



TEST REPORT

Product Name : Industrial Remote Controller

Model Number : SAGA1-L12

Data Applies to : SAGA1-L12-1

Brand Name : SAGA

FCC ID : NCT048L12

Applicant : GAIN ELECTRONIC CO., LTD

Address : 4F-1, NO. 288-5, Hsin-Ya Rd, Chien-Chen
Zone(806), Kaohsiung, Taiwan, R.O.C.

Received Date : August 13, 2004

Tested Date : August 13 ~ October 06, 2004

Notes :

1. This report will be invalid if duplicated or photocopied in part.
2. This report refers only to the specimen(s) submitted to testing, and be invalid as separately used.
3. This report is invalid without examination stamp and signature of this institute.
4. The tested specimen(s) will be preserved for thirty days from the data issued.
5. The report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.





Ecom Sertech Corp.

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., Chu Tung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 2 of 32

Test Report Certification

Product Name : Industrial Remote Controller
Model Number : SAGA1-L12
Data Applies to : SAGA1-L12-1
Brand Name : SAGA
FCC ID : NCT048L12
Applicant : GAIN ELECTRONIC CO., LTD

Measurement Standard :

47 CFR Part 15 Subpart B and C (Section 15.231)
ANSI C63.4-2001

Tested By : Ken Tu, **Date** : October 08, 2004
(Ken Tu)

Approved By : Chieh-De Tsai, **Date** : September 08, 2004
(Chieh-De Tsai, Manager)



WE HEREBY CERTIFY THAT: The measurements shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable. We assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.



TABLE OF CONTENTS

TITLE	PAGE NO.
1. GENERAL INFORMATION	4
1.1 General Statement	4
1.2 General Description of EUT & Power	4
1.3 EUT & Peripherals Setup Diagram	4
1.4 EUT Operating Condition	5
1.5 Description of Test Site	5
1.6 Summary of Test Results	6
2. TRANSMITTER AUTO-OFF AND DUTY CYCLE	7
2.1 Test Equipments	7
2.2 Test Setup	7
2.3 Test Procedures	7
2.4 Uncertainty of Radiated Emission	7
2.5 Test Result	8-13
3. RADIATED EMISSION TEST	14
3.1 Test Equipments	14
3.2 Test Setup	14
3.3 Radiation Limit	15
3.4 Test Procedures	16
3.5 Uncertainty of Radiated Emission	16
3.6 Radiated RF Noise Measurement Results	17-22
3.7 Photos of Radiated Test	23-28
4. BANDWIDTH MEASUREMENT	29
4.1 Test Equipments	29
4.2 Test Setup	29
4.3 Limits of Bandwidth Measurement	29
4.4 Test Procedure	29
4.5 Uncertainty of Conducted Emission	29
4.6 Test Results	30
4.7 Photo of Bandwidth Measurement	31
5. ANTENNA REQUIREMENT	32
5.1 Standard Applicable	32
5.2 Antenna Connected Construction	32

**Ecom Sertech Corp.**

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., Chu Tung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 4 of 32

1. GENERAL INFORMATION

1.1 General Statement

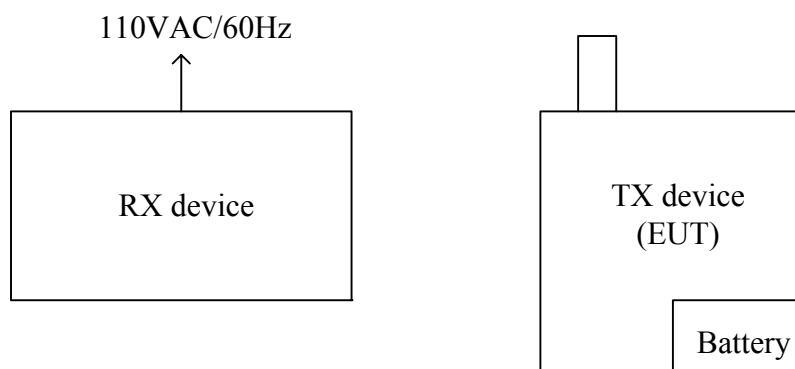
MEASUREMENT DEVIATION : Comply with standard in full

TRACEABILITY : This test result is traceable to national or international std.

1.2 General Description of EUT & Power

Product Name	Industrial Remote Controller
Model Number	SAGA1-L12
Data Applies To	SAGA1-L12-1
Frequency Range	310MHz ~ 320MHz
Operated Selection	manual
Type of Modulation	FSK
EUT Description	The EUT, was the transmitter of a industrial remote control system. The EUT is for transmission of a control signal used with remote switch. It does not activate automatically and transmit periodically at a regular predetermined interval.
Antenna Type	Helix Antenna, Antenna Gain : 1.5dBi.
Power Source	3VDC (For TX device) from two AA battery

1.3 EUT & Peripherals Setup Diagram





Ecom Sertech Corp.

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., ChuTung Chen, Hsinchu, Taiwan 310, R.O.C
TEL:886-3-5918012 FAX : 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 5 of 32

1.4 EUT Operating Condition

- (1) Set up the EUT as described in set up diagram.
- (2) Switch on the operation button.
- (3) Start test.

1.5 Description of Test Site

SITE DESCRIPTION

FCC Certificate NO. : 90585
BSMI Certificate NO. : SL2-IN-E-0002
NVLAP Lab Code : 200118-0
CNLA Certificate NO. : CNLA-ZL97018
VCCI Certificate NO. : R-1189, C-1250
TÜV Rheinland Certificate NO. : 10008375

NAME OF SITE : Ecom Sertech Corp. Hsin-Chu Lab.
(Spin-off from ITRI / ERSO on Apr. 01, 2003)

SITE LOCATION : Rm.258, Bldg.17, NO.195 , Sec. 4, Chung Hsing Rd.,
Chu-Tung Chen. Hsin-Chu, Taiwan 310 R.O.C.

**Ecom Sertech Corp.**

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., ChuTung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 6 of 32

1.6 Summary of Test Results

The EUT has been tested according to the following specifications :

APPLIED STANDARD : 47 CFR Part 15, Subpart B and Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.231(b)	Field strength of Fundamental	PASS	Meet the requirement of limit
15.231(b)	Field strength of Harmonics	PASS	Meet the requirement of limit
15.231(b)(3)	Transmitter Radiated Emissions Limit : 15.231(b)	PASS	Meet the requirement of limit
15.231(a)(1)	Deactivate transmission within 5 seconds of being released	PASS	Manually operated only
15.231(a)(2)	Cease transmission within 5 seconds after activation	N/A	Manually operated only
15.231(a)(3)	Transmit periodically at a regular predetermined interval.	N/A	Manually operated only
15.231(c)	Bandwidth Limit: Center frequency $\times$ 0.25%	PASS	Meet the requirement of limit

2. TRANSMITTER AUTO-OFF AND DUTY CYCLE

2.1 Test Equipments

The following test equipments are utilized in making the measurements contained in this report.

