ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name:	**GTStarter I**
Brand Name:	**Gallo Technologies**
Model Name:	**GS1**
Model Difference:	**N/A**
FCC ID:	**WDOGTS10806**
Report No.:	**ER/2008/50063**
Issue Date:	**Jun. 11, 2008**
FCC Rule Part:	**§15.231**
Prepared for:	**Gallo Technologies** **6224 Camellia Cir, Rocklin, CA, 95765, USA**
Prepared by:	**SGS Taiwan Ltd.** **Electronics & Communication Laboratory** **No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan.**

Testing Laboratory
0513

VERIFICATION OF COMPLIANCE

Applicant:	Gallo Technologies 6224 Camellia Cir, Rocklin, CA, 95765, USA
Product Name:	GTStarter I
Brand Name:	Gallo Technologies
Model No.:	GS1
FCC ID:	WDOGTS10806
Model Difference:	N/A
File Number:	ER/2008/50063
Date of test:	Jun. 01, 2008 ~ Jun. 09, 2008
Date of EUT received:	Jun. 01, 2008

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:		***Date***	Jun. 11, 2008
	Jim Chang/Supervisor		
Prepared By:		***Date***	Jun. 11, 2008
	Elisa Chen/Asst. Supervisor		
Approved By:		***Date***	Jun. 11, 2008
	Vincent Su/ Manager		

Version

Version No.	Date
00	Jun. 11, 2008

Table of Contents

1. GENERAL INFORMATION

1.1 Product Description

The Gallo Technologies, Model: GS1 (referred to as the EUT in this report) is a 433.92MHz remote controller.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 433.92 MHz
B). Modulation: ASK
C). Antenna Designation: Non-User Replaceable (Fixed)
D). Power Supply: 12Vdc 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: **WDOGTS10806** 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 verification 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 measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-1

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county,which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.

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 7 & 13 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 and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna. According to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4-2003.

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 MHz	Limits dB (uV)	
	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.		

(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 Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious	
	(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 ξ15.205, 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. 433.92MHz limit = 41.6667 * 433.92 – 7083.33333= 10996.681 uV/m
   = 80.8dBuV/m

2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System (TX)

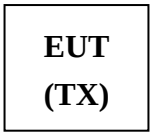


Table 2-1 Equipment Used in Tested System

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

3 Summary Of Test Results

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

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 433.92MHz is chosen for testing.

The worst case of duty cycle was found by change the dip switches and measure in this report.

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

5. Conducted Emissions Test

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)

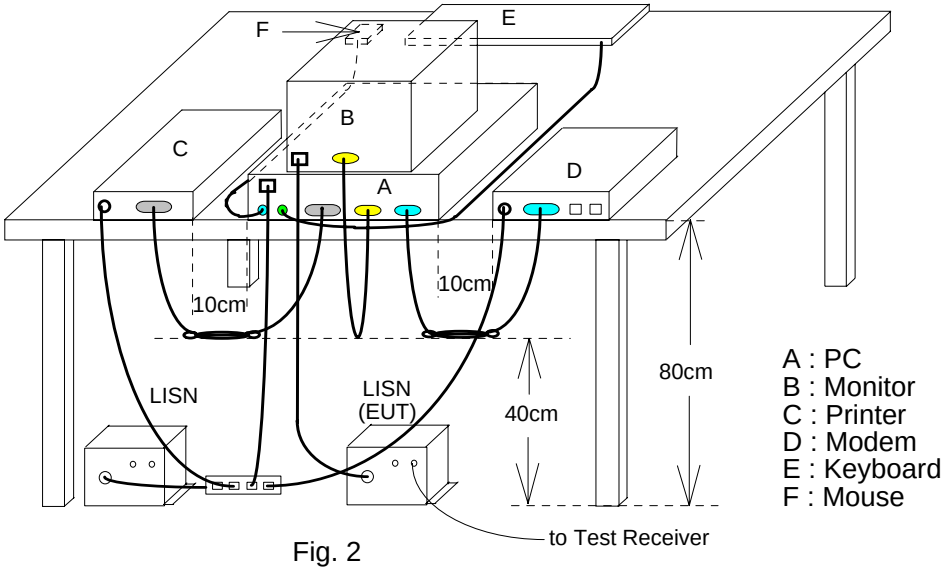


Fig. 2

5.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMC Analyzer	HP	8594EM	3624A00203	09/02/2007	09/03/2008
EMI Test Receiver	R&S	ESCS30	828985/004	06/09/2008	06/10/2009
Transient Limiter	HP	11947A	3107A02062	09/02/2007	09/03/2008
LISN	Rolf-Heine	NNB-2/16Z	99012	12/31/2007	12/30/2008
LISN	Rolf-Heine	NNB-2/16Z	99013	12/24/2007	12/23/2008
Coaxial Cables	N/A	No. 3, 4	N/A	12/01/2007	12/01/2008

