

**Test Report****No. : DR50110212I** Page 1 of 19

Applicant	:	HUMAX CO., LTD. HUMAX Venture Tower 271-2, Seohyeon-Dong, Bundang-Gu, Seongnam-City, Gyeonggi-Do, Korea	
Manufacturer	:	HUMAX CO., LTD. HUMAX Bldg. 212-1 Yubang-Dong, Youngin-Si, Gyeonggi-Do, Korea	
Test Item	:	Digital Satellite Receiver	
FCC ID	:	O6ZSIR-S310W	
Model No.	:	SIR-S310W	
Brand Name	:	HUMAX, SAMSUNG	
Test Specification	:	ANSI C 63.4:2001 FCC Part 15 Class B	
Tested Date	:	December 24 ~ 26, 2002	
Issued Date	:	December 27, 2002	
Test Result	:	Passed	
Tested by :		Reviewed by :	
			
K.T.LEE		C.H.AHN	
Name		Name	
Signature		Signature	
Other Aspects :			
Abbreviations : OK, Pass = passed , Fail = failed , N/A = not applicable			
This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by NVLAP or any agency of the U.S.Government.			



NVLAP LAB CODE 200559-0



TEST SUMMARY

The data collected shows that the **HUMAX CO., LTD. (Model NO.: SIR-S310W) Digital Satellite Receiver** complies with §15.107 and §15.109 of the FCC Rules.

The highest emission observed, with a minimum margin to the specifications, was at 6.783MHz for conducted emissions with a margin of 6.1dB, and at 32.43MHz for radiated emissions (Pol.: Vertical, EUT Angle : 108degree , ANT. Height : 100cm)with a margin of 4.6dB.

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report accdg. to NIS 81 / 5 1994.”.

5.1 CONDUCTED EMISSIONS

RESULT : Pass

5.2 RADIATED EMISSIONS

RESULT : Pass

5.3 ANTENNA CONDUCTED POWER EMISSIONS

RESULT : Pass

5.4 OUTPUT CONDUCTED LEVEL EMISSIONS

RESULT : Pass

5.5 ANTENNA TRANSFER SWITCH EMISSIONS

RESULT : Pass

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1. General Remarks

This Report describes the emission characteristics of the tested product.

If the product will be used with additional equipment other than those mentioned in this report or if the tested product will be used against the manufacture's specifications, the compliance with the relevant standards for the system has to be ensured.

2. Test Facility

2.1 Test Laboratory

Quality control in the testing laboratory is implemented as per ISO/IEC 17025, which is the "General requirements for the competents of calibration and testing laboratory".

This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200559-0.

DIGITAL EMC CO., LTD.

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2.2 Measurement Instruments

Refer to each item.



3. General Product Information

SIR-S310W

Kind of Equipment	: Digital Satellite Receiver
Model Number	: SIR-S310W
FCC ID	: O6ZSIR-S310W
Brand Name	: HUMAX,SAMSUNG
Serial No.	: 460D700003
High Frequency	:27MHz(Main CLK) 4.9152(Modem) 150MHz(PLC CLK)
Input Voltage	: AC 120V,60Hz(SMPS type)
Power Consumption	: 24W max
Size	: 12.13 in.(W)X2.36in.(H)X9.25 in.(D) (308mmX 60mm X235mm)
Weight	: 1.83 Kg(about 4.03 lbs.)
Tested Power Supply	: 1 phase 120Vac 60Hz
Applicant	: HUMAX CO., LTD.
Manufacturer	: HUMAX CO., LTD.
Date of Receipt of Sample	: 2002-12-23

4. Test Set-up and operation modes

4.1 Principle of Configuration Selection

Emission : The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation modes

- The controls of the EUT are set to obtain a picture of normal brightness, contrast, and color saturation. This is obtained with the following luminance values:

Black part of the test pattern 2 cd/m²
Magenta part of the test pattern 30 cd/ m²
White part of the test pattern 80 cd/ m²

The standard picture is a pattern consisting of vertical color bars in accordance with CCIR Recommendation 471, 100/0/75/0.

