

#### GLENAYRE ELECTRONICS, INC. TEST REPORT

# FOR THE WIRELESS MESSAGING MODULE, @CTIVELINK (TRANSMITTER PORTION ONLY)

#### FCC PARTS 2 AND 24 COMPLIANCE

DATE OF ISSUE: JUNE 13, 2000

Glenayre Electronics, Inc.	Joyce Walker
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P.O. No: L7683	
W.O. No: 74365	Date of test: May 8-17, June 5 & 6, 2000
Report No: FC00-052	A DDD OVED DV
DOCUMENTATION CONTROL:	APPROVED BY:

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PREPARED FOR:

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Dennis Ward

PREPARED BY:

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#### **ADMINISTRATIVE INFORMATION**

**DATE OF TEST:** Date of test: May 8, 2000

**PURPOSE OF TEST:**To demonstrate the compliance of the

Wireless Messaging Module, @ctiveLink with the requirements for devices under

FCC Parts 2 and 24.

MANUFACTURER: Glenayre Electronics, Inc.

**REPRESENTATIVE:** Louie Sanguinetti

**TEST LOCATION:** CKC Laboratories, Inc.

1653 Los Viboras Road Hollister, CA 95023

**TEST PERSONNEL:** Art Rice

**TEST METHOD:** FCC Part 2 and Part 24

**EQUIPMENT UNDER TEST:** Wireless Messaging Module

Manuf: Glenayre Electronics, Inc.

Model: @ctiveLink

Serial: C8

FCC ID: K3N7000 (pending)

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#### **SUMMARY OF RESULTS**

The Wireless Messaging Module, @ctiveLink, was tested in accordance with FCC Part 2 and Part 24 for compliance with the transmitter characteristic requirements of the FCC Rules.

As received, the above equipment was found to be fully compliant with the limits of FCC Parts 2 and 24.

#### **EQUIPMENT UNDER TEST (EUT) DESCRIPTION**

The Wireless Messaging Module, @ctiveLink for the Handspring Visor PDA.

#### **MEASUREMENT UNCERTAINTY**

Associated with data in this report is a  $\pm 4dB$  measurement uncertainty.

#### PERIPHERAL DEVICES

The EUT was tested with the following peripheral devices:

Personal	<u>Data Assistant</u>	Laptop I	<u>'C</u>
Manuf:	Handspring	Manuf:	Toshiba
Model:	Visor	Model:	PA1205U X
Serial:	WAI 0863 (asset #)	Serial:	12424214
FCC ID:	DoC	FCC ID:	CJ6UK454

#### AC adapter for PC Docking station

Handspring
Serial Cradle
3003E
DoC
S

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#### 2.1033(c)(4) - Type(s) of Emissions

10K0F1D

#### **2.1033(c)(5) – Frequency Range**

901 – 902 MHz

#### 2.1033(c)(6) -Range of Operating Power

The operating RF output power (ERP) is 2.80 watts. The output power is fixed. There is no means provided for variation of the operating power.

#### 2.1033(c)(7) – Maximum Power Rating

The maximum power rating as defined in Part 24.132(a) is 7 watts E.R.P. The Wireless Messaging Module, @ctiveLink has a maximum power rating of 2.80 watts.

#### 2.1033(c)(8) - DC Voltages

The transmitter in the @ctiveLink is powered by a 3.6V NiCad battery internal to the unit. The NiCad battery supplies a DC voltage of 3.6V and a current of 600mA to the final RF power amplifier stage.

#### **2.1033(c)(9) – Tune-Up Procedure**

There is no tune-up procedure for the output power as it is fixed to the maximum output power supplied by the final RF power amplifier stage. There is no means provided for variation of the operating power.

#### 2.1033(c)(10) – Frequency Stabilization, Modulation, & Spurious Radiation

This section has been provided to the FCC per a separate file due to confidentiality reasons.

#### 2.1033(c)(13) – Description of Modulation

This section has been provided to the FCC per a separate file due to confidentiality reasons.

