

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product name: 2-way transmitter for car alarm

Model Name: TR5B

FCC ID: M65NVTR5B

REPORT NO: ER/2004/20023

ISSUE DATE: Mar. 08, 2004

FCC Rule Part: §15.231

Prepared for SuperNova Co., Ltd.

No. 34, Wu-Chuan 6 Rd., Wu-Ku
Industrial Zone, Wu-Ku Hsiang, Taipei
Hsien, Taiwan, R.O.C.

Prepared by SGS Taiwan Ltd.

No. 134, Wu Kung Rd., Wuku Industrial
Zone, Taipei County, Taiwan.

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SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan. / 台北縣五股工業區五工路136之1號
台灣檢驗科技股份有限公司 t (886-2) 2299-3939 f (886-2) 2298-2698 www.sgs.com.tw

VERIFICATION OF COMPLIANCE

Applicant:	SuperNova Co., Ltd. No. 34, Wu-Chuan 6 Rd., Wu-Ku Industrial Zone, Wu-Ku Hsiang, Taipei Hsien, Taiwan, R.O.C.
Product Description:	2-way transmitter for car alarm
FCC ID Number:	M65NVTR5B
Brand Name:	N/A
Model No.:	TR5B
Model Difference:	N/A
File Number:	ER/2004/20023
Date of test:	Feb. 20, 2004 ~ Feb 22, 2004
Date of receive:	Feb. 19, 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 (1992) 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:

Willis Chen

Date

Mar. 08, 2004

Willis Chen

Approved By

Vincent Su

Date

Mar. 08, 2004

Vincent Su

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1. GENERAL INFORMATION

1.1 Product Description

The SuperNova Co., Ltd., Model: TR5B (referred to as the EUT in this report) is a 2-ways Transmitter for car alarm security system. It offers wireless remote control, ideal for use in vehicle security system to activate the function of center door lock control system and car searching except the alarm system.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 433.92 MHz
- B). Modulation: Pulse Modulation
- C). Antenna Designation: Non-User Replaceable (Fixed)
- D). Power Supply: 12V, Battery Operated.
- E). Transmitting Time: Periodic ≤ 5 seconds

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **M65NVTR5B** 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 (1992). 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: 1992 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.

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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 C63.4-1992. 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 C63.4-1992.

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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	47.04	225
70 - 130	61.94	1,250	41.94	125
130 - 174	* 61.94 - 71.48	* 1,250 - 3,750	* 41.94 - 51.48	* 125 - 375
174 - 260	71.48	3,750	51.48	375
260 - 470	* 71.48 - 81.94	* 3,750 - 12,500	* 51.48 - 61.94	* 375 - 1,250
above 470	81.94	12,500	61.94	1,250

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- Remark:
1. Emission level in $\text{dBuV/m} = 20 \log (\text{uV/m})$
 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.

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2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

EUT

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						

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3. Summary Of Test Results

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

4. Description of test modes

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

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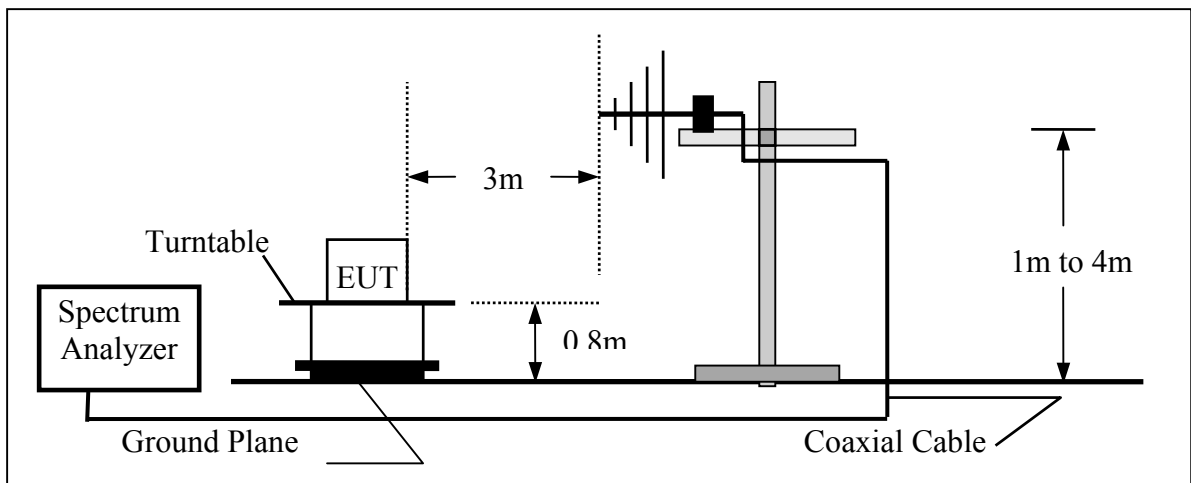
6. Radiated Emission Test