4.3 Support Equipment Used

TYPE	MANUFACTURER	MODEL NO.	SERIAL NO.	Cable
Monitor	Tae Young Telstar	TVL-151M	N/N	Power :1.8 Non-Shield A/V :1.6 Non-Shield S-Video: 1.6 Shield
Modulator	CONEXANT	CM2000B	000408	-
RF-Generator	DOCTORDESIGN INC.	RF-100	N/A	-

NOTE

- See "photographs" for actual system test setup

5. Test Results EMISSION

5.1 Conducted Emissions

RESULT :

Pass

5.1.1 Measurement Procedure

In the range of 0.45MHz to 30MHz the Conducted Emission was measured in accordance with ANSI C 63.4:2001. The test set-up was made according to ANSI C 63.4:2001. A 1m. x 1.5m. wooden table 80cm. high is placed 40cm. away from the vertical wall and 1.5m away from the side wall of the shielded room. Kyoritsu Model KNW-407 and KNW-242(10kHz-30MHz) 50 Ω /50uH Line-Impedance Stabilization Networks(LISNs) are bonded to the shielded room. The EUT is powered from the KNW-242 LISN and the support equipment is powered from the KNW-407 LISN. By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission. For further description of the configuration refer to the picture of the test set-up.

5.1.2 List of Test and Measurement Instruments

Conducted Emission				
Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
Spectrum Analyzer	E4411B	US41062735	Agilent Technologies	2003.04
RFI/Field intensity Meter	KNW-2402	4N-170-3	Kyoritsu Electrical Works	2003.07
LISN	KNW-407	8-317-8	Kyoritsu Electrical Works	2003.06
LISN	KNW-242	8-654-15	Kyoritsu Electrical Works	2003.06

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5.1.3 Conducted Test Data

1) Test Data: December 24, 2002 Humidity: 35 %
Temperature: 20 °C Barometric: 993 mbar

2) Measurement uncertainty (95%, Confidence level, k=2) : +2.2dB / -2.21dB

3) Result

Frequency (MHz)	LISN Pol.	Q.P. Reading [dB μ V]	A.V Reading [dB μ V]	Final Result [dB μ V]	Q.P. Limit [dB μ V]	Margin [dB]
0.465	N	40.8	*	41.0	48.0	7.0
1.130	N	38.2	*	38.7	48.0	9.3
1.863	N	39.7	*	40.1	48.0	7.9
2.061	N	37.3	*	37.7	48.0	10.3
4.327	N	37.7	*	38.2	48.0	9.8
6.783	N	40.6	*	41.9	48.0	6.1
0.465	L1	39.8	*	40.0	48.0	8.0
1.197	L1	38.2	*	38.7	48.0	9.3
1.728	L1	36.6	*	37.0	48.0	11.0
2.460	L1	37.0	*	37.5	48.0	10.5
3.993	L1	39.1	*	39.6	48.0	8.4
6.788	L1	40.2	*	41.2	48.0	6.8

Table 1: Conducted Test Data

NOTES:

1. All modes of operation were investigated and the worst-case emissions are reported.
2. L1 = Phase; N = Neutral
3. See "APPENDIX 1 Conducted measurement Graph"
4. Margin = Q.P. Limit - Q.P. Result
5. Measurement Data's kept in DIGITAL EMC.
6. Result = Cable loss + insertion loss + Reading value
7. If the amplitude measured in the quasi-peak mode is at least 6dB higher than the amplitude measured in the average mode, the level measured in the quasi-peak mode may be reduced by 13dB before comparing it to the limit.

5.2 Electromagnetic Radiation Disturbance

RESULT :

Pass

5.2.1 Measurement Procedure

In the range of 30MHz to 1GHz the Electric Field strength was measured in accordance with ANSI C 63.4:2001. The test set-up was made according to ANSI C 63.4:2001.

On open test site, which allows a 3m-distance measurement. The EUT was placed in the center of a wooden turntable. The height of this table was 0.8m. The measurement was conducted with both horizontal and vertical antenna polarization (high:1-4m). The turntable has been fully rotated. The highest radiation of the equipment has been recorded. By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission. For further description of the configuration refer to the picture of the test set-up.

