

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

Test Report No. : E05NR-052

Applicant : Irumtek Co., Ltd.

Address : 3rd Floor, Daemyung Bldg., 274-2, Yatap3-Dong, Bundang-Gu, Seongnam, Kyunggi-Do, Korea

Manufacturer : Hengdi Digital Technology(Shenzhen) Co., Ltd.

Address : BldgA, Royal Ind Zone, ZangqiRoad, Palao Village, Kukeng, Guanlan Town, Bao'an Dist, Shenzhen City, China, PRC.

Type of Equipment : Digital Satellite Receiver (TV INTERFACE DEVICE)

FCC ID : TRYFS8080U

Model Name : FS-8080U

Multiple Model Name : F-8080U

Serial number : N/A

Total page of Report : 17 pages (including this page)

Date of Incoming : October 25, 2005

Date of Issuing : November 16, 2005

SUMMARY

The equipment complies with the requirements of **FCC CFR 47 PART 15 SUBPART B, Class B**.

This test report contains only the results of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

Prepared by:


Young-Min, Choi / Project Engineer
EMC Div.
ONETECH Corp.

Reviewed by:


Y. K. Kwon / Director
EMC Div.
ONETECH Corp.

It should not be reproduced except in full, without the written approval of ONETECH.

FCC-003 (Rev.0)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea
(TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

CONTENTS

	Page
1. VERIFICATION OF COMPLIANCE.....	4
2. GENERAL INFORMATION.....	5
2.1 PRODUCT DESCRIPTION.....	5
2.2 MODEL DIFFERENCES:	5
2.3 RELATED SUBMITTAL(S) / GRANT(S)	5
2.4 TEST SYSTEM DETAILS	5
2.5 TEST METHODOLOGY	5
2.6 TEST FACILITY.....	5
3. SYSTEM TEST CONFIGURATION.....	6
3.1 JUSTIFICATION	6
3.2 EUT EXERCISE SOFTWARE.....	6
3.3 CABLE DESCRIPTION	6
3.4 NOISE SUPPRESSION PARTS ON CABLE	6
3.5 EQUIPMENT MODIFICATIONS	6
3.6 CONFIGURATION OF TEST SYSTEM	7
3.6.1 Line Conducted Test.....	7
3.6.2 Radiated Emission Test	7
3.6.3 Output Signal Level Test	7
3.6.4 Output Terminal Conducted Spurious Emission test.....	7
3.6.5 Transfer Switch Isolation Test	8
4. PRELIMINARY TEST	8
4.1 AC POWER LINE CONDUCTED EMISSION TEST	8
4.2 RADIATED EMISSIONS TESTS.....	8
5. FINAL RESULT OF MEASURMENT	9
5.1 CONDUCTED EMISSION TEST	9
5.2 RADIATED EMISSION TEST	11
5.3. ANTENNA POWER CONDUCTION DATA.....	12
5.4 OUTPUT TERMINAL SIGNAL LEVEL TEST	13
5.5 OUTPUT TERMINAL CONDUCTED SPURIOUS EMISSIONS TEST	14

5.6 TRANSFER SWITCH ISOLATION TEST	15
6. FIELD STRENGTH CALCULATION.....	16
7. LIST OF TEST EQUIPMENT	17

1. VERIFICATION OF COMPLIANCE

- . APPLICANT : Irumtek Co., Ltd.
- . ADDRESS : 3rd Floor, Daemyung Bldg., 274-2, Yatap3-Dong, Bundang-Gu, Seongnam,
Kyunggi-Do, Korea
- . CONTACT PERSON : Mr. Jeffrey / CTO
- . TELEPHONE NO : +82-31-702-6991
- . FCC ID : TRYFS8080U
- . MODEL NAME : FS-8080U
- . BRAND NAME : MvisionE+
- . SERIAL NUMBER : N/A
- . DATE : November 16, 2005