5.4 Measurement Result:

N/A. Powered by 12Vdc Battery

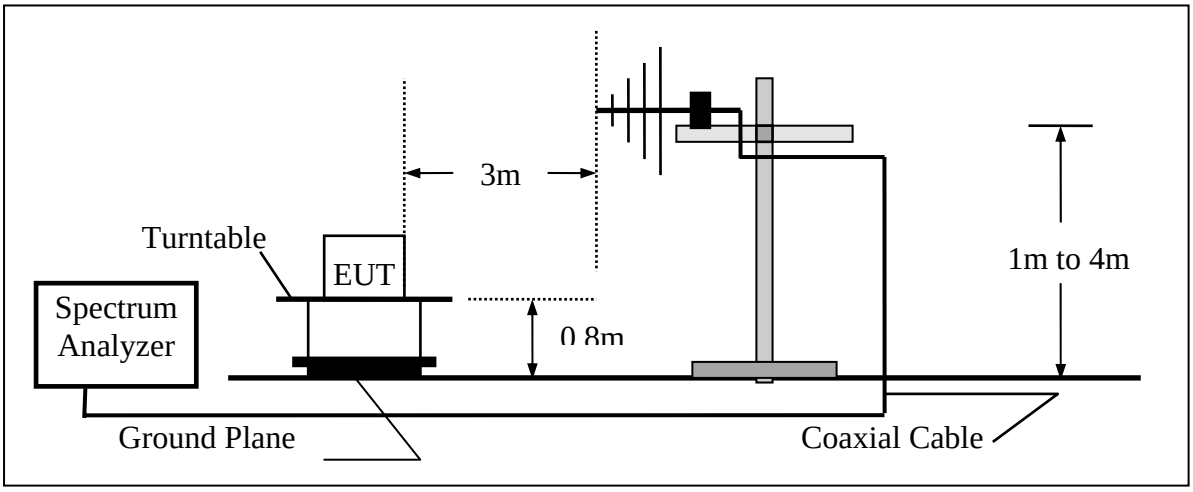
6. Radiated Emission Test

6.1 Measurement Procedure

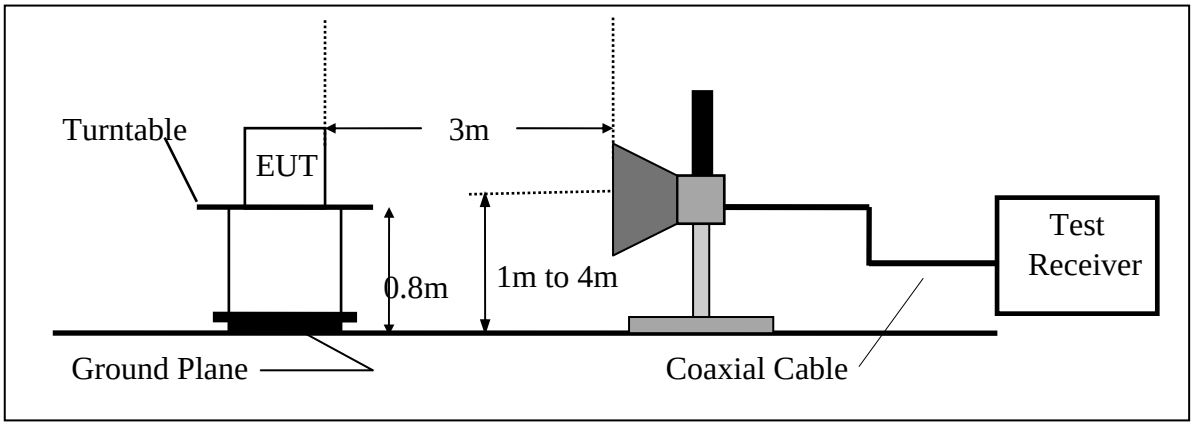
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above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



6.3 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2008	05/26/2009
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2007	08/26/2008
Bilog Antenna	SCHWAZBECK	VULB9163	152	06/03/2008	06/02/2009
Bilog Antenna	SCHWAZBECK	VULB9160		08/16/2007	08/15/2008
Horn Antenna	SCHWAZBECK	BBHA 9120D	309/320	07/04/2007	07/03/2008
Pre-Amplifier	HP	8447D	2944A09469	07/19/2007	07/18/2008
Pre-Amplifier	HP	8449B	3008A00578	02/26/2008	02/25/2009
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+SUHNER	SUCOFLEX 104PEA-10M	10m	10/09/2007	10/08/2008
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	10/09/2007	10/08/2008
Site NSA	SGS	966 chamber	N/A	11/17/2007	11/16/2008
Site NSA	SGS	10m Open-Site	N/A	05/27/2008	05/26/2009