5.2.2 List of Test and Measurement Instruments

Radiated Emission (OATS)				
Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
RFI/Field intensity Meter	KNM-504D	4N-161-4	Kyoritsu Electrical Work	2003.07
Frequency Converter	KCV-604C	4-230-3	Kyoritsu Electrical Work	2003.07
Spectrum Analyzer	E4404B	US41061134	Agilent	2003.04
BICONICAL ANT.	VHA9103	VHA91031946	SCHWARZBECK	2003.10
LOG-PERIODIC ANT.	UHALP9108-A1	1098	SCHWARZBECK	2003.10
Amplifier (25dB)	8447D	2944A10144	Agilent	2003.04
Position Controller	5902T2	14173	TOKIN	N/A
DRIVER	5902T2	14174	TOKIN	N/A
SWITCH	MP59B	6100097292	ANRITSU	N/A
Radiated Emission (ANECHOIC CHAMBER-PRE TESTING)				
Spectrum Analyzer	E4404B	US41061134	Agilent	2003.11
Amplifier (25dB)	8447D	2443A03690	Agilent	2003.04
BICONICAL ANT.	VHA9103	VHA91031946	SCHWARZBECK	2003.10
LOG-PERIODIC ANT.	UHALP9108-A1	1098	SCHWARZBECK	2003.10
CONTROLLER	5900	N/A	TOKIN	N/A

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5.2.3 Radiated Test Data

1) Test Data: December 24, 2002 Humidity: 35 %
Temperature: 20 °C Barometric: 993 mbar

2) Measurement uncertainty(95%, Confidence level, k=2) : +3.42dB / -4.14dB

3) Result

Frequency [MHz]	ANT Pol.	Reading [dB μ V]	T.F [dB(1/m)]	Results [dB μ V/m]	Limits [dB μ V/m]	Margin [dB]
32.43	V	46.00	-10.59	35.4	40.0	4.6
63.95	V	50.01	-19.66	30.3	40.0	9.7
73.65	V	52.50	-20.26	32.2	40.0	7.8
225.82	V	40.50	-6.46	34.0	46.0	12.0
524.70	V	36.99	-3.34	33.6	46.0	12.4
987.87	V	39.00	5.61	44.6	54.0	9.4
73.65	H	51.50	-20.26	31.2	40.0	8.8
209.45	H	39.50	-7.12	32.4	43.5	11.1
216.73	H	43.49	-6.81	36.7	46.0	9.3
225.82	H	44.00	-6.46	37.5	46.0	8.5
236.12	H	43.49	-6.07	37.4	46.0	8.6
879.65	H	36.00	1.47	37.5	46.0	8.5

- No values due to local oscillator less than 20dB for the limit was measured during radiated disturbance.
- Measurements above 1GHz is performed using a minimum resolution bandwidth of 1MHz.
- The EUT was tested up to the 10th(1.5GHz) and no significant emission was found.

Table 2 : Radiated Test Data

NOTES:

1. All modes of operation were investigated and the worst-case emissions are reported.
2. H = Horizontal; V = Vertical
3. Margin = Limit - Result
4. T.F : Correction Factors(Cable loss + Antenna factor) - AMP Gain
5. Measurement Data's kept in DIGITAL EMC
6. Sample calculation ;

At Frequency : 32.43MHz

Result = Reading + T.F.=46.00 + (-10.59) = 35.4[dB μ V/m]

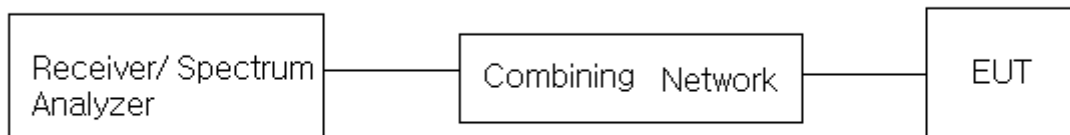
5.3 Antenna-Conducted Power Measurements

RESULT :