EQUIPMENT CLASS	HID – Part 15 TV INTERFACE DEVICE
E.U.T. DESCRIPTION	Digital Satellite Receiver - Unintentional Radiator
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4: 2003
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15, SECTION 15.101
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

- This device has shown compliance with the conducted emissions limits in 15.107 adopted under FCC 02-107 (ET Docket 98-80). The device may be marketed after July 11, 2005 affected by the 15.37(j) transition provisions.
- The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The Irumtek Co., Ltd., Model FS-8080U (referred to as the EUT in this report) is a Digital Satellite Receiver. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Metal
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	27 MHz on the Main Board, 11.0592 MHz on the CPU Board
NUMBER OF LAYERS	2Layers: Main Board and Front Board, 1 Layer: SMPS Board
ELECTRICAL RATING	AC 90-240V, 50/60Hz, Max. 35W
TUNER M/N / MFR	HXF-S / SHARP
EXTERNAL TERMINALS	Tuner, RF-Modulator, Video Out, Audio Out, YUV Out, S-Video, AC3, RS-232C

2.2 Model Differences:

The difference(s) compared to the EUT is as follows:

	Model Name	Model Differences
Basic Model	FS-8080U	-
Multiple Model	F-8080U	This model is identical to basic mode, but the smart card board is not included.

2.3 Related Submittal(s) / Grant(s)

- Original submittal only

2.4 Test System Details

The model numbers for all the equipments that were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
FS-8080U	Hengdi Digital Technology(Shenzhen) Co., Ltd.	TRYFS8080U	Digital Satellite Receiver (EUT)	-
LT201CB	KTV Global	DoC	LCD TV	EUT

2.5 Test Methodology

The measurement for radiated emission, line conducted emission, output signal level, output terminal conducted spurious emission and transfer switch isolation tests were performed in accordance with the procedures described in ANSI C63.4: 2003. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on April 04, 2003. (Registration Number: 340658)

It should not be reproduced except in full, without the written approval of ONETECH.

FCC-003 (Rev.0)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea
(TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	N/A	FTA-M	N/A
Front Board	N/A	FTS-FPZ-F	N/A
SMPS Board	N/A	EV-P25W	N/A
SMART Card Board	N/A	FP3-CA	N/A

3.2 EUT exercise Software

The EUT was received satellite signal from dish antenna and then the signals were transmitted to a LCD TV using the audio/video cables and other cables were terminated with resistance load.

During the test, each channel 3 & 4 was tested, but the worst emissions were recorded in this report.

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
Digital Satellite Receiver	N	N	1.5(P), 1.5(D)
LCD TV	N	N	1.5(P), 1.5(D)

* The marked "(P)" means the Power Cable and "D" means the I/O Cable.

3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
Digital Satellite Receiver	N	N/A	-	-
LCD TV	N	N/A	Y	BOTH END

3.5 Equipment Modifications

- None

3.6 Configuration of Test System

3.6.1 Line Conducted Test

The EUT was connected to LISN, all supporting equipment were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2003 7.2.3 to determine the worse operating conditions.

3.6.2 Radiated Emission Test

Preliminary radiated emission test was conducted using the procedure in ANSI C63.4: 2003 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3 meters open area test site.

3.6.3 Output Signal Level Test

The output voltage of video carrier frequency at the RF-output terminal of the EUT was measured at 3 and 4 channel connecting directly to a spectrum analyzer with 50ohm input impedance via 75-to-50ohm matching pad. Indicated voltage on screen of measuring instrument was converted to the voltage of 75ohm system.

Data conversion method is as follows.

$$V_{75}[\mu V] = 10^{(V_r + CF)/20}[\mu V]$$

here, V_{75} : Voltage at the RF-out terminal of 75ohm in μV ,

V_r : Voltage read at analyzer with 50ohm input-impedance in μV ,

CF : Conversion Factor of the matching pad in dB.