6.1 Measurement Procedure

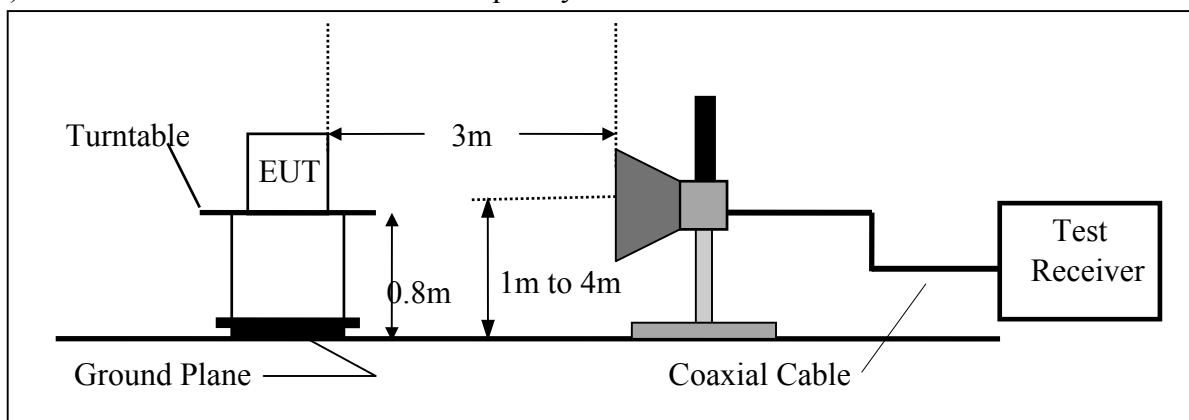
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above 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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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	05/27/2003	05/26/2004
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2003	08/27/2004
Bilog Antenna	SCHWAZBECK	VULB9163	152	06/03/2003	06/02/2004
Bilog Antenna	SCHWAZBECK	VULB9160		06/03/2003	06/02/2004
Horn Antenna	SCHWAZBECK	BBHA 9120D	309/320	08/16/2003	08/15/2004
Pre-Amplifier	HP	8447D	2944A09469	07/19/2003	07/18/2004
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	10/9/2003	10/08/2004
Low Loss Cable	HUBER+SUHNE R	SUCOFLEX 104PEA-3M	3m	10/9/2003	10/08/2004
Site NSA	SGS	966 chamber	N/A	11/17/2003	11/16/2004
Site NSA	SGS	10m Open-Site	N/A	10/02/2003	10/01/2004

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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6.5 Measurement Result

Operation Mode: Transmitting Mode Test Date: Feb. 22, 2004
 Fundamental Frequency: 433.92MHz X mode Test By: Willis
 Temperature : 25 °C Pol: Vertical
 Humidity : 65 %
 Judgement : Passed by -18.32 dB at 1736 MHz Ant.Pol. Ver EUT Axis X

