	Class II Change:
Equipment Type:	BT-COM, Model BT-COM	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: **Defer until:**	No: X
Company Name **agrees to notify the Commission by:** **of the intended date of announcement of the product so that the grant can be issued on that date.**	N/A	
Transition Rules Request per 15.37?	Yes:	No: X*

(*) FCC Part 15, Paragraph(s) **15.247(a), 15.247(b), 15.247(c)**

Report Prepared by:

TÜV AMERICA, INC
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 858 546 3999
Fax: 858 546 0364

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1.0 GENERAL INFORMATION

1.1 Product Description

General Equipment Description -- *NOTE: This information will be input into your test report as shown below.*

EUT Description: Bluetooth communication adaptor

EUT Name: BT-COM

Model No.: BT-COM Serial No.: --

Product Options: --

Configurations to be tested: With MeetingPad

EUT Specifications and Requirements

Length: 4 Width: 3" Height: 1 Weight: 1 Lb

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 3.3VDC to 15VDC from tablet (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: --

Current (Amps/phase(max)): 70mA Current (Amps/phase(nominal)): --

Other: Charger supplied with unit to charge batteries. 9VDC out @ 250 mA draw. Chargers are power supplies available in 120V and 120/230V 50/60Hz switchers

Other Special Requirements

--

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Business, Schools

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EUT Power Cable

☐ Permanent OR ☐ Removable Length (in meters): --
☐ Shielded OR ☐ Unshielded
■ Not Applicable

EUT Interface Ports and Cables

Interface				Shielding								
Type	Analog	Digital	Qty	Yes	No	Type	Termination	Connector Type	Port Termination	Length (In meters)	Removable	Permanent
EXAMPLE:												
RS232	☐	■	*2*	■	☐	*Foil over braid*	*Coaxial*	*Metallized 9-pin D-Sub*	*Characteristic Impedance*	*6*	■	☐
I/O cable	☐	■	1	■	☐	Braid	--	RJ12	--	1	☐	■

EUT Software.

Revision Level: Zeevo Bluetooth 3.3

Description: --

EUT Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing.
Consult with your TÜV Product Service Representative if additional assistance is required.

1. Connected to MeetingPad and talking to the computer via Bluetooth and running Interwrite Starter software.

EUT System Components -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC ID #
--			

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Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)

Description	*Model #*	*Serial #*	*FCC ID #*
TDK USB adapter	--	--	--
MeetingPad	--	--	--
Light Touch Pen	--	--	--

Oscillator Frequencies

Frequency	*Derived Frequency*	*Component # / Location*	*Description of Use*
12 Mhz	--	Y1 Zeevo Bluestamp on Daughter board	Main clock for Bluetooth radio and micro in Zeevo chip
32Khz	--	Y2 Zeevo Bluestamp on Daughter board	Main clock for Bluetooth radio and micro in Zeevo chip

Power Supply

Manufacturer	*Model #*	*Serial #*	*Type*
OEM	Ad-091ag	--	☐ Switched-mode: (Frequency) -- ■ Linear ☐ Other: --
Ault	Sc1027a0903f01	--	■ Switched-mode: (Frequency) -- ☐ Linear ☐ Other: --

Power Line Filters

Manufacturer	*Model #*	*Location in EUT*
--		

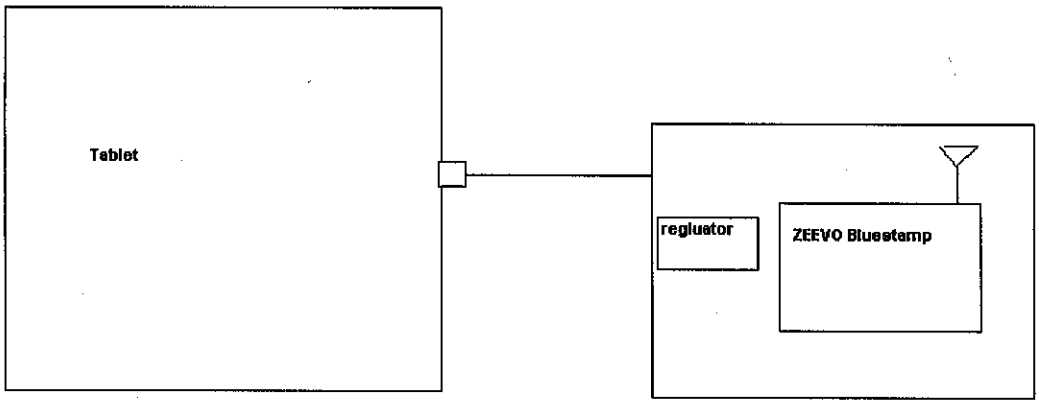
Critical EMI Components (Capacitors, ferrites, etc.)

Description	*Manufacturer*	*Part # or Value*	*Qty*	*Component # / Location*
--				

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

--

System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.



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1.2 Related Submittal Grant

None

1.3 Tested System Details

The FCC ID's 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 following tests.

TEST	FCC CFR 47#	PASS/FAIL
Channel Separation	15.247(a)	Pass
Number of Hopping Frequencies	15.247(a)	Pass
-20 dB Bandwidth	15.247(a)	Pass
Time of Occupancy	15.247(a)	Pass
Peak Output Power	15.247(b)	Pass
Radiated Spurious Emissions	15.247(c)	Pass

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 - 25 GHz).

1.5 Test Facility

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

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10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 858 546 3999
Fax: 858 546 0364

The Test Site Data and performance comply with ANSI C63.4 and are registered with the FCC, 7435 Oakland Mills Road, 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.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was initially tested for FCC emissions in the following configuration:

See Block Diagram

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Equipment Modifications

None

2.5 Configuration of Test System

See Block Diagram

3.0 CHANNEL SEPARATION EQUIPMENT/DATA
NUMBER OF HOPPING FREQUENCIES EQUIPMENT/DATA
-20 dB BANDWIDTH EQUIPMENT/DATA
TIME OF OCCUPANCY EQUIPMENT/DATA
PEAK OUTPUT POWER EQUIPMENT/DATA
RADIATED SPURIOUS EMISSIONS EQUIPMENT/DATA

See following page(s).