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#### 2.1033(c)(14)/2.1046/24.132- RF Power Output

Test Location: CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485

Customer: Glenavre Electronics, Inc. Specification: FCC 24.132 TX Limit

Work Order #: 74280 Date: 5/8/2000 Test Type: Time: 13:52:23 **Maximized Emissions** Equipment: Sequence#: 1 2-way pager Manufacturer: Glenayre Electronics Tested By: Art Rice

@ctiveLink Model:

S/N: C 8

#### Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 85650A QP Adaptor	2430A00541	04/09/2000	04/09/2001	0
HP 85662A Display	2112A02174	04/09/2000	04/09/2001	0
HP 85680A S. A.	2049A01408	04/09/2000	04/09/2001	0
Cable, 3m	Cbl3mha00	01/18/2000	01/18/2001	0
Log Periodic, A.H. SAS200/510	318	04/23/1999	05/19/2000	0

Equipment Under Test (\* = EUT):

11				
Function	Manufacturer	Model #	S/N	
2-way pager*	Glenayre Electronics	@ctiveLink	C 8	

#### Support Devices:

Function Manufacturer	Model #	S/N	
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#### Test Conditions / Notes:

Measurement Data:

Tested in accordance with FCC Part 2 and Part 24 test procedures. The EUT is a two-way pager that operates in the 901-902 MHz range. Testing the pager in the transmit mode in three positions to determine worst case. The front of the unit is defined as the side that has the button. Position 1 is with bottom edge placed on table top. Position 2 is with right end placed on table top. Position 3 is with back placed on table top. Note: Spec limit of 133.7 dBuV is equivalent to 7 watts ERP. The carrier frequency is 901.20625 MHz with a channel bandwidth of 10 kHz. The main digital clock is 9.6 MHz. The EUT is in "test mode 39", which causes it to transmit with no modulation of the carrier.

					Cable	Log					
#	Freq	Rdng					Dist	Corr	Spec	Margin	Polar
	MHz	dΒμV	dB	dB	dB	dB	Table	$dB\mu V/m$	$dB\mu V/m$	dB	Ant
1	901.298M	102.8			+4.4	+22.5	+0.0	129.7	133.7	-4.0	Horiz
									The unit is	placed in	

Reading listed by margin.

							The unit is	pracea m	
							position 2.		
2	901.292M	98.1	+4.4	+22.5	+0.0	125.0	133.7	-8.7	Vert
							The unit is	placed in	
							position 1.	-	

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Test Distance: 3 Meters

97.9	+4.4	+22.5	+0.0	124.8	133.7	-8.9	Horiz
					The unit is	placed in	
					position 3.		
90.4	+4.4	+22.5	+0.0	117.3	133.7	-16.4	Vert
					The unit is	placed in	
					position 2.		
89.6	+4.4	+22.5	+0.0	116.5	133.7	-17.2	Horiz
					The unit is	placed in	
					position 1.		
88.4	+4.4	+22.5	+0.0	115.3	133.7	-18.4	Vert
					The unit is	placed in	
					position 3.	_	
	90.4	90.4 +4.4 89.6 +4.4	90.4 +4.4 +22.5 89.6 +4.4 +22.5	90.4 +4.4 +22.5 +0.0 89.6 +4.4 +22.5 +0.0	90.4 +4.4 +22.5 +0.0 117.3 89.6 +4.4 +22.5 +0.0 116.5	The unit is position 3.  90.4	The unit is placed in position 3.  90.4

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Test Location: CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485

Customer: Glenayre Electronics, Inc. Specification: FCC 24.132 TX Limit

Work Order #: 74365 Date: 5/12/2000
Test Type: Maximized Emissions Time: 15:59:13
Equipment: 2-way pager Sequence#: 19
Manufacturer: Glenayre Electronics Tested By: Art Rice
Model: @ctiveLink S/N: C 8

#### Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 85650A QP Adaptor	2430A00541	04/09/2000	04/09/2001	0
HP 85662A Display	2112A02174	04/09/2000	04/09/2001	0
HP 85680A S. A.	2049A01408	04/09/2000	04/09/2001	0
Cable, 3m	Cbl3mha00	01/18/2000	01/18/2001	0
Log Periodic, A.H. SAS200/510	464	10/12/1999	10/12/2000	2

#### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
2-way pager*	Glenayre Electronics	@ctiveLink	C_8

#### Support Devices:

Function	Manufacturer	Model #	S/N
Personal Data Assistant	Handspring	Visor	WAI 0863 (asset #)

#### Test Conditions / Notes:

Tested in accordance with FCC Part 2 and Part 24 test procedures. The EUT is a two-way pager that operates in the 901-902 MHz range. Testing the pager in the transmit mode in three positions to determine worst case. The front of the unit is defined as the side that has the button. The bottom edge has the interface connector. **Position 1** is with bottom edge pointed down toward the table top. **Position 2** is with right end pointed down toward the table top. **Position 3** is with back placed on table top. Note: Spec limit of 133.7 dBuV is equivalent to 7 watts ERP. The carrier frequency is 901.20625 MHz with a channel bandwidth of 10 kHz. The main digital clock is 9.6 MHz. The EUT is in "test mode 39", which causes it to transmit with no modulation of the carrier. The Pager is plugged into the expansion port of the PDA. The address bus and data bus which interface with the Personal Data Assistant (PDA) are continuously active. The PDA sleep mode is disabled to provide continuous activity. The PDA is battery operated with no charger jack provided.

Measu	rement Data:	R	eading lis	sted by ma	argin.		Te	est Distanc	e: 3 Meters	1	
		Cable Log									
#	Freq	Rdng					Dist	Corr	Spec	Margin	Polar
	MHz	dΒμV	dB	dB	dB	dB	Table	$dB\mu V/m$	$dB\mu V/m$	dB	Ant
1	901.299M	98.8	+4.4	+22.0			+0.0	125.2	133.7	-8.5	Horiz
									The EUT i	s placed in	position
									2.		
2	901.294M	97.2	+4.4	+22.0			+0.0	123.6	133.7	-10.1	Horiz
									The EUT i	s placed in	position
									3.		

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3	901.299M	94.5	+4.4	+22.0	+0.0 120.9 133.7 -12.8 Vert
)	901.299W	94.3	+4.4	+22.0	
					The EUT is placed in position
					1.
4	901.299M	91.7	+4.4	+22.0	+0.0 118.1 133.7 -15.6 Horiz
					The EUT is placed in position
					1.
5	901.294M	91.0	+4.4	+22.0	+0.0 117.4 133.7 -16.3 Vert
6	901.299M	86.0	+4.4	+22.0	+0.0 112.4 133.7 -21.3 Vert
					The EUT is placed in position
					2.

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Test Location: CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485

Customer: Glenayre Electronics, Inc. Specification: FCC 24.132 TX Limit

Work Order #: 74495 Date: 06/05/2000
Test Type: Maximized Emissions Time: 12:30:16
Equipment: 2-way pager Sequence#: 37
Manufacturer: Glenayre Electronics Tested By: Art Rice
Model: @ctiveLink S/N: C 8

#### Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 85650A QP Adaptor	2430A00541	04/09/2000	04/09/2001	0
HP 85662A Display	2112A02174	04/09/2000	04/09/2001	0
HP 85680A S. A.	2049A01408	04/09/2000	04/09/2001	0
Log Periodic, A.H. SAS200/510	464	10/12/1999	10/12/2000	2
Cable, 3m	Cbl3mha00	01/18/2000	01/18/2001	0

#### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
2-way pager*	Glenayre Electronics	@ctiveLink	C_8

#### Support Devices:

Function	Manufacturer	Model #	S/N
Personal Data Assistant	Handspring	Visor	WAI 0863 (asset #)
Laptop PC	Toshiba	PA1205U X	12424214
AC adapter for PC	Toshiba	PA2431U	9505
Docking station	Handspring	Serial Cradle	3003E

