

Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 1 of 25



ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

Product Name: Ceiling Fan Remote Controll

Model Name: AS-3DN

Brand Name: N/A

FCC ID: **SQ8AS-3DN**

ER/2004/A0004 **Report No.:**

Issue Date: Dec. 01, 2004

§15.231 FCC Rule Part:

Prepared for AIR-SUPPLY TECHNOLOGY CO. Ltd

1 Lane 146 Fuyi Rd, Taiping, Taichung

411

Prepared by SGS Taiwan Ltd.

No. 134, Wu Kung Rd., Wuku Industrial

Zone, Taipei County, Taiwan.

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Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 2



VERIFICATION OF COMPLIANCE

1 Lane 146 Fuyi Rd, Taiping, Taichung 411

Product Description: Ceiling Fan Remote Controll

FCC ID Number: SQ8AS-3DN

Brand Name: N/A

Model No.: AS-3DN

N/A **Model Difference:**

File Number: ER/2004/A0004

Date of test: Oct. 22, 2004 ~ Oct. 28, 2004

Date of EUT received: Oct. 20, 2004

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.231.

The test results of this report relate only to the tested sample identified in this report.

Test By:	Alex	Hsieh	Date	Dec. 01, 2004	
Approved By	Time	x Hsieh	Date	Dec. 01, 2004	



Report No: ER/2004/A0004 **Issue Date: Dec. 01, 2004**

Page: 3



Version

Version No.	Date
00	Dec. 01, 2004



Report No: ER/2004/A0004 **Issue Date: Dec. 01, 2004**

Page: 4



Table of Contents

1.	GENERAL INFORMATION	6
1.1	PRODUCT DESCRIPTION	6
1.2	RELATED SUBMITTAL(S) / GRANT (S)	6
1.3	TEST METHODOLOGY	6
1.4	TEST FACILITY	6
2.	SYSTEM TEST CONFIGURATION	7
2.1	EUT CONFIGURATION	7
2.2	EUT Exercise	7
2.3	TEST PROCEDURE	7
2.4	LIMITATION	
2.5	CONFIGURATION OF TESTED SYSTEM	10
3.	SUMMARY OF TEST RESULTS	11
4.	DESCRIPTION OF TEST MODES	11
5.	CONDUCTED EMISSIONS TEST (NOT APPLICABLE IN THE REPORT)	12
5.1	Measurement Procedure:	12
5.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	12
5.3	MEASUREMENT EQUIPMENT USED:	12
5.4	MEASUREMENT RESULT:	12
6.	RADIATED EMISSION TEST	13
6.1	MEASUREMENT PROCEDURE	13
6.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	13
6.3	MEASUREMENT EQUIPMENT USED:	14
6.4	FIELD STRENGTH CALCULATION	14
6.5	MEASUREMENT RESULT	15
7.	OCCUPIED BANDWIDTH	19
7.1	MEASUREMENT PROCEDURE	19
7.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	19
7.3	MEASUREMENT EQUIPMENT USED:	19
7.4	MEASUREMENT RESULTS	19
8.	DUTY CYCLE MEASUREMENT	21
8.1	MEASUREMENT PROCEDURE	21
8.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	21
8.3	MEASUREMENT EQUIPMENT USED:	21
8.4	MEASUREMENT RESULTS:	21

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.



Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 5



).	RELEASE TIME MEASUREMENT:	24
9.1	MEASUREMENT PROCEDURE	24
9.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	24
9.3	MEASUREMENT EQUIPMENT USED:	24
9.4	MEASUREMENT RESULTS	24



Report No: ER/2004/A0004 **Issue Date: Dec. 01, 2004**

Page: 6



1. GENERAL INFORMATION

1.1 Product Description

The AIR-SUPPLY TECHNOLOGY CO. Ltd, Model: AS-3DN (referred to as the EUT in this report) is a Ceiling Fan Remote Controll.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 303 MHz

B). Modulation: Pulse Modulation

C). Antenna Designation: Non-User Replaceable (Fixed)

D). Power Supply: 9 Vdc from battery.