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Test Equipment Used: Model Number	Prop. #	Description	Manufacturer	Serial No.	Cal. Dates
Roof, 3-meter open site					
■ hp8566B	407	Spectrum Analyzer	Hewlett Packard	2311A02209	11/13/02
■ PreAmp 2-20 GHZ	719	PreAmp	TUV PS	na	n.c.r.
■ 3115	251	Antenna, Horn	Electro Mechanics Co	2595	12/1/03
■ Cable 1	732	30 ' cable	United Microwave Products	na	n.c.r.
■ Cable 2	6788	3 ' cable	United Microwave Products	na	n.c.r.
■ Cable 3	656	10" cable	United Microwave Products	na	n.c.r.
■ hp8445B	809	Automatic Preselector	Hewlett Packard	1442A01127	n.c.r.
SR-5, Shielded Room, 16' x 28' x 15', Metal, Semi-Anechoic Chamber					
■ hp8568B	6523	Spectrum Analyzer	Hewlett Packard	3503A00365	3/28/03
■ CBL6111	460	Antenna, Bilog	Chase	1013	n.c.r.
■ 3115	251	Antenna, Horn	Electro Mechanics Co	2595	12/1/03

Test Conditions: Emissions

Report No. SC205406

Photos taken? ■ Yes 10/30/02

GTCO CalComp Meeting Pad 300
FCC 15.247

15.247(a)(1)(ii)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB Bandwidth of the hopping frequency, whichever is greater. **Measured: 1.004 MHz.**

Frequency hopping systems in the 2400 to 2483.5 frequency bands shall have at least 75 hopping frequencies -- **counted 76 frequencies**.

The maximum -20 dB bandwidth shall be 1 MHz - **measured 774 kHz**

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period. **Measured 0.300 seconds**.

In a 20 msec sweep measured width of 200 microseconds
In a 30 sec sweep, there are 1500 20 msec intervals, so 1500 x 200 microseconds = .300 seconds

Measurements for the above tests were performed at the 3 meter OATS - Roof site.

15.247(b)(1)

The maximum peak power for frequency hopping systems operating in the 2400-2483.5 MHz bands shall be 1 Watt --- measured:

	dBuV/m	Watts
low channel 0	96.5	0.00133
mid channel 40	97.34	0.00161
high channel 79	96.51	0.00133

15.247(c)

RF conducted measurements could not be taken as the EUT is not configured for direct connection to test equipment.
The antenna is integral with the RF circuitry.
Radiated spurious measurements were taken in the RX and TX modes.
For radiated spurious measurements the device passed the limits as imposed by 15.205(a) and 15.209(a).
No emissions were found due to the EUT between 1000 MHz and 25000 MHz other than reported on data sheet presented.
No emissions were found due to the EUT between 30 MHz and 1000 MHz.
Prescan measurements to verify no emissions evident were performed in SR5.
Measured emissions for Radiated Spurious and Peak Power Output were performed at the 3 meter OATS - Roof site.

Measurements performed by
A. Laudani
A. LAUDANI EMC ENGINEER

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3.1 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:

Corrected Meter Reading Limit (CMRL) = SAR + AF + CL - AG - DC

Where, SAR = Spectrum Analyzer Reading
AF = Antenna Factor
CL = Cable Loss
AG = Amplifier Gain (if any)
DC = Distance Correction (if any)

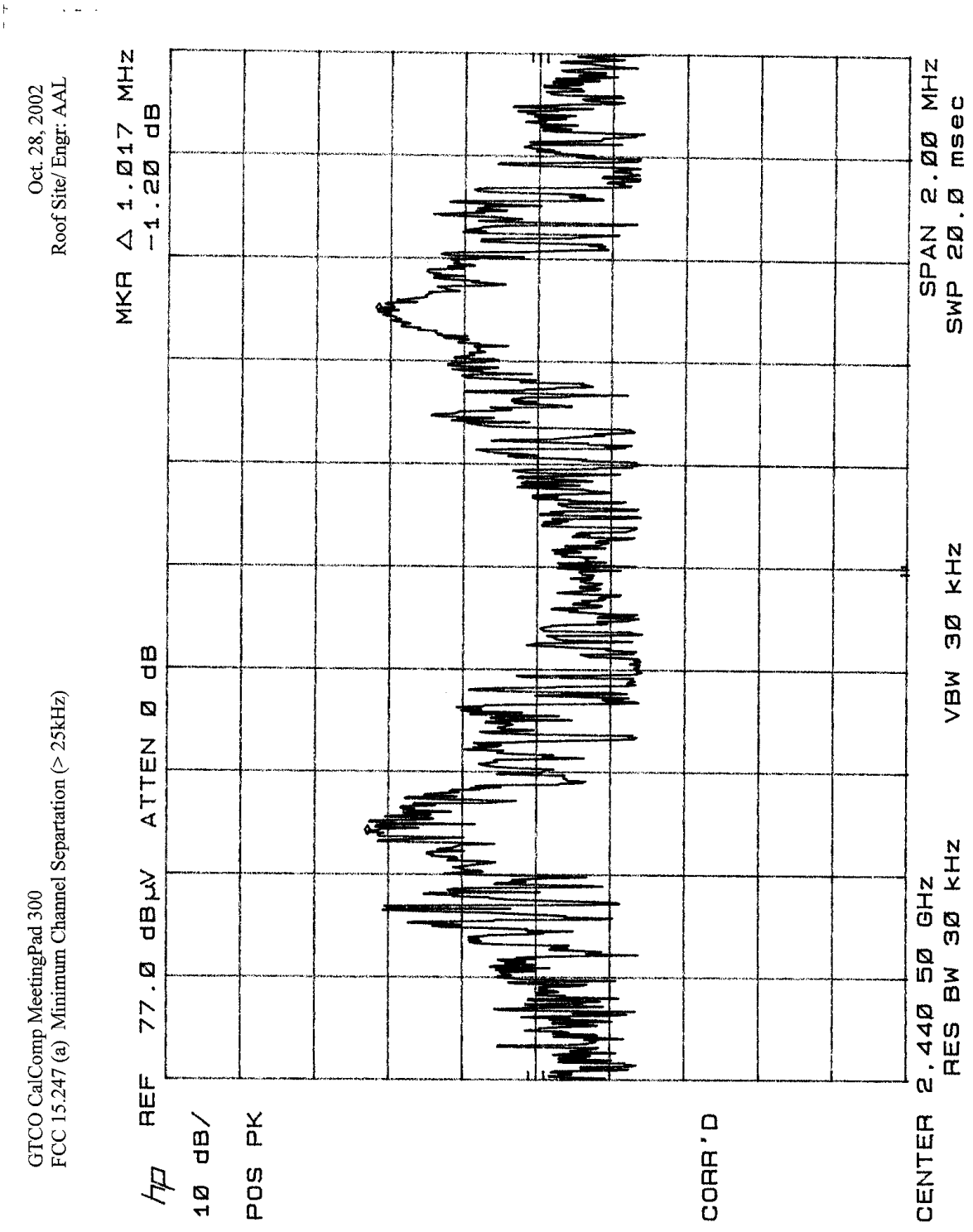
Assume the following situation: A meter reading of 29.4 dBuV was obtained from a Class A computing device measured at 83 MHz. Assume an antenna factor of 9.2 dB, a cable loss of 1.4 dB and amplifier gain of 20.0 dB at 83 MHz. The final field strength would be determined as follows:

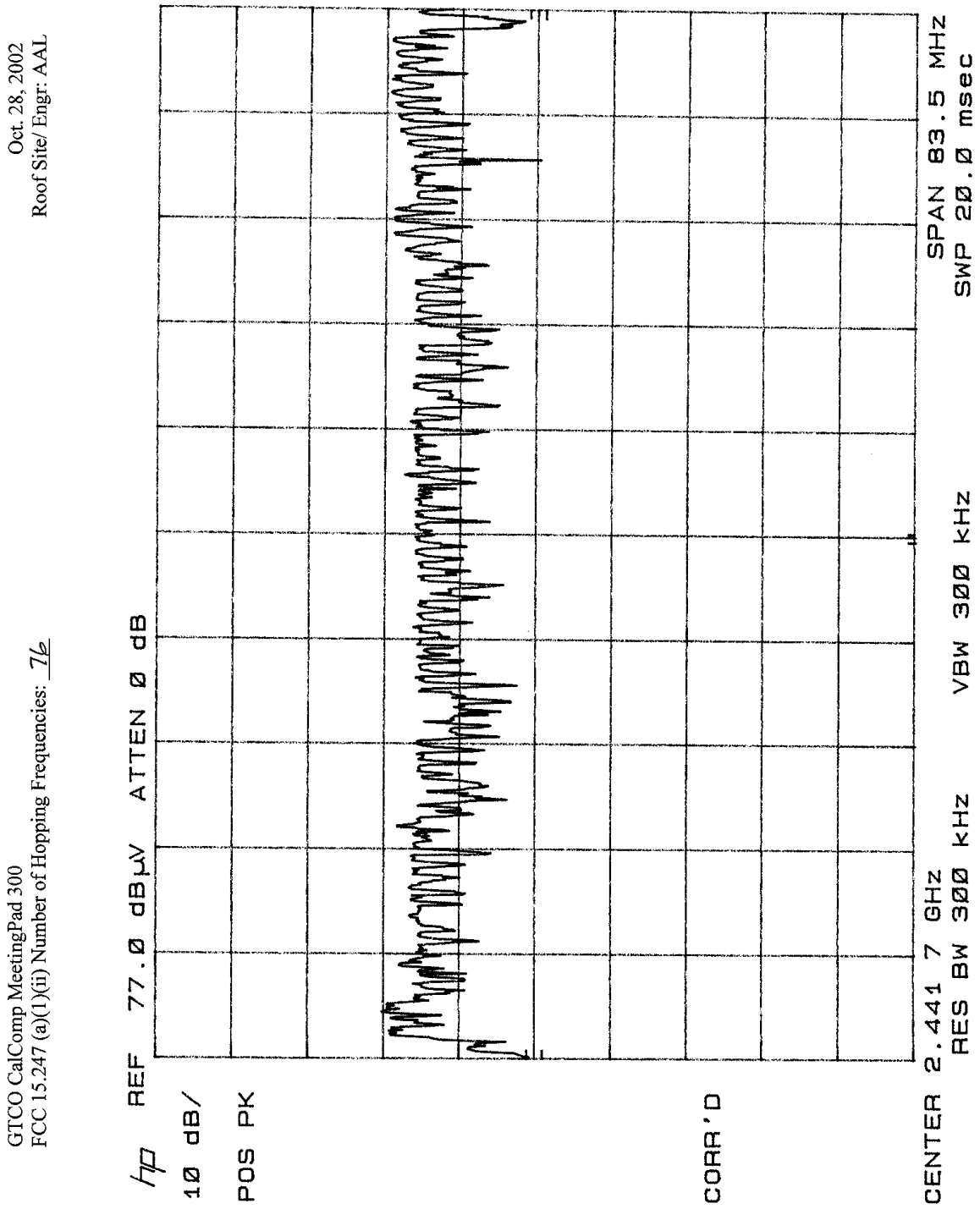
CMRL = 29.4 dBuV + 9.2dB = 1.4 dB - 20 dB/M - 0.0 dB

CMRL = 20.0 dBuV/M

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

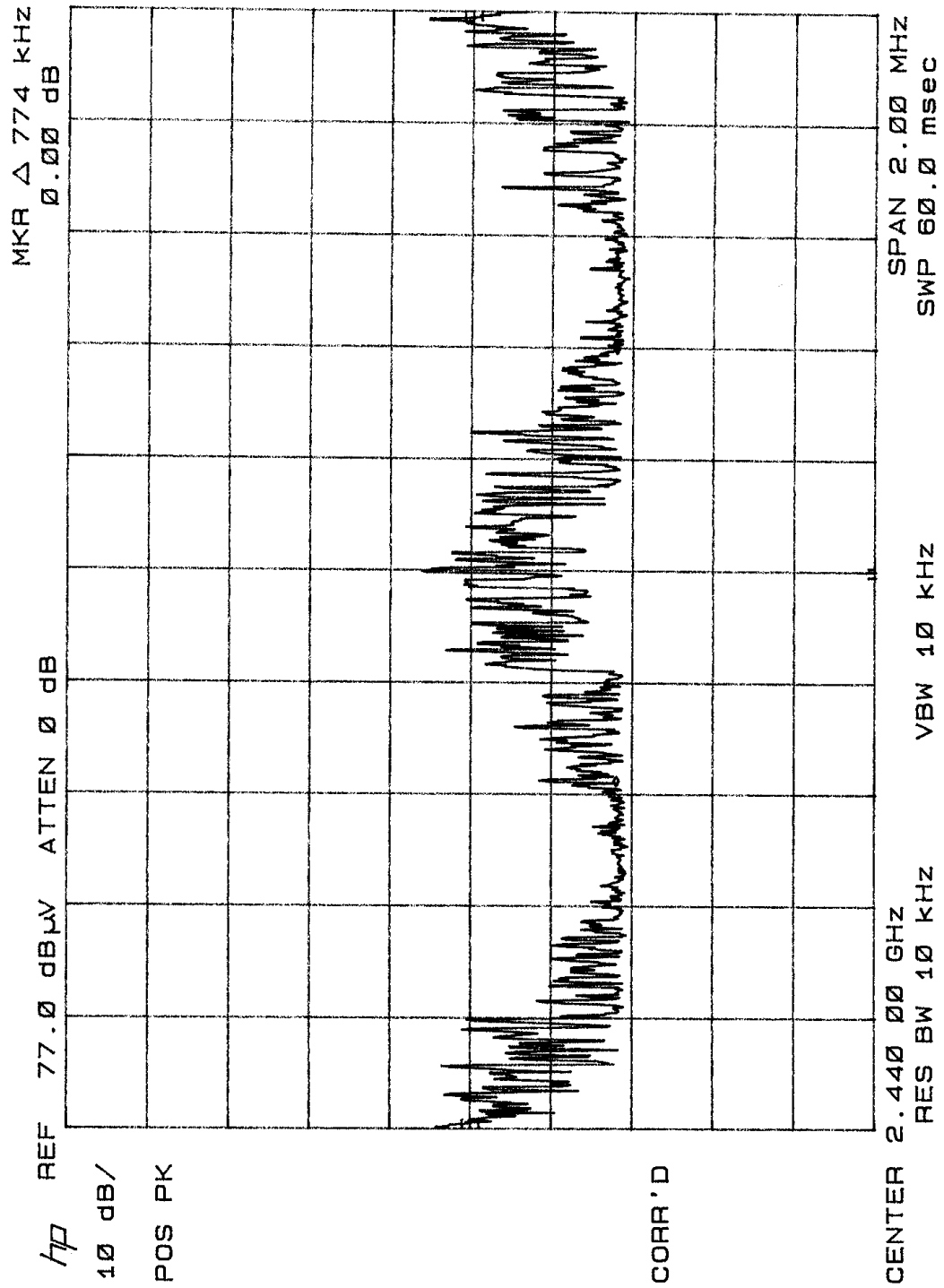
For the manual mode of measurement, a table of corrected meter reading limit was used to permit immediate comparison of the meter reading to determine if the measure emission amplitude exceeded the specification limit at that specific frequency.

