EMI TEST REPORT

Test report No. : ERI-FCC-0140

Type of equipment : Digital Video Recorder

Model name : SHR-5016

Applicant : KODICOM Co.,Ltd.

Test standards : FCC Part 15 Subpart B (Class B)

Test Procedure and Items :

- AC Power line Conducted emissions measurement : ANSI C63.4-1992
- Radiated emissions measurement : ANSI C63.4-1992

Test result : Pass

This equipment has been tested to comply with the requirements of FCC Rules and Regulations Part 15 Subpart B unintentional Radiators. The results in this report apply only to the sample tested.
This test report shall not be reproduced except in full, without the written approval of ERI Laboratory.

Date of test: 2002. 8. 19 8. 28 **Issued date:** 2002. 8. 29

Tested by : SEJIN, O

Approved by: SANG-KYU, LEE

Contents

Attached : Conducted emission graph

1. Client information

Applicant / Manufacturer	: KODICOM Co., Ltd.
Address	: 5th floor, A Dong, SK Twin Tower, 345-9, Gasan Dong, Gumchon-Ku, Seoul, Korea
Telephone number	: + 82-2-529-5768
Facsimile number	: + 82-2-579-8419

2. Laboratory information

Address

The open area test site and EMC facilities are used for these testing.
This facility was accredited by KOLAS, EK of Korea, MIC, FCC.

EMC RESEARCH INSTITUTE .
66-6, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA

Telephone Number : 82- 31- 336- 1186
Facsimile Number : 82- 31- 336 -1184

KOLAS No. : 111
EK : J
MIC : KR0030
FCC Filing No. : 302567

3. TEST SYSTEM CONFIGURATION

3.1 Operation environment

	Temperature	Humidity	Pressure
10m Chamber :	21.0 °C	52 %	-
Shielded room :	24.0 °C	58 %	998hPa

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, specifically in field of EMC.
The factors contributing to uncertainties are test receiver, Cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna Frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability.

Based on NIS 80,81, The measurement uncertainty level with a 95% confidence level were applied.

3.3 Sample calculation

Conducted emission

The field strength is calculated by adding the LISN factor, cable loss from the measured reading.
The sample calculation is as follows :

FS = MR + LF + CL
MR = Meter Reading
LF = LISN Factor
CL = Cable Loss

If MR is 30dB, LISN Factor 1dB, CL 1dB
The result (MR) is
30 + 1 + 1 = 32dBuV

Radiated emission

The field strength is calculated by adding the antenna Factor, cable loss and, Antenna pad subtracting the amplifier gain from the measured reading.
The sample calculation is as follows :

FS = MR + AF + CL + AT -AG

MR = Meter Reading
AF = Antenna Factor
CL = Cable Loss
AT = Antenna Pad
AG=Amplifier Gain

If MR is 30dB, AF 12dB, CL 5dB, AP 10dB, AG 35dB
The result (MR) is

30 + 12 + 5 + 10 –35 = 22dBuV/m

4. Description of EUT

4.1 Product description

Type of product :	Digital Video Recorder
Basic model No. :	SHR-5016
Serial No. :	N/A
Electric rating :	AC 100~120V, 5A, 200~240V, 3A
General description :	This EUT(Equipment under test) is digital video recorder.

