TEST REPORT

Report Number: 30488991
Project Number: 3048899
September 29, 2003

Testing performed on the

VitalSense Transmitters
Models: Capsule and Arm Patch
FCC ID: JIAXTP1
to

FCC Part 15, Subpart C (15.229)
for
Mini Mitter Co., Inc.

A2LA Certificate Number: 1755-01

Test Performed by:	Test Authorized by:
Intertek Testing Services	Mini Mitter Co., Inc.
1365 Adams Court	20300 Empire Ave., Bldg B-3
Menlo Park, CA 94025	Bend, OR 97701

Prepared by: _____ Date: September 29, 2003
Bruce Gordon

Reviewed by: _____ Date: September 30, 2003
David Chernomordik

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1.0 Summary of Tests

FCC ID: JIAXTP1

TEST	REFERENCE	RESULTS
Field Strength on fundamental	15.229(a)	Complies
Spurious radiated emissions outside the band	15.229(c)	Complies
Frequency stability	15.229(d)	Complies
Antenna Requirement	15.203	Complies, antenna is integral part of the device

Date of test: September 26, 2003

2.0 General Description

2.1 Product Description

The VitalSence system contains two sensors (transmitters) and monitor (receiver) operating in 40.66 – 40.70 MHz band. It is intended to monitor body core temperature and dermal surface temperature using telemetric sensors and receiver (monitor).

Overview of the EUT

Applicant name & address	Mini Mitter Co., Inc. 20300 Empire Ave., Bidg B-3 Bend, OR 97701
Manufacturer	Mini Mitter Co., Inc.
FCC Identifier	JIAXTP1
Type of Modulation	FSK
Rated RF Output	Not rated
Frequency Range	40.66 – 40.70 MHz
Number of Channel(s)	0ne
Antenna	Integral part of the EUT

A pre-production version of the EUT was received on September 25, 2003 in good operating condition. As declared by the Applicant, it is identical to the production units.

2.2 Related Submittal(s) Grants

None.

2.3 Test Methodology

The radiated emissions measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Data Sheet"** of this Application. All other measurements were made in accordance with the procedures in parts 2 and 15 of CFR 47.

2.4 Test Facility

The test site used to collect the radiated data is site 1 (10-m semi-anechoic chamber). The site measurement data have been fully placed on file with the FCC and A2LA accredited.

3.0 System Test Configuration

3.1 Support Equipment and description

None. Both transmitters operate as stand-alone equipment.

3.2 Block Diagram of Test Setup

Arm Patch

Or,

Capsule

S = Shielded **U** = Unshielded	**F** = With Ferrite **m** = Meter

3.3 Justification

For emission testing, the Equipment Under Test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT is a stand-alone equipment; therefore, no peripherals were attached for the test.

For radiated emission measurements, the EUT was affixed to a non-conductive support and placed on the non-conductive turntable. The EUT is a stand-alone equipment, so there were no external I/O cables to maximize during testing. The position of the transmitter was varied about the 3-orthogonal axis. The worse case data is reported (transmitter lying along the y-axis) and the worse case axis is pictured in the test set-up photographs. The EUT is wired to transmit full power.

3.4 Software Exercise Program

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.

3.5 Mode of operation during test

For emissions testing, the units were setup to transmit continuously to simplify the measurement methodology.

3.6 Modifications required for Compliance

Intertek installed no modifications during compliance testing in order to bring the product into compliance.

3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.

4.0 Radiated emission measurements

FCC Rules: 15.229(a), 15.229(c)

4.1 Requirements

The Field Strength of any emissions within the band shall not exceed 60 dB(μV/m) at 3 m. The Field Strength of any emissions appearing outside the band shall not exceed the following general radiated emission limits in 15.209.

Radiated Emissions Limits, Section 15.209(a)

Frequency, MHz	Field Strength at 3m dB(μV/m)
30-88	40.0
88-216	43.5
216-960	46.0
Above 960	54.0

4.2 Procedure

Radiated emission measurements were performed from 30 MHz to 1000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater.

The EUT is placed on the wooden turntable. 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.

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.

In addition, the plots of the emissions within the band were performed to show compliance with the requirements on the band-edge frequencies.

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.

4.3 Field Strength Calculation

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(1/m)
AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB(μV) is obtained. The antenna factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μV/m). This value in dB(μV/m) was converted to its corresponding level in μV/m.

RA = 52.0 dB(μV) AF = 7.4 dB(1/m)
CF = 1.6 dB AG = 29.0 dB

FS = 52 + 7.4 + 1.6 - 29 = 32 dB(μV/m)
Level in μV/m = Common Antilogarithm [(32 dB(μV/m)/20] = 39.8 μV/m