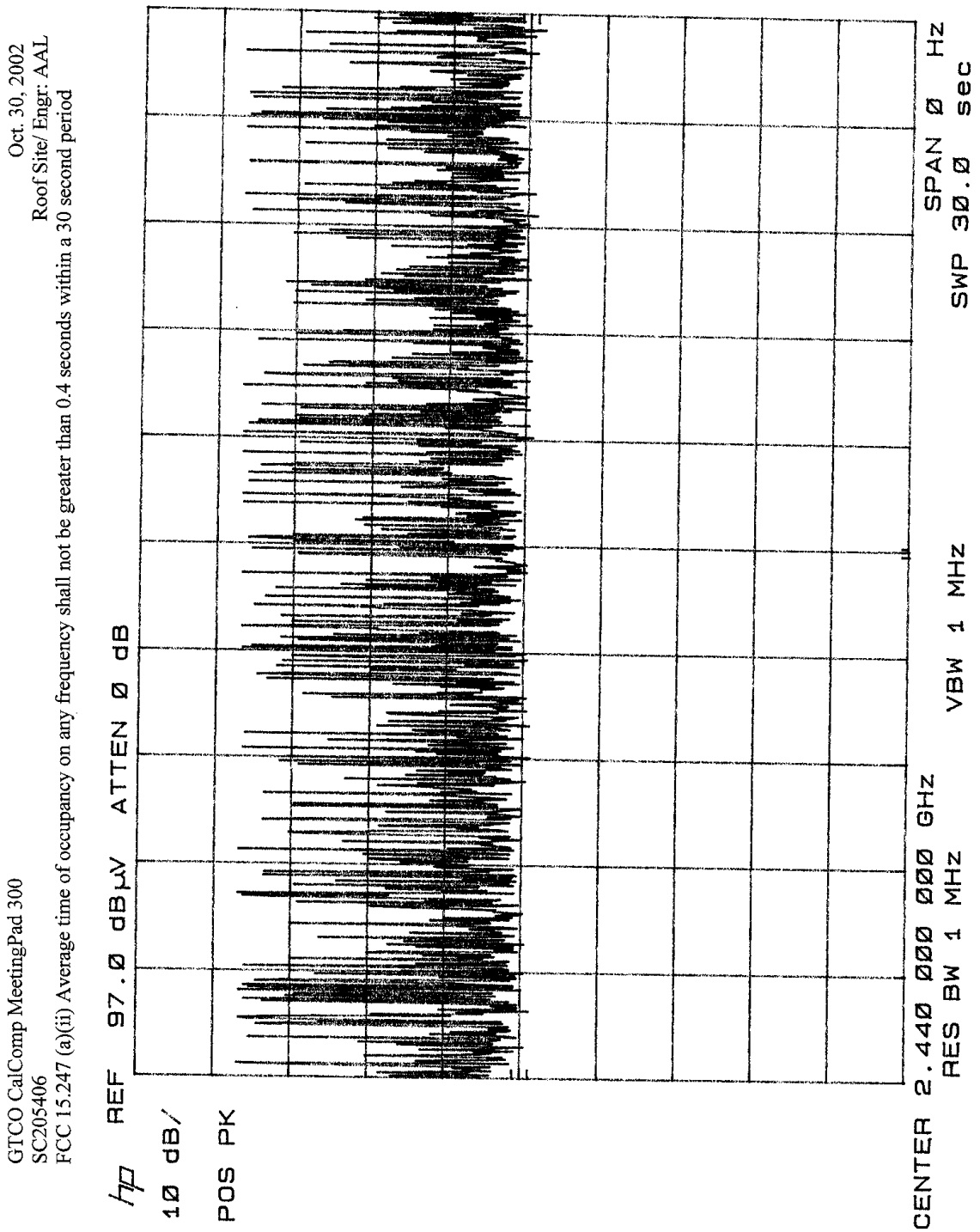

Oct. 28, 2002
Roof Site/ Engr: AAL
GTCO CalComp MeetingPad 300
FCC 15.247 (a) Minimum Channel Separtation (> 25kHz)
MKR Δ 1.017 MHz
-1.20 dB
REF 77.0 dBµV
ATTEN 0 dB
10 dB/
POS PK
CORR'D
CENTER 2.440 50 GHz
RES BW 30 kHz
VBW 30 kHz
SPAN 2.00 MHz
SWP 20.0 msec