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		

6.5 Measurement Result

Operation Mode:	Transmitting Mode	Test Date:	Jun. 05, 2008
Fundamental Frequency:	433.92 MHz X mode	Test By:	Jim
Temperature :	25 ℃	Pol:	Vertical
Humidity :	65 %		

Freq. (MHz)	F /S	Ant.Pol. (H/V)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Peak Level (dBuV/m)	AV Level (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	
433.92	F	V	60.70		-25.24	35.46	--	100.80	80.80	-45.34	PK
867.84	S	V	44.23		-19.48	24.75	--	80.80	60.80	-36.05	PK
1301.76	*S	V	--		--	--	--	74.00	54.00		
1735.68	S	V	42.90		-13.39	29.51	--	80.80	60.80	-31.29	PK
2169.60	S	V	--		--	--	--	80.80	60.80		
2603.52	S	V	--		--	--	--	80.80	60.80		
3037.44	S	V	44.20		-10.34	33.86	--	80.80	60.80	-26.94	PK
3471.36	S	V	--		--	--	--	80.80	60.80		
3905.28	*S	V	--		--	--	--	74.00	54.00		
4339.20	*S	V	--		--	--	--	74.00	54.00		

Remark：

(1) + F/S F：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 433.92 MHz。

(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 ξ15.205, 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

Operation Mode:	Transmitting Mode	Test Date:	Jun. 05, 2008
Fundamental Frequency:	433.92 MHz X mode	Test By:	Jim
Temperature :	25 ℃	Pol:	Horizontal
Humidity :	65 %		

Freq. (MHz)	F /S	Ant.Pol. (H/V)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Peak Level (dBuV/m)	AV Level (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	
433.92	F	H	81.16		-25.24	55.92	--	100.80	80.80	-24.88	PK
867.84	S	H	54.43		-19.48	34.95	--	80.80	60.80	-25.85	PK
1301.76	*S	H	--		--	--	--	74.00	54.00		
1735.68	S	H	42.94		-13.39	29.55	--	80.80	60.80	-31.25	PK
2169.60	S	H	--		--	--	--	80.80	60.80		
2603.52	S	H	--		--	--	--	80.80	60.80		
3037.44	S	H	44.13		-10.34	33.79	--	80.80	60.80	-27.01	PK
3471.36	S	H	--		--	--	--	80.80	60.80		
3905.28	*S	H	--		--	--	--	74.00	54.00		
4339.20	*S	H	--		--	--	--	74.00	54.00		

Remark：

(1) + F/S　F：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 433.92 MHz。

(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 ξ15.205, 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

Operation Mode:	Transmitting Mode	Test Date:	Jun. 05, 2008
Fundamental Frequency:	433.92 MHz Y mode	Test By:	Jim
Temperature :	25 ℃	Pol:	Vertical
Humidity :	65 %		

Freq. (MHz)	F /S	Ant.Pol. (H/V)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Peak Level (dBuV/m)	AV Level (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	
433.92	F	V	66.01		-25.24	40.77	--	100.80	80.80	-40.03	PK
867.84	S	V	54.48		-19.48	35.00	--	80.80	60.80	-25.80	PK
1301.76	*S	V	--		--	--	--	74.00	54.00		
1735.68	S	V	43.29		-13.39	29.90	--	80.80	60.80	-30.90	PK
2169.60	S	V	--		--	--	--	80.80	60.80		
2603.52	S	V	--		--	--	--	80.80	60.80		
3037.44	S	V	44.77		-10.34	34.43	--	80.80	60.80	-26.37	PK
3471.36	S	V	--		--	--	--	80.80	60.80		
3905.28	*S	V	--		--	--	--	74.00	54.00		
4339.20	*S	V	--		--	--	--	74.00	54.00		

Remark：

(1) + F/S　F：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。

(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 ξ15.205, 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

Operation Mode:	Transmitting Mode	Test Date:	Jun. 05, 2008
Fundamental Frequency:	433.92 MHz Y mode	Test By:	Jim
Temperature :	25 ℃	Pol:	Horizontal
Humidity :	65 %		