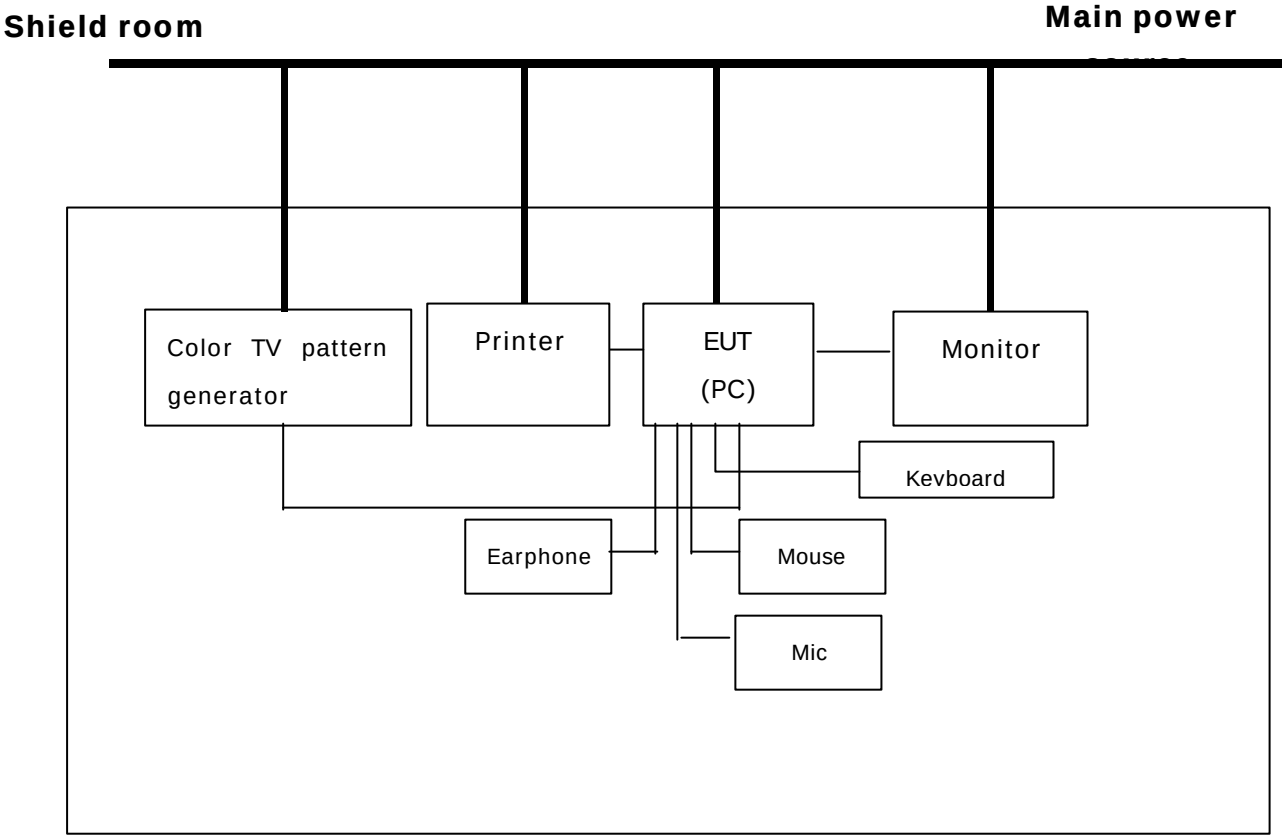
4.2 Peripherals

Description	Manufacturer	Model / Part #	Serial No
Mouse	N/A	SWW-35	N/A
Keyboard	Samsung Electro-Machanics Co., Ltd.	SEM0DT35	27007087
Monitor	Samsung electronics Co., Ltd.	CDP15S	P041H8WKA17397
Printer	HP	C6427A	CN13V1B1SZ
Color TV pattern generator	PHILIPS	PM5418TDSI	LD642864
Earphone	N/A	N/A	N/A
Mic	N/A	N/A	N/A

4.3 Used cables

Cable type	Shield	Length (meters)	Connector	Connection point 1
Video in 1	No	3.0	BNC	Color TV pattern generator
Video in 2~10	No	1.0	BNC	Open
Mouse	No	1.0	-	Mouse
Keyboard	No	1.0	-	Keyboard
USB port	Yes	1.0	USB	Open
Printer	No	1.0	D-SUB	Printer
Comm port	No	0.5	D-SUB	EUT

4.4 EUT Test configuration



4.5 Operating conditions

Operating : Normal operating mode

- The system was configured in typical fashion (as a customer would normally use it) for testing.
- The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

5. TEST RESULTS

5.1 Conducted emission

5.1.1 Measurement procedure

Mains

The measurements were performed in a shielded room.
EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.
The rear of tabletop was located 0.4m to the vertical conducted plane.
All other surfaces of tabletop was at least 0.8m from any other grounded conducting surface.
I/O cables and AC cables that were connected to the peripherals were bundled in center.
They were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane.
Each EUT power lead, except ground (safety) lead, were individually connected through a LISN to input power source.
Both lines of power cord, hot and neutral, were measured.