3.6.4 Output Terminal Conducted Spurious Emission test

Any other spectrum at RF-output terminal appearing on frequencies removed by more than 4.6 MHz below or 7.4 MHz above the video carrier frequency of EUT was searched at 3 and 4 channel.

Data conversion method is as follows.

$$V_{75}[\mu V] = 10^{(V_r + CF + AT)/20}[\mu V]$$

here, V_{75} : Voltage at the RF-out terminal of 75ohm in μV ,

V_r : Voltage read at analyzer with 50ohm input-impedance in μV ,

CF : Conversion Factor of the matching pad in dB,

AT : Attenuation of attenuator in dB.

3.6.5 Transfer Switch Isolation Test

As a transfer switch was equipped with EUT as an antenna-in, measurement of isolation were made at RF-input terminal with rated input impedance.

The maximum voltage of video carrier frequency of the EUT at the antenna input (RF-in) terminal of the switch was measured for both channels.

Data conversion method is as follows.

$$V_{75}[\text{uV}] = 10^{(V_r + CF - PG + AT)/20}[\text{uV}]$$

here,

V_{75} : Voltage at the RF-out terminal of 75ohm in uV,

V_r : Voltage read at analyzer with 50ohm input-impedance in dBuV,

CF : Conversion Factor of the matching pad in dB,

PG : Gain of pre-amplifier in dB,

AT: Attenuation of attenuator in dB.

4. PRELIMINARY TEST**4.1 AC Power line Conducted Emission Test**

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
CH. 3	X
CH. 4	

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated.

Operation Mode	The Worse operating condition (Please check one only)
CH. 3	X
CH. 4	

5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level

5.1 Conducted Emission Test

Humidity Level	: <u>48 %</u>	Temperature: <u>21 °C</u>
Limits apply to	: <u>FCC CFR 47, PART 15, SUBPART B, SECTION 15.107 (a)</u>	
Type of Test	: <u>CLASS B</u>	
Result	: <u>PASSED BY -3.22 dB at 4.94 MHz under average mode</u>	

EUT	: Digital Satellite Receiver		Date: October 29, 2005
Operating Condition	: CH. 3		
Detector	: CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)		

Frequency (MHz)	Line	Peak (dBuV)		Margin (dB)
		Emission level	Q.P Limits	
0.20	N	52.92	63.61	-10.69
0.40	H	52.26	57.85	-5.59
4.94	H	48.53	56.00	-7.47
5.00	N	48.20	60.00	-11.80
9.71	H	52.99	60.00	-7.01
23.00	N	47.75	60.00	-12.25
Frequency (MHz)	Line	Average (dBuV)		Margin (dB)
		Emission level	Limits	
0.20	N	39.89	53.61	-13.72
0.40	H	43.88	47.85	-3.97
4.94	H	42.78	46.00	-3.22
9.71	H	44.38	50.00	-5.62

