



GARMIN AT TEST REPORT
FOR THE
UNIVERSAL ACCESS TRANSCEIVER, GDL 90
FCC PART 87
COMPLIANCE

DATE OF ISSUE: MAY 27, 2004

PREPARED FOR:

Garmin AT
2345 Turner Rd. S.E.
Salem, OR 97302

P.O. No.: 223235
W.O. No.: 81985

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: April 14 - May 25, 2004

Report No.: FC04-044

This report contains a total of 24 pages and may be reproduced in full only. Partial reproduction may only be done with the written consent of CKC Laboratories, Inc. The results in this report apply only to the items tested, as identified herein.

TABLE OF CONTENTS

Administrative Information	3
Summary of Results	4
Conditions for Compliance	4
Approvals	4
Equipment Under Test (EUT) Description	5
Equipment Under Test	5
Peripheral Devices	5
Temperature and Humidity During Testing	6
FCC 2.1033(c)(3) User's Manual	6
FCC 2.1033(c)(4) Type of Emissions	6
FCC 2.1033(c)(5) Frequency Range	6
FCC 2.1033(c)(6) Operating Power	6
FCC 2.1033(c)(7) Maximum Power Rating	6
FCC 2.1033(c)(8) DC Voltages	6
FCC 2.1033(c)(9) Tune-Up Procedure	6
FCC 2.1033(c)(10) Schematics and Circuitry Description	6
FCC 2.1033(c)(11) Label and Placement	6
FCC 2.1033(c)(12) Submittal Photos	6
FCC 2.1033(c)(13) Modulation Information	7
FCC 2.1033(c)(14)/2.1046 - RF Power Output	7
FCC 2.1033(c)(14)/2.1049(i)/87.137 - Occupied Bandwidth	9
FCC Part 87.139 Emissions Mask	11
FCC 2.1033(c)(14)/2.1051/87.139 - Spurious Emissions at Antenna Terminal	14
FCC 2.1033(c)(14)/2.1053/87.139 - Field Strength of Spurious Radiation	19
FCC 2.1033(c)(14)/2.1055/87.133 - Frequency Stability	23

ADMINISTRATIVE INFORMATION

DATE OF TEST: April 14 - May 25, 2004

DATE OF RECEIPT: April 14, 2004

PURPOSE OF TEST: To demonstrate the compliance of the Universal Access Transceiver, GDL 90 with the requirements for FCC Part 87 devices.

TEST METHOD: FCC Part 87

FREQUENCY RANGE TESTED: 9 kHz-10 GHz

MANUFACTURER: Garmin AT
2345 Turner Rd. S.E.
Salem, OR 97302

REPRESENTATIVE: George Cooley

TEST LOCATION: CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

SUMMARY OF RESULTS

As received, the Garmin AT Universal Access Transceiver, GDL 90 was found to be fully compliant with the following standards and specifications:

United States

➤ FCC Part 87

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

Steve Behm, Director of Engineering Services

QUALITY ASSURANCE:


A handwritten signature in black ink, appearing to read "Joyce Walker".

Joyce Walker, Quality Assurance Administrative Manager

TEST PERSONNEL:

A handwritten signature in black ink, appearing to read "Randy Clark".

Randy Clark, EMC Engineer

A handwritten signature in black ink, appearing to read "Mike Wilkinson".

Mike Wilkinson, Lab Manager

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT tested by CKC Laboratories was a production unit

EQUIPMENT UNDER TEST

Universal Access Transceiver

Manuf: Garmin AT
Model: GDL 90
Serial: 6068135
FCC ID: EOJGDL90A1H (pending)

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

DC Power Supply

Manuf: Astron
Model: LS-10A
Serial: 99050014

I/O Test Interface Unit

Manuf: UPS Aviation Technologies
Model: RL#E-81-4
Serial: J

TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within +15°C and + 35°C.

The relative humidity was between 20% and 75%.

FCC 2.1033(c)(3) USER'S MANUAL

The necessary information is contained in a separate document.

FCC 2.1033 (c)(4) TYPE OF EMISSIONS

The UAT emissions type is F1D (FM modulated, one digital channel).

The emissions type can be derived using the following formula:

$$B_n = 2(B + 1)F_m, \text{ with } B = 0.6 \text{ (the modulation index) and } F_m = 520 \text{ kHz.}$$

$$B_n = 1.66 \text{ MHz,}$$

This gives a full emissions designator of 1M70F1D

FCC 2.1033 (c)(5) FREQUENCY RANGE

978 MHz.

FCC 2.1033 (c)(6) OPERATING POWER

50.1 Watts.

FCC 2.1033 (c)(7) MAXIMUM POWER RATING

55 Watts.

FCC 2.1033 (c)(8) DC VOLTAGES

The necessary information is contained in a separate document.