5.1.2 Used equipment

Equipment	Model	Serial No.	Makers	Next Cal.Date	Used
Test receiver	ESCS30	100022	R&S	2003. 3. 25	x
L.I.S.N.	ESH3-Z5	827246/008	R&S	2003. 3. 12	x
	ESH3-Z5	831887/018	R&S	2003. 3. 12	x
Shield room	8 × 6 × 3.3m/H	-	Daehan shield Engineering	-	x

5.1.3 Measurement uncertainty

Conducted emission measurement : ± 2.4 (K=2)

5.1.4 Test data

Frequency	Tested	LISN	Meter		Limits	
Range	Freq.	Pol.	Reading			
			QP	AV	QP	AV
[MHz]	[MHz]		[dBuV]		[dBuV]	
0.15 - 0.5(MHz)	0.150	H	39.60	35.90	66.00	56.00
	0.195	N	51.70	44.70	63.80	53.80
	0.261	H	42.90	41.00	61.40	51.40
	0.327	H	45.00	39.70	59.50	49.50
	0.459	N	40.90	39.20	56.70	46.70
0.5-5 (MHz)	0.624	H	39.70	36.70	56.00	46.00
	0.753	H	39.40	36.10	56.00	46.00
	0.885	H	39.40	35.70	56.00	46.00
	1.017	H	38.80	35.40	56.00	46.00
5-30 (MHz)	25.180	N	38.10	35.50	60.00	50.00

* <5 : mean less than 5dB

* Loss = LISN insertion Loss + Cable Loss

Attached < Conducted emission test graph >

5.1.5 Test result

Pass

5.2 Radiated emission

5.2.1 Measurement procedure

A pretest was performed at 3m distance in an semi-anechoic chamber for searching correct frequency.
The final test was done at a 10m open area test site with a quasi-peak detector.
EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.
Cables connected to EUT were fixed to cause maximum emission.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

5.2.2 Used equipment

Equipment	Model No.	Serial No.	Makers	Next Cal Date	Used
Test receiver	ESMI	826210/007	R&S	2003. 3. 8	
	ESCS30	830986/015	R&S	2003. 3.18	x
Biconnical antenna	VHA9103	1950	Schwarzbeck	2003. 4. 17	x
Log-Periodic antenna	UHALP9108-A1	0393	Schwarzbeck	2003. 4. 17	x
Antenna Mast	MA240	N/A	HD	-	x
Turn Table	DT430S	N/A	HD	-	x
Test site	10m chamber	-	Daetong	-	
	3m chamber	-	Daetong	-	x

5.2.3 Measurement uncertainty

Radiated emission measurement

30-300MHz +3.96dB / -4.04dB
300-1000MHz +3.04dB / -3.00dB

5.2.4 Test data

Frequency Range [MHz]	Tested Frequency [MHz]	ANT Pol.	Meter Reading [A] [dBuV/m]	Total Loss [B] [dB]	Results [A+B] [dBuV/m]	Margine	Limits [dBuV/m]
30 - 88	67.10	H	26.80	8.19	34.99	5.01	**40**
88-216	134.21	H	20.10	16.06	36.16	7.34	**43.5**
	167.70	H	20.40	18.20	38.60	4.9	
216-960	233.20	H	16.70	19.90	36.60	9.4	**46.0**
	258.20	H	17.30	20.55	37.85	8.15	
	287.90	H	15.20	21.95	37.15	8.85	
	302.82	H	15.10	17.40	32.50	13.5	
	608.42	V	13.60	24.00	37.60	8.4	
	626.51	V	14.80	24.00	38.80	7.2	
	672.12	H	17.10	24.70	41.80	4.2	
	768.14	V	16.20	25.98	42.18	3.82	
	810.75	H	11.20	26.94	38.14	7.86	
	938.24	H	10.20	28.26	38.46	7.54	
960-above							**54.0**