E). Transmitting Time: Periodic ≤ 5 seconds

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **SQ8AS-3DN** filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a DoC procedure.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements. Site No. 1(3 &10 meters) Registration Number: 94644, Anechoic chamber (3 meters) Registration Number: 573967

1.5 **Special Accessories**

Not available for this EUT intended for grant.

1.6 **Equipment Modifications**

Not available for this EUT intended for grant.



Report No: ER/2004/A0004 **Issue Date: Dec. 01, 2004**

Page: 7



2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode, the Tx frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions (Not apply in the report)

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.



Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 8



2.4 Limitation

(1) Conducted Emission (Not applicable in this report)

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range		Limits B (uV)
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

- 1. The lower limit shall apply at the transition frequencies
- 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.



Report No: ER/2004/A0004 **Issue Date: Dec. 01, 2004**

Page: 9



(2) Radiated Emission

According to 15.231(b), the field strength of emissions from Intentional Radiators operated under this section shall not exceed the following:

Fundamental	Field Strength of		Field Strength of	
Frequency	Fundar	nental	Spurious	
(MHz)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)
40.66 - 40.70	67.04	2,250	40	100
70 - 130	61.94	1,250	34	50
130 - 174	* 61.94 - 71.48	* 1,250 -3,750	* 34 – 43.5	* 50 to 150
174 - 260	71.48	3,750	43.5	150
260 - 470	* 71.48 - 81.94	* 3,750 - 12,500	* 43.5 - 54	* 150 to 500
above 470	81.94	12,500	74	500

Remark: 1. Emission level in dBuV/m=20 log (uV/m)

- 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
- 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205
- 4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of ξ 15.205, then the general radiated emission limits in ξ 15.209 apply.
- 5. For the band 130-174MHz, uV/m at 3meters = 56.81818(F) 6136.3636; For the band 260-470MHz uV/m at 3meters = 41.6667(F) - 7083.3333; Where F is the frequency in MHz.
- 6. 303MHz limit = 41.6667 * 303 7083.33333 = 5541.6768 uV/m= 74.8728 dBuV/m



Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 10



2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

EUT (TX)

Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	FCC ID	Series No.	Data Cable	Power Cord
1.							



Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 11



3. Summary Of Test Results

FCC Rules	Description Of Test	Result
§15.207	Conducted Emission	N/A
§15.231	Radiated Emission Complia	
§15.231(c)	20dB Bandwidth	Compliant
	Duty Cycle Test (Pulse Co	
Modulation)		
§15.231(a)(1)	Release Time Measurement Complia	

4. Description of test modes

The EUT has been tested under engineering test mode condition. and the EUT staying in continuous transmitting mode.

The Frequency 303MHz is chosen for testing.

The X, Y and Z-axis of EUT were pre-test; X and Y mode were the worse case and report.



Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 12

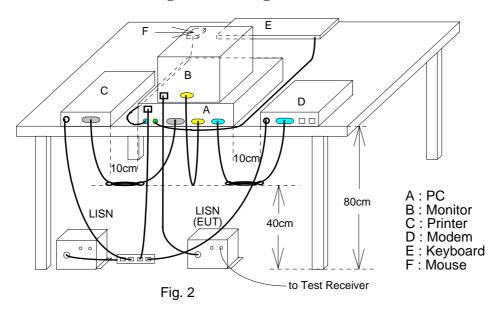


5. Conducted Emissions Test (Not applicable in the report)

5.1 Measurement Procedure:

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- **2.** Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- **3.** Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)



5.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
EMC Analyzer	HP	8594EM	3624A00203	12/31/2003	12/30/2004
EMI Test Receiver	R&S	ESCS30	828985/004	01/15/2004	01/14/2005
LISN	Rolf-Heine	NNB-2/16Z	99012	12/30/2003	12/29/2004
LISN	Rolf-Heine	NNB-2/16Z	99013	11/06/2004	11/05/2005