FCC 2.1033 (c)(9) TUNE-UP PROCEDURE

The necessary information is contained in a separate document.

FCC 2.1033(c)(10) SCHEMATICS AND CIRCUITRY DESCRIPTION

The necessary information is contained in a separate document.

FCC 2.1033(c)(11) LABEL AND PLACEMENT

The necessary information is contained in a separate document.

FCC 2.1033(c)(12) SUBMITTAL PHOTOS

The necessary information is contained in a separate document.

FCC 2.1033 (c)(13) MODULATION INFORMATION

The transmitter modulation is generated with a Direct Digital Synthesizer (U10). The DDS has an 8-bit parallel interface. The value that is written into the DDS accumulator register is converted to an output frequency at baseband. Varying the data that is sent to the accumulator register modulates the 44.25 MHz baseband frequency. The baseband frequency is up converted to 978 MHz by mixing it with a 933.75 MHz, +7 dBm transmitter local oscillator (LO) into U30 the transmit mixer. The signal then passes through FLT1, a passive ceramic bandpass filter to attenuate undesired harmonics and mixing artifacts before being sent to the power amplifiers for final amplification to 50 watts.

FCC 2.1033(c)(14)/2.1046 - RF POWER OUTPUT

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP-8596E	3346A00225	06/24/2002	06/24/2004	00783
30 dB attenuator, Bird 25-A-MFN-30	9724	05/08/2003	05/08/2005	P01577
Attenuator 30dB, Bird 25-A-MFN-30	9949	05/09/2003	05/09/2005	P01572
Cable, WL Gore 2'	149047	04/10/2003	04/10/2005	P01527

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Universal Access Transceiver*	Garmin AT	GDL 90	6068135

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Astron	LS-10A	99050014
I/O Test Interface Unit	UPS Aviation Technologies	RL#E-81-4	J

Test Conditions / Notes:

EUT is a transmitter designed for aircraft use. EUT power is provided via support DC power supply. RF output is provided on two ports, both ports are tested. EUT RF output port is connected directly to a spectrum analyzer through suitable attenuation. RBW = VBW = 3 MHz.

Measurement Data:

Frequency (MHz)	RF Port	Peak Power Output (dBm)	Peak Power Output (Watts)
978	Upper	47.0	50.1
978	Lower	45.8	38.0