Freq.	F	Ant.Pol.	Reading	Ant./CL	Duty	Peak	AV	Peak	AV	Margin	
(MHz)	/S	(H/V)	(dBuV)	CF(dB)	Cycle	(dBuV/m)	(dBuV/m)	Limit	Limit	(dB)	
433.9	F	V	67.74	-9.62	-13.06	58.12	45.06	99.00	79.00	-33.94	AV
868.2	S	V	37.22	-2.35	-13.06	34.87	21.81	79.00	59.00	-37.19	AV
1300.0	*S	V	53.01	- 5.39	-13.06	47.62	34.56	74.00	54.00	-19.44	AV
1736.0	S	V	57.26	-3.52	-13.06	53.74	40.68	79.00	59.00	-18.32	AV
2172.0	S	V	47.94	-1.52	-13.06	46.42	33.36	79.00	59.00	-25.64	AV
2604.0	S	V	44.66	0.21	-13.06	44.87	31.81	79.00	59.00	-27.19	AV
3030.0	S	V	38.77	1.27	-13.06	40.04	26.98	79.00	59.00	-32.02	AV
3470.0	S	V	--	-3.5	-13.06	--	--	79.00	59.00		
3900.0	*S	V	--	-1.68	-13.06	--	--	74.00	54.00		
4340.0	*S	V	--	-0.4	-13.06	--	--	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 §15.205, then the general radiated emission limits in § 15.209 apply.
- (6) Spectrum Setting: 30MHz – 1000MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 8GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms

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Operation Mode: Transmitting Mode
 Fundamental Frequency: 433.92MHz X mode
 Temperature: 25 °C
 Humidity: 65 %

Test Date: Feb. 22, 2004

Test By: Willis

Pol: Hor.

Judgement : Passed by -13.14 dB at 1300 MHz Ant.Pol. Hor EUT Axis X

Freq. (MHz)	F /S	Ant.Pol. (H/V)	Reading (dBuV)	Ant./CL CF(dB)	Duty		Peak (dBuV/m)	AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	AV
					Cycle	Peak						
433.9	F	H	78.60	-9.62	-13.06	68.98	55.92	99.00	79.00	-23.08		
868.2	S	H	41.84	-2.35	-13.06	39.49	26.43	79.00	59.00	-32.57		
1300.0	*S	H	59.31	-5.39	-13.06	53.92	40.86	74.00	54.00	-13.14		
1736.0	S	H	58.62	-3.52	-13.06	55.10	42.04	79.00	59.00	-16.96		
2172.0	S	H	55.89	-1.52	-13.06	54.37	41.31	79.00	59.00	-17.69		
2604.0	S	H	44.84	0.21	-13.06	45.05	31.99	79.00	59.00	-27.01		
3030.0	S	H	--		-13.06	--	--	79.00	59.00			
3470.0	S	H	--		-13.06	--	--	79.00	59.00			
3900.0	*S	H	--		-13.06	--	--	74.00	54.00			
4340.0	*S	H	--		-13.06	--	--	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 §15.205, then the general radiated emission limits in § 15.209 apply.
- (6) Spectrum Setting: 30MHz – 1000MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 8GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms

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Operation Mode: Transmitting Mode
 Fundamental Frequency: 433.92MHz Y mode
 Temperature: 25 °C
 Humidity: 65 %

Test Date: Feb. 22, 2004
 Test By: Willis
 Pol: Vertical

Judgement : Passed by -15.68 dB at 433.9 MHz Ant.Pol. Ver EUT Axis Y

					Duty		Peak		AV		
Freq. (MHz)	F /S	Ant.Pol. (H/V)	Reading (dBuV)	Ant./CL CF(dB)	Cycle CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	
433.9	F	V	86.00	-9.62	-13.06	76.38	63.32	99.00	79.00	-15.68	AV
868.2	S	V	37.42	-2.35	-13.06	35.07	22.01	79.00	59.00	-36.99	AV
1300.0	*S	V	54.72	- 5.39	-13.06	49.33	36.27	74.00	54.00	-17.73	AV
1736.0	S	V	55.90	-3.52	-13.06	52.38	39.32	79.00	59.00	-19.68	AV
2172.0	S	V	52.37	-1.52	-13.06	50.85	37.79	79.00	59.00	-21.21	AV
2604.0	S	V	44.42	0.21	-13.06	44.63	31.57	79.00	59.00	-27.43	AV
3030.0	S	V	--		-13.06	--	--	79.00	59.00		
3470.0	S	V	--		-13.06	--	--	79.00	59.00		
3900.0	*S	V	--		-13.06	--	--	74.00	54.00		
4340.0	*S	V	--		-13.06	--	--	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 §15.205, then the general radiated emission limits in § 15.209 apply.
- (6) Spectrum Setting: 30MHz – 1000MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 8GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms

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Operation Mode: Transmitting Mode

Test Date : Feb. 22, 2004

Fundamental Frequency: 433.92MHz Y mode

Test By: Willis

Temperature : 25 °C

Pol: Hor.