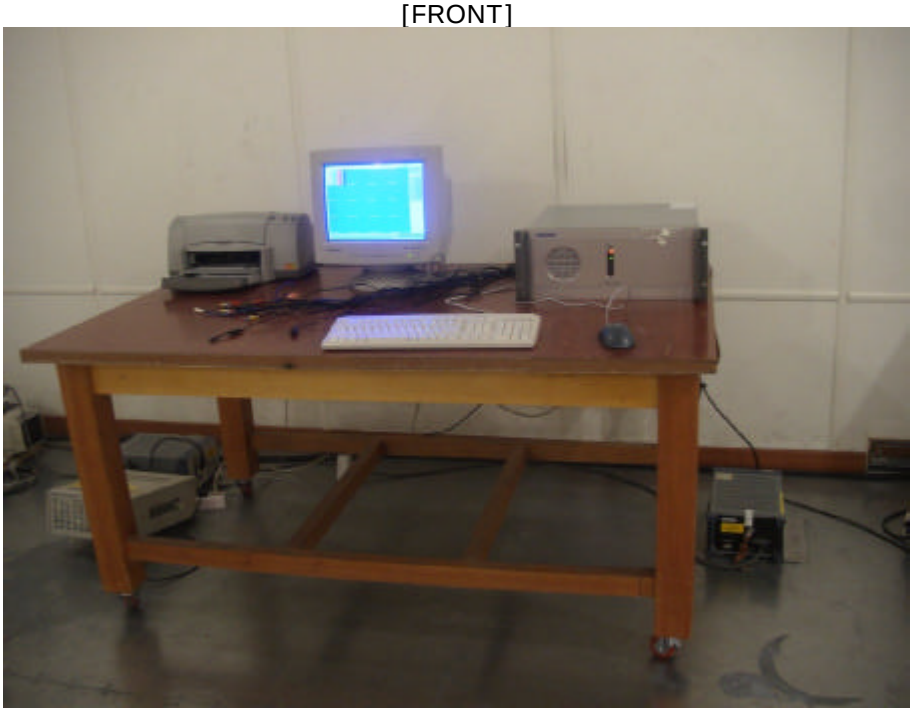
5.2.5 Test result

Pass

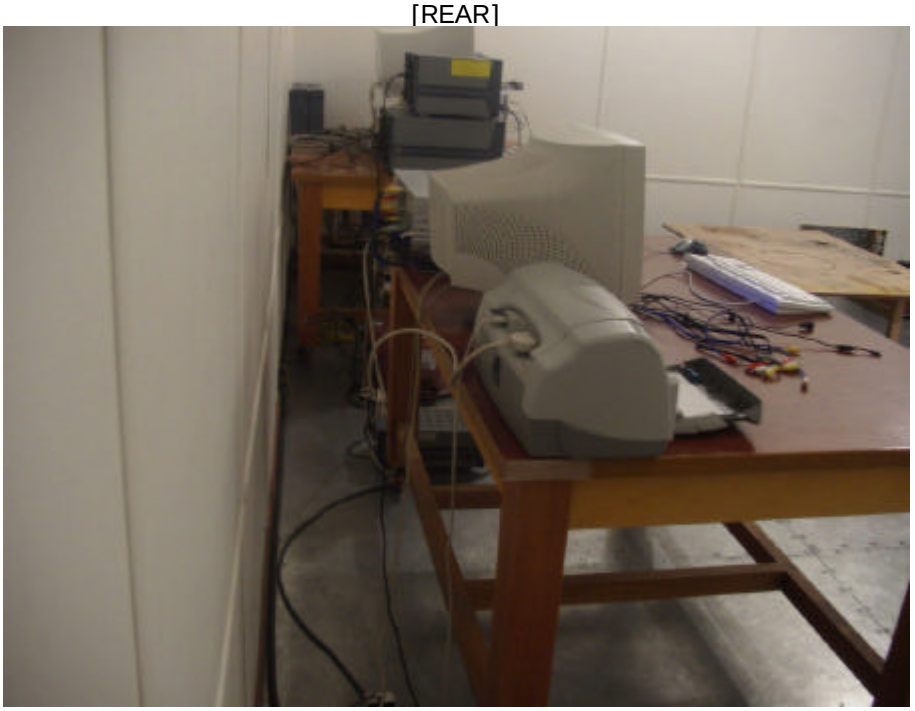
6. TEST PHOTOGRAPHS

Conducted emission

[FRONT]