4.4 Test Result

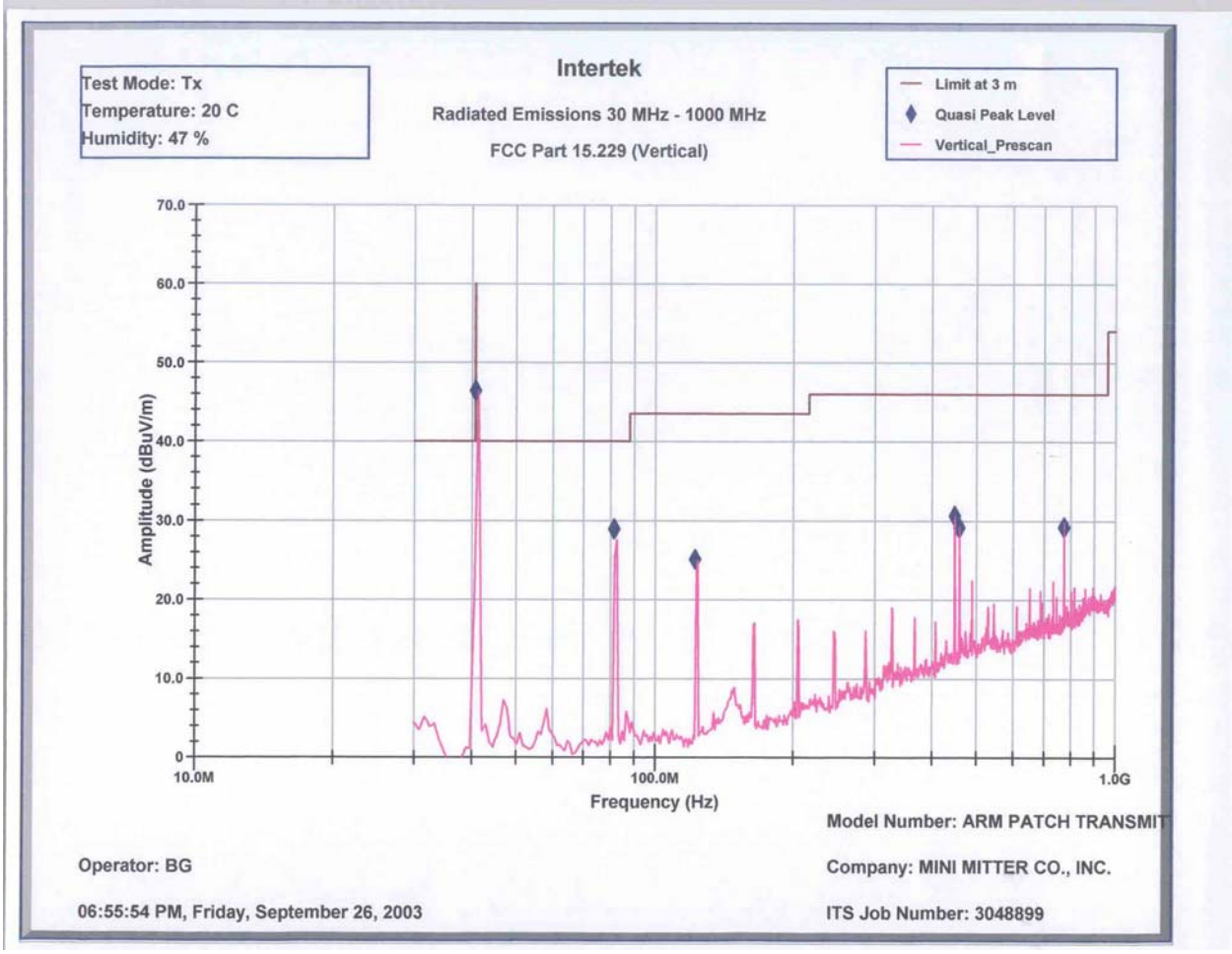
The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

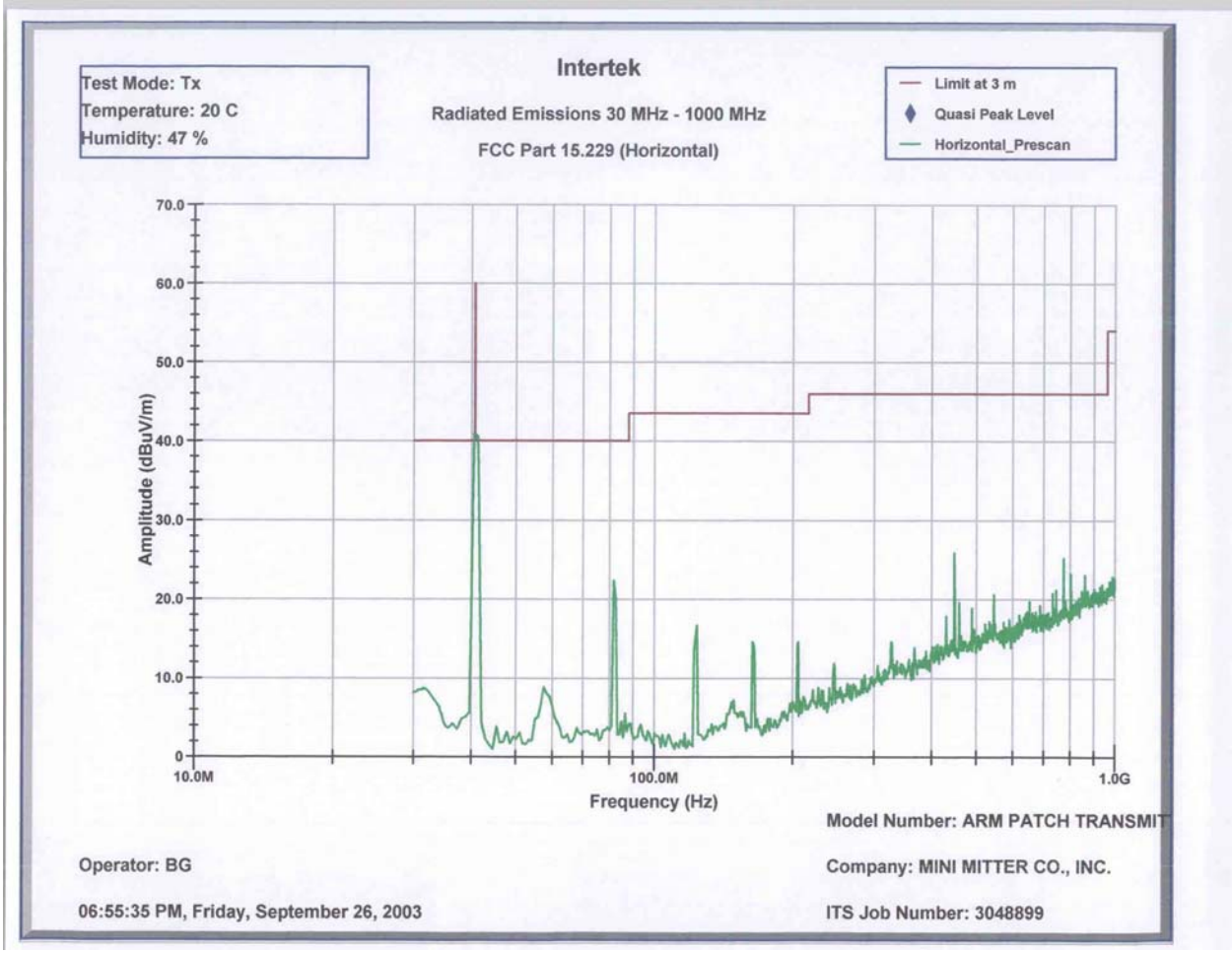
The following levels of the Field Strength on the fundamental frequency were measured:

Model	Field Strength at 3 m, dB(μV/m)	Field Strength Limit, dB(μV/m)	Margin, dB
Capsule	23.8	60.0	-36.2
Arm Patch	46.4	60.0	-13.6

The level of the Field Strength on the band-edge frequencies is more than 30 dB below the limit.
The level of the Field Strength of the spurious radiated emissions (worst-case) is below the limit:

by 11.0 dB – for Arm Patch,
by 16.8 dB – for Capsule.


Intertek
Test Mode: Tx
Temperature: 20 C
Humidity: 47 %
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15.229 (Vertical)
Limit at 3 m
Quasi Peak Level
Vertical_Prescan
Amplitude (dBuV/m)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
10.0M
100.0M
1.0G
Frequency (Hz)
Model Number: ARM PATCH TRANSMIT
Operator: BG
Company: MINI MITTER CO., INC.
06:55:54 PM, Friday, September 26, 2003
ITS Job Number: 3048899


Intertek
Test Mode: Tx
Temperature: 20 C
Humidity: 47 %
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15.229 (Horizontal)
Limit at 3 m
Quasi Peak Level
Horizontal_Prescan
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
Amplitude (dBuV/m)
10.0M
100.0M
1.0G
Frequency (Hz)
Model Number: ARM PATCH TRANSMIT
Operator: BG
Company: MINI MITTER CO., INC.
06:55:35 PM, Friday, September 26, 2003
ITS Job Number: 3048899

Intertek
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15.229 (QP-Vertical)

Operator: BG
Model Number: ARM PATCH TRANSMITTER
ITS Job Number: 3048899
07:03:29 PM, Friday, September 26, 2003
Company: MINI MITTER CO., INC.

	1	2	3	4	5	6	7	8
Frequency	Quasi Pk FS	Limit@3	Margin	RA	AG	CF	AF	Atten
MHz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB(1/m)	dB
40.685 MHz	46.4	60.0	-13.6	69.0	32.4	0.6	6.1	3.0
81.3563 MHz	29.0	40.0	-11.0	50.9	32.3	0.8	6.6	3.0
122.033 MHz	25.1	43.5	-18.4	46.1	32.3	1.0	7.3	3.0
447.48 MHz	30.7	46.0	-15.3	41.5	32.3	1.9	16.6	3.0
458.175 MHz	29.2	46.0	-16.8	39.8	32.3	1.9	16.8	3.0
772.913 MHz	29.2	46.0	-16.8	35.3	32.5	2.5	20.9	3.0