Humidity : 65 %

Judgement : Passed by -19.48 dB at 1736 MHz Ant.Pol. Hor EUT Axis Y

				Duty				Peak	AV		
Freq. (MHz)	F /S	Ant.Pol. (H/V)	Reading (dBuV)	Ant./CL CF(dB)	Cycle CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	
433.9	F	H	76.39	-9.62	-13.06	66.77	53.71	99.00	79.00	-25.29	AV
868.2	S	H	39.66	-2.35	-13.06	37.31	24.25	79.00	59.00	-34.75	AV
1300.0	*S	H	43.40	- 5.39	-13.06	38.01	24.95	74.00	54.00	-29.05	AV
1736.0	S	H	56.10	-3.52	-13.06	52.58	39.52	79.00	59.00	-19.48	AV
2172.0	S	H	48.63	-1.52	-13.06	47.11	34.05	79.00	59.00	-24.95	AV
2604.0	S	H	40.12	0.21	-13.06	40.33	27.27	79.00	59.00	-31.73	AV
3030.0	S	H	--		-13.06	--	--	79.00	59.00		
3470.0	S	H	--		-13.06	--	--	79.00	59.00		
3900.0	*S	H	--		-13.06	--	--	74.00	54.00		
4340.0	*S	H	--		-13.06	--	--	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 §15.205, then the general radiated emission limits in § 15.209 apply.
- (6) Spectrum Setting: 30MHz – 1000MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 8GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms

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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.

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7.4 Measurement Results

Refer to attached data chart.

The center frequency f_c is **433.92MHz**, according to the Rules, section 15.231(C), the Bandwidth of Center Frequency at-20dB should be calculated as following:

$$433.92 \times 0.0025 = 1.0848(\text{MHz})$$

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

$$f_{(U)} = f_c + \Delta f/2 = 433.92 + 0.5424 = 434.46(\text{MHz})$$

$$f_{(L)} = f_c - \Delta f/2 = 433.92 - 0.5424 = 433.377 (\text{MHz})$$

Measurement Result:

Center Frequency = 433.920MHz

Lower Frequency = 433.150 MHz

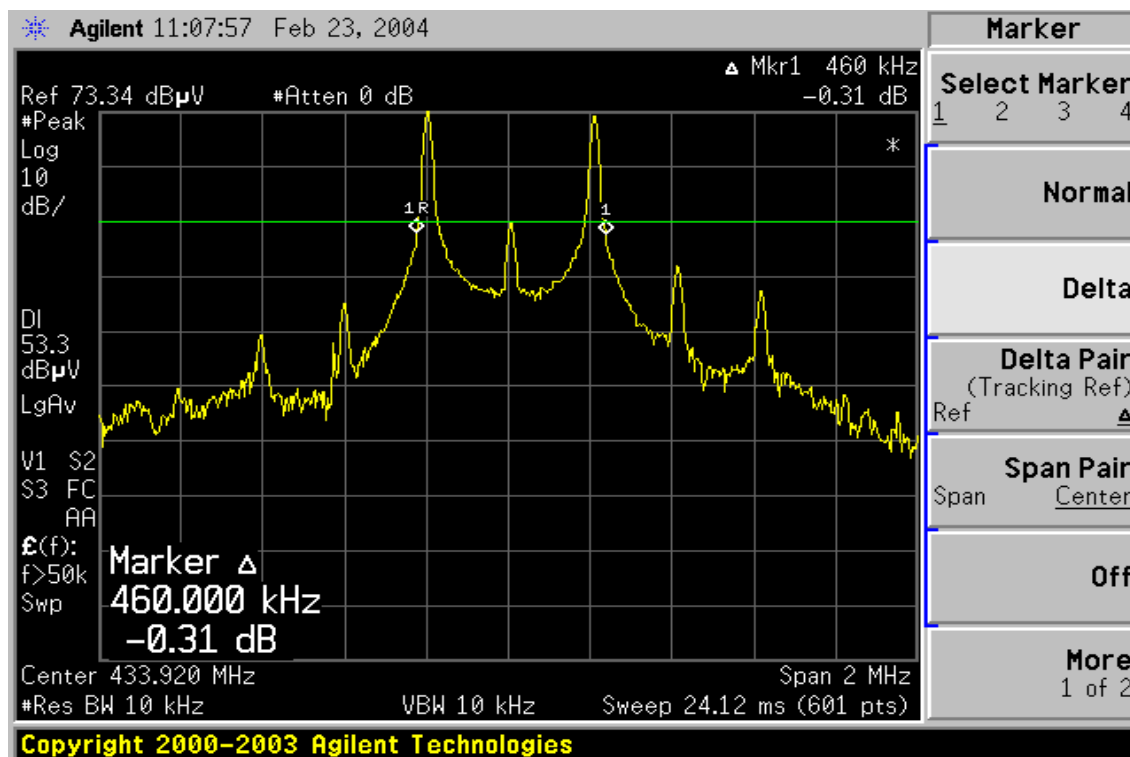
Upper Frequency= 433.690 MHz

The measured frequencies at -20dB Bandwidth of Fundamental are frequency(-20dB upper) =433.690MHz and frequency (-20dB lower) =433.150MHz as shown in the spectrum graphic below within the band of frequency between $f_{(L)}$ =433.377 MHz and $f_{(U)}$ =434.46 MHz.

So, it is complacence with the requirements.

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26dB Band Width Test Data



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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: Refer to attached data chart.

Average Correction Factor = 20 Log (Ton/Tp)

Tp = 69 ms (refer to plot 1)

Ton = 1.698 X 2 (refer to Ton 1) = 3.396 (ms)

+ 0.967 X1 (refer to Ton 2) = 0.967 (ms)

+ 0.696 X3 (refer to Ton 3) = 1.392 (ms)

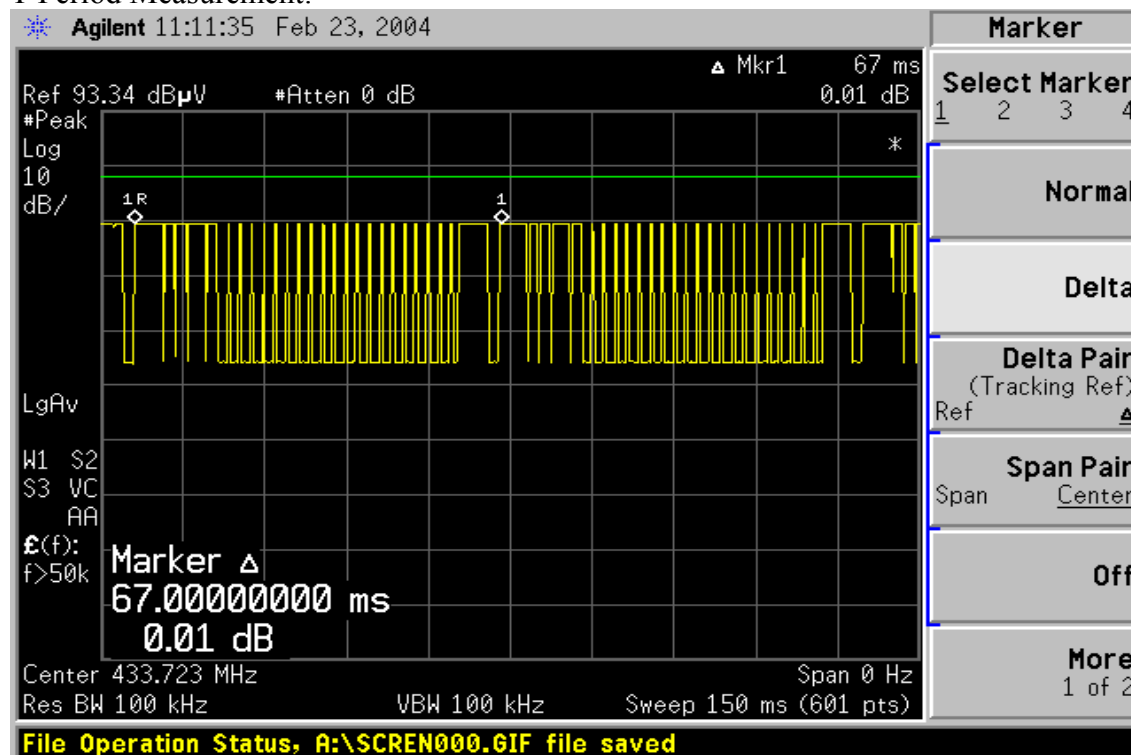
+ 0.4789 X20 (refer to Ton 4) = 9.578 (ms)