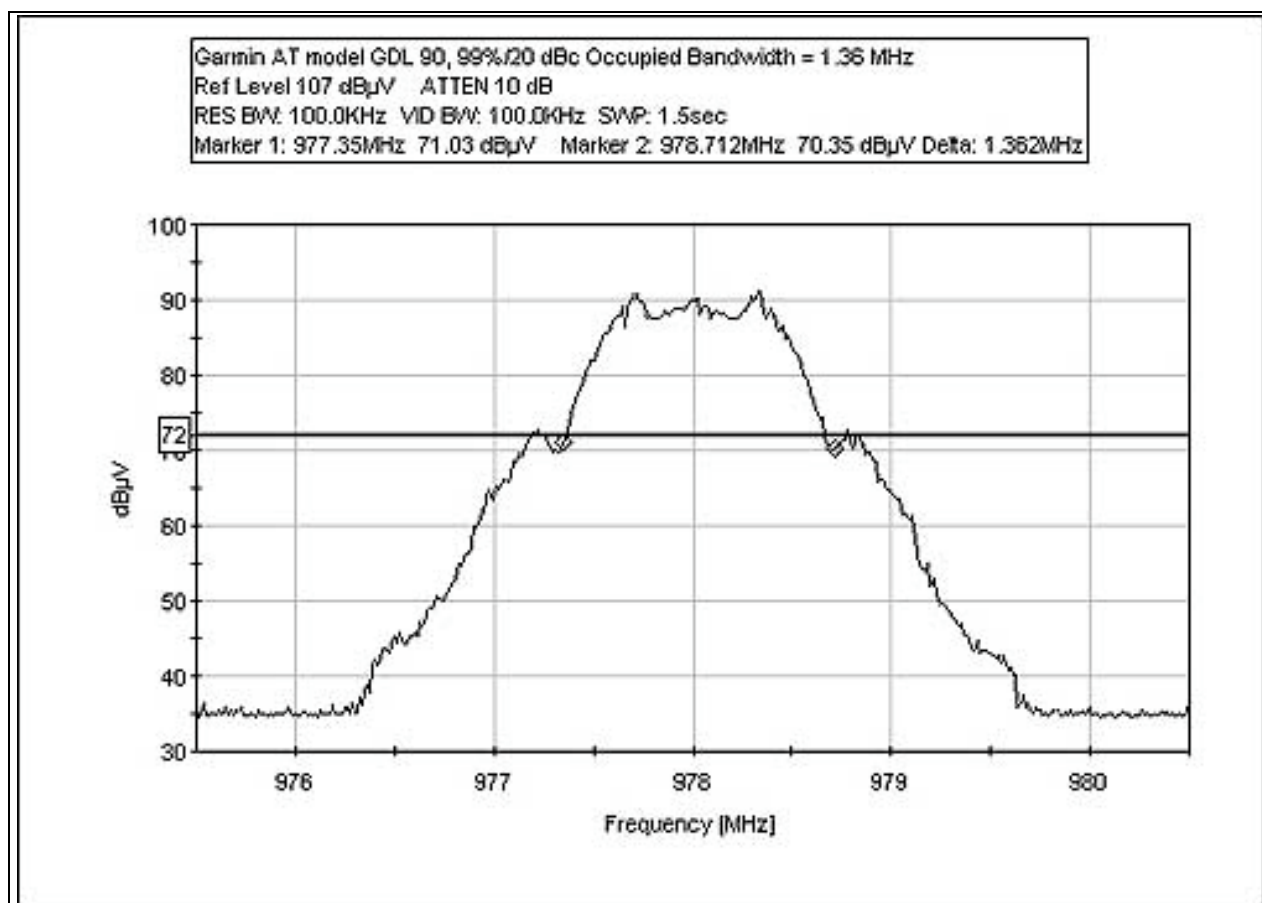
PHOTOGRAPH SHOWING DIRECT CONNECT TEST SETUP



FCC 2.1033(c)(14)/2.1049(i)/87.137 - OCCUPIED BANDWIDTH

Test Conditions / Notes:

EUT is a transmitter designed for aircraft use. EUT power is provided via support DC power supply. RF output is provided on two ports, both ports are tested. EUT RF output port is connected directly to a spectrum analyzer through suitable attenuation. RBW = VBW = 3 MHz.



Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP-8596E	3346A00225	06/24/2002	06/24/2004	00783
30 dB attenuator, Bird 25-A-MFN-30	9724	05/08/2003	05/08/2005	P01577
Attenuator 30dB, Bird 25-A-MFN-30	9949	05/09/2003	05/09/2005	P01572
Cable, WL Gore 2'	149047	04/10/2003	04/10/2005	P01527