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration
R/S SPECTRUM ANALYZER	FSEK30	835253/002	June 17, 2004

2.2 Test Setup

The diagram below shows the test setup that is utilized to perform the measurements for duty cycle and power off duration.



2.3 Test Procedures

1. The tests were performed with the equipment under test (EUT) connected to the spectrum directly.
2. The spectrum was turned to the center frequency of the emission and set to the zero span with proper sweep time.
3. The duration of transmission of ON/OFF was determined by the spectrum with the function of marker and cursor line.
4. The spectrum was used to check whether the EUT stop transmission or not within 5 seconds after the EUT was powered off.

2.4 Uncertainty of Radiated Emission

The uncertainty of time domain measurement is $\pm 1 \mu s$.



2.5 Test Result

1. For the fundamental frequency (310.27MHz)

The EUT in manual mode complies with the requirement of FCC 15.231(a). After exploratory tests, two types of pattern were discovered and recorded.

For Pattern one :

Parameter	Results	Remark
Manual on time	200.40 μ s	Manual mode
Manual duration time	472.95 μ s	Manual mode
Duty Cycle	42.37 %	Manual mode

For Pattern two :

Parameter	Results	Remark
Manual on time	100.20 μ s	Manual mode
Manual duration time	236.47 μ s	Manual mode
Duty Cycle	42.37 %	Manual mode

The transmitter ceases transmission immediately after being released and complied with the requirement in section 15.231(a)(1).

**Ecom Sertech Corp.**

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., ChuTung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 9 of 32

2. For the fundamental frequency (318MHz)

The EUT in manual mode complies with the requirement of FCC 15.231(a). After exploratory tests, two types of pattern were discovered and recorded.

For Pattern one :

Parameter	Results	Remark
Manual on time	209.42 μ s	Manual mode
Manual duration time	465.93 μ s	Manual mode
Duty Cycle	45 %	Manual mode

For Pattern two :

Parameter	Results	Remark
Manual on time	101.20 μ s	Manual mode
Manual duration time	241.48 μ s	Manual mode
Duty Cycle	41.9 %	Manual mode

The transmitter ceases transmission immediately after being released and complied with the requirement in section 15.231(a)(1).



Ecom Sertech Corp.

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., Chu Tung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

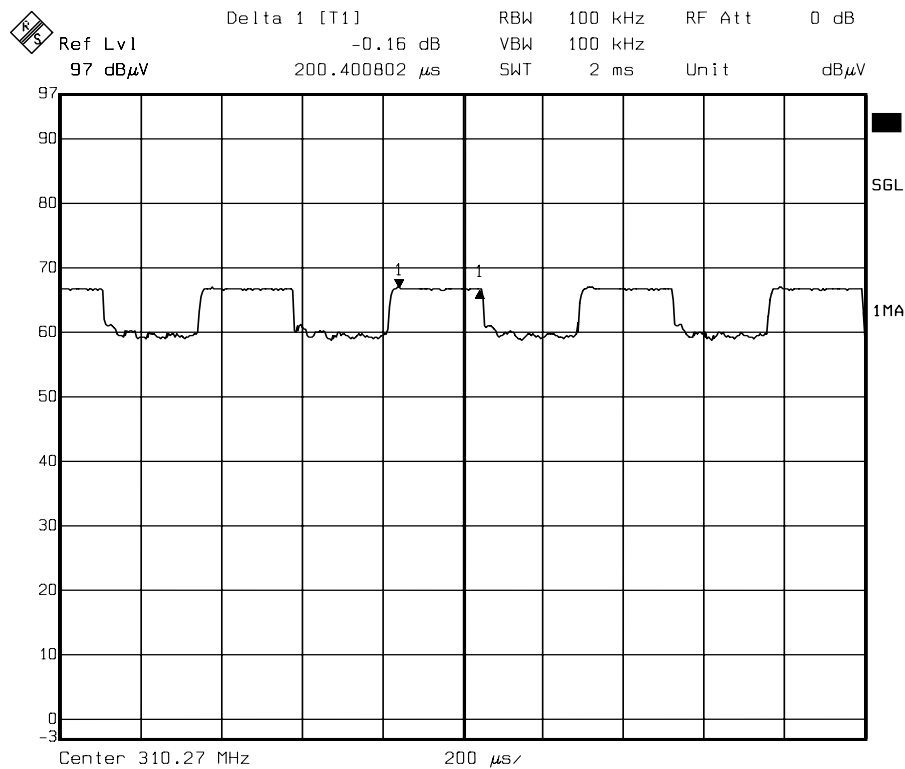
FCC ID : NCT048L12

Report No. : ER04-08-031FRF

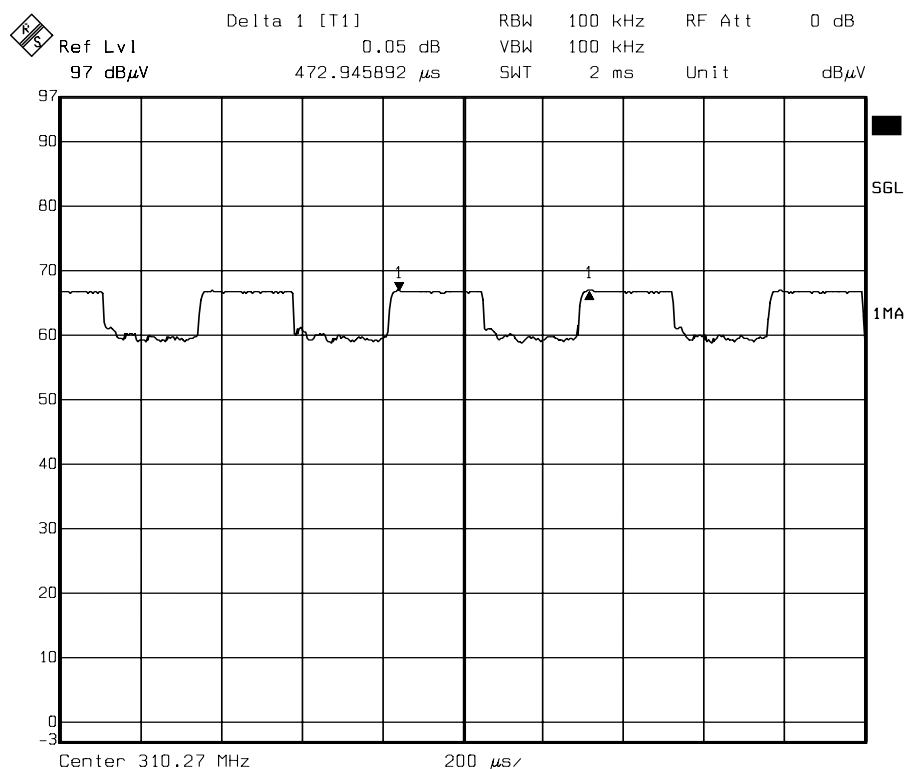
Page 10 of 32

1. For the fundamental frequency (310.27MHz)

For pattern one :



Date: 05.OCT.2004 22:14:23



Date: 05.OCT.2004 22:13:13



Ecom Sertech Corp.