5.4 Measurement Result:

N/A



Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 13



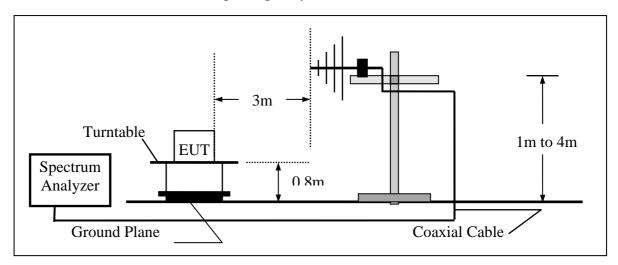
6. Radiated Emission Test

6.1 Measurement Procedure

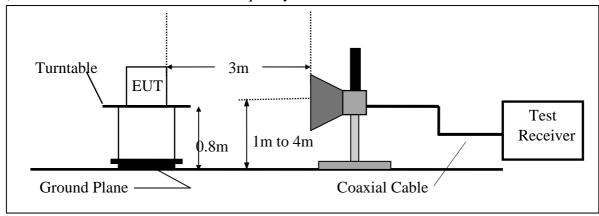
- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4. Repeat above procedures until all frequency measured were complete.

6.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



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Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 14



6.3 Measurement Equipment Used:

	966 Chamber				
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
	D o C				
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2004	05/26/2005
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2004	08/27/2005
Bilog Antenna	SCHWAZBECK	VULB9163	152	06/03/2004	06/02/2005
Bilog Antenna	SCHWAZBECK	VULB9160		06/03/2004	06/02/2005
Horn Antenna	SCHWAZBECK	BBHA 9120D	309/320	08/16/2004	08/15/2005
Pre-Amplifier	HP	8447D	2944A09469	07/19/2004	07/18/2005
Pre-Amplifier	HP	8449B	3008A00578	02/26/2004	02/25/2005
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	HUBER+SUHNE R	SUCOFLEX 104PEA-10M	10m	10/09/2004	10/08/2005
Low Loss Cable	HUBER+SUHNE R	SUCOFLEX 104PEA-3M	3m	10/09/2004	10/08/2005
Site NSA	SGS	966 chamber	N/A	11/17/2004	11/16/2005
Site NSA	SGS	10m Open-Site	N/A	10/02/2004	10/01/2005

6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Average Value = Peak Value + 20 Log (Ton/Tp) Pulse Modulation

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

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Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 15



6.5 Measurement Result

Operation Mode: Transmitting Mode Test Date: Oct. 23, 2004

Fundamental Frequency: 303 MHz X mode Test By: Alex Temperature: Pol: Vertical 25

65 % **Humidity**:

Judgement: Passed by -10.70 dB at 1516 MHz Ant.Pol. Ver EUT Axis X

			Peak	AV		Peak	AV	Peak	AV		
Freq.	F	Ant.Pol.	Reading	Correct	Ant./CL	Level	Level	Limit	Limit	Margin	
(MHz)	/S	(H/V)	(dBuV)	dB	CF(dB)	(dBuV/m)(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
303.5	F	V	81.57	-10.41	-13.29	68.28	57.87	94.87	74.87	-17.00	AV
606.2	*S	V	48.64	-10.41	-7.49	41.15	30.74	74.00	54.00	-23.26	ΑV
909.8	S	V	43.67	-10.41	-2.09	41.58	31.17	74.87	54.87	-23.70	AV
1207.0	*S	V	55.07	-10.41	-8.55	46.52	36.11	74.00	54.00	-17.89	AV
1516.0	*S	V	62.77	-10.41	-7.14	55.63	45.22	74.00	54.00	-8.78	AV
1816.0	S	V	48.56	-10.41	-5.90	42.66	32.25	74.87	54.87	-22.62	AV
2122.0	S	V	43.85	-10.41	-4.62	39.23	28.82	74.87	54.87	-26.05	AV
2428.3	S	V		-10.41				74.87	54.87		
2731.9	*S	V		-10.41				74.00	54.00		
3035.4	S	V		-10.41				74.87	54.87		