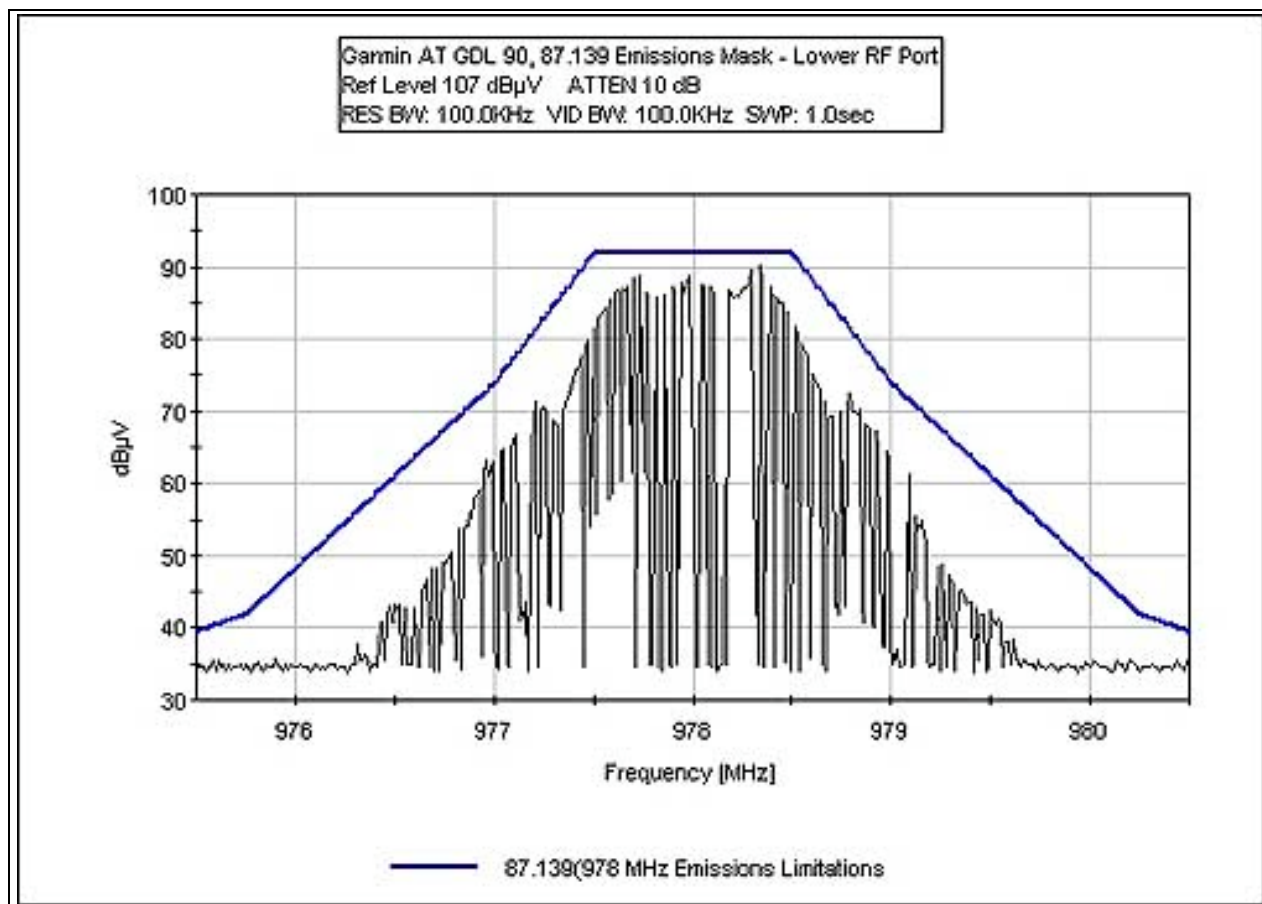
PHOTOGRAPH SHOWING DIRECT CONNECT TEST SETUP



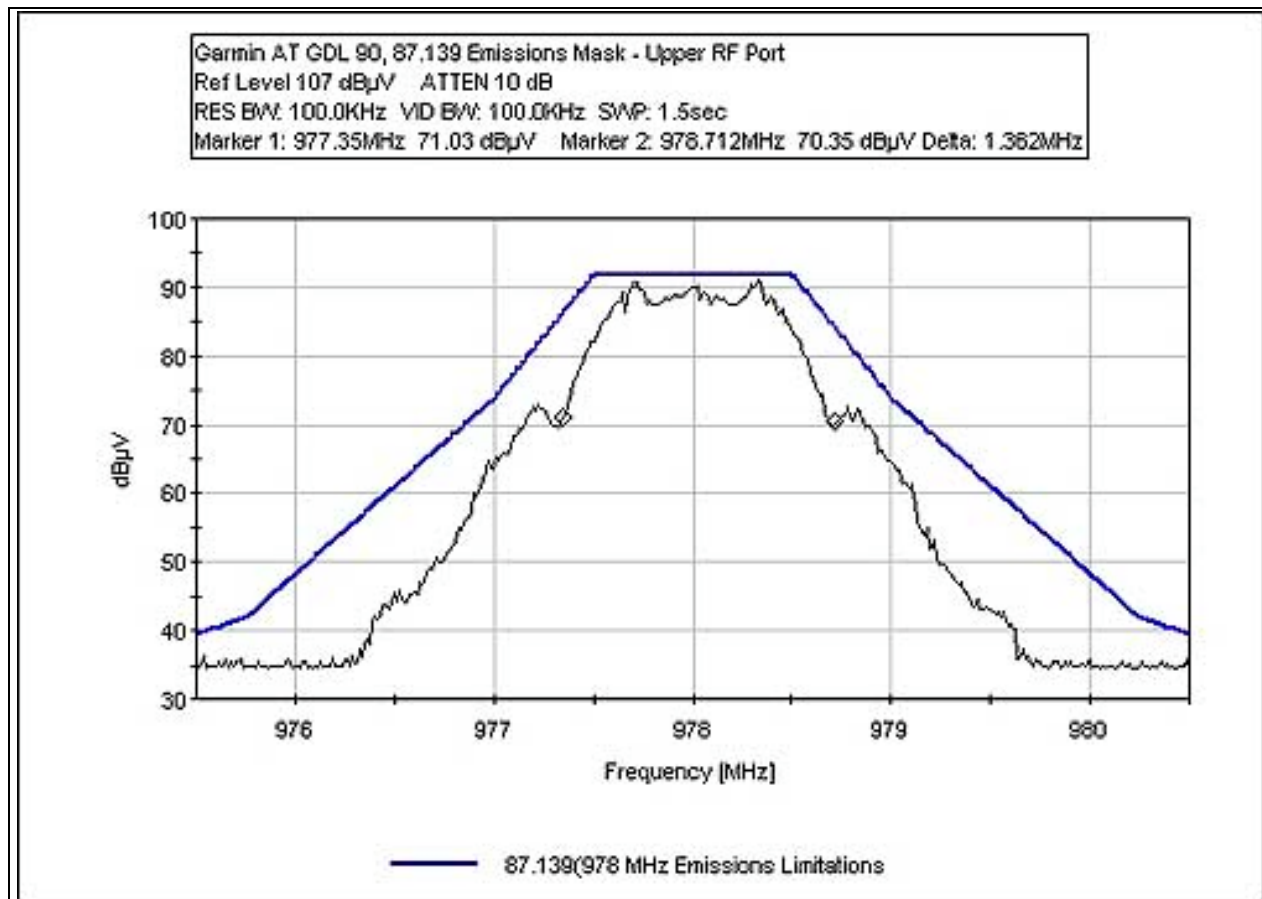
FCC PART 87.139 EMISSIONS MASK LOWER RF PORT