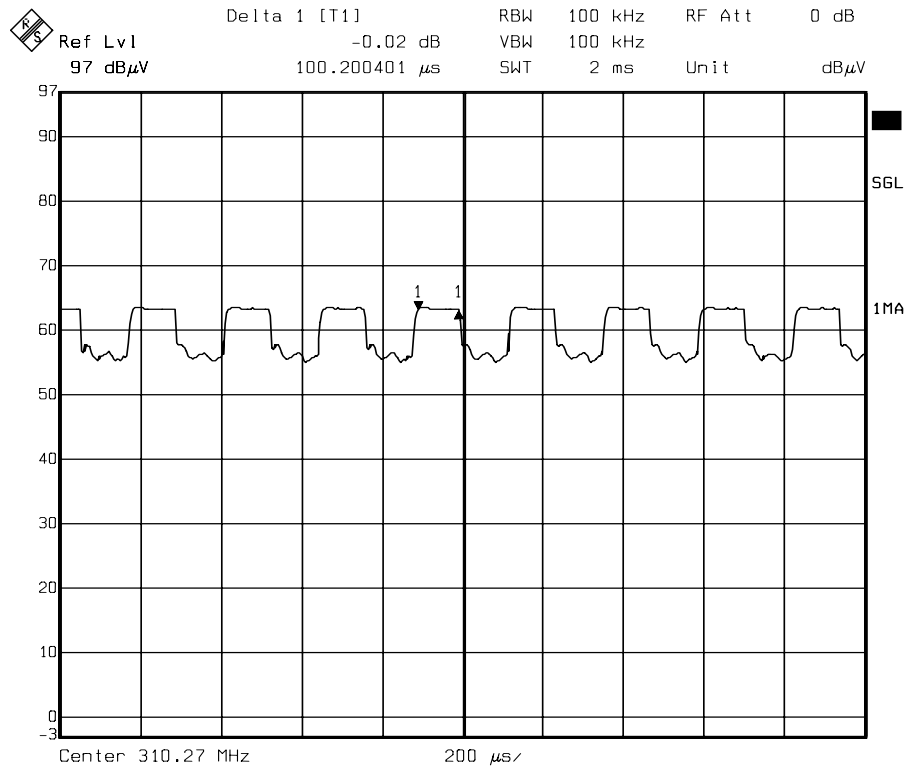
Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., ChuTung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

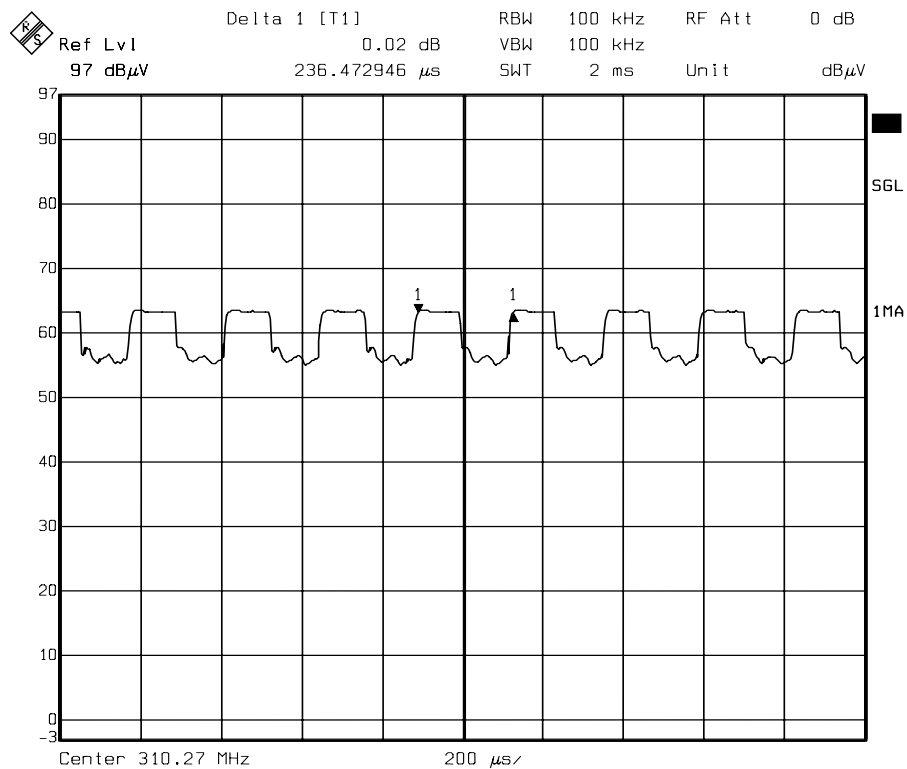
Report No. : ER04-08-031FRF

Page 11 of 32

For pattern two :