Test Mode: Tx
Carrier Meas. is Peak
Temp: 20 C, Hum: 47 %

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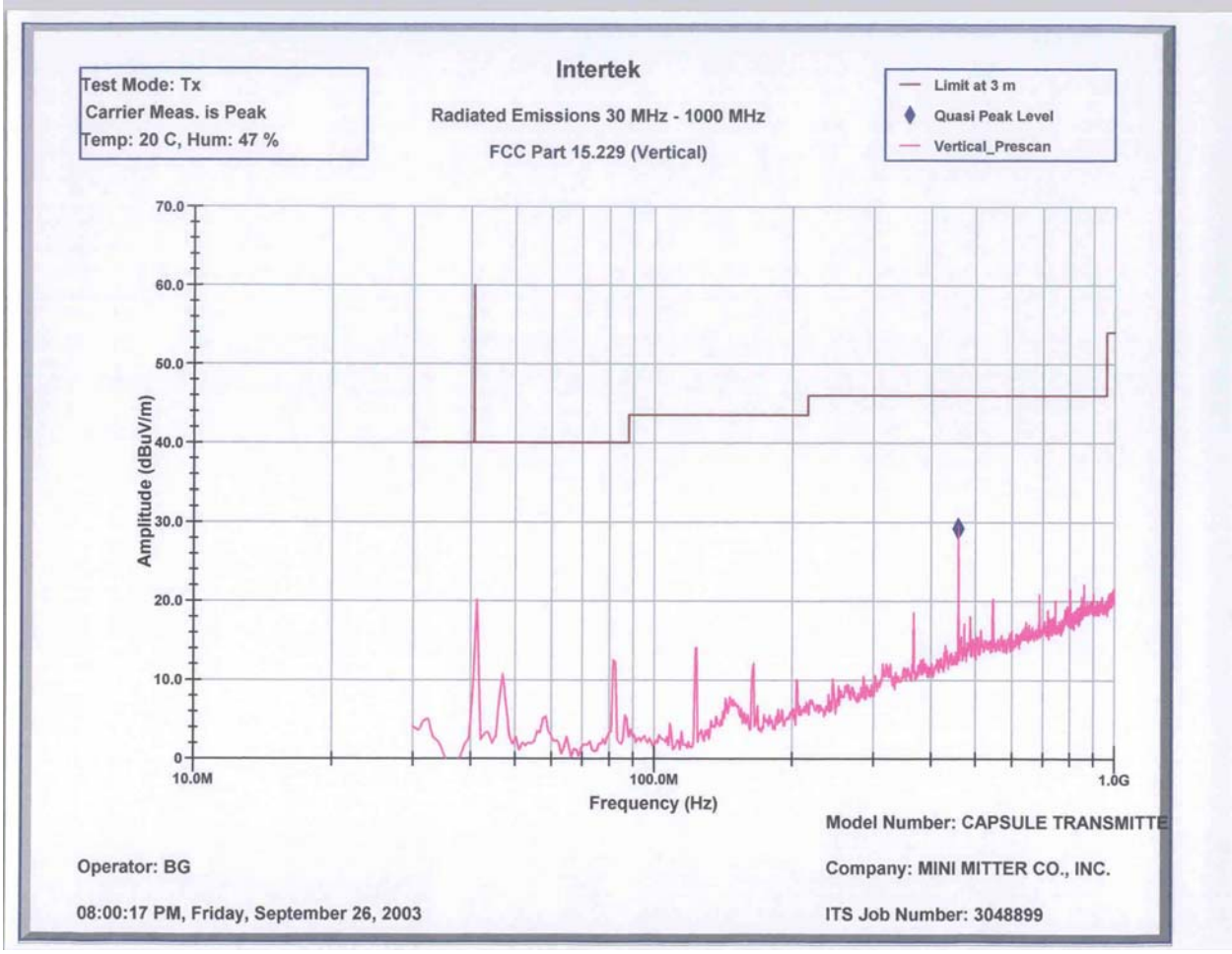
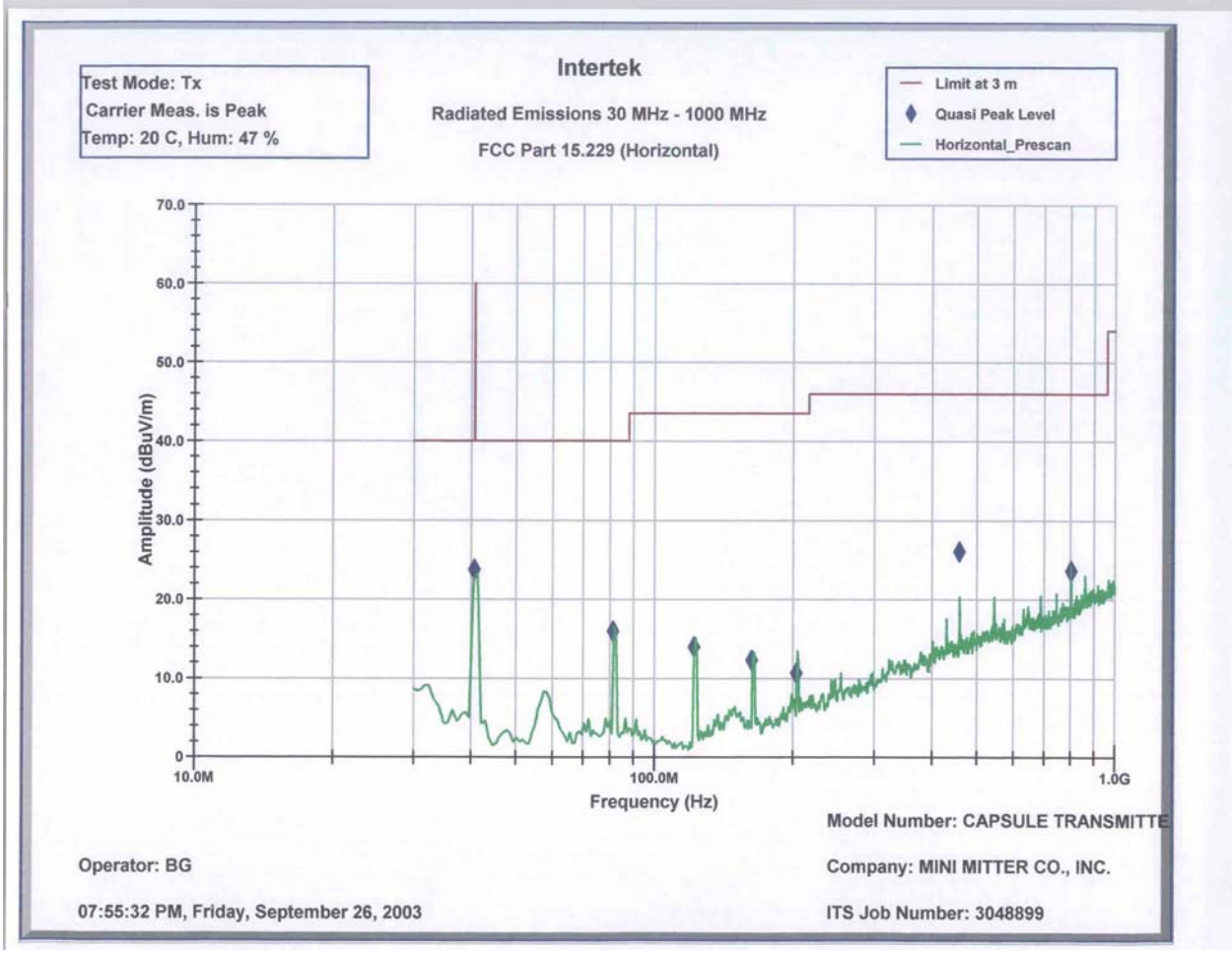