- (1) + F/SF: denotes Fundamental Frequency; S: denotes Spurious Frequency
- (2) EUT Orthogonal Axes: X denotes Laid on Table; Y denotes Vertical Stand.
- (3) Measuring frequencies from 30 MHz to the 10th harmonic of fundamental frequency of 310 MHz_o
- (4) Dates of measurement within this frequency range shown " " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) * Denotes spurious frequency, which falls within the Restricted Bands specified in provision of ξ 15.205, then the general radiated emission limits in ξ 15.209 apply.
- (6) Peak Setting: 30MHz 1000MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz-5GHz, RBW=1MHz, VBW=1MHz, Sweep time=200 ms



Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 16

Pol:



Horizontal

Transmitting Mode Oct. 23, 2004 Operation Mode: Test Date:

Fundamental Frequency: 303MHz X mode Test By: Alex

Temperature: 25 65 % **Humidity**:

Judgement: Passed by -0.37 dB at 303.5 MHz Ant.Pol. Hor EUT Axis X

				Peak	AV		Peak	AV	Peak	AV		
	Freq.	F	Ant.Pol.	Reading	Correct	Ant./CL	Level	Level	Limit	Limit	Margin	
(MHz)	/S	(H/V)	(dBuV)	dB	CF(dB) (dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
3	303.5	F	Н	98.20	-10.41	-13.29	84.91	74.50	94.87	74.87	-0.37	AV
6	506.2	*S	Н	58.41	-10.41	-7.49	50.92	40.51	74.00	54.00	-13.49	ΑV
9	909.8	S	Н	61.38	-10.41	- 2.09	59.29	48.88	74.87	54.87	-5.99	AV
1	207.0	*S	Н	70.27	-10.41	- 8.55	61.72	51.31	74.00	54.00	-2.69	AV
1.	516.0	*S	Н	70.50	-10.41	- 7.14	63.36	52.95	74.00	54.00	-1.05	AV
1	816.0	S	Н	61.01	-10.41	- 5.90	55.11	44.70	74.87	54.87	-10.17	AV
2	122.0	S	Н	53.20	-10.41	- 4.62	48.58	38.17	74.87	54.87	-16.70	AV
2	428.3	S	Н	44.54	-10.41	- 3.26	41.28	30.87	74.87	54.87	-24.00	AV
2	731.9	*S	Н	45.56	-10.41	- 2.51	43.05	32.64	74.00	54.00	-21.36	AV
3	035.4	S	Н	43.43	-10.41	- 1.93	41.50	31.09	74.87	54.87	-23.78	AV

- (1) + F/SF: denotes Fundamental Frequency; S: denotes Spurious Frequency
- (2) EUT Orthogonal Axes: X denotes Laid on Table; Y denotes Vertical Stand.
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- (4) Dates of measurement within this frequency range shown " " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) * Denotes spurious frequency, which falls within the Restricted Bands specified in provision of ξ 15.205, then the general radiated emission limits in ξ 15.209 apply.
- (6) Peak Setting: 30MHz 1000MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz-5GHz, RBW=1MHz, VBW=1MHz, Sweep time=200 ms



Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 17



Operation Mode: Transmitting Mode Test Date: Oct. 23, 2004

Fundamental Frequency: 303MHz Y mode Test By: Alex Temperature: Pol: Vertical 25

Humidity: 65 %

Judgement: Passed by EUT Axis Y -0.54 dB at 1516 MHz Ant.Pol. Ver

			Peak	AV		Peak	AV	Peak	AV		
Freq.	F	Ant.Pol.	Reading	Correct	Ant./CL	Level	Level	Limit	Limit	Margin	
(MHz)	/S	(H/V)	(dBuV)	dB	CF(dB)	(dBuV/m)(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
303.5	F	V	97.50	-10.41	-13.29	84.21	73.80	94.87	74.87	-1.07	AV
606.2	*S	V	58.96	-10.41	-7.49	51.47	41.06	74.00	54.00	-12.94	ΑV
909.8	S	V	61.17	-10.41	- 2.09	59.08	48.67	74.87	54.87	-6.20	AV
1207.0	*S	V	69.04	-10.41	- 8.55	60.49	50.08	74.00	54.00	-3.92	AV
1516.0	*S	V	71.01	-10.41	- 7.14	63.87	53.46	74.00	54.00	-0.54	AV
1816.0	S	V	56.95	-10.41	- 5.90	51.05	40.64	74.87	54.87	-14.23	AV
2122.0	S	V	46.30	-10.41	- 4.62	41.68	31.27	74.87	54.87	-23.60	AV
2428.3	S	V		-10.41	- 3.26			74.87	54.87	55.30	
2731.9	*S	V		-10.41	- 2.51			74.00	54.00	54.00	
3035.4	S	V		-10.41	- 1.93			74.87	54.87	55.30	

- F: denotes Fundamental Frequency; S: denotes Spurious Frequency (1) + F/S
- (2) EUT Orthogonal Axes: X denotes Laid on Table; Y denotes Vertical Stand.
- (3) Measuring frequencies from 30 MHz to the 10th harmonic of fundamental frequency of 310 MHz_o
- (4) Dates of measurement within this frequency range shown " " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) * Denotes spurious frequency, which falls within the Restricted Bands specified in provision of ξ 15.205, then the general radiated emission limits in ξ 15.209 apply.
- (6) Peak Setting: 30MHz 1000MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz-5GHz, RBW=1MHz, VBW=1MHz, Sweep time=200 ms



Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 18



Operation Mode: Transmitting Mode Test Date: Oct. 23, 2004

Fundamental Frequency: 303 MHz Y mode Test By: Alex

Temperature: Pol: Horizontal 25

Humidity: 65 %

Judgement: Passed by EUT Axis Y -1.74 dB at 1516 MHz Ant.Pol. Hor

			Peak	AV		Peak	AV	Peak	AV		
Freq.	F	Ant.Pol.	Reading	Correct	Ant./CL	Level	Level	Limit	Limit	Margin	
(MHz)	/S	(H/V)	(dBuV)	dB	CF(dB)	(dBuV/m	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
303.5	F	Н	84.49	-10.41	-13.29	71.20	60.79	94.87	74.87	-14.08	AV
606.2	*S	H	49.40	-10.41	-7.49	41.91	31.50	74.00	54.00	-22.50	ΑV
909.8	S	H	46.12	-10.41	- 2.09	44.03	33.62	74.87	54.87	-21.25	AV
1207.0	*S	H	59.15	-10.41	- 8.55	50.60	40.19	74.00	54.00	-13.81	AV
1516.0	*S	H	69.81	-10.41	- 7.14	62.67	52.26	74.00	54.00	-1.74	AV
1816.0	S	Н	59.56	-10.41	- 5.90	53.66	43.25	74.87	54.87	-11.62	AV
2122.0	S	H	45.26	-10.41	- 4.62	40.64	30.23	74.87	54.87	-24.64	AV
2428.3	S	H	40.64	-10.41	- 3.26	37.38	26.97	74.87	54.87	-27.90	AV
2731.9	*S	Н	42.07	-10.41	- 2.51	39.56	29.15	74.00	54.00	-24.85	AV
3035.4	S	Н		-10.41				74.87	54.87		