Test Conditions / Notes:

EUT is a transmitter designed for aircraft use. EUT power is provided via support DC power supply. RF output is provided on two ports, both ports are tested. EUT RF output port is connected directly to a spectrum analyzer through suitable attenuation. RBW = VBW = 3 MHz.



FCC PART 87.139 EMISSIONS MASK UPPER RF PORT



Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP-8596E	3346A00225	06/24/2002	06/24/2004	00783
30 dB attenuator, Bird 25-A-MFN-30	9724	05/08/2003	05/08/2005	P01577
Attenuator 30dB, Bird 25-A-MFN-30	9949	05/09/2003	05/09/2005	P01572
Cable, WL Gore 2'	149047	04/10/2003	04/10/2005	P01527

PHOTOGRAPH SHOWING DIRECT CONNECT TEST SETUP



FCC 2.1033(c)(14)/2.1051/87.139 - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Garmin AT**
 Specification: **2.1051 / 87.139**
 Work Order #: **81985**
 Test Type: **Conducted RF Power**
 Equipment: **Universal Access Transceiver**
 Manufacturer: **Garmin AT**
 Model: **GDL 90**
 S/N: **6068135**

Date: 05/03/2004
 Time: 10:38:38 AM
 Sequence#: 6
 Tested By: Randal Clark

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8566B SA	2209A01404	02/26/2003	02/26/2005	00490
HP 8566B SA Display	2403A08241	02/26/2003	02/26/2005	00489
HP 85650A QPA	2811A01267	02/26/2003	02/26/2005	00478
Attenuator 30dB, Bird 25-A-MFN-30	9949	05/09/2003	05/09/2005	P01572
Attenuator 14dB, JFW 50FHC-014-20		05/08/2003	05/08/2005	P01630
Cable, WL Gore 2'	149047	04/10/2003	04/10/2005	P01527

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Universal Access Transceiver*	Garmin AT	GDL 90	6068135

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Astron	LS-10A	99050014
I/O Test Interface Unit	UPS Aviation Technologies	RL#E-81-4	J

Test Conditions / Notes:

EUT is a transmitter designed for aircraft use. EUT power is provided via support DC power supply. RF output is provided on two ports, only one port is tested. Test data represents the worst case emissions. Due to EUT transmit duty cycle, RF output port conducted emissions are performed using max hold function. Each sweep range is allowed to maximize for a minimum duration of 3 minutes. Frequency Range Investigated 9 kHz to 30 MHz. Measurement Detector Functions: 9kHz to 150kHz RBW=VBW=300Hz, 150kHz to 30MHz RBW=VBW=10kHz.
No emissions detected within 20dB of the limit.

Transducer Legend:

T1=Pad 14dB AN P01631	T2=Pad 30dB
-----------------------	-------------

Measurement Data:

Reading listed by margin.

Test Distance: None

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	151.092k	20.8	+14.1	+29.6			+0.0	64.5	94.0	-29.5	None
2	199.208k	18.7	+14.1	+29.6			+0.0	62.4	94.0	-31.6	None
3	182.472k	17.9	+14.1	+29.6			+0.0	61.6	94.0	-32.4	None

4	224.312k	16.5	+14.1	+29.7	+0.0	60.3	94.0	-33.7	None
5	241.048k	16.2	+14.1	+29.7	+0.0	60.0	94.0	-34.0	None
6	245.232k	15.5	+14.1	+29.7	+0.0	59.3	94.0	-34.7	None
7	12.130k	15.9	+14.0	+29.2	+0.0	59.1	94.0	-34.9	None
8	20.913k	15.7	+14.0	+29.3	+0.0	59.0	94.0	-35.0	None
9	249.416k	15.1	+14.1	+29.7	+0.0	58.9	94.0	-35.1	None
10	372.844k	13.7	+14.1	+29.7	+0.0	57.5	94.0	-36.5	None
11	341.464k	13.6	+14.1	+29.7	+0.0	57.4	94.0	-36.6	None
12	24.537k	13.4	+14.0	+29.4	+0.0	56.8	94.0	-37.2	None
13	272.428k	12.9	+14.1	+29.7	+0.0	56.7	94.0	-37.3	None
14	21.610k	12.8	+14.0	+29.3	+0.0	56.1	94.0	-37.9	None
15	324.728k	12.1	+14.1	+29.7	+0.0	55.9	94.0	-38.1	None
16	28.858k	11.5	+14.0	+29.4	+0.0	54.9	94.0	-39.1	None
17	17.985k	11.4	+14.0	+29.3	+0.0	54.7	94.0	-39.3	None
18	10.179k	11.4	+14.0	+29.2	+0.0	54.6	94.0	-39.4	None
19	25.093M	10.2	+14.1	+29.7	+0.0	54.0	94.0	-40.0	None