Freq. (MHz)	F /S	Ant.Pol. (H/V)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Peak Level (dBuV/m)	AV Level (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	
433.92	F	H	61.19		-25.24	35.95	--	100.80	80.80	-44.85	PK
867.84	S	H	21.23		-19.48	1.75	--	80.80	60.80	-59.05	PK
1301.76	*S	H	--		--	--	--	74.00	54.00		
1735.68	S	H	42.67		-13.39	29.28	--	80.80	60.80	-31.52	PK
2169.60	S	H	--		--	--	--	80.80	60.80		
2603.52	S	H	--		--	--	--	80.80	60.80		
3037.44	S	H	44.26		-10.34	33.92	--	80.80	60.80	-26.88	PK
3471.36	S	H	--		--	--	--	80.80	60.80		
3905.28	*S	H	--		--	--	--	74.00	54.00		
4339.20	*S	H	--		--	--	--	74.00	54.00		

Remark：

(1) + F/S　F：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 433.92 MHz。

(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 ξ15.205, 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

7. Occupied Bandwidth

7.1 Measurement Procedure

1. 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 =100KHz.
4. 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 fc is 433.92MHz, according to the Rules, section 15.231(C), the Bandwidth of Center Frequency at-20dB should be calculated as following:

433.92 X 0.0025 = 1.0848(MHz)

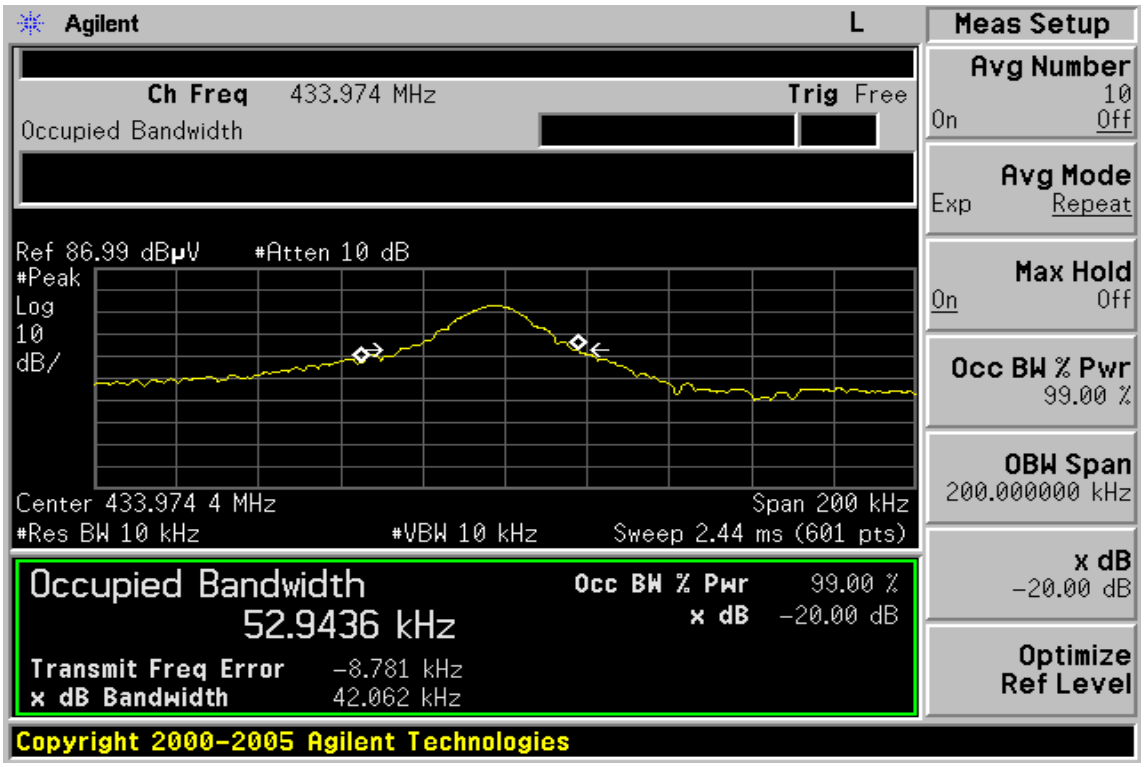
So, the Uper/Lower frequencies limit should be specified as:

$$f_{(U)} = f_c + \Delta f/2 = 433.92 + (1.0848/2) = 434.4624(MHz)$$

$$f_{(L)} = f_c - \Delta f/2 = 433.92 - (1.0848/2) \quad = 433.3776\ (MHz)$$

-20dB bandwidth = 40.062kHz within allowed frequency range.

20dB Band Width Test Data



8. Duty Cycle Measurement

8.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 100KHz, Span =0 Hz. Adjacent sweep.
4. 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:

N/A, It's ASK modulation.

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.

Measurement Results

The release time less than 5 s. Refer to attached data chart.