#### Test Conditions / Notes:

Tested in accordance with FCC Part 2 and Part 24 test procedures. The EUT is a two-way pager that operates in the 901-902 MHz range. Testing the pager while installed in the expansion port of the Personal Data Assistant (PDA) which is mounted on it's docking station. The address bus and data bus which interface the pager with the PDA are continuously active. The PDA sleep mode is disabled to provide continuous activity. The docking station is connected to the Laptop PC serial port through a shielded DB9 cable that is permanently attached to the docking station. "Hot Sync" software is transferring files from the PC to the docking station. The laptop PC is placed at the back edge of the test table. The docking station is placed to the left of the PC. The PC AC adapter is placed on the floor of the turntable. Note: Spec limit of 133.7 dBuV is equivalent to 7 watts ERP. The carrier frequency is 901.20625 MHz with a channel bandwidth of 10 kHz. The main digital clock is 9.6 MHz. The EUT is in "test mode 39", which causes it to transmit with no modulation of the carrier.

Meas	urement Data:	R	eading lis	ted by ma	argin.		Те	est Distanc	e: 3 Meters	1	
			cable	Log							
#	Freq	Rdng					Dist	Corr	Spec	Margin	Polar
	MHz	dΒμV	dB	dB	dB	dB	Table	$dB\muV/m$	$dB\mu V/m$	dB	Ant
1	901.292M	91.2	+4.4	+22.0			+0.0	117.6	133.7	-16.1	Vert
									With hot sy	ync data tr	ansfer.
2	901.298M	89.1	+4.4	+22.0			+0.0	115.5	133.7	-18.2	Horiz
									Without ho	ot sync data	a
									transfer.		
3	901.292M	88.9	+4.4	+22.0	•		+0.0	115.3	133.7	-18.4	Horiz
									With hot s	ync data tr	ansfer.

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## Video Bandwidth and Resolution Bandwidth Settings:

Frequency Range	Signal Analyzer
	VBW & RBW Setting
901– 902 MHz	1 MHz

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Front View of Transmitter Only

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Back View of Transmitter Only

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Front View of Transmitter with PDA

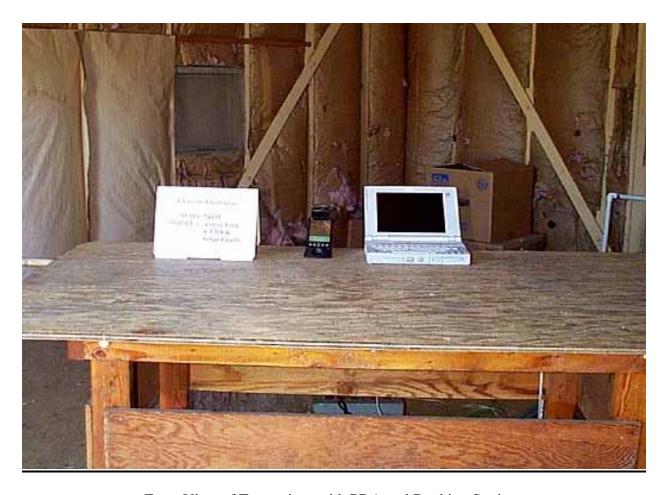
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Back View of Transmitter with PDA

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Front View of Transmitter with PDA and Docking Station

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Back View of Transmitter with PDA and Docking Station

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## <u>2.1033(c)(14)/2.1047(a)/24.131 - MODULATION CHARACTERISTICS – Audio Frequency Response</u>

Not applicable to this unit.

## 2.1033(c)(14)/2.1047(b)/24.131 - MODULATION CHARACTERISTICS - Modulation Limiting Response

Customer supplied data to be uploaded to the FCC in separate files.

#### 2.1033(c)(14)/2.1049(i)/24.131- OCCUPIED BANDWIDTH

Customer supplied data to be uploaded to the FCC in separate files.

#### 2.1033(c)(14)/2.1051/N/A - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

Measurements were not taken at the antenna terminal because the 2-way pager has a permanently attached integral antenna and there was no means of modifying the antenna for direct measurements. A similar device was previous tested in the same manner and granted on August 20, 1998 (K3N5000).