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Garmin AT**
 Specification: **2.1051 / 87.139**
 Work Order #: **81985**
 Test Type: **Conducted RF Power**
 Equipment: **Universal Access Transceiver**
 Manufacturer: **Garmin AT**
 Model: **GDL 90**
 S/N: **6068135**

Date: 05/03/2004
 Time: 13:45:39
 Sequence#: 5
 Tested By: Randal Clark

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8566B SA	2209A01404	02/26/2003	02/26/2005	00490
HP 8566B SA Display	2403A08241	02/26/2003	02/26/2005	00489
HP 85650A QPA	2811A01267	02/26/2003	02/26/2005	00478
Attenuator 14dB, JFW 50FHC-014-20		05/08/2003	05/08/2005	P01630
Attenuator 30dB, Bird 25-A-MFN-30	9949	05/09/2003	05/09/2005	P01572
Cable, WL Gore 2'	149047	04/10/2003	04/10/2005	P01527

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Universal Access Transceiver*	Garmin AT	GDL 90	6068135

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Astron	LS-10A	99050014
I/O Test Interface Unit	UPS Aviation Technologies	RL#E-81-4	J

Test Conditions / Notes:

EUT is a transmitter designed for aircraft use. EUT power is provided via support DC power supply. RF output is provided on two ports, only one port is tested. Test data represents the worst case emissions. Due to EUT transmit duty cycle, RF output port conducted emissions are performed using max hold function. Each sweep range is allowed to maximize for a minimum duration of 3 minutes. Frequency Range Investigated 30 MHz to 10 GHz. Measurement Detector Functions: 30-10000 MHz RBW=VBW=100kHz. Due to the signal characteristics and in order to determine a worst case approach to the emissions, average measurements are performed via calculation as shown below. EUT transmits 420uS at a one second period. Averaging over a 100ms period based on $10 \cdot \log(\text{On time}/100\text{ms})$ yields $10 \cdot \log(0.420/100)$ or -23.7 dB.

Transducer Legend:

T1=Upper Cable	T2=Cable HF P01527
T3=Pad 30dB	T4=Pad 14dB AN P01631
T5=Corr Average Correction	

Measurement Data:

Reading listed by margin.

Test Distance: None

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV	dBμV	dB	Ant
1	959.480M	43.1	+1.8	+0.2	+29.7	+14.2	+0.0	89.0	94.0	-5.0	None
2	3910.725M	41.5	+4.0	+0.5	+28.7	+14.1	+0.0	88.8	94.0	-5.2	None

3	3910.720M	41.5	+4.0	+0.5	+28.7	+14.1	+0.0	88.8	94.0	-5.2	None
4	996.600M	42.5	+1.8	+0.2	+29.7	+14.2	+0.0	88.4	94.0	-5.6	None
5	1021.810M	41.2	+1.8	+0.2	+29.7	+14.2	+0.0	87.1	94.0	-6.9	None
6	959.500M	41.1	+1.8	+0.2	+29.7	+14.2	+0.0	87.0	94.0	-7.0	None
7	2933.070M	39.9	+3.4	+0.4	+28.9	+14.1	+0.0	86.7	94.0	-7.3	None
8	2933.070M	39.9	+3.4	+0.4	+28.9	+14.1	+0.0	86.7	94.0	-7.3	None
9	2934.920M	39.7	+3.4	+0.4	+28.9	+14.1	+0.0	86.5	94.0	-7.5	None
10	145.980M	40.3	+0.6	+0.2	+29.4	+14.2	+0.0	84.7	94.0	-9.3	None
11	3912.475M	36.8	+4.0	+0.5	+28.7	+14.1	+0.0	84.1	94.0	-9.9	None
12	907.985M	57.9	+1.7 -23.7	+0.2	+29.7	+14.1	+0.0	79.9	94.0	-14.1	None
13	208.970M	31.9	+0.7	+0.2	+29.5	+14.1	+0.0	76.4	94.0	-17.6	None
14	933.600M	52.6	+1.8 -23.7	+0.2	+29.7	+14.1	+0.0	74.7	94.0	-19.3	None
15	635.250M	28.9	+1.4	+0.2	+29.6	+14.1	+0.0	74.2	94.0	-19.8	None
16	958.745M	25.6	+1.8	+0.2	+29.7	+14.2	+0.0	71.5	94.0	-22.5	None
17	281.250M	25.7	+0.9	+0.2	+29.6	+14.1	+0.0	70.5	94.0	-23.5	None
18	977.720M	108.0	+1.8 -23.7	+0.2	+29.7	+14.2	+0.0	130.2	154.0	-23.8	None
19	768.600M	23.6	+1.6	+0.2	+29.6	+14.1	+0.0	69.1	94.0	-24.9	None
20	1047.520M	45.9	+1.9 -23.7	+0.2	+29.7	+14.2	+0.0	68.2	94.0	-25.8	None
21	1955.985M	45.4	+2.6 -23.7	+0.4	+29.2	+14.1	+0.0	68.0	94.0	-26.0	None
22	3913.240M	42.0	+4.0 -23.7	+0.5	+28.7	+14.1	+0.0	65.6	94.0	-28.4	None