Ton = 15.333 (ms)

Average Correction Factor = 20 Log (Ton/Tp) = 20 log (15.333/69)
= -13.064 (dB)

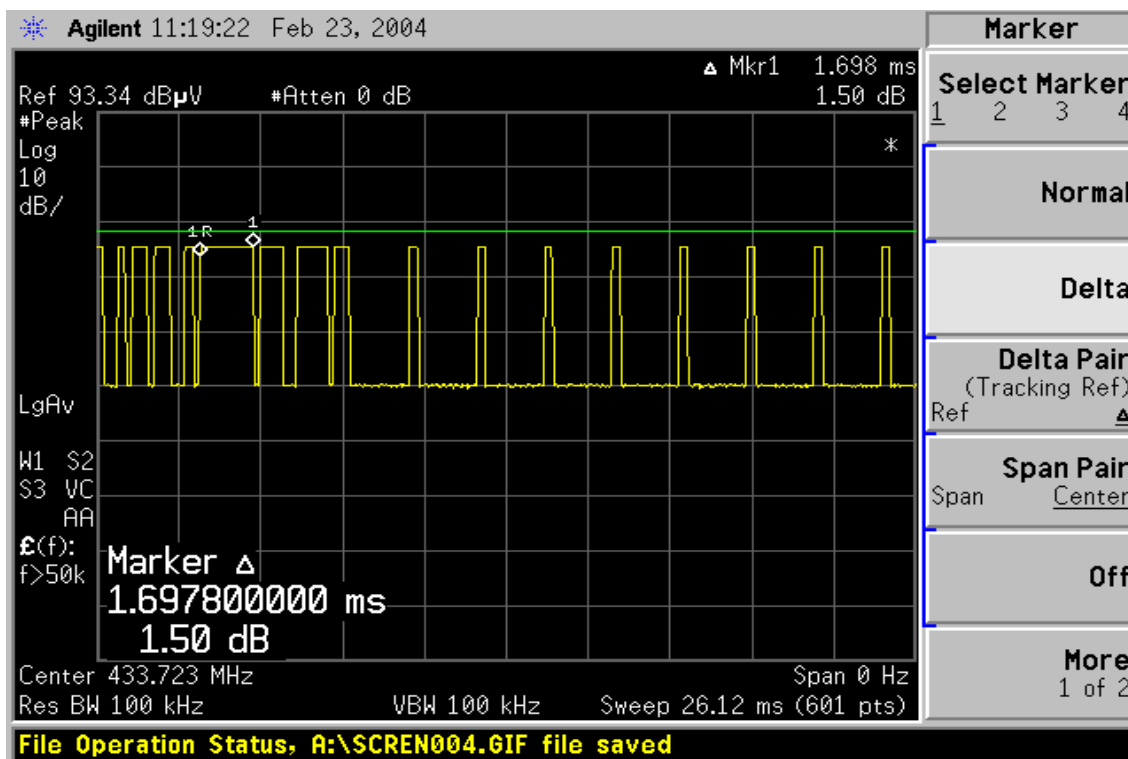
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T Period Measurement:

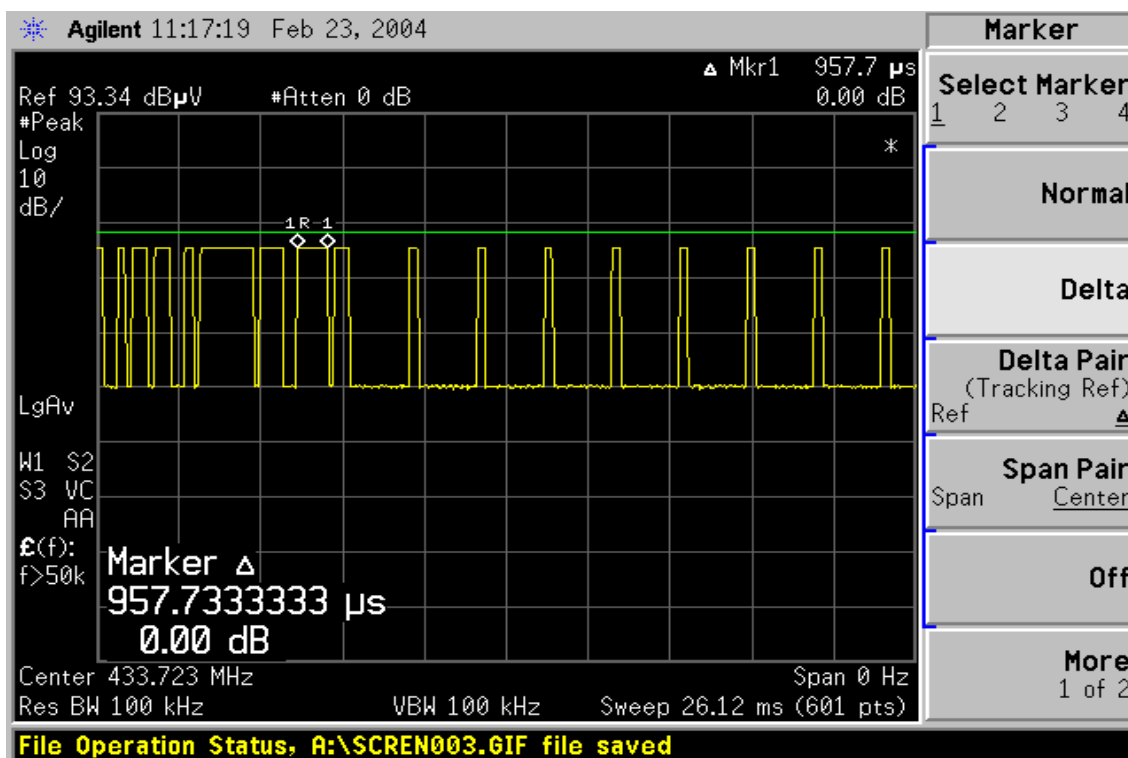


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Ton Measurement 1

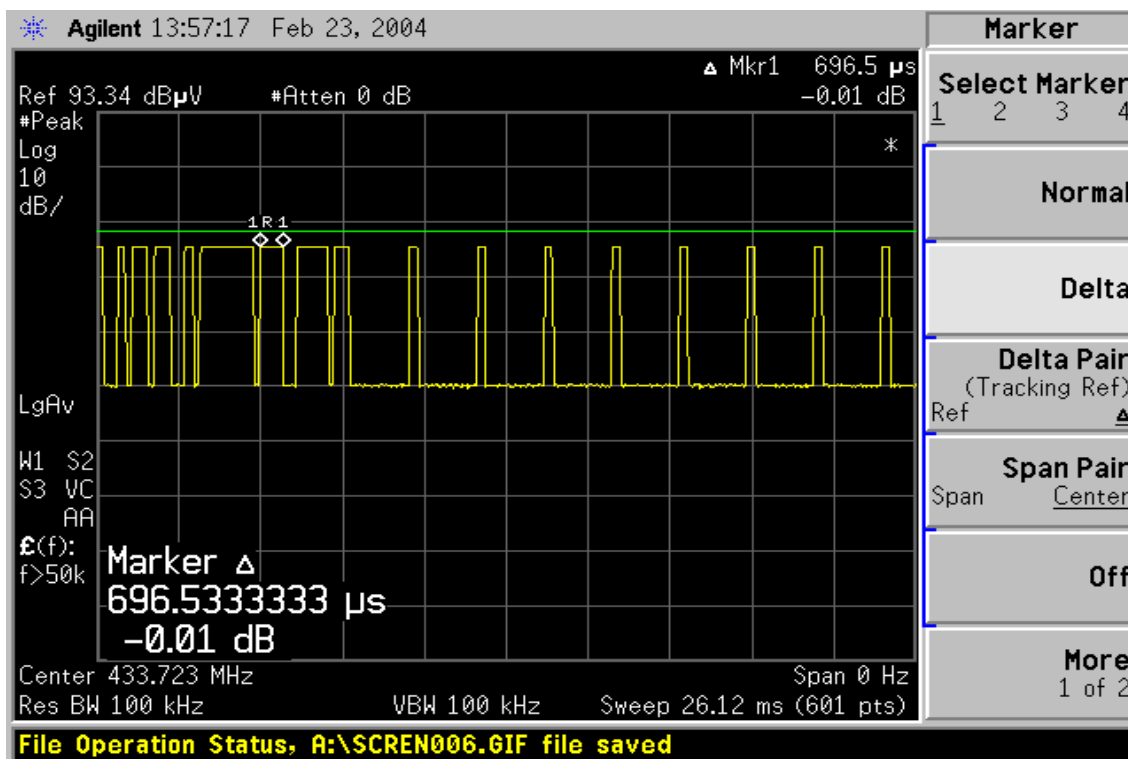


Ton Measurement 2