#### 2.1033(c)(14)/2.1053/24.133 - FIELD STRENGTH OF SPURIOUS RADIATION

#### **Test Equipment Used:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 85650A QP Adaptor	2430A00541	04/09/2000	04/09/2001	0
HP 85662A Display	2112A02174	04/09/2000	04/09/2001	0
HP 85680A S. A.	2049A01408	04/09/2000	04/09/2001	0
Bicon, AH Sys. SAS200/540	273	10/29/1999	10/29/2000	0
Cable, 3m	Cbl3mha00	01/18/2000	01/18/2001	0
Log Periodic, A.H. SAS200/510	464	10/12/1999	10/12/2000	2
Horn Ant, ARA DRG-118A	1064	02/08/2000	02/08/2001	2061
Cable,100 ft Andrews FSJ1P-50A-4A	Cable #7	09/23/1999	09/23/2000	0
Cable, 25 ft Andrews FSJ1P-50A-4A	Cable #12	09/23/1999	09/23/2000	0
Preamp, HP83017A	3123A00281	07/27/1999	07/27/2000	786
HP 8596E S.A.	3346A00225	05/10/2000	05/10/2001	783

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## **Test Data for Transmitter Only**

	Part 2.1053 8	27.100									
lenayre mo	del: @ctiveL	ink (standalon	e configurati	on)							
FR 47 Part	2.1053 & 24.1	133 Measureme	ents required:	Field strength	of spurious ra	adiation.					
perating Cl	hannel - 901.2	20625 MHz									
Polarity	Freq (MHz)	Reading in dBuV	PreAmp Factor	Cable Factor	Horn Antenna	Corrected E (dBuV/M)	V/M	ERP (Watts)	Spec Limit Watts	Pass or Fail	
Horizontal	1802.41	75.00	-39.40	9.7	25.6	70.90	0.003507519	0.000003691	0.000050000	Pass	
/ertical	8110.89	38.80	-37.00	23.3	37.1	62.20	0.001288250	0.000000498	0.000050000	Pass	
Horizontal	3604.82	53.50	-38.60	14.9	32	61.80	0.001230269	0.000000454	0.000050000	Pass	
Horizontal	9012.05	33.30	-35.00	26	37.3	61.60	0.001202264	0.000000434	0.000050000	Pass	
Horizontal	7209.65	36.90	-35.30	21.8	37.6	61.00	0.001122018	0.00000378	0.000050000	Pass	
ertical	6308.48	34.00	-36.00	21	35.6	54.60	0.000537032	0.000000087	0.000050000	Pass	
lotes: Frequ	I Jency range in	vestigated was	from 30 MHz	l to 9.012 GHz.	All spurious a	and harmonic e	missions were i	nvestigated. All	emissions dete		less than
otes: Frequ 0dB below the	Luency range in he permissible	vestigated was	from 30 MHz	l to 9.012 GHz.	All spurious a	and harmonic e	l missions were i	nvestigated. All	emissions dete		less than
lotes: Frequ 0dB below th	Lency range in the permissible	vestigated was e value were rep	from 30 MHz ported. CKC d	to 9.012 GHz. ata sheet file r	All spurious a	and harmonic e e04a-txspurs1-9	I missions were i Oghz.DAT (posit	nvestigated. All ion 2, standalon	emissions dete e)		less than
otes: Frequ OdB below the CALCUI ote: The da	Lancy range in the permissible LATIONS	vestigated was e value were rep	from 30 MHz ported. CKC d	to 9.012 GHz. ata sheet file r	All spurious aname is fc24se	and harmonic ee04a-txspurs1-9	I missions were i Oghz.DAT (posit Ilated carrier po	nvestigated. Allion 2, standalon	emissions dete e) e transmitter.	ected that were	less than
lotes: Frequ 0dB below th CALCUI	Lancy range in the permissible LATIONS	vestigated was e value were rep	from 30 MHz ported. CKC d	to 9.012 GHz. ata sheet file r	All spurious aname is fc24se	and harmonic ee04a-txspurs1-9	I missions were i Oghz.DAT (posit	nvestigated. Allion 2, standalon	emissions dete e) e transmitter.	ected that were	less than
CALCUI ote: The da he 43+10log	Lency range in the permissible LATIONS at a taken is the g(P) dB "out of	vestigated was a value were repertured to the control of the contr	from 30 MHz corted. CKC de r of each spur ion equates to	to 9.012 GHz. ata sheet file r ious emission o a 50 uW limit	All spurious aname is fc24se	and harmonic ee04a-txspurs1-9	I missions were i Oghz.DAT (posit Ilated carrier po	nvestigated. Allion 2, standalon	emissions dete e) e transmitter.	ected that were	less than