PHOTOGRAPH SHOWING DIRECT CONNECT TEST SETUP



FCC 2.1033(c)(14)/2.1053/87.139 - FIELD STRENGTH OF SPURIOUS RADIATION

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Garmin AT**
 Specification: **2.1053/87.139**
 Work Order #: **81985**
 Test Type: **Conducted RF Power**
 Equipment: **Universal Access Transceiver**
 Manufacturer: **Garmin AT**
 Model: **GDL 90**
 S/N: **6068135**

Date: 05/18/2004
 Time: 11:38:22
 Sequence#: 7
 Tested By: Randal Clark

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8566B SA	2209A01404	02/26/2003	02/26/2005	00490
HP 8566B SA Display	2403A08241	02/26/2003	02/26/2005	00489
HP 85650A QPA	2811A01267	02/26/2003	02/26/2005	00478
EMCO Loop Antenna	1074	05/21/2003	05/21/2005	00226
EMCO 3115 Horn Antenna	9006-3413	04/15/2003	04/25/2005	327
Chase CBL6111C Bilog	2456	12/13/2002	12/13/2004	01991

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Universal Access Transceiver*	Garmin AT	GDL 90	6068135

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Astron	LS-10A	99050014
I/O Test Interface Unit	UPS Aviation Technologies	RL#E-81-4	J

Test Conditions / Notes:

EUT is a transmitter designed for aircraft use. EUT power is provided via support DC power supply. RF output is provided on two ports, both ports are terminated in characteristic impedance. Frequency Range Investigated 9 kHz to 10 GHz. **No spurious emissions detected within 20dB of the limit within the frequency range of 9kHz to 1GHz.** Measurement Detector Functions: 9kHz to 150kHz RBW=VBW=300Hz 150kHz to 30MHz RBW=VBW=10kHz 30-10000 MHz RBW=VBW=100kHz.

Transducer Legend:

T1=Amp - S/N 604	T2=Amp - S/N 301
T3=Bilog Site B	T4=Horn AN 00656 1-18 GHz (Mariposa)
T5=Cable - 10 Meter	T6=Cable - 3 Meter to bulkhead
T7=Cable HF-005-20	

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	T5	T6	T7		Table	dBμV/m	dBμV/m	dB	Ant
			dB	dB	dB	dB					
1	1956.840M	79.7	+0.0	-35.2	+0.0	+26.8	+0.0	77.5	82.3	-4.8	Horiz
			+0.0	+4.4	+1.8						111