- F: denotes Fundamental Frequency; S: denotes Spurious Frequency (1) + F/S
- (2) EUT Orthogonal Axes: X denotes Laid on Table; Y denotes Vertical Stand.
- (3) Measuring frequencies from 30 MHz to the 10th harmonic of fundamental frequency of 310 MHz_o
- (4) Dates of measurement within this frequency range shown " " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) * Denotes spurious frequency, which falls within the Restricted Bands specified in provision of ξ 15.205, then the general radiated emission limits in ξ 15.209 apply.
- (6) Peak Setting: 30MHz 1000MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz-5GHz, RBW=1MHz, VBW=1MHz, Sweep time=200 ms



Report No: ER/2004/A0004 **Issue Date: Dec. 01, 2004**

Page: 19



7. Occupied Bandwidth

7.1 Measurement Procedure

- The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Set EUT as normal operation
- 3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 10KHz, Span =1MHz.
- Set SPA Max hold. Mark peak, -20dB.

7.2 Test SET-UP (Block Diagram of Configuration)

Same as 6.3 Radiated Emission Measurement.

7.3 Measurement Equipment Used:

Same as 6.3 Radiated Emission Measurement.

7.4 Measurement Results

Refer to attached data chart.

The center frequency f_c is 303.0MHz, according to the Rules, section 15.231(C), the Bandwidth of Center Frequency at-20dB should be calculated as following:

$$303.0 \times 0.0025 = 757.5 \text{KHz}$$

So, the Uper/Lower frequencies limit should be specified as:

$$f_{(U)} = f_c + \Delta f/2 = 303 + 0.3787 = 303.3787(MHz)$$

$$f_{(L)} = f_c - \Delta f/2 = 303 - 0.3787 = 302.6213 \text{ (MHz)}$$

Measurement Result:

-20dB bandwidth = 61 kHz within allowed frequency range.

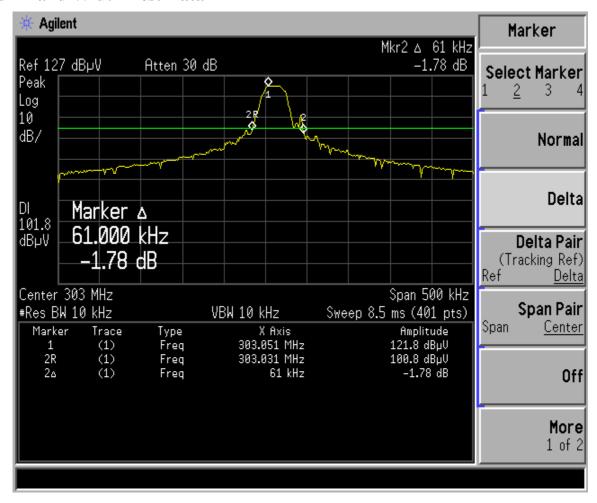


Report No: ER/2004/A0004 **Issue Date: Dec. 01, 2004**

Page: 20



20dB Band Width Test Data





Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 21



8. Duty Cycle Measurement

8.1 Measurement Procedure

- The EUT was placed on a turn table which is 0.8m above ground plane.
- Set ETU normal operating mode.
- 3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 100KHz, Span =0 Hz. Adjacent sweep.
- Set SPA View. Mark delta.

8.2 Test SET-UP (Block Diagram of Configuration)

Same as 6.3 Radiated Emission Measurement.

8.3 Measurement Equipment Used:

Same as 6.3 Radiated Emission Measurement.