CALCUI lote: The da he 43+10log	LATIONS ata taken is the g(P) dB "out of	vestigated was a value were reperent of the value was a value were reperent of the value of	from 30 MHz corted. CKC do r of each spur ion equates to - (43+10logP)	to 9.012 GHz. ata sheet file r ious emission a 50 uW limit = -43 dBW.	All spurious aname is fc24se	and harmonic ee04a-txspurs1-9	I missions were i Oghz.DAT (posit Ilated carrier po	nvestigated. Allion 2, standalon	emissions dete e) e transmitter.	ected that were	less than
CALCUI ote: The da he 43+10log	LATIONS ata taken is the g(P) dB "out of	vestigated was a value were repertured to the control of the contr	from 30 MHz corted. CKC do r of each spur ion equates to - (43+10logP)	to 9.012 GHz. ata sheet file r ious emission a 50 uW limit = -43 dBW.	All spurious aname is fc24se	and harmonic ee04a-txspurs1-9	I missions were i Oghz.DAT (posit Ilated carrier po	nvestigated. Allion 2, standalon	emissions dete e) e transmitter.	ected that were	less than
CALCUI ote: The da he 43+10log purious Emi	LATIONS  ata taken is the g(P) dB "out of issions Limit (Vissions Limit (Vissi	vestigated was a value were reperent of the value was a value were reperent of the value of	from 30 MHz corted. CKC do r of each spur ion equates to - (43+10logP)	to 9.012 GHz. ata sheet file r ious emission a 50 uW limit = -43 dBW.	All spurious aname is fc24se	and harmonic ee04a-txspurs1-9	ulated carrier po	nvestigated. Allion 2, standalon	emissions dete e) e transmitter. limit for spurious	ected that were	less than
CALCUI OdB below the CALCUI Ode: The date the 43+10log Epurious Emispurious Em	LATIONS  ata taken is the g(P) dB "out of issions Limit (Vissions Limit (Vissions).	vestigated was a value were reperent of the value was a value were reperent of the value of	from 30 MHz corted. CKC do r of each spur ion equates to - (43+10logP)	to 9.012 GHz. ata sheet file r ious emission a 50 uW limit = -43 dBW.	All spurious aname is fc24se	and harmonic ee04a-txspurs1-9	Jamissions were in Dight. DAT (positions) with the properties of t	nvestigated. Allion 2, standalon wer output of the this amplitude	emissions dete e) e transmitter. limit for spurious	s emissions.	
CALCUI Note: The da The 43+10log	LATIONS  ata taken is the g(P) dB "out of issions Limit (Vissions Limit (Vissions).	vestigated was a value were reperent of the value was a value were reperent of the value of	from 30 MHz corted. CKC do r of each spur ion equates to - (43+10logP)	to 9.012 GHz. ata sheet file r ious emission a 50 uW limit = -43 dBW.	All spurious aname is fc24se	and harmonic ee04a-txspurs1-9	Jamissions were in Dight. DAT (positions) with the properties of t	nvestigated. All ion 2, standalon wer output of the this amplitude	emissions dete e) e transmitter. limit for spurious	s emissions.	
CALCUI Note: The da The 43+10log Spurious Emi ERP Calcula	LATIONS  ata taken is the g(P) dB "out of issions Limit (Vissions Limit (Vissions).	vestigated was a value were reperent of the value was a value were reperent of the value of	from 30 MHz corted. CKC do r of each spur ion equates to - (43+10logP)	to 9.012 GHz. ata sheet file r ious emission a 50 uW limit = -43 dBW.	All spurious aname is fc24se	and harmonic ee04a-txspurs1-9	Jamissions were in Dight. DAT (positions) with the properties of t	nvestigated. All ion 2, standalon wer output of the this amplitude	emissions dete e) e transmitter. limit for spurious	s emissions.	