Pass

5.3.1 Measurement Procedure

Power on the receive antenna terminals was to be determined by measurement of the voltage Present at these terminals. Antenna-conducted power measurements was performed with the EUT antenna terminals connected directly to measuring instrument (RFI/Field intensity Meter & Frequency Converter) using a impedance-Matching network to connect the measurement Instrument to the antenna terminals of the EUT. Losses in decibels in impedance-matching network used was added to the measured values in dBuV. With the receiver tuned to one of the number of frequency and voltage present at the antenna input terminals over the frequency range specified in the individual equipment requirements, The measurements was repeated with the receiver tuned to another frequency until the number of frequencies had been successively measured. Power in the receive antenna terminals in the ratio of V^2 / R , where V is the loss-corrected voltage measured at the antenna terminals, and R is the impedance of the measuring instrument.



Test Block diagram

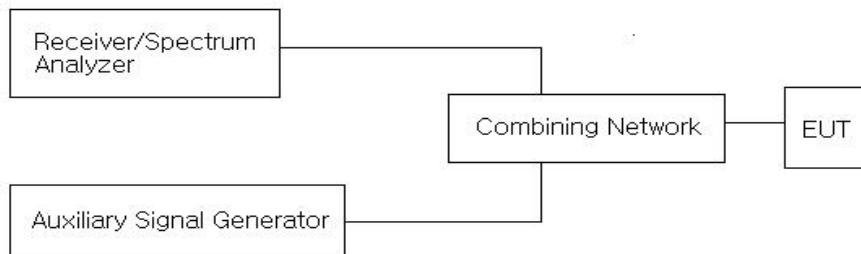
5.4 .Output-Conducted Level Measurements

RESULT :

Pass

5.4.1 Measurement Procedure

The output signal level was the maximum voltage level present at the output terminal of EUT On a particular frequency during normal use. Measurement was made of the levels of the aural carrier, visual carrier and all spurious emissions. Measurement was made by direct connection to the measuring instrument (RFI/Field intensity Meter & Frequency Converter) with Proper impedance matching between the measuring instrument and the EUT. Losses in decibels in impedance-matching network used was added to the measured values in dBuV. The cable was supported between the EUT and the measuring instrument in a straight horizontal line so it had at least 75cm clearance from any conducting surface. The EUT was provided with a typical signal consistent with normal operation. For each channel on which the EUT operated the level the video carrier, audio carrier, the spurious emissions over the Frequency range measured and recorded.



Test Block diagram

5.4.2 List of Test and Measurement Instruments

Output-Conducted Level Emission				
Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
RFI/Field intensity Meter	KNM-504D	4N-161-4	Kyoritsu Electrical Work	2003.07
Frequency Converter	KCV-604C	4-230-3	Kyoritsu Electrical Work	2003.07
Spectrum Analyzer	E4404B	US41061134	Agilent	2003.04
SWITCH	MP59B	6100097292	ANRITSU	N/A
Matching PAD	932A	53932	Eiden Co.,Ltd.	2003.08

- # DIGITAL EMC CO., LTD.

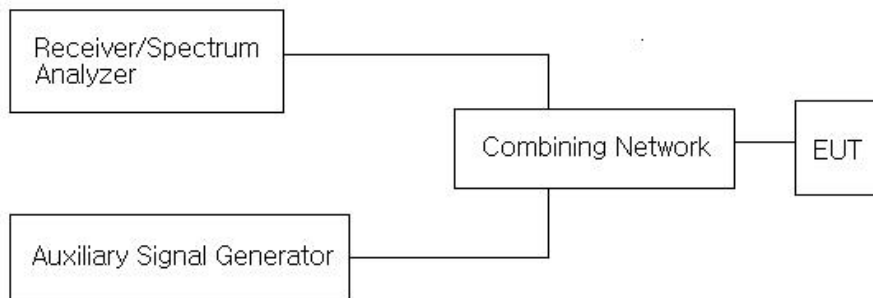
5.5 Antenna Transfer Switch Measurements

RESULT :

Pass

5.5.1 Measurement Procedure

Isolation was measured for all positions of an antenna transfer switch on all output channels of The EUT. TV interface device transfer switch is isolation is the difference the levels of a signal Going into one antenna input port of the switch and that of the same signal coming out of Another antenna terminal of the transfer switch. The isolation of an antenna transfer switch Equipped with coaxial connectors was performed by measuring the maximum voltage of the Visual carrier. Using an impedance-matching device, the length of coaxial cable was connected between the antenna terminal of the switch and the measuring instrument (RFI/Field intensity Meter & Frequency Converter). The measuring instrument was tuned to the output channel of the EUT in peak mode and the voltage levels was measured and recorded.