8.4 Measurement Results:

Ton = 0.6188 (ms)*9 + 0.2812 (ms)*4 = 6.8168 (ms)

Tp = 22.62(ms)

Average Correction Factory = $20\log(\text{Ton/Tp})=20\log(6.8168/22.62)$

=-10.41 dB

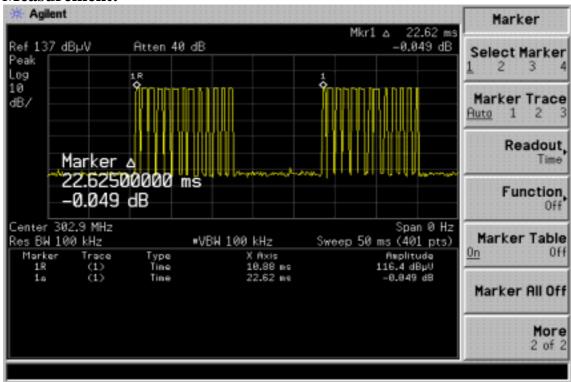


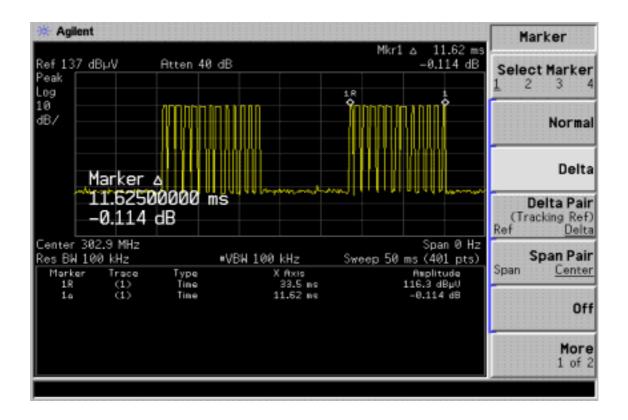
Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 22



Ton Measurement:



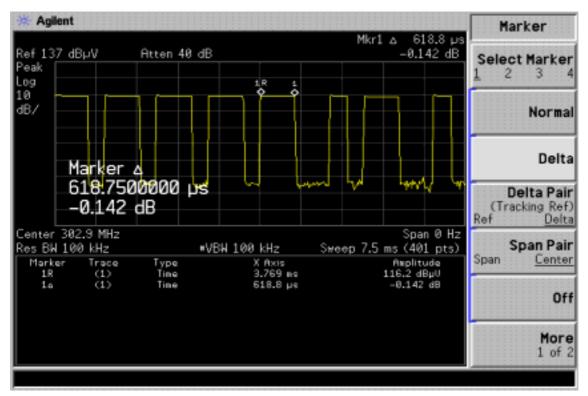




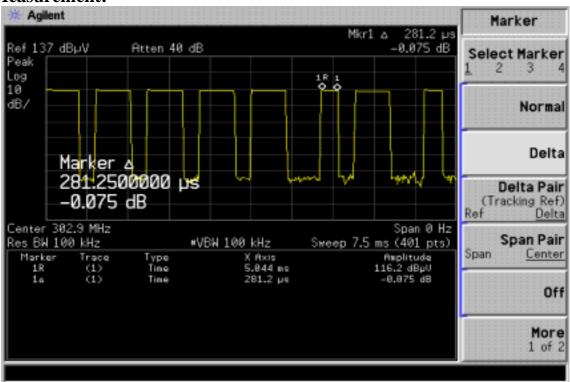
Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 23





Tp Measurement:





Report No: ER/2004/A0004 Issue Date: Dec. 01, 2004

Page: 24



9. Release Time Measurement:

15.231 (a) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

9.1 Measurement Procedure

- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 100KHz, Span =0Hz. Sweep Time= 5s.
- 3. Set EUT as normal operation and press Transmitter bottom for 2 s,
- 4. Set SPA Max hold. Delta Mark.

9.2 Test SET-UP (Block Diagram of Configuration)

Same as 6.3 Radiated Emission Measurement.

9.3 Measurement Equipment Used:

Same as 6.3 Radiated Emission Measurement.

9.4 Measurement Results

The release time less than 5 s.

Refer to attached data chart.



Report No: ER/2004/A0004 **Issue Date: Dec. 01, 2004**

Page: 25