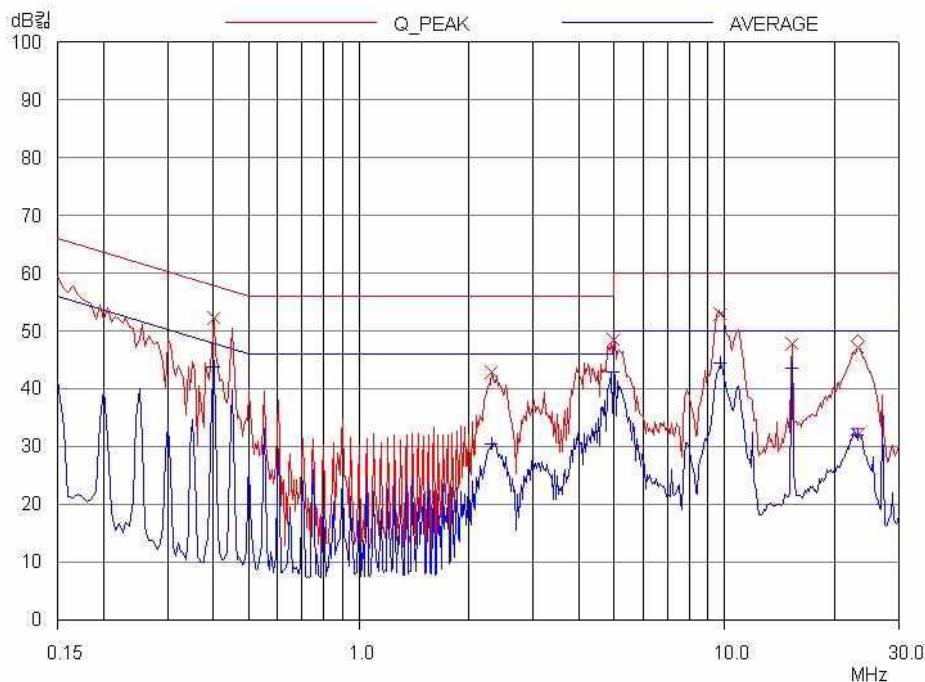
Line Conducted Emission Tabulated Data

Remark : "H": Hot Line, "N": Neutral line, "P": Peak detect

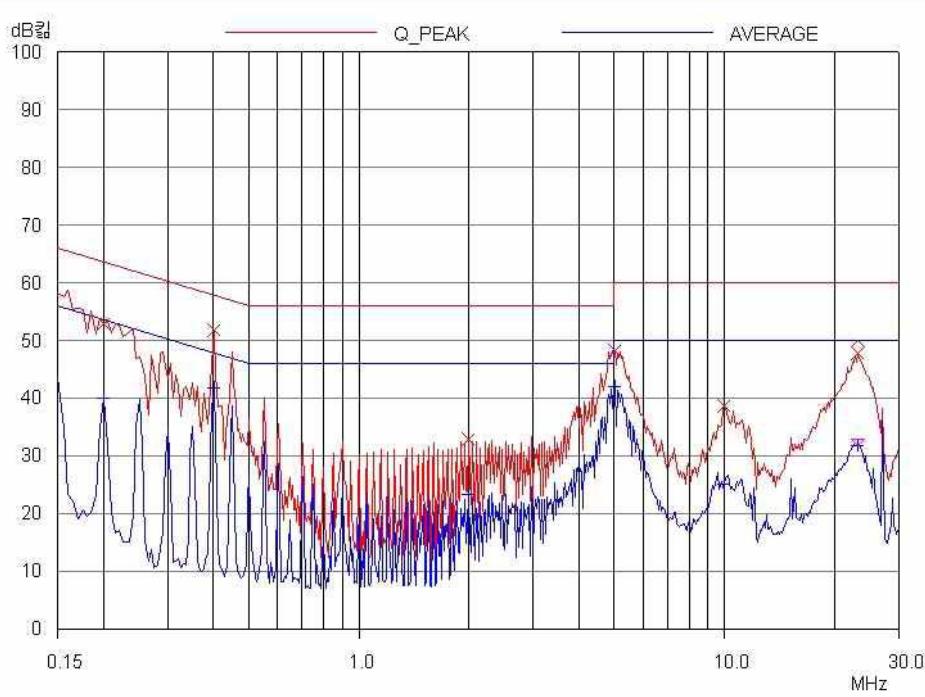
See next page for an overview sweep performed with peak detector.