Test Block diagram

5.5.2 List of Test and Measurement Instruments

Antenna Transfer Switch Emission				
Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
RFI/Field intensity Meter	KNM-504D	4N-161-4	Kyoritsu Electrical Work	2003.07
Frequency Converter	KCV-604C	4-230-3	Kyoritsu Electrical Work	2003.07
Spectrum Analyzer	E4404B	US41061134	Agilent	2003.04
SWITCH	MP59B	6100097292	ANRITSU	N/A
Matching PAD	932A	53932	Eiden Co.,Ltd.	2003.08

- # DIGITAL EMC CO., LTD.

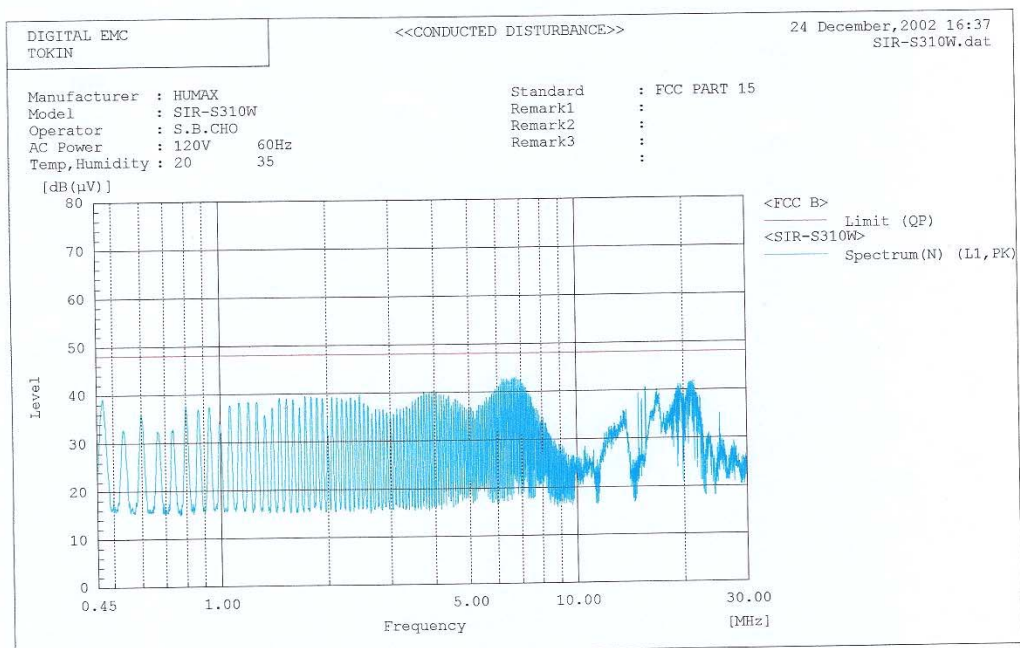
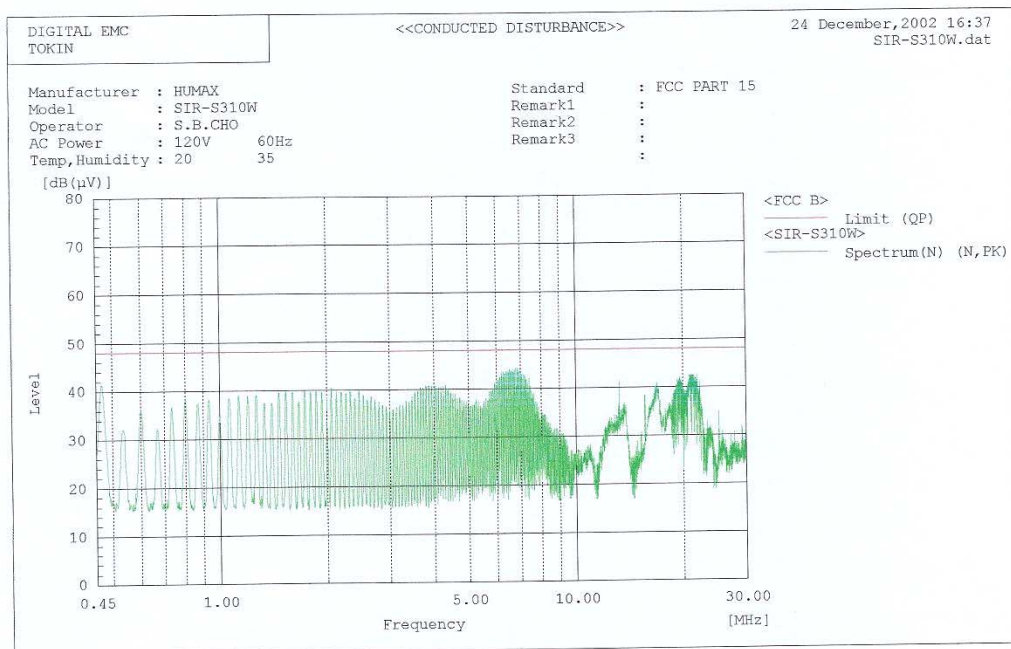