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#### CFR 47 Part 24 calculations.

Maximum transmit level measured was 129.7 dBµV/m.

Transmitter Power Limitations Calculations for standalone (transmitter only) configuration:

```
Convert to linear V/m:
inv log(129.7/20) *.000001 = 3.055 V/m
Calculate ERP:
ERP = (Ed)^2 / 30 [distance d=3 meters]
ERP = (3.055*3)^2/30
ERP = 83.993/30
ERP = 2.80 watts (7 watts is allowable in Part 24)
Spec Limit Calculations:
ERP = (Ed)^2/30 (ERP = 7 watts, and d = 3 meters)
(Ed)^2 = ERP*30
Ed = (ERP*30)^{1/2}
E = (ERP*30)^{1/2}/d
E = (7*30)^{1/2}/3
E = (210)^{\frac{1}{2}}
E = 4.83 \text{ V/m}
E = 4,830,000 \mu V/m
20 \log(4,830,000 \,\mu\text{V/m}) = 133.7 \,\text{dB}\mu\text{V/m} (specification limit used on CKC data sheets to calculate
margin)
```

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<b>Test Data</b>	a for Tran	smitter wi	th PDA								
FCC CFR 47	Part 2.1053 8	<u>k</u> 24.133									
Glenayre mo	odel: @ctiveL	ink (configura	tion with PDA	A)							
CFR 47 Part	t 2.1053 & 24.	133 Measureme	ents required:	Field strength	of spurious ra	adiation.					
Operating C	hannel - 901.2	20625 MHz									
Polarity	Freq (MHz)	Reading in dBuV	PreAmp Factor	Cable Factor	Horn Antenna	Corrected E (dBuV/M)	V/M	ERP (Watts)	Spec Limit Watts	Pass or Fail	
Horizontal	1802.41	72.10	-39.40	9.7	25.6	68.00	0.002511886	0.000001893	0.000050000	Pass	
Horizontal	3604.83	56.50	-38.60	14.9	32	64.80	0.001737801	0.000000906	0.000050000	Pass	
Horizontal	2703.62	59.20	-38.50	12.8	30.8	64.30	0.001640590	0.000000807	0.000050000	Pass	
Horizontal	4506.03	53.80	-37.80	17.1	31	64.10	0.001603245	0.000000771	0.000050000	Pass	
Horizontal	8110.92	39.50	-37.00	23.3	37.1	62.90	0.001396368	0.000000585	0.000050000	Pass	
Vertical	9012.07	33.60	-35.00	26	37.3	61.90	0.001244515	0.000000465	0.000050000	Pass	
							emissions were i 9ghz.DAT (posit				
CALCU	LATIONS			1							
Note: The da	ata taken is the	e radiated powe	er of each spur	ious emission	with reference	e to the unmod	ulated carrier po	wer output of th	e transmitter.		
The 43+10log	g(P) dB "out of	f band" attenuat	tion equates to	a 50 uW limi	t for any P. Th	he following equ	uations establish	this amplitude	limit for spuriou	s emissions.	
	•	dBW) = 10logP	,								
Spurious Em	issions Limit (\	W) = 10^(-43/10	0) = 50 * 10^-6	W.							
			I	T	1		TI-	T		ı	
ERP Calcula									f dBuV/m to V/i		
$ERP = (Ed)^2/$	30							[invlog(Reading	g in dBuV/m/20)	)j*.000001 = V/	n
E = V/m											
d= distance									1		

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#### CFR 47 Part 24 calculations.