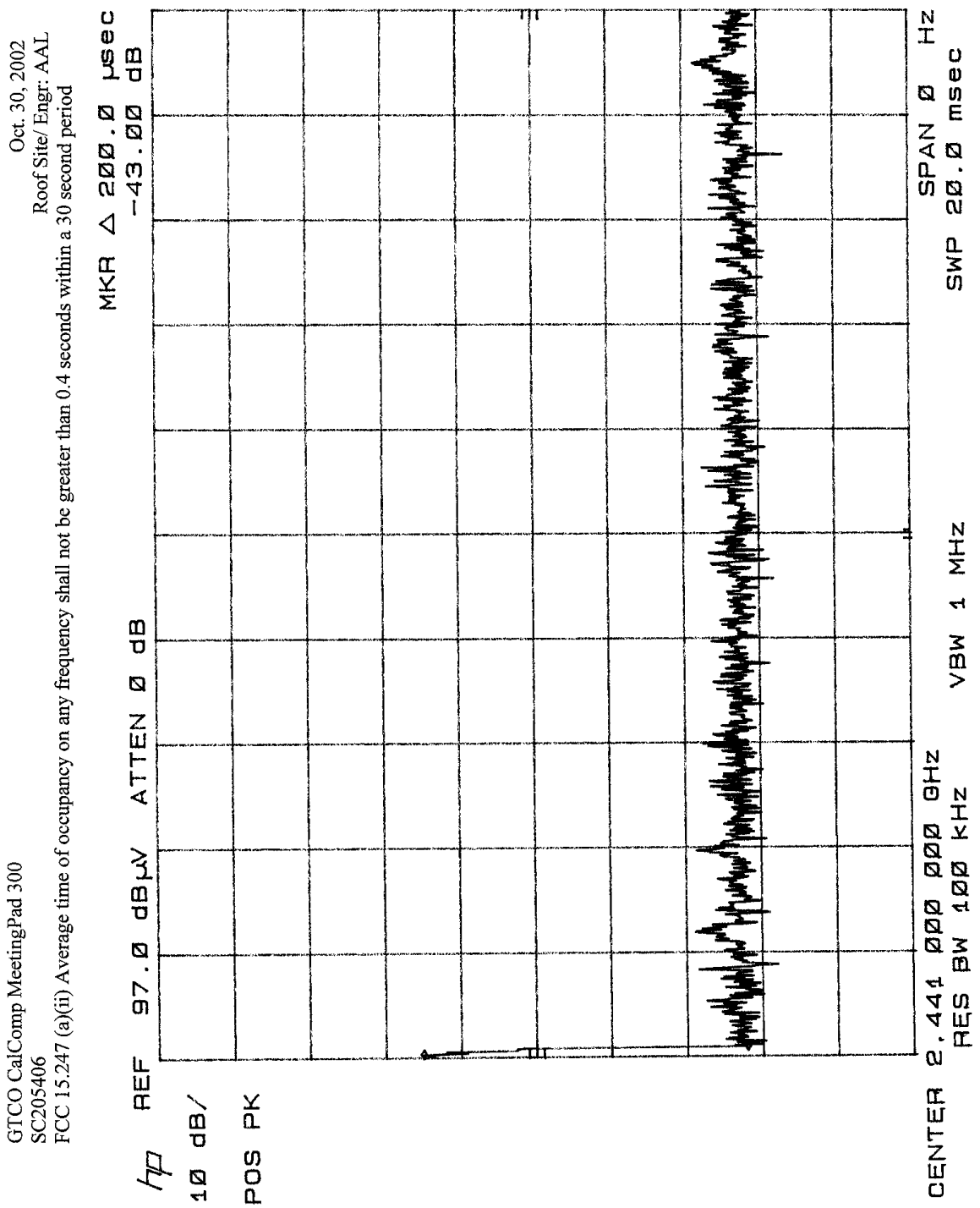

GTCO CalComp MeetingPad 300
FCC 15.247 (a)(1)(ii) Number of Hopping Frequencies: 76
Oct. 28, 2002
Roof Site/ Engr: AAL
REF 77.0 dBµV ATTEN 0 dB
10 dB/
POS PK
CORR'D
CENTER 2.441 7 GHz
RES BW 300 kHz
VBW 300 kHz
SPAN 83.5 MHz
SWP 20.0 msec

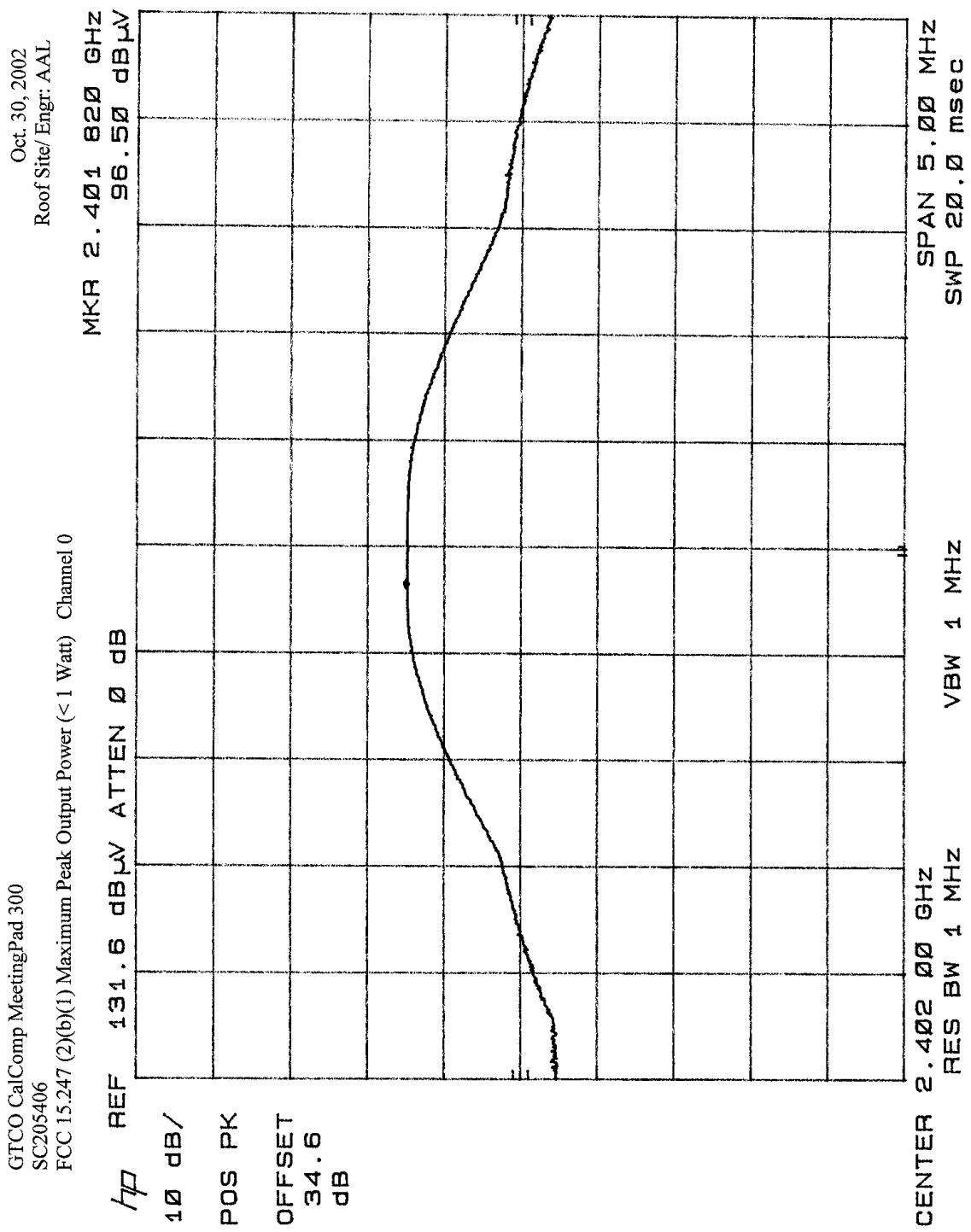
GTCO CalComp MeetingPad 300
FCC 15.247 (a) -20 dB Bandwidth (< 1 MHz): 214 kHz