Intertek
Test Mode: Tx
Carrier Meas. is Peak
Temp: 20 C, Hum: 47 %
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15.229 (Vertical)
Limit at 3 m
Quasi Peak Level
Vertical_Prescan
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
Amplitude (dBuV/m)
10.0M
100.0M
1.0G
Frequency (Hz)
Model Number: CAPSULE TRANSMITTE
Operator: BG
Company: MINI MITTER CO., INC.
08:00:17 PM, Friday, September 26, 2003
ITS Job Number: 3048899


Intertek
Test Mode: Tx
Carrier Meas. is Peak
Temp: 20 C, Hum: 47 %
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15.229 (Horizontal)
Limit at 3 m
Quasi Peak Level
Horizontal_Prescan
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
Amplitude (dBuV/m)
10.0M
100.0M
1.0G
Frequency (Hz)
Model Number: CAPSULE TRANSMITTE
Operator: BG
Company: MINI MITTER CO., INC.
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ITS Job Number: 3048899

Intertek
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15.229 (QP-Vertical)

Operator: BG
Model Number: CAPSULE TRANSMITTER
ITS Job Number: 3048899
08:00:17 PM, Friday, September 26, 2003
Company: MINI MITTER CO., INC.

	1	2	3	4	5	6	7	8
Frequency	Quasi Pk FS	Limit@3	Margin	RA	AG	CF	AF	Atten
MHz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB(1/m)	dB
458.1795 MHz	29.2	46.0	-16.8	39.8	32.3	1.9	16.8	3.0

Test Mode: Tx
Carrier Meas. is Peak
Temp: 20 C, Hum: 47 %

Page 1

Intertek
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15.229 (QP-Horizontal)