Transmitter Power Limitations Calculations for configuration with PDA:

```
Maximum transmit level measured was 125.2 dBµV/m.
Convert to linear V/m:
inv log(125.2/20) *.000001 = 1.82 V/m
Calculate ERP:
ERP = (Ed)^2 / 30 [distance d=3 meters]
ERP = (1.82*3)^2/30
ERP = 29.80/30
ERP = 0.993 watts (7 watts is allowable in Part 24)
Spec Limit Calculations:
ERP = (Ed)^2/30 (ERP = 7 watts, and d = 3 meters)
(Ed)^2 = ERP*30
Ed = (ERP*30)^{1/2}
E = (ERP*30)^{1/2}/d
E = (7*30)^{1/2}/3
E = (210)^{\frac{1}{2}}
E = 4.83 \text{ V/m}
E = 4,830,000 \mu V/m
20 \log(4,830,000 \,\mu\text{V/m}) = 133.7 \,\text{dB}\mu\text{V/m} (specification limit used on CKC data sheets to calculate
margin)
```

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#### Test Data for Transmitter with PDA and Docking Station FCC CFR 47 Part 2.1053 & 24.133 Glenayre model: @ctiveLink (configuration with PDA & Docking Station) CFR 47 Part 2.1053 & 24.133 Measurements required: Field strength of spurious radiation. Operating Channel - 901.20625 MHz Polarity ERP (Watts) Spec Limit Pass or Fail Frea Reading in PreAmp Cable Horn Corrected E V/M (MHz) dBuV (dBuV/M) Watts Factor **Factor Antenna** 1802.39 74.70 -39.40 9.7 70.60 0.003388442 0.000003444 0.000050000 Pass Horizontal 25.6 8110.93 38.50 -37.00 23.3 37.1 61.90 0.001244515 0.000000465 0.000050000 Pass Horizontal 0.001096478 Vertical 7209.58 36.70 -35.30 21.8 37.6 60.80 0.000000361 0.000050000 Pass Horizontal 3604.80 51.00 -38.60 14.9 32 59.30 0.000922571 0.000000255 0.000050000 **Pass** 2703.59 52.00 -38.50 30.8 57.10 0.000716143 0.000000154 0.000050000 Horizontal 12.8 Pass 6308.37 33.80 -36.00 21 35.6 54.40 0.000524807 0.000000083 0.000050000 Vertical Pass Notes: Frequency range investigated was from 30 MHz to 9.012 GHz. All spurious and harmonic emissions were investigated. All emissions detected that were less than 20dB below the permissible value were reported. CKC data sheet file name is fc24se46c-txspurs1-9ghz.DAT (with PDA & Docking Station) CALCULATIONS Note: The data taken is the radiated power of each spurious emission with reference to the unmodulated carrier power output of the transmitter. The 43+10log(P) dB "out of band" attenuation equates to a 50 uW limit for any P. The following equations establish this amplitude limit for spurious emissions. Spurious Emissions Limit (dBW) = 10logP - (43+10logP) = -43 dBW. Spurious Emissions Limit (W) = $10^{-43/10}$ = $50 * 10^{-6}$ W. **ERP Calculations** Conversion of dBuV/m to V/m $ERP = (Ed)^{2}/30$ [invlog(Reading in dBuV/m/20)]\*.000001 = V/m E = V/m

d= distance

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#### CFR 47 Part 24 calculations.

Transmitter Power Limitations Calculations for configuration with PDA & Docking Station:

```
Maximum transmit level measured was 117.6 dBµV/m.
Convert to linear V/m:
inv log(117.6/20) *.000001 = .7586 V/m
Calculate ERP:
ERP = (Ed)^2 / 30 [distance d=3 meters]
ERP = (.7586*3)^2/30
ERP = 5.178/30
ERP = 0.173 watts (7 watts is allowable in Part 24)
Spec Limit Calculations:
ERP = (Ed)^2/30 (ERP = 7 watts, and d = 3 meters)
(Ed)^2 = ERP*30
Ed = (ERP*30)^{1/2}
E = (ERP*30)^{1/2}/d
E = (7*30)^{1/2}/3
E = (210)^{\frac{1}{2}}3
E = 4.83 \text{ V/m}
E = 4,830,000 \mu V/m
20 \log(4,830,000 \,\mu\text{V/m}) = 133.7 \,\text{dB}\mu\text{V/m} (specification limit used on CKC data sheets to calculate
margin)
```

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## **Photograph Showing Spurious Emissions**

Test setup same as RF Power Output. See photos on pages 12 - 17.

## 2.1033(c)(14)/2.1055/24.135/24.135 - Frequency Stability

Customer supplied data to be uploaded to the FCC in separate files.

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