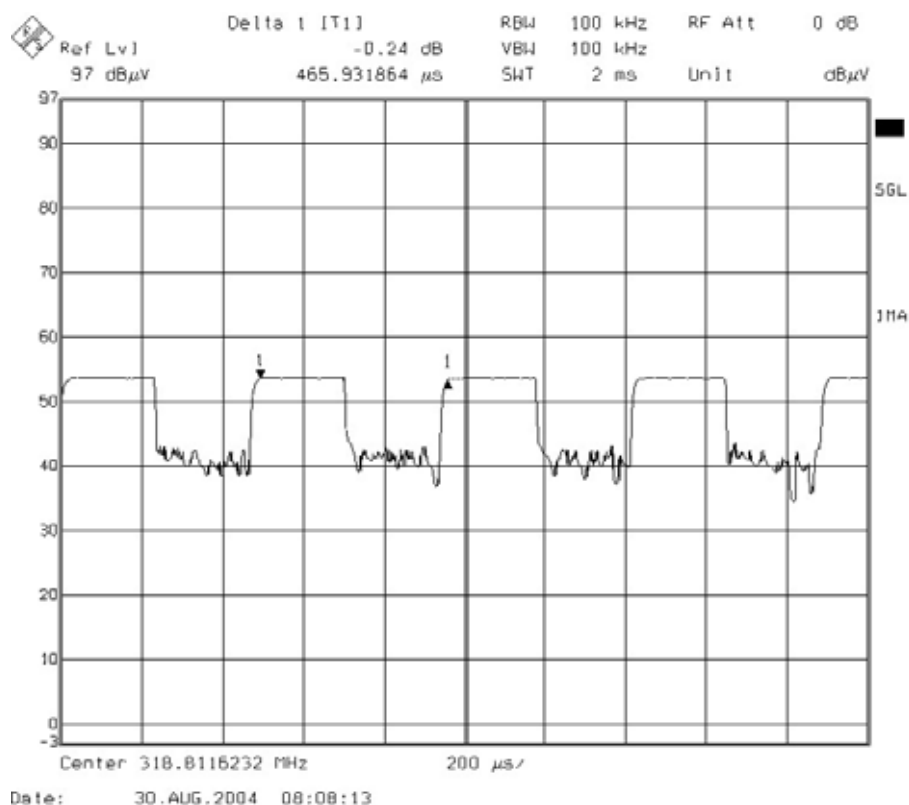
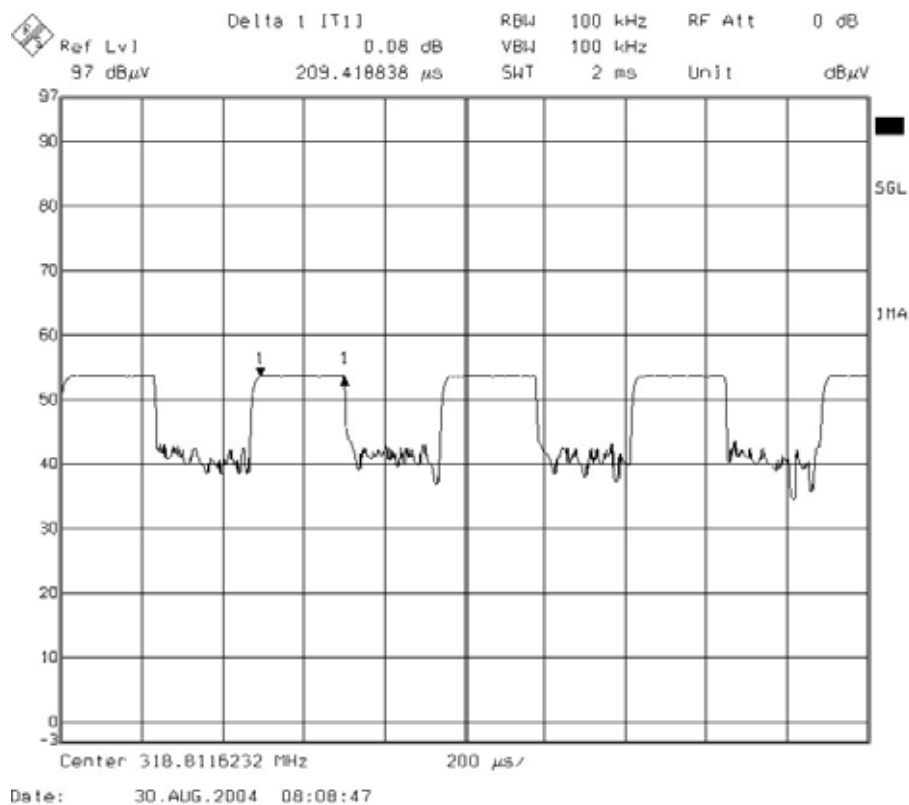
Date: 05.OCT.2004 22:31:04



Date: 05.OCT.2004 22:27:02

2. For the fundamental frequency (318MHz)

For pattern one :





Ecom Sertech Corp.

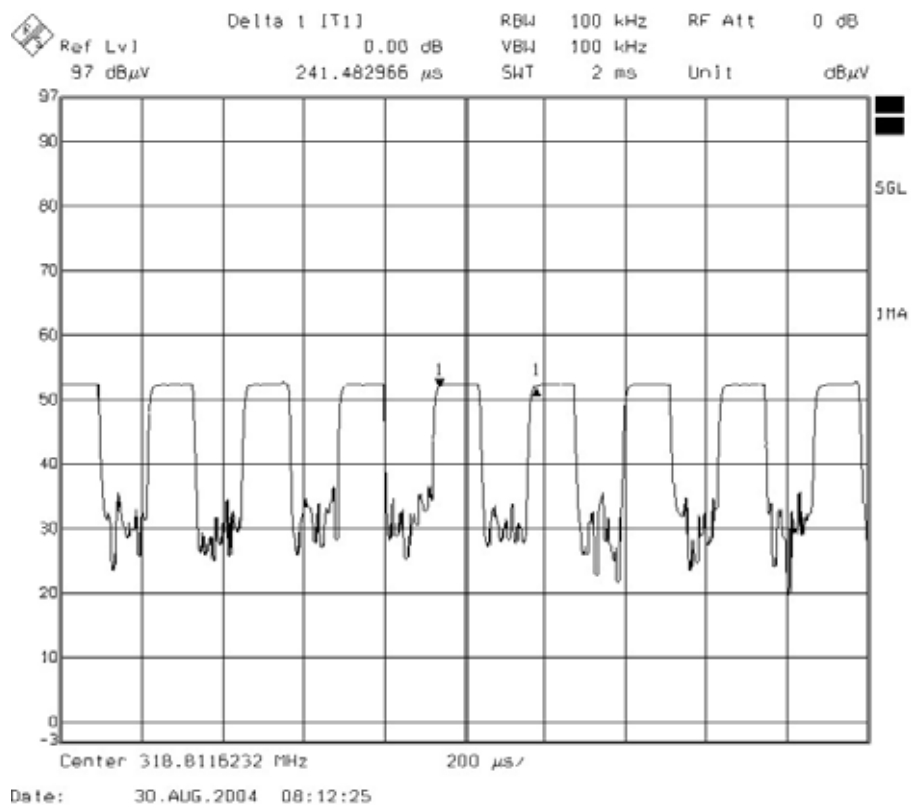
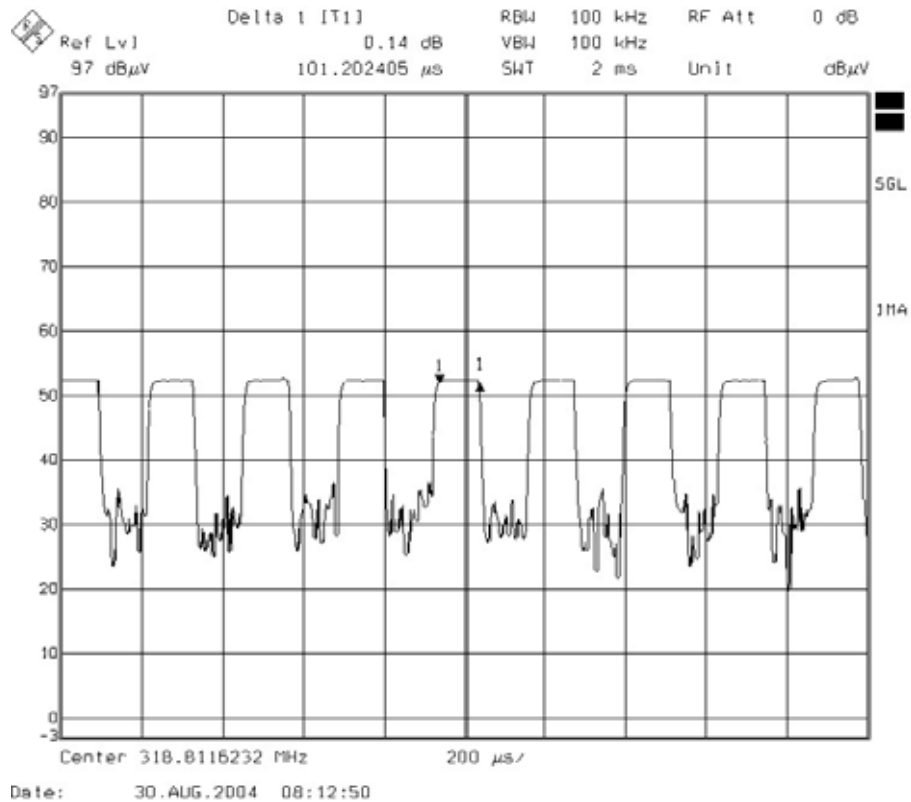
Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., Chu Tung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 13 of 32