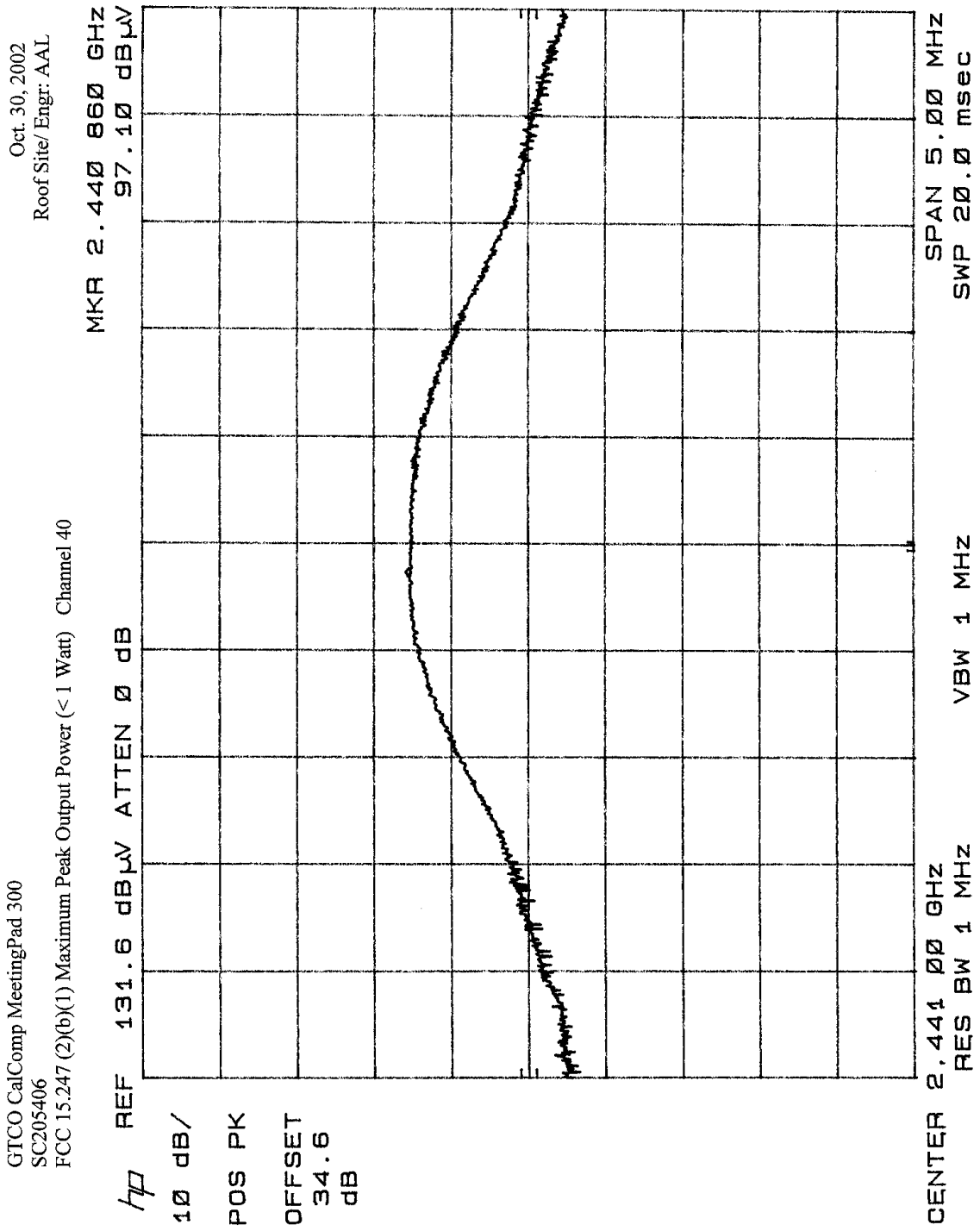
Oct. 28, 2002
Roof Site/ Engr: AAL

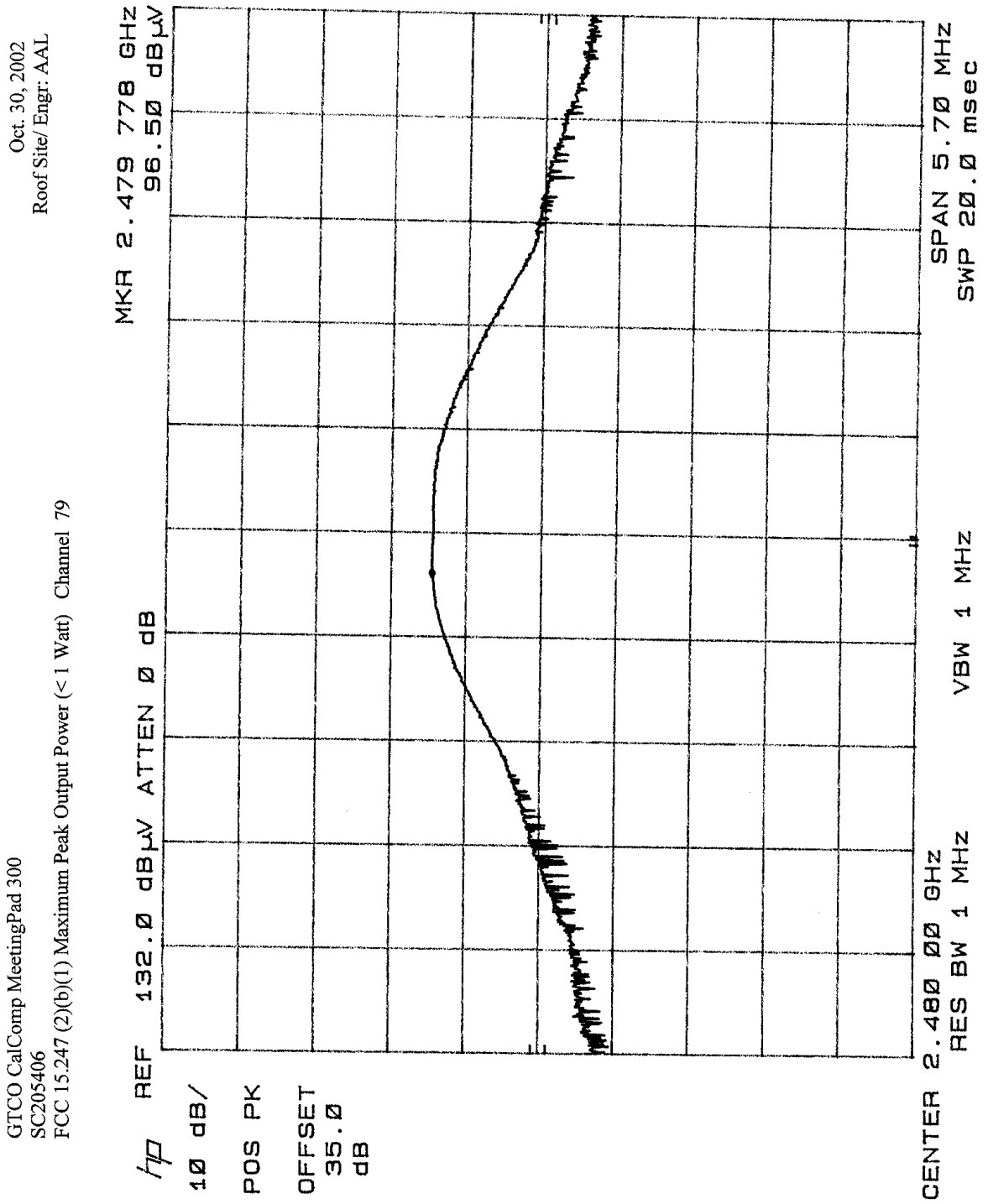



Oct. 30, 2002
Roof Site/ Engr: AAL
FCC 15.247 (a)(ii) Average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period
GTCO CalComp MeetingPad 300
SC205406
REF 97.0 dBµV
ATTEN 0 dB
10 dB/
POS PK
CENTER 2.440 000 000 GHz
RES BW 1 MHz
VBW 1 MHz
SPAN 0 Hz
SWP 30.0 sec


GTCO CalComp MeetingPad 300
SC205406
FCC 15.247 (a)(ii) Average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period
Oct. 30, 2002
Roof Site/ Engr: AAL
MKR Δ 200.0 µsec
-43.00 dB
REF 97.0 dBµV ATTEN 0 dB
10 dB/
POS PK
CENTER 2.441 000 000 GHz
RES BW 100 kHz
VBW 1 MHz
SPAN 0 Hz
SWP 20.0 msec


GTCO CalComp MeetingPad 300
SC205406
FCC 15.247 (2)(b)(1) Maximum Peak Output Power (< 1 Watt) Channel 0
Oct. 30, 2002
Roof Site/ Engr: AAL
MKR 2.401 820 GHz
96.50 dBµV