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APPENDIX 1

CONDUCTED MEASUREMENT GRAPH





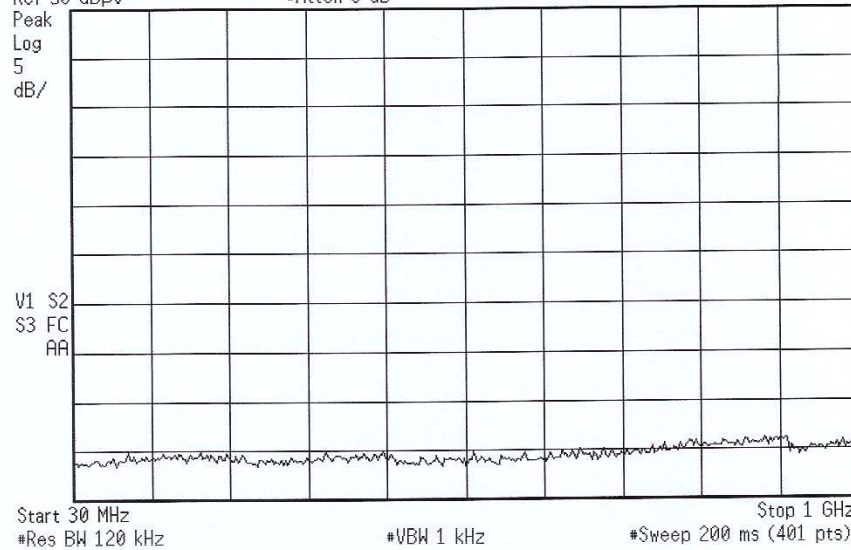
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APPENDIX 2 ANT. TRANSFER SWITCH MEASUREMENT GRAPH