For pattern two :



3. RADIATED EMISSION TEST

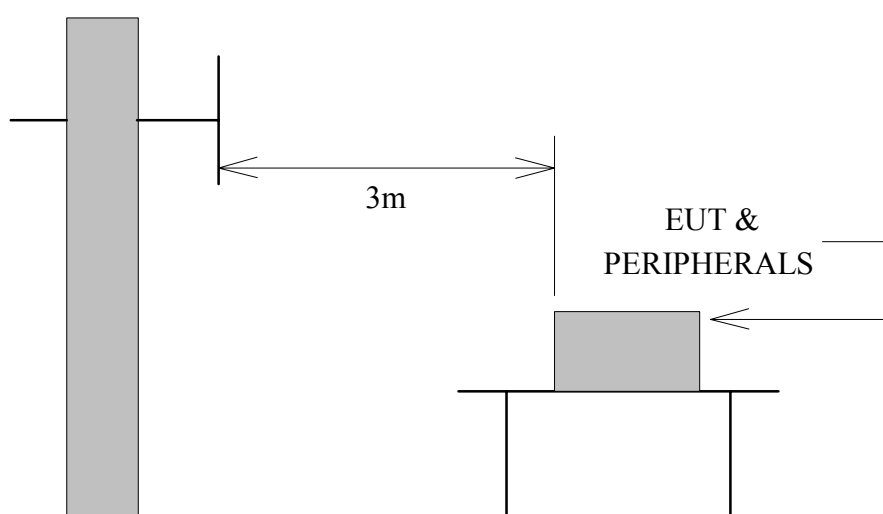
3.1 Test Equipments

The following test equipments are utilized in making the measurements contained in this report.

Manufacturer or Type	Model No	Serial No	Date of Calibration	Calibration Period	Remark
CHASE BI-LOG ANTENNA	CBL6112B	2421	May 07, 2004	1 Year	FINAL
R/S SPECTRUM ANALYZER	FSEK30	835253/002	June 17, 2004	1 Year	FINAL
OPEN SITE	-----	No.2	May 07, 2004	1 Year	FINAL
N TYPE COAXIAL CABLE	CHA9525	4	July 13, 2004	1 Year	FINAL
Horn Antenna	AH-118	10089	February 25, 2004	1 Year	FINAL
HP Pre-amplifier	8449B	3008A01471	October 11, 2003	1 Year	FINAL
HP High pass filter	84300/80038	011	CAL. ON USE	1 Year	FINAL
Horn Antenna	AH-840	03077	February 25, 2004	1 Year	FINAL

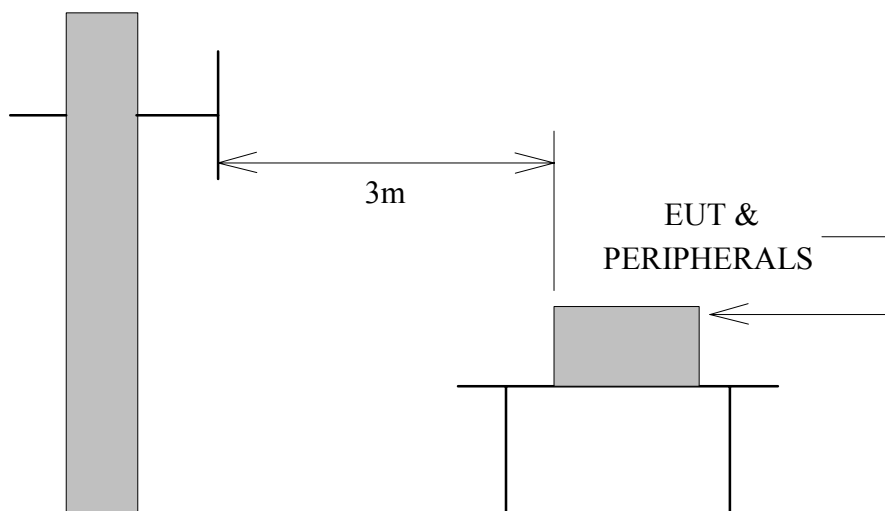
3.2 Test Setup

1. The diagram below shows the test setup that is utilized to make the measurements for emission from 30 to 1GHz.(For TX device)



Antenna Elevation Variable

2. The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.(For TX device)



Antenna Elevation Variable

3.3 Radiation Limit

For intentional device, according to § 15.231(b), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following table.