Operator: BG

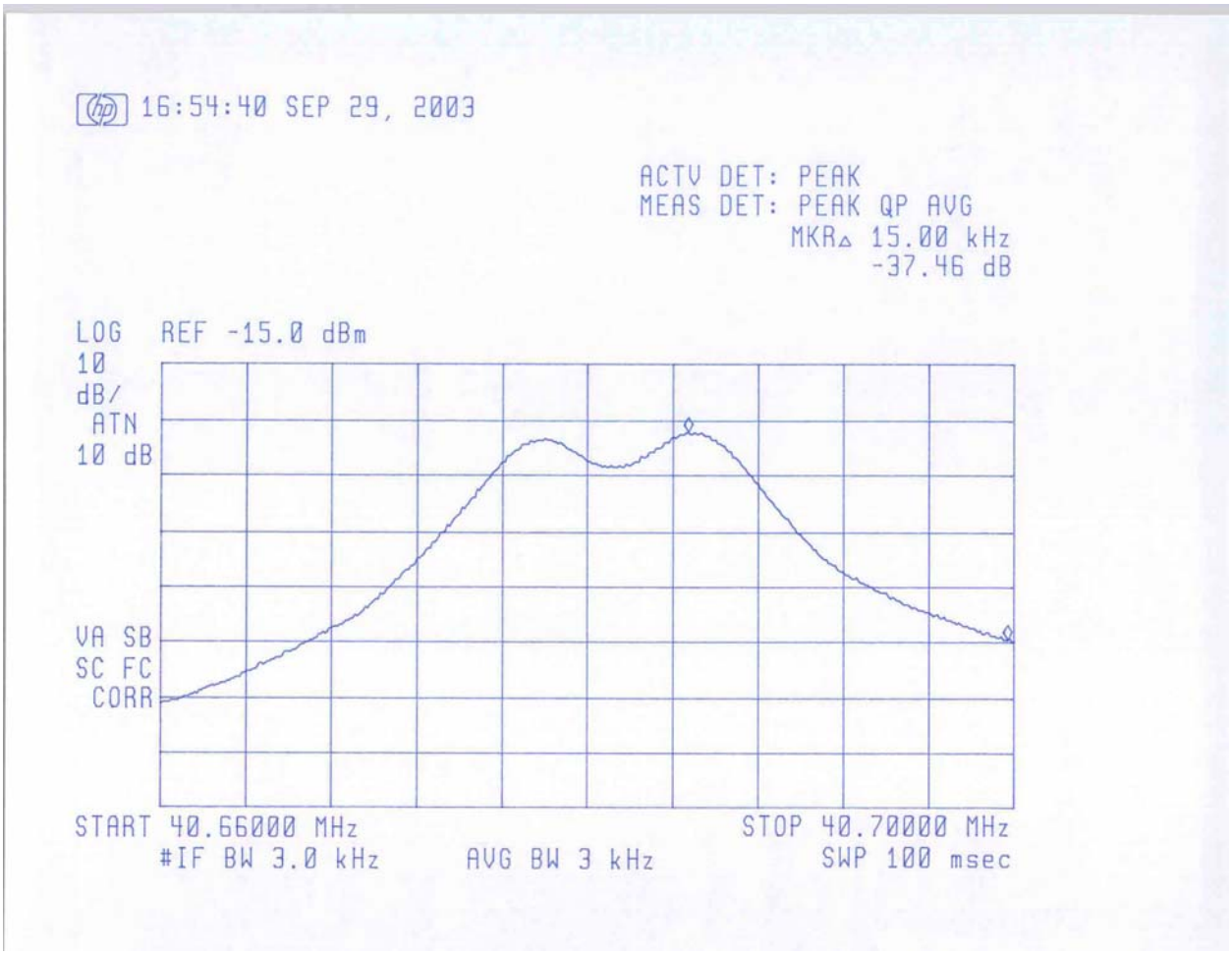
Model Number: CAPSULE TRANSMITTER
ITS Job Number: 3048899
Company: MINI MITTER CO., INC.

07:55:32 PM, Friday, September 26, 2003

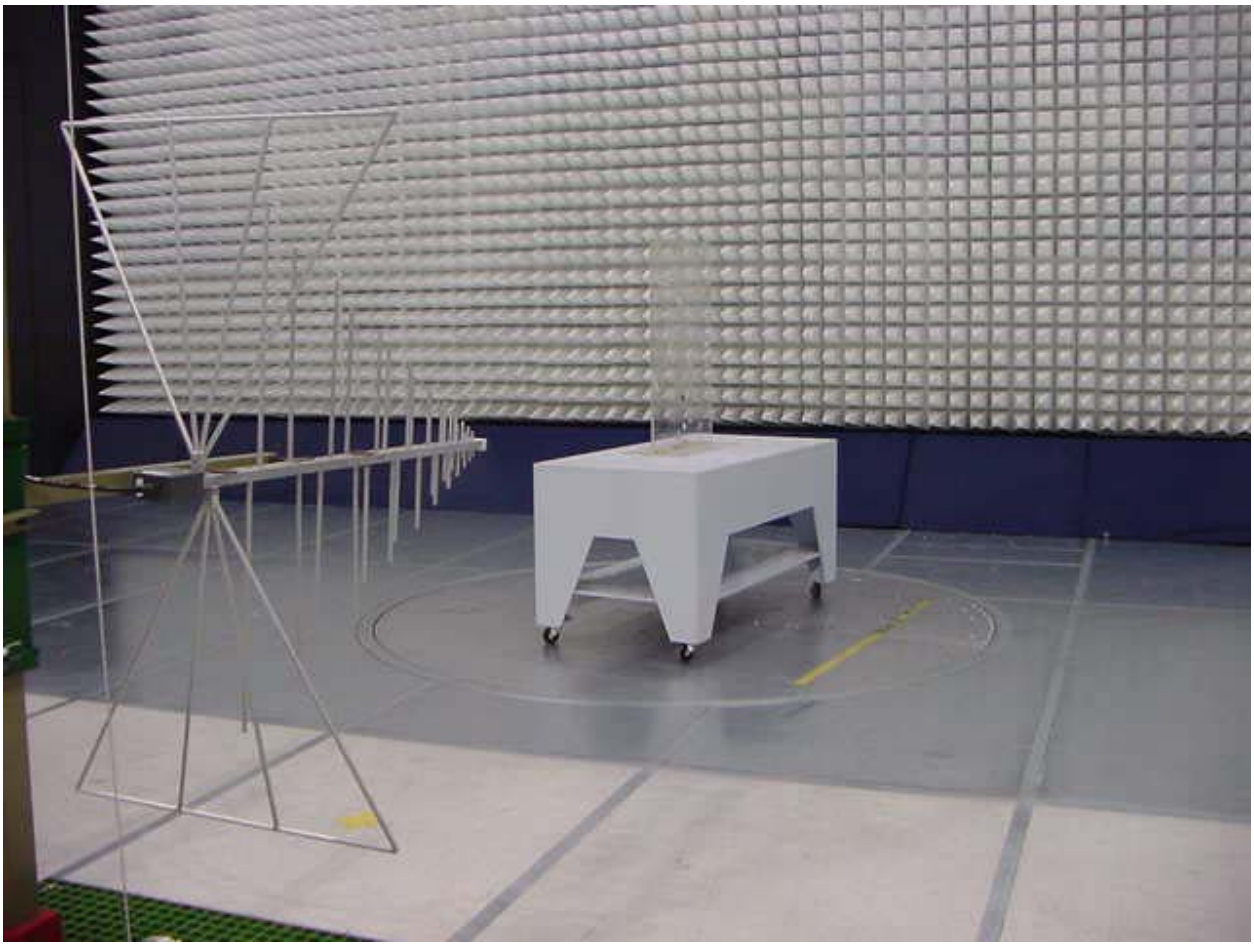
	1	2	3	4	5	6	7	8
Frequency	Quasi Pk FS	Limit@3m	Margin	RA	AG	CF	AF	Atten
MHz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB(1/m)	dB
40.6815 MHz	23.8	60.0	-36.2	42.4	32.4	0.6	10.1	3.0
81.3488 MHz	16.0	40.0	-24.0	36.4	32.3	0.8	8.1	3.0
122.024 MHz	14.0	43.5	-29.5	35.4	32.3	1.0	6.9	3.0
162.699 MHz	12.3	43.5	-31.2	31.6	32.3	1.1	8.9	3.0
203.3713 MHz	10.6	43.5	-32.9	27.7	32.3	1.3	10.9	3.0
458.1795 MHz	26.1	46.0	-19.9	35.6	32.3	1.9	17.9	3.0
801.8169 MHz	23.6	46.0	-22.4	28.4	32.4	2.8	21.9	3.0