REF 131.6 dBµV ATTEN 0 dB
10 dB/
POS PK
OFFSET
34.6
dB
CENTER 2.402 00 GHz
RES BW 1 MHz
VBW 1 MHz
SPAN 5.00 MHz
SWP 20.0 msec


Oct. 30, 2002
Roof Site/ Engr: AAL
GTCO CalComp MeetingPad 300
SC205406
FCC 15.247 (2)(b)(1) Maximum Peak Output Power (< 1 Watt) Channel 40
MKR 2.440 860 GHz
97.10 dBµV
REF 131.6 dBµV ATTEN Ø dB
10 dB/
POS PK
OFFSET
34.6
dB
CENTER 2.441 ØØ GHz
RES BW 1 MHz
VBW 1 MHz
SPAN 5.ØØ MHz
SWP 20.Ø msec


Oct. 30, 2002
Roof Site/ Engr: AAL
GTCO CalComp MeetingPad 300
SC205406
FCC 15.247 (2)(b)(1) Maximum Peak Output Power (< 1 Watt) Channel 79
MKR 2.479 778 GHz
96.50 dBµV
REF 132.0 dBµV
ATTEN 0 dB
10 dB/
POS PK
OFFSET
35.0
dB
SPAN 5.70 MHz
SWP 20.0 msec
VBW 1 MHz
CENTER 2.480 00 GHz
RES BW 1 MHz

REPORT No: SC205406 TESTER: Alan Laudani SPEC:FCC Part 15 para 15.247(a)(2)(b)(1)
FCC Part 15 para 15.247(c)
CUSTOMER: Calcomp GTCO TEST DIST: 3 Meters