2	4888.240M	67.5	+0.0	-34.7	+0.0	+33.3	+0.0	76.6	82.3	-5.7	Horiz
			+0.0	+7.3	+3.2						105
3	5869.480M	62.7	+0.0	-34.8	+0.0	+34.4	+0.0	73.9	82.3	-8.4	Horiz
			+0.0	+8.1	+3.5						103
4	2934.440M	67.3	+0.0	-35.0	+0.0	+30.1	+0.0	70.0	82.3	-12.3	Horiz
			+0.0	+5.4	+2.2						108
5	4891.920M	60.5	+0.0	-34.7	+0.0	+33.3	+0.0	69.6	82.3	-12.7	Vert
			+0.0	+7.3	+3.2						105
6	3913.360M	61.7	+0.0	-34.6	+0.0	+32.9	+0.0	69.2	82.3	-13.1	Horiz
			+0.0	+6.6	+2.6						105
7	5865.920M	54.5	+0.0	-34.8	+0.0	+34.4	+0.0	65.7	82.3	-16.6	Vert
			+0.0	+8.1	+3.5						105
8	1955.120M	63.9	+0.0	-35.2	+0.0	+26.8	+0.0	61.7	82.3	-20.6	Vert
			+0.0	+4.4	+1.8						111
9	3632.005M	52.9	+0.0	-35.0	+0.0	+33.3	+0.0	59.9	82.3	-22.4	Horiz
			+0.0	+6.2	+2.5		33				120
10	3911.040M	51.9	+0.0	-34.6	+0.0	+32.9	+0.0	59.4	82.3	-22.9	Horiz
			+0.0	+6.6	+2.6						108
11	2934.800M	56.0	+0.0	-35.0	+0.0	+30.1	+0.0	58.7	82.3	-23.6	Horiz
			+0.0	+5.4	+2.2						108
12	908.089M	54.9	-27.3	+0.0	+22.9	+0.0	+0.0	58.6	82.3	-23.7	Horiz
			+8.1	+0.0	+0.0		116				109
13	4540.160M	50.5	+0.0	-34.5	+0.0	+32.6	+0.0	58.5	82.3	-23.8	Horiz
			+0.0	+7.1	+2.8		292				125
14	3631.880M	51.0	+0.0	-35.0	+0.0	+33.3	+0.0	58.0	82.3	-24.3	Vert
			+0.0	+6.2	+2.5		137				139
15	908.085M	54.0	-27.3	+0.0	+22.9	+0.0	+0.0	57.7	82.3	-24.6	Vert
			+8.1	+0.0	+0.0		196				118
16	2724.010M	55.6	+0.0	-35.0	+0.0	+29.3	+0.0	57.2	82.3	-25.1	Horiz
			+0.0	+5.2	+2.1		273				142
17	2724.120M	53.9	+0.0	-35.0	+0.0	+29.3	+0.0	55.5	82.3	-26.8	Vert
			+0.0	+5.2	+2.1		344				117
18	4539.900M	47.0	+0.0	-34.5	+0.0	+32.6	+0.0	55.0	82.3	-27.3	Vert
			+0.0	+7.1	+2.8		5				125
19	1816.055M	55.1	+0.0	-35.3	+0.0	+26.3	+0.0	52.0	82.3	-30.3	Horiz
			+0.0	+4.2	+1.7		363				147
20	1816.070M	47.2	+0.0	-35.3	+0.0	+26.3	+0.0	44.1	82.3	-38.2	Vert
			+0.0	+4.2	+1.7						113

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View

FCC 2.1033(c)(14)/2.1055/87.133- FREQUENCY STABILITY

Test Conditions: EUT is a transmitter designed for aircraft use. EUT power is provided via support DC power supply. RF output is provided on two ports, only one port is tested. Test data represents the worst case emissions. Due to EUT transmit duty cycle, RF output port conducted emissions are performed using max hold function. The variable DC power supply was used to during Voltage Variations testing. EUT was connected directly to the analyzer through external attenuators. Due to the signal characteristics the frequency stability measurements on the carrier were impractical, therefore frequency stability measurements are performed on pilot tone.

Customer: Garmin AT
WO#: 81985
Date: 25-May-04
Test Engineer: Randal Clark and Mike Wilkinson

Device Model #: GDL 90
Operating Voltage: 28 VDC
Frequency Limit: 20 PPM
Frequency Ref: 908 MHz

Temperature Variations

Temp (C)	Voltage	Deviation (PPM)
-30	28	3.76652
-20	28	3.72247
-10	28	3.30396
0	28	4.77974
10	28	6.55286
20	28	5.99119
30	28	1.56388
40	28	13.57930
50	28	16.26652

Voltage Variations ($\pm 15\%$)

20	23.8	6.12335
20	28	5.99119
20	32.2	5.89207

Max Deviation	16.26652 PASS
----------------------	------------------

Test Equipment

<i>Description</i>	<i>Asset #</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Digital Multimeter	01241	Radio Shack	22-183	NA	NR	NR
Spectrum Analyzer 100Hz - 22.5GHz	00490	HP	8566B	2209A01404	2/26/03	2/26/05
Spectrum Analyzer Display	00489	HP	8566B	2403A08241	2/26/03	2/26/05
Spectrum Analyzer QP Adapter	00478	HP	85650A	2811A01267	2/26/03	2/26/05
Temp Chamber	01879	Thermotron	S-1.2 MiniMax	11899	1/31/03	1/31/05
Variable DC Power Supply	00765	Sorensen	DCR-60-30B	176	7/8/03	7/7/05
Temperature Meter	02242	Omega	HH-26K	T-202884	8/15/03	8/15/05

NR = Not Required

PHOTOGRAPH SHOWING TEMPERATURE TESTING