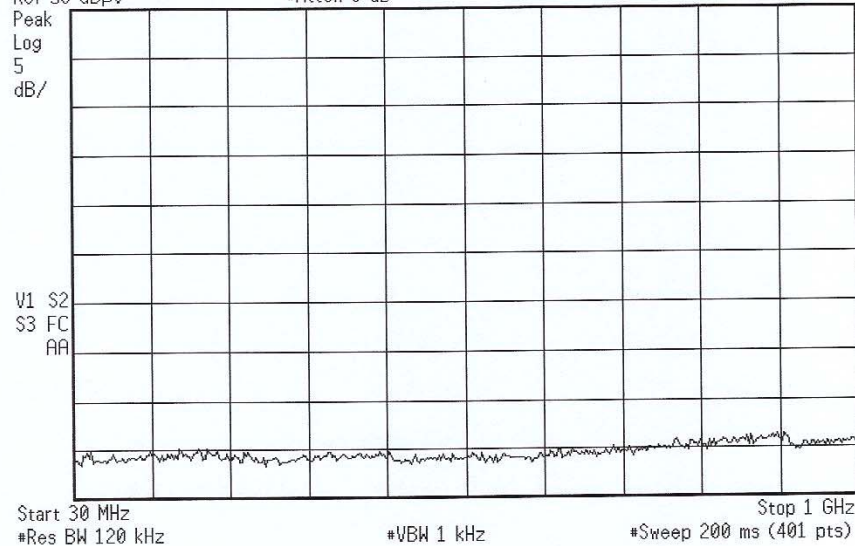
* Agilent 19:36:03 Dec 26, 2002

ANT.Transfer Switch Measurement(CH3)
Ref 50 dB μ V #Atten 0 dB



* Agilent 19:36:40 Dec 26, 2002

ANT.Transfer Switch Measurement(CH4)
Ref 50 dB μ V #Atten 0 dB





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APPENDIX 3 OUTPUT CONDUCTED LEVEL MEASUREMENT GRAPH

* Agilent 19:30:58 Dec 26, 2002

Output Conducted level(CH3)

Ref 70 dBμV

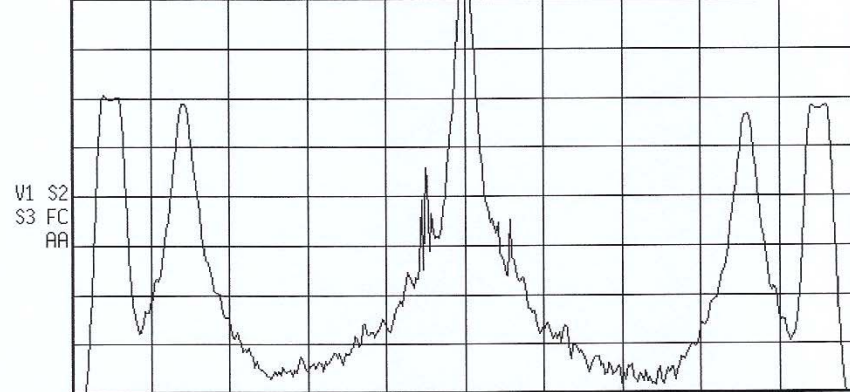
*Atten 0 dB

Peak

Log

5

dB/



Center 61.23 MHz

*Res BW 120 kHz

VBW 300 kHz

Span 10 MHz

*Sweep 200 ms (401 pts)

* Agilent 19:31:44 Dec 26, 2002

Output Conducted level(CH4)

Ref 70 dBμV

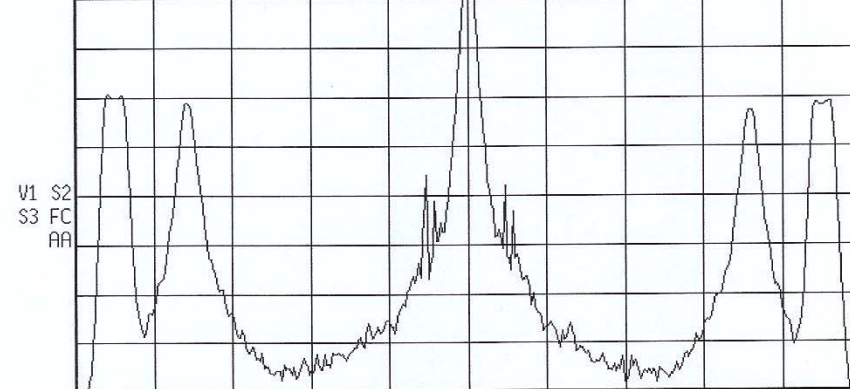
*Atten 0 dB

Peak

Log

5

dB/



Center 67.23 MHz

*Res BW 120 kHz

VBW 300 kHz

Span 10 MHz

*Sweep 200 ms (401 pts)