Tested by: Sue-Yong, Lee / Test Engineer



HOT LINE



NEUTRAL LINE

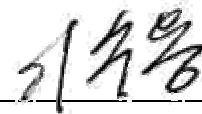
5.2 Radiated Emission Test

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level	: <u>47 %</u>	Temperature : <u>17 °C</u>
Limits apply to	: <u>FCC CFR 47, PART 15, SUBPART B, Section 15.109 (a)</u>	
Type of Test	: <u>TV INTERFACE DEVICE</u>	
Result	: <u>PASSED BY -4.28 dB at 242.99 MHz</u>	

EUT	: Digital Satellite Receiver	Date: October 31, 2005
Operating Condition	: CH. 3	
Frequency range	: 30MHz – 1000MHz	
Detector	: CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)	
Distance	: 3 Meter	

Radiated Emission		Ant	Correction Factors		Total	FCC CLASS B	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
121.46	17.20	H	13.09	2.03	32.32	43.52	-11.20
242.99	21.64	H	16.81	3.29	41.74	46.02	-4.28
315.50	17.30	H	13.93	3.92	35.15	46.02	-10.87
418.87	16.80	H	15.95	4.44	37.19	46.02	-8.83
441.60	16.10	V	16.55	4.48	37.13	46.02	-8.89
523.62	11.80	V	17.81	5.41	35.02	46.02	-11.00



Tested by: Sue-Yong, Lee / Test Engineer

5.3. Antenna Power conduction Data

This test is the power conduction test at the antenna terminal due to the local oscillator of the satellite receiver part in the EUT.

The fundamental and 2nd harmonic frequencies of the local oscillator were tested on a near top, middle and bottom tuned frequencies of the EUT according to section 15.111(a), 15.31(m) and 15.33(b)(3).

The EUT antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in section 15.33 shall not exceed 2.0 nanowatts. (2.0 nW = 50.1dBuV)

Operating Condition : Tuning the selected frequency

Detector : Span	: 10 MHz	SWP : 2 sec
RBW : 100 kHz		VBW : 300 kHz

Freq. to which tuned (MHz)	OSC. Freq (MHz)	Measured Value (dBuV)	Imp. Mat. +Ca. Loss (dB)	Total (dBuV)	Limit (dBuV)	Margin (dBuV)
950	1429.5	9.50	6.0	15.50	50.10	-34.60
955	1434.5	10.40	6.0	16.40	50.10	-33.70
960	1439.4	10.10	6.0	16.10	50.10	-34.00

*Harmonics RF Radiation

Freq. to which tuned (MHz)	Har.	OSC. Freq (MHz)	Measured Value (dBuV)	Imp. Mat. +Ca. Loss (dB)	Total (dBuV)	Limit (dBuV)	Margin (dBuV)
950	2	2859.0	-	6.0	-	50.10	-
955	2	2869.0	-	6.0	-	50.10	-
960	2	2878.8	-	6.0	-	50.10	-

Remark: There was no found any emission during the above test.

IF = 479.5MHz.



Tested by: Sue-Yong, Lee / Test Engineer

5.4 Output Terminal Signal Level Test

The following table shows that the all modes of operation and worst-case emissions were investigated

Humidity Level : 47 % Temperature : 17 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : DIGITAL SATELLITE RECEIVER Date: October 31, 2005
 Detector : Span : 10MHz SWP : 2 sec
 RBW : 100kHz VBW : 300kHz

Output Impedance of RF-Output Terminal: 75ohm

- Video signal

CH	Freq.(MHz)	Reading(dBuV)	M/P Loss(dB)	Signal Level(uV)	Limit(uV)	Margin(dB)
3	61.20	52.2	6.0	812.83	3000	-11.34
4	67.21	52.9	6.0	881.05	3000	-10.64

- Audio signal

CH	Freq.(MHz)	Reading(dBuV)	M/P Loss(dB)	Signal Level(uV)	Limit(uV)	Margin(dB)
3	56.46	35.1	6.0	113.50	671	-15.43
	65.94	37.3	6.0	146.22	671	-13.23
4	62.48	37.0	6.0	141.25	671	-13.53
	71.95	39.0	6.0	177.83	671	-11.53

MP = Impedance Matching Pad

*Sample Calculation at 61.20MHz = $10^{[(52.2 + 6.0)/20]} = 812.83\text{uV}$

*Margin [dB] = $20 \log (R/L)$ where, R : Signal Level, [uV] or [uV/m],

L : Corresponding Limit, [uV] or [uV/m].