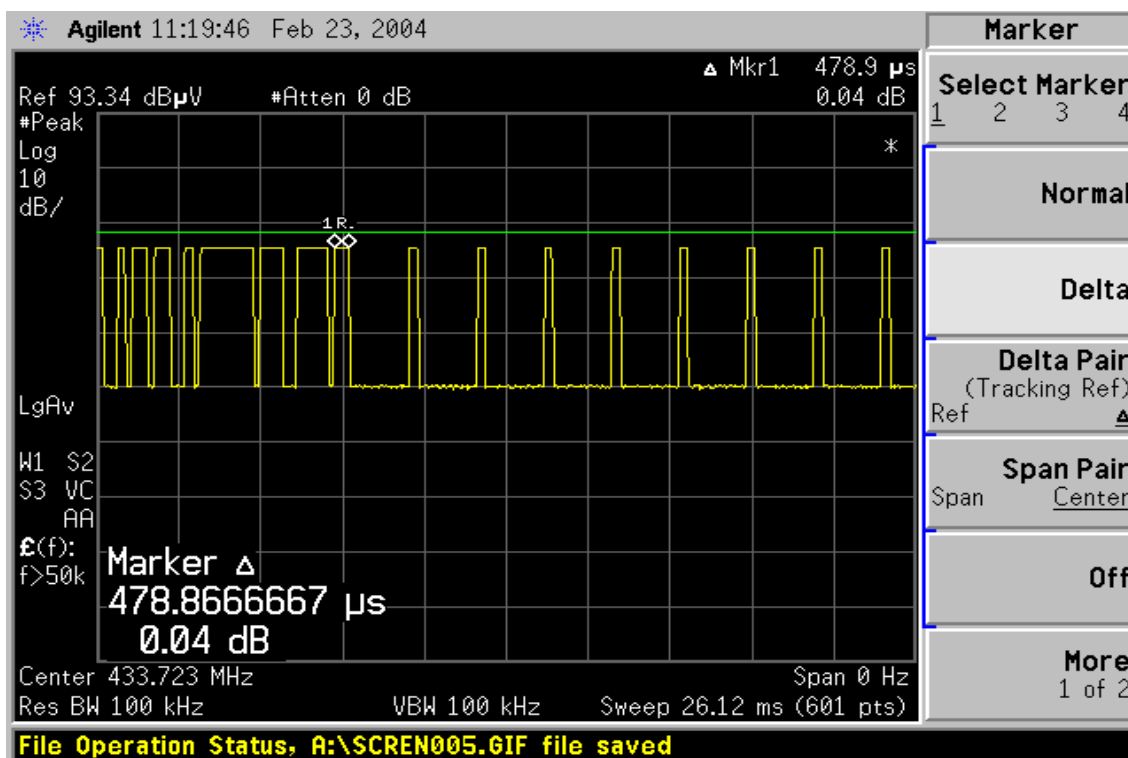


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Ton Measurement 3



Ton Measurement 4



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