Test Mode: Tx
Carrier Meas. is Peak
Temp: 20 C, Hum: 47 %

Page 1

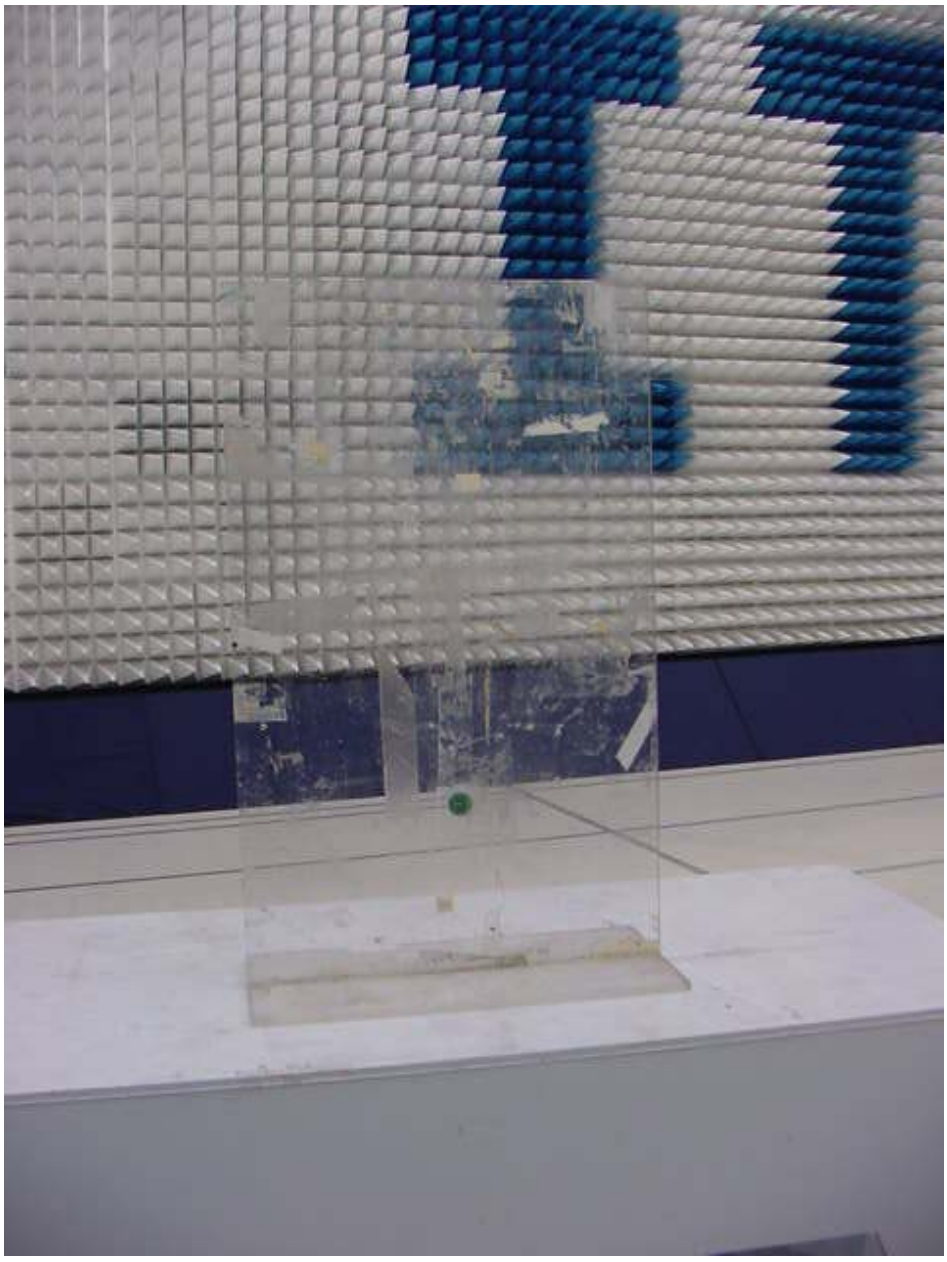

16:54:40 SEP 29, 2003
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 15.00 kHz
-37.46 dB
LOG REF -15.0 dBm
10
dB/
ATN
10 dB
VA SB
SC FC
CORR
START 40.66000 MHz
#IF BW 3.0 kHz
AVG BW 3 kHz
STOP 40.70000 MHz
SWP 100 msec