E U T: MeetingPad 300 TEST SITE: Roof

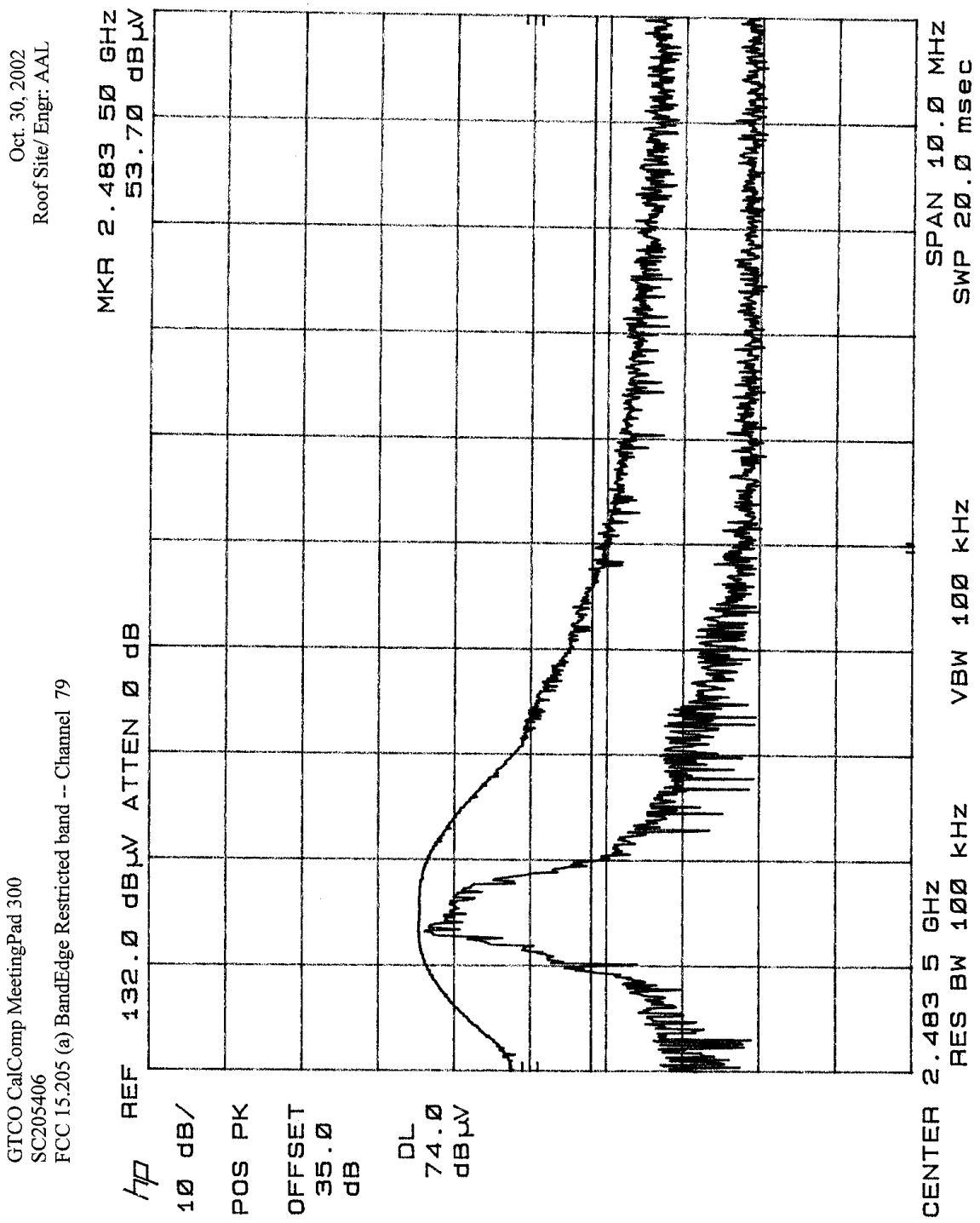
EUT MODE: Transmit BICONICAL: N/A

DATE: Oct. 30, 2002 LOG: N/A

NOTES: OTHER: 251
above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG
CF = Antenna Factor + Cable Loss

v.beta1a

FREQ (MHz)	VERTICAL (dBuv) pk	VERTICAL (dBuv) av	HORIZONTAL (dBuv) pk	HORIZONTAL (dBuv) av	CF (dB/m)	MAX LEVEL (dBuV/m) pk	MAX LEVEL (dBuV/m) av	SPEC LIMIT (dBuV/m) pk	SPEC LIMIT (dBuV/m) av	MARGIN (dB) pk	MARGIN (dB) av	EUT Rotation	Antenna Height	Notes
channel 0														FCC Part 15 para 15.247(a)(2)(b)(1)
2402	61.83		58.4		34.6688	**96.5**						332	1	
channel 40														
2441	62.5		57.8		34.8404	**97.34**						320	1	
channel 79														
2480	61.5		56.6		35.012	**96.51**						118	1	
														FCC Part 15 para 15.247(c)
2483.5	37.4	18.5	33.8	18.5	35.0274	**72.43**	**53.5**	74	54	-1.57	-0.47	118	1	Bandedge
2480	60.9		55.4		35.012	**95.91**						118	1	VBW: 1 % of 10 MHz span = 100 kHz
2483.6	36.8	17.9	33.2	17.9	35.0278	**71.83**	**52.9**	74	54	-2.17	-1.07			subtracted delta of 0.6


Oct. 30, 2002
Roof Site/ Engr: AAL
GTCO CalComp MeetingPad 300
SC205406
FCC 15.205 (a) BandEdge Restricted band -- Channel 79
MKR 2.483 50 GHz
53.70 dBµV
REF 132.0 dBµV ATTEN 0 dB
10 dB/
POS PK
OFFSET
35.0
dB
DL
74.0
dBµV
CENTER 2.483 5 GHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

REPORT No: SC205406 TESTER: Alan Laudani SPEC: FCC Part 15 para 15.209(a)

CUSTOMER: CalComp GTCO TEST DIST: 3 Meters

E U T: Meeting Pad 300 TEST SITE: Roof

EUT MODE: Transmit BICONICAL: N/A

DATE: Oct. 30, 2002 LOG: N/A

NOTES: OTHER: 251

Radiated Spurious 15.247(c) No other emissions evident 1000 MHz to 25 GHz

v.beta1a

FREQ (MHz)	VERTICAL (dBuv) pk	VERTICAL (dBuv) av	HORIZONTAL (dBuv) pk	HORIZONTAL (dBuv) av	CF (dB/m)	MAX LEVEL (dBuV/m) pk	MAX LEVEL (dBuV/m) av	SPEC LIMIT (dBuV/m) pk	SPEC LIMIT (dBuV/m) av	MARGIN (dB) pk	MARGIN (dB) av	EUT Rotation	Antenna Height
2402	Channel 0												
4804	46.9	31.4	47.9	30.4	6.0	**53.9**	**37.4**	74	54	-20.1	-16.6	37	1.1
7206	48.4	29.6	47.7	28.6	15.1	**63.5**	**44.7**	74	54	-10.5	-9.3	48	1.5
2442	Channel 40												
4884	48.5	33.0	49.0	32.9	6.4	**55.4**	**39.4**	74	54	-18.6	-14.6	24	1.7
7326	47.6	28.5	47.8	29.1	15.5	**63.3**	**44.6**	74	54	-10.7	-9.4	20	1.3
2480	Channel 79												
4960	50.3	33.1	47.3	32.2	6.8	**57.1**	**39.9**	74	54	-16.9	-14.1	55	1.1
7440	49.3	29.7	51.7	30.2	15.8	**67.5**	**46.0**	74	54	-6.5	-8.0	85	1.7

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4.0 ATTESTATION STATEMENT

GENERAL REMARKS:

SUMMARY:

All tests were performed per CFR 47, Part(s) 15.247(a), 15.247(b), 15.247(c)

■ - Performed

The Equipment Under Test

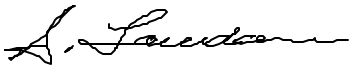
■ - **Fulfills** the requirements of CFR 47, Part(s) 15.247(a), 15.247(b), 15.247(c)

- TÜV AMERICA, INC. -

Responsible Engineer:

Jim Owen
(EMC Chief Engineer)

Responsible Engineer:



Alan Laudani
(EMC Engineer)

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