Fundamental Frequency (MHz)	Distance (Meters)	Field Strength of Fundamental ($\mu\text{V/M}$)	Field Strength of Spurious Emission ($\mu\text{V/M}$)
40.66-40.70	3	2250	225
70-130	3	1250	125
130-174	3	1250 to 3750	125 to 375
174-260	3	3750	375
260-470	3	3750 to 12500	375 to 1250
Above 470	3	12500	1250

3.4 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. During performing radiated emission below 1GHz, the EUT (TX device) was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1GHz, the EUT (TX device) was set 3 meters away from the interference-receiving antenna.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

3.5 Uncertainty of Radiated Emission

The uncertainty of radiated emission is $\pm 2.72\text{dB}$.



Ecom Sertech Corp.

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., Chu Tung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 17 of 32

3.6 Radiated RF Noise Measurement Results

The frequency spectrum from 30 MHz to 4000 MHz was investigated. All emissions not reported are much lower than the prescribed limits.

Company	GAIN ELECTRONIC CO., LTD	Test Date	2004/10/05
Product Name	Industrial Radio Remote Controller	Test By	Ken Tu
Model Name	SAGA1-L10(Transmitter)	TEMP & Humidity	23°C, 78%

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading at 3m(dBμV)		Limits (dBμV/m)	Emission Level at 3m(dBμV/m)	
			Horizontal	Vertical		Horizontal	Vertical
30.00	17.01	0.97	*	*	40.00	*	*
▲310.27	14.01	4.36	41.20	51.10	75.34(QP)	59.57	69.47
620.54	18.84	5.78	1.20	7.80	46.00(QP)	25.82	32.42
930.81	21.52	7.37	-1.80	-0.60	46.00(QP)	27.09	28.29
※1241.08	23.41	8.92	11.80	12.30	74.00(PK)	44.13	44.63
※1241.08	23.41	8.92	1.00	1.10	54.00(AVG)	33.33	33.43
※1551.35	25.07	10.14	10.50	11.40	74.00(PK)	45.71	46.61
※1551.35	25.07	10.14	0.40	0.30	54.00(AVG)	35.61	35.51
1861.62	26.87	11.39	11.20	12.20	75.34(PK)	49.47	50.47
1861.62	26.87	11.39	0.90	0.90	55.34(AVG)	39.17	39.17
3102.70	---	---	---	---	75.34(PK)	---	---
3102.70	---	---	---	---	55.34(AVG)	---	---

REMARKS :

1. * Undetectable
2. Emission level (dBμV/m) = Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).
3. Remark "▲" means fundamental frequency for TX device.
4. The emission value below 1GHz is quasi-peak value and the emission value above 1GHz is both peak and average value.
PK : Peak value; AVG : Average value; QP : Quasi-peak value.
5. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
6. Remark "※" means the Restricted band.
7. For the fundamental frequency (310.27MHz)
8. X-axis direction, detailed in setup photo.

**Ecom Sertech Corp.**

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., Chu Tung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 18 of 32

The frequency spectrum from 30 MHz to 4000 MHz was investigated. All emissions not reported are much lower than the prescribed limits.

Company	GAIN ELECTRONIC CO., LTD	Test Date	2004/10/05
Product Name	Industrial Radio Remote Controller	Test By	Ken Tu
Model Name	SAGA1-L10(Transmitter)	TEMP & Humidity	23°C, 78%

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading at 3m(dBμV)		Limits (dBμV/m)	Emission Level at 3m(dBμV/m)	
			Horizontal	Vertical		Horizontal	Vertical
30.00	17.01	0.97	*	*	40.00	*	*
▲310.27	14.01	4.36	51.00	38.60	75.34(QP)	69.37	56.97
620.54	18.84	5.78	8.30	2.10	46.00(QP)	32.92	26.72
930.81	21.52	7.37	-1.90	-2.20	46.00(QP)	26.99	26.69
※1241.08	23.41	8.92	12.20	11.60	74.00(PK)	44.53	43.93
※1241.08	23.41	8.92	1.20	1.10	54.00(AVG)	33.53	33.43
※1551.35	25.07	10.14	11.30	11.50	74.00(PK)	46.51	46.71
※1551.35	25.07	10.14	0.40	0.30	54.00(AVG)	35.61	35.51
1861.62	26.87	11.39	11.50	11.30	75.34(PK)	49.77	49.57
1861.62	26.87	11.39	0.90	1.00	55.34(AVG)	39.17	39.27
3102.70	---	---	---	---	75.34(PK)	---	---
3102.70	---	---	---	---	55.34(AVG)	---	---

REMARKS :

1. * Undetectable
2. Emission level (dBμV/m) = Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).
3. Remark "▲" means fundamental frequency for TX device.
4. The emission value below 1GHz is quasi-peak value and the emission value above 1GHz is both peak and average value.
PK : Peak value; AVG : Average value; QP : Quasi-peak value.
5. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
6. Remark "※" means the Restricted band.
7. For the fundamental frequency (310.27MHz)
8. Y-axis direction, detailed in setup photo.

**Ecom Sertech Corp.**

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., Chu Tung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 19 of 32

The frequency spectrum from 30 MHz to 4000 MHz was investigated. All emissions not reported are much lower than the prescribed limits.

Company	GAIN ELECTRONIC CO., LTD	Test Date	2004/10/05
Product Name	Industrial Radio Remote Controller	Test By	Ken Tu
Model Name	SAGA1-L10(Transmitter)	TEMP & Humidity	23°C, 78%

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading at 3m(dBμV)		Limits (dBμV/m)	Emission Level at 3m(dBμV/m)	
			Horizontal	Vertical		Horizontal	Vertical
30.00	17.01	0.97	*	*	40.00	*	*
▲310.27	14.01	4.36	52.80	36.20	75.34(QP)	71.17	54.57
620.54	18.84	5.78	3.60	1.10	46.00(QP)	28.22	25.72
930.81	21.52	7.37	-1.80	-1.60	46.00(QP)	27.09	27.29
※1241.08	23.41	8.92	11.50	11.30	74.00(PK)	43.83	43.63
※1241.08	23.41	8.92	1.10	1.20	54.00(AVG)	33.43	33.53
※1551.35	25.07	10.14	10.90	10.60	74.00(PK)	46.11	45.81
※1551.35	25.07	10.14	0.40	0.40	54.00(AVG)	35.61	35.61
1861.62	26.87	11.39	12.50	12.20	75.34(PK)	50.77	50.47
1861.62	26.87	11.39	1.00	0.90	55.34(AVG)	39.27	39.17
3102.70	---	---	---	---	75.34(PK)	---	---
3102.70	---	---	---	---	55.34(AVG)	---	---

REMARKS :

1. * Undetectable
2. Emission level (dBμV/m) = Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).
3. Remark "▲" means fundamental frequency for TX Device.
4. The emission value below 1GHz is quasi-peak value and the emission value above 1GHz is both peak and average value.
PK : Peak value; AVG : Average value; QP : Quasi-peak value.
5. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
6. Remark "※" means the Restricted band.
7. For the fundamental frequency (310.27MHz)
8. Z-axis direction, detailed in setup photo.