Tested by: Sue-Yong, Lee / Test Engineer

5.5 Output Terminal Conducted Spurious Emissions Test

The following table shows that frequency range of 30MHz to 1000MHz removed by more than 4.6 MHz below or 7.4 MHz above the video carrier frequency of EUT was investigated at each channel.

Humidity Level : 47 % Temperature : 17 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : DIGITAL SATELLITE RECEIVER Date: October 31, 2005
Detector : Span : 10MHz SWP : 2 sec
RBW : 100kHz VBW : 300kHz

Output Impedance of RF-Output Terminal: 75ohm

CH.	Freq. (MHz)	Reading (dBuV)	M/P Loss (dB)	Output Level(uV)	Limit (uV)	Margin (dB)
3	121.2	16.5	6.0	13.34	95.00	-17.05
	182.3	19.0	6.0	17.78	95.00	-14.55
	304.5	9.4	6.0	5.89	95.00	-24.15
4	114.4	11.9	6.0	7.85	95.00	-21.65
	132.8	15.3	6.0	11.61	95.00	-18.25
	199.8	23.0	6.0	28.18	95.00	-10.55

* Sample Calculation at 121.2MHz = $10^{[(16.5 + 6.0)/20]} = 13.34\text{uV}$

*Margin [dB] = $20 \log (R/L)$ where, R : Output Level, [uV] or [uV/m],

L : Corresponding Limit, [uV] or [uV/m].



Tested by: Sue-Yong, Lee / Test Engineer

5.6 Transfer Switch Isolation Test

The following table shows that the maximum voltage of video carrier frequency of the EUT at the antenna input (RF-in) terminal of the switch was measured for both channels.

Humidity Level : 41 % Temperature : 20 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : DIGITAL SATELLITE RECEIVER Date: April 20, 2005
Detector : Span : 1 MHz SWP : 30 msec
RBW : 10 kHz VBW : 30 kHz

Output Impedance of RF-Output Terminal: 75ohm

CH.	Freq. (MHz)	Meter Reading (dBuV)	M/P Loss (dB)	Preamp Gain(dB)	Attn. (dB)	Signal Level (uV)	Limit (uV)	Margin (dB)
"There was no found any emission during the above test"								

Note : To clarify the emissions emanated from RF output terminal the EUT, RF pre-amplifier was utilized.

The gain of pre-amplifier at each frequency measured from the EUT was obtained after sufficient warm-up for stabilization of gain.



Tested by: Sue-Yong, Lee / Test Engineer

6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)

7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUe CAL	USE
1.	Test receiver	R/S	ESVS10	827864/005	DEC/04	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	MAY/05	12MONTH	■
3.	Spectrum analyzer	HP	8566B	3407A08547	JUL/05	12MONTH	
4.	Spectrum analyzer	HP	85680B	3001A04955	APR/05	12MONTH	■
5.	RF preselector	HP	85685A	3107A01264	APR/05	12MONTH	■
6.	Quasi-Peak Adapter	HP	8574B	2811A01432	APR/05	12MONTH	■
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 166	APR/05	12MONTH	
8.	Biconical antenna	EMCO	3110	9003-1121	FEB/05	12MONTH	
		Schwarzbeck	VHA9103	91031852	JAN/05		■
9.	Log Periodic antenna	EMCO	3146	9001-2614	FEB/05	12MONTH	
		Schwarzbeck	9108-A(494)	62281001	FEB/05		■
10.	LISN	EMCO	3825/2	9109-1867	JUL/05	12MONTH	
				9109-1869	JUL/05		■
		Schwarzbeck	NSLK 8128	8128-216	JUN/05		■
11.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
12.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
13.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■