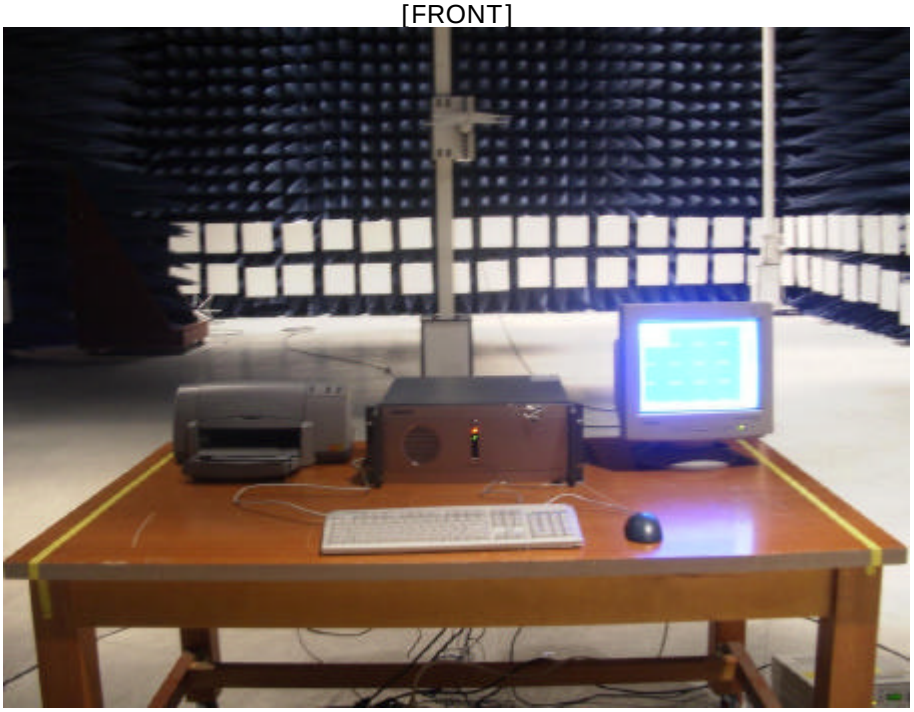


[REAR]

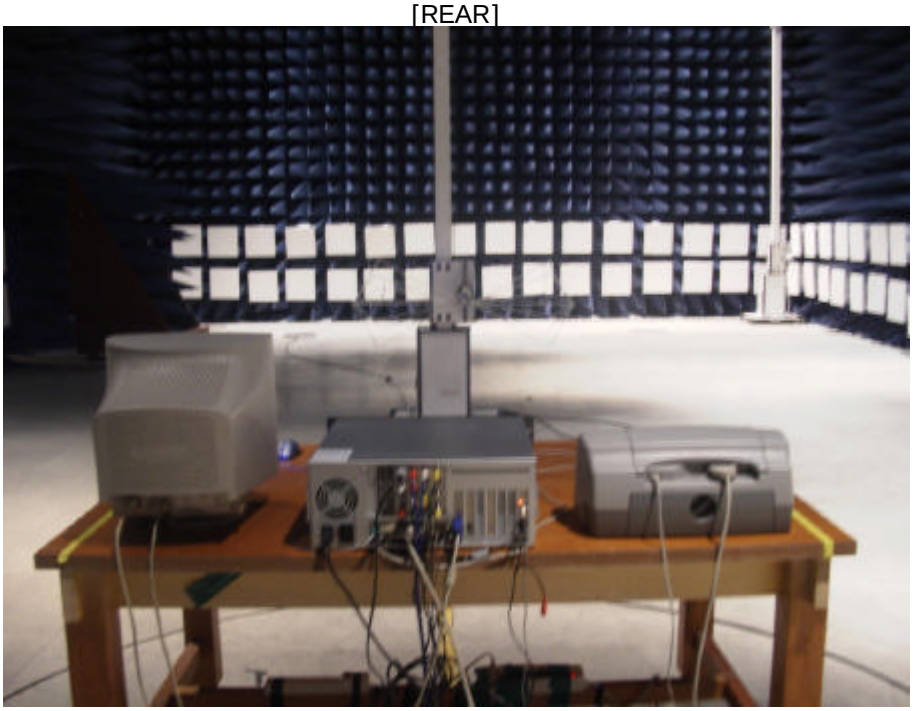


Radiated emission

[FRONT]



[REAR]