**Ecom Sertech Corp.**

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., Chu Tung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 20 of 32

The frequency spectrum from 30 MHz to 4000 MHz was investigated. All emissions not reported are much lower than the prescribed limits.

Company	GAIN ELECTRONIC CO., LTD	Test Date	2004/08/19
Product Name	Industrial Remote Controller	Test By	Ken Tu
Model Name	SAGA1-L12(Transmitter)	TEMP & Humidity	31.6°C, 43%

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading at 3m(dBμV)		Limits (dBμV/m)	Emission Level at 3m(dBμV/m)	
			Horizontal	Vertical		Horizontal	Vertical
30.00	17.01	0.97	*	*	40.00	*	*
▲318.81	14.43	4.40	27.90	48.10	75.80(QP)	46.74	66.94
637.62	18.98	5.88	2.40	7.50	55.80(QP)	27.26	32.36
1275.24	23.55	8.97	12.70	13.70	75.80(PK)	45.23	46.23
1275.24	23.55	8.97	1.50	1.50	55.80(AVG)	34.03	34.03
※1594.05	25.41	10.31	11.20	11.50	74.00(PK)	46.92	47.22
※1594.05	25.41	10.31	0.50	0.60	54.00(AVG)	36.22	36.32
1912.86	27.03	11.57	13.80	12.70	75.80(PK)	52.40	51.30
1912.86	27.03	11.57	1.60	1.60	55.80(AVG)	40.20	40.20
3188.10	---	---	---	---	75.80(PK)	---	---
3188.10	---	---	---	---	55.80(AVG)	---	---

REMARKS :

1. * Undetectable
2. Emission level (dBμV/m) = Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).
3. Remark "▲" means fundamental frequency for TX device.
4. The emission value below 1GHz is quasi-peak value and the emission value above 1GHz is both peak and average value.
PK : Peak value; AVG : Average value; QP : Quasi-peak value.
5. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
6. Remark "※" means the Restricted band.
7. For the fundamental frequency (318MHz)
8. X-axis direction, detailed in setup photo.

**Ecom Sertech Corp.**

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., Chu Tung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 21 of 32

The frequency spectrum from 30 MHz to 4000 MHz was investigated. All emissions not reported are much lower than the prescribed limits.

Company	GAIN ELECTRONIC CO., LTD	Test Date	2004/08/19
Product Name	Industrial Remote Controller	Test By	Ken Tu
Model Name	SAGA1-L12(Transmitter)	TEMP & Humidity	31.6°C, 43%

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading at 3m(dBμV)		Limits (dBμV/m)	Emission Level at 3m(dBμV/m)	
			Horizontal	Vertical		Horizontal	Vertical
30.00	17.01	0.97	*	*	40.00	*	*
▲318.81	14.43	4.40	51.60	34.70	75.80(QP)	70.44	53.54
637.62	18.98	5.88	6.80	3.70	55.80(QP)	31.66	28.56
1275.24	23.55	8.97	12.90	14.20	75.80(PK)	45.43	46.73
1275.24	23.55	8.97	1.50	1.50	55.80(AVG)	34.03	34.03
※1594.05	25.41	10.31	11.40	10.90	74.00(PK)	47.12	46.62
※1594.05	25.41	10.31	0.50	0.50	54.00(AVG)	36.22	36.22
1912.86	27.03	11.57	13.40	12.70	75.80(PK)	52.00	51.30
1912.86	27.03	11.57	1.60	1.60	55.80(AVG)	40.20	40.20
3188.10	---	---	---	---	75.80(PK)	---	---
3188.10	---	---	---	---	55.80(AVG)	---	---

REMARKS :

1. * Undetectable
2. Emission level (dBμV/m) = Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).
3. Remark "▲" means fundamental frequency for TX device.
4. The emission value below 1GHz is quasi-peak value and the emission value above 1GHz is both peak and average value.
PK : Peak value; AVG : Average value; QP : Quasi-peak value.
5. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
6. Remark "※" means the Restricted band.
7. For the fundamental frequency (318MHz)
8. Y-axis direction, detailed in setup photo..

**Ecom Sertech Corp.**

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., Chu Tung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 22 of 32

The frequency spectrum from 30 MHz to 4000 MHz was investigated. All emissions not reported are much lower than the prescribed limits.

Company	GAIN ELECTRONIC CO., LTD	Test Date	2004/08/19
Product Name	Industrial Remote Controller	Test By	Ken Tu
Model Name	SAGA1-L12(Transmitter)	TEMP & Humidity	31.6°C, 43%

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading at 3m(dBμV)		Limits (dBμV/m)	Emission Level at 3m(dBμV/m)	
			Horizontal	Vertical		Horizontal	Vertical
30.00	17.01	0.97	*	*	40.00	*	*
▲318.89	14.44	4.40	50.60	34.50	75.80(QP)	69.44	53.34
637.62	18.98	5.88	7.60	3.70	55.80(QP)	32.46	28.56
1275.54	23.55	8.97	12.80	13.50	75.80(PK)	45.33	46.03
1275.54	23.55	8.97	1.50	1.50	55.80(AVG)	34.03	34.03
※1594.05	25.41	10.31	12.10	11.10	74.00(PK)	47.82	46.82
※1594.05	25.41	10.31	0.60	0.50	54.00(AVG)	36.32	36.22
1912.86	27.03	11.57	13.40	12.10	75.80(PK)	52.00	50.70
1912.86	27.03	11.57	1.50	1.50	55.80(AVG)	40.10	40.10
3188.90	---	---	---	---	75.80(PK)	---	---
3188.90	---	---	---	---	55.80(AVG)	---	---

REMARKS :

1. * Undetectable
2. Emission level (dBμV/m) = Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).
3. Remark "▲" means fundamental frequency for TX Device.
4. The emission value below 1GHz is quasi-peak value and the emission value above 1GHz is both peak and average value.
PK : Peak value; AVG : Average value; QP : Quasi-peak value.
5. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
6. Remark "※" means the Restricted band.
7. For the fundamental frequency (318MHz)
8. Z-axis direction, detailed in setup photo.

3.7 Photos of Radiated Test

TX mode :

(1) X-axis





Ecom Sertech Corp.