4.5 Configuration photographs



Configuration photographs (Continued)

Configuration photographs (Continued)

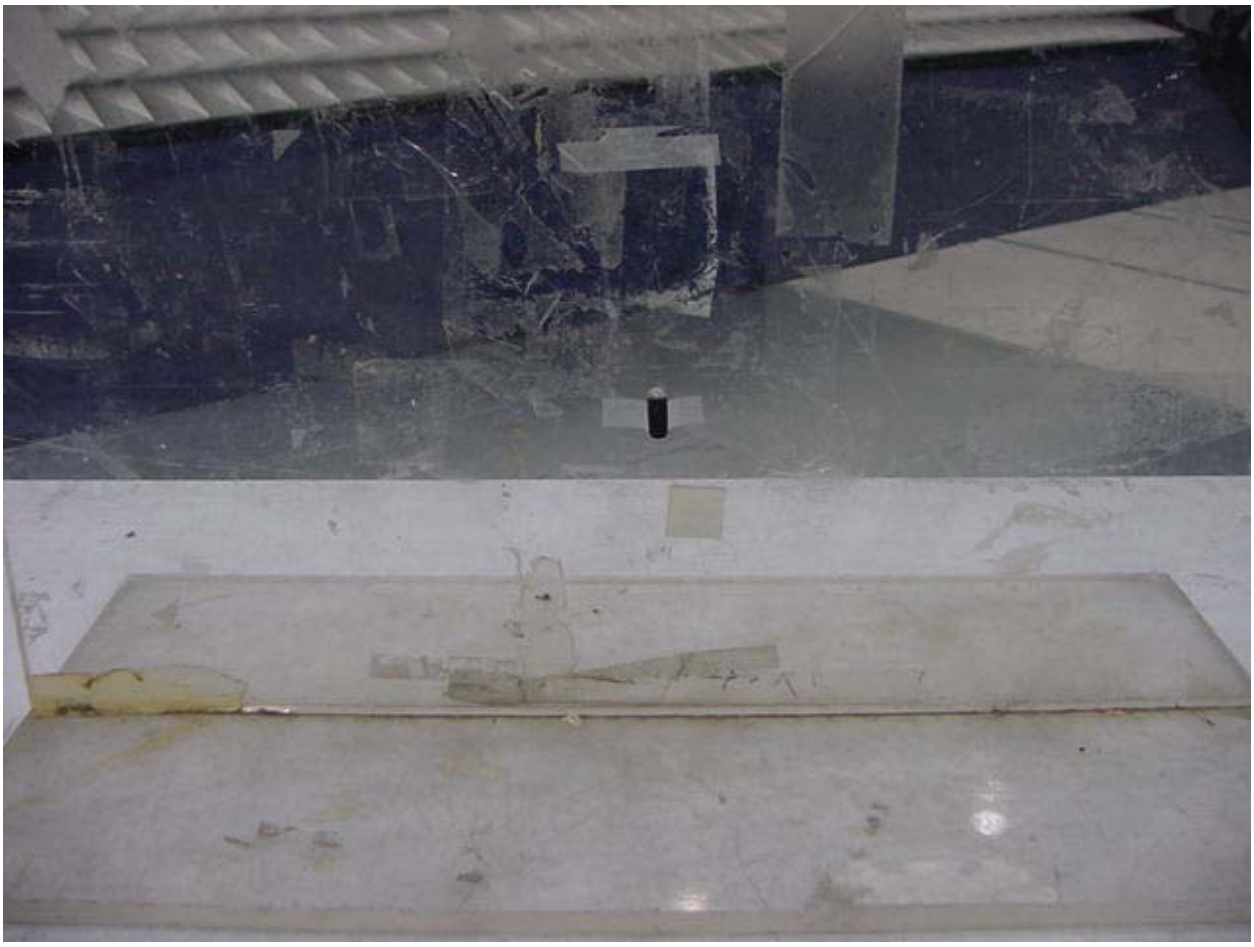


Configuration photographs (Continued)

Configuration photographs (Continued)

Configuration photographs (Continued)

Configuration photographs (Continued)



Configuration photographs (Continued)

5.0 Frequency Stability measurements

FCC Rule: 15.229(d)

See separate test report.

6.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. INTERVAL	CAL. DUE
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	9/9/04
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	9/8/04
BI-Log Antenna	EMCO	3143	9509-1164	12	3/24/04
Pre-Amplifier	Sonoma Inst.	310	185634	12	10/30/03
Attenuator	Narda	757C	00432	12	9/27/04

7.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 3048899	DC	September 29, 2003	Original document