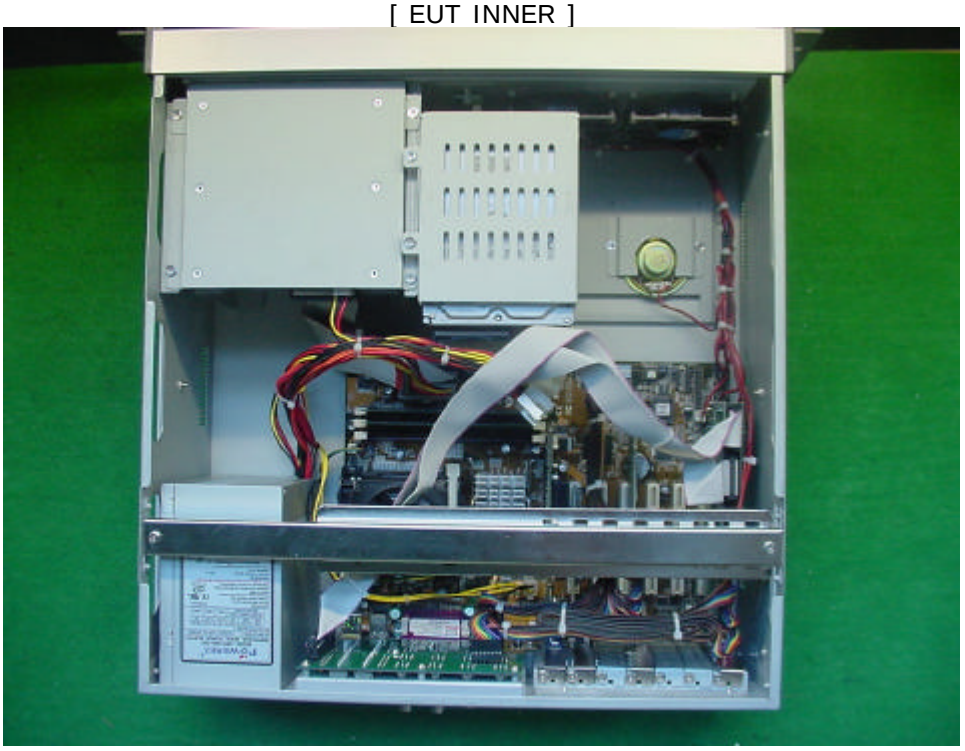


EUT(equipment under test)

[EUT FRONT]

[EUT REAR]

[EUT INNER]

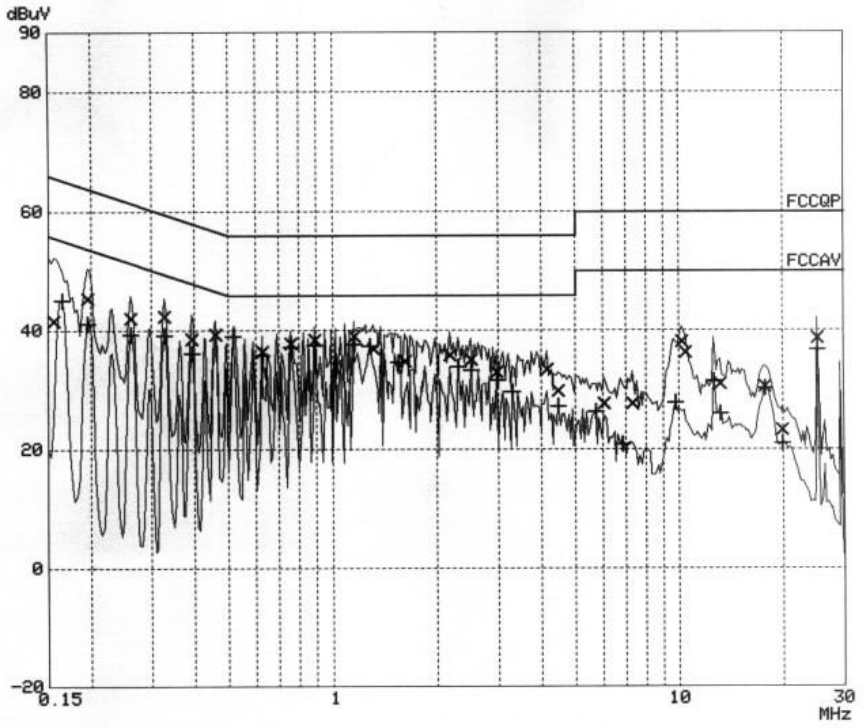


EUT: SHR-5016
Op Cond: N
Test Spec:
Date: 19. Aug 02 14:15

Scan Settings (2 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	3M	3k	9k	PK+AV	20ms	AUTO LN	ON
3M	30M	10k	9k	PK+AV	10ms	AUTO LN	ON

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 50dB



EUT: SHR-5016
Op Cond: H
Test Spec:
Date: 19. Aug 02 14:05

Scan Settings (2 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	3M	3k	9k	PK+AV	20ms	AUTO LN	ON
3M	30M	10k	9k	PK+AV	10ms	AUTO LN	ON

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 50dB