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing
Rd., ChuTung Chen, Hsinchu, Taiwan 310, R.O.C
TEL: 886-3-5918012 FAX: 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 24 of 32

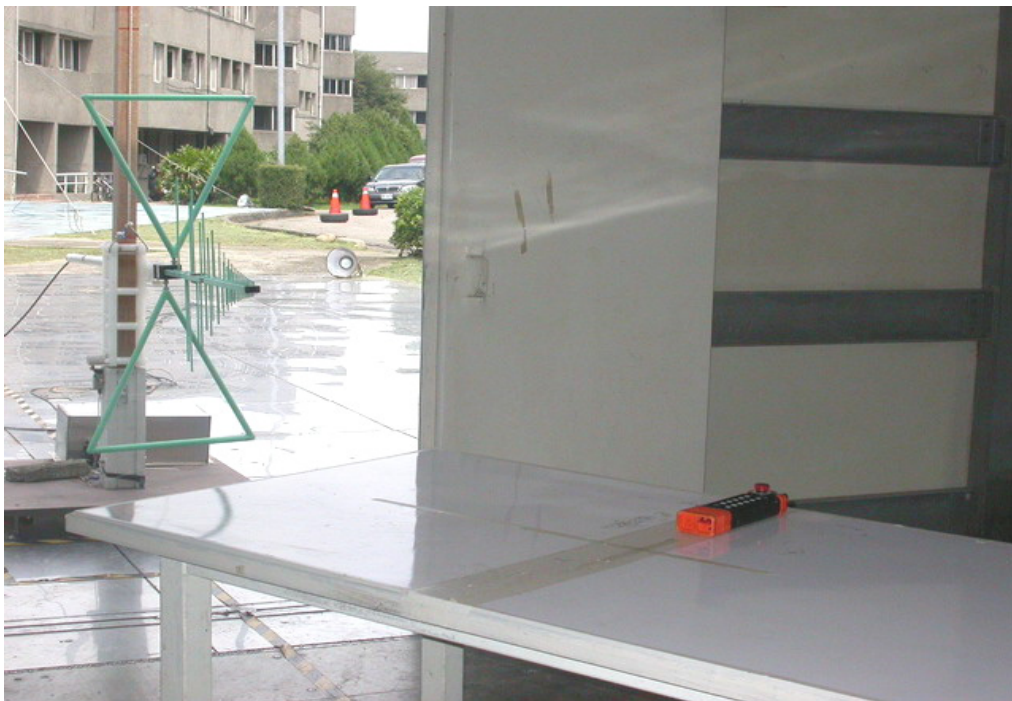


(2) Y-axis





(3) Z-axis







4. BANDWIDTH MEASUREMENT

4.1 Test Equipments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	June 17, 2004

Note :

1. The measurement uncertainty is less than $\pm 2.6\text{dB}$, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.2 Test Setup



4.3 Limits of Bandwidth Measurement

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

4.4 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 1MHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.5 Uncertainty of Conducted Emission

The uncertainty of conducted emission is $\pm 200\text{KHz}$.

4.6 Test Results

Input Power (System)	3VDC (For TX device) from two AA battery	Environmental Conditions	30°C, 50%RH
Tested By	Ken Tu		

1. For the fundamental frequency (310.27MHz)

Center Frequency (MHz)	Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
310.27	125.25	775.7	PASS

Note : The fundamental frequency of EUT is 310.27MHz. The minimum bandwidth limit will be the 0.25% of the center frequency that is $310.27\text{MHz} \times 0.25\% = 775.7\text{ kHz}$.

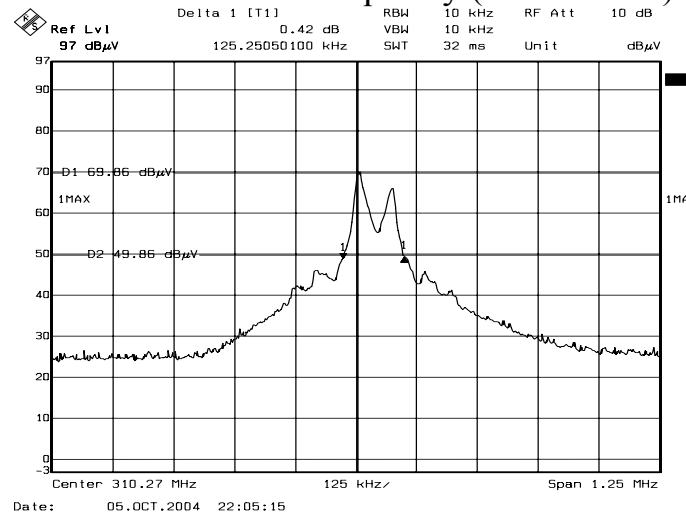
2. For the fundamental frequency (318MHz)

Center Frequency (MHz)	Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
318	132.76	795	PASS

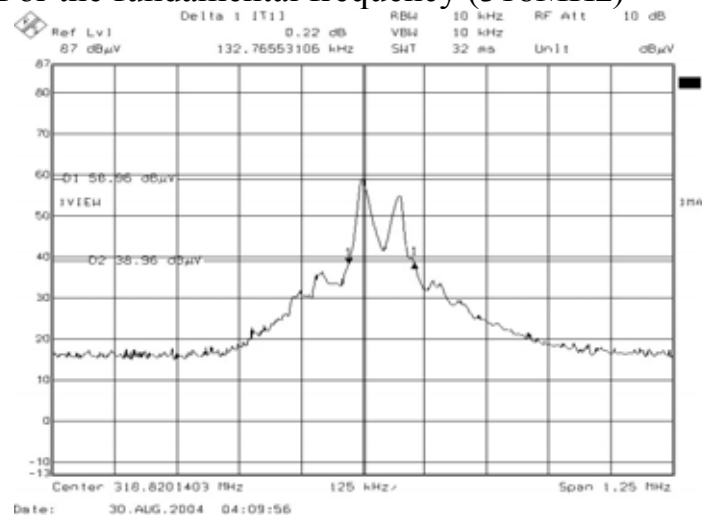
Note : The fundamental frequency of EUT is 318MHz. The minimum bandwidth limit will be the 0.25% of the center frequency that is $318\text{MHz} \times 0.25\% = 795\text{ kHz}$.

4.7 Photo of Bandwidth Measurement

1. For the fundamental frequency (310.27MHz)



2. For the fundamental frequency (318MHz)



**Ecom Sertech Corp.**

Rm. 258, Bldg. 17, NO.195, Sec. 4 Chung Hsing Rd., ChuTung Chen, Hsinchu, Taiwan 310, R.O.C
TEL:886-3-5918012 FAX : 886-3-5825720

FCC ID : NCT048L12

Report No. : ER04-08-031FRF

Page 32 of 32

5. ANTENNA REQUIREMENT

5.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

5.2 Antenna Connected Construction

The antenna used in this product is Helix antenna. And the maximum Gain of the antenna is only 1.5dBi.