

TDVG-H151F Test Report

Test Report No. : 4521-080304IH

REPORT FOR A TV INTERFACE DEVICE

Scope – Measurement and determination of electromagnetic emission (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

RF MODULATOR

Manufacturer : LG Innotek Co., Ltd.

Model No. : TDVG-H151F

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PART I

INTRODUCTION

TDVG-H151F Test Report

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1. GENERAL INFORMATION

1.1 DESCRIPTIONS OF EQUIPMENT UNDER TEST(EUT)

- | | | |
|-------|---------------------------------------|---|
| 1.1.1 | Manufacturer | Shanghai LG Electronics Co., Ltd.
No.600, Yun Qiao Road, Jin Qiao Export Processing Zone,
Pu Dong New Area, Shanghai, China, 201206 |
| 1.1.2 | Applicant | LG Electronics Inc.; 20, YOIDO-DONG
YOUNGDUNGPO-GU, SEOUL, 150-721, KOREA |
| 1.1.3 | MODEL Name | TDVG-H151F |
| 1.1.4 | SERIAL NO | NOT ATTACHED |
| 1.1.5 | TRADE NAME | Zenith, INSIGNIA |
| 1.1.6 | FCC ID NO | BEJ9QKE00710 |
| 1.1.7 | DESCRIPTIONS | |
| | a) Product Type | Digital TV Tuner Converter Box(Model: DTT901)
Coupon Eligible Converter Box(Model: NS-DXA1-APT) |
| | b) RF Output Channel | Channel 3 and 4 |
| | c) RF IN/OUT Terminal Impedance | 75 ohms (Unbalance F-type coaxial) |
| | d) Number of RF IN/OUT terminal | 1EA at each |
| | e) Terminal for signal | Video/Audio out (RCA-type) |
| | f) Power Supply | AC120V, 60Hz |
| 1.1.8 | Accessories connected to the EUT | |
| | a) Coaxial cables for RF-OUT terminal | |
| | b) Video/Audio cables | |

1.2 Regulations applied to the EUT .. FCC Part 15.115

1.3 Measurement Procedure MP-3 : ANSI C63.4 : 2003

1.4 Measurement site description

- Location of measurement facility
LG Electronics Inc : Pyungtaek plant
Digital-Media Standards Team
19-1, Cheongho-ri, Jinwi-myeon, Pyeongtaek-si, 451-713 Korea

Note;

The detailed description of measuring facility was found to be in compliance
With Federal Communications Commission requirements of 2.948 according to
ANSI C63.4 :2003.

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2. GENERAL TEST CONDITIONS

The test data contained in this report was obtained by use of the measurement method recommended in FCC Rules, 47 C.F.R. 15.31(a)(3), with equipment and at the test site filed by the Federal Communications Commission (FCC). The technical standard for a TV interface device are set forth in Subpart B of Part 15 of FCC Rules and regulation. The measurement for Radiated Emissions, Power line Conducted Emissions, Output signal levels, Output Terminal Conducted Spurious Emissions and Transfer Switch Isolation were performed in accordance with the procedures described in ANSI C63.4 : 2003.

2.1 OPERATING CONDITIONS OF THE EUT

According to the requirements in Subpart B of Part 15, the measurement is made at each function of the EUT being connected with appropriate cables and loads. The EUT has a tuner a modulator mentioned in this test report and either a video/audio output terminal in RCA-type and antenna input terminal. Therefore, every measurement was investigated in the operation mode, tuning mode (tuning to TV signal supplied through the antenna input terminal at each Ch. 3 or/and 4)

2.2 STABILIZATION OF EUT OPERATION

The EUT was operated for sufficient minutes before testing to make it stabilized in a normal operating condition. The power supplied to the EUT was filtered to meet the requirements.

2.3 TEMPERATURE

Measurement procedure recommended by FCC requires the test to be performed at the site with ambient temperature within 10 to 40 degrees centigrade (50 to 104 F). The specification for operating temperature of EUT is from 5 to 35 degrees centigrade (41 to 95 F) as described in owner's manual. The measurement data in this report was obtained at the temperature in the range of 20 ~ 25 degrees centigrade.

3. TEST SITE

3.1 OPEN AREA TEST SITE

Measurement of radiated emissions from EUT was made at open area test site, a description of which has been submitted to the FCC pursuant to Part 15 of 47 C.F.R., 2.948.

3.2 A SHIELDED ENCLOSURE.

All other measurements, including power line conducted emissions, output signal levels, and transfer switch isolation, and transfer switch isolation were made in a shielded enclosure providing sufficient shielding effectiveness.

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4. MEASURING INSTRUMENTATIONS AND CALIBRATIONS.

Measurements of output signal level, output terminal conducted spurious emissions, and transfer switch isolation (if applicable) were made with instruments calibrated according to the recommendation by manufacturer. Measurement of radiated emissions and power line conducted emissions were made with instruments conforming to American National Standard Specification, ANSI C63.4 :2003.

The calibration of measuring instrument, including any accessories that may affect test results, was performed according to the recommendation by manufactures.

5. DESCRIPTION OF TEST CONDITION.

5.1 POWERLINE CONDUCTED EMISSION MEASUREMENT.

5.1.1 SHIELDED ENCLOSURE.

The measurement for power-line emissions from EUT was made in shielded enclosure which provides sufficient shielding effectiveness enough not to affect test results.

5.1.2 DETECTOR FUNCTION SELECTION AND BANDWIDTH.

During conducted emission measurement, a radio noise meter (ESCS 30, Rohde & Schwarz) that has a CISPR quasi-peak detector with 9 KHz IF bandwidth of 6 dB was utilized.

5.1.3 FREQUENCY RANGE TO BE SCANNED.

For conducted emissions measurement, frequency range of 150 KHz to 30 MHz, included, was investigated.

5.1.4 UNIT OF MEASUREMENT.

Test results for conducted emissions are reported in micro-volts.

5.1.5 LINE IMPEDANCE STABILIZATION NETWORK

A LISN with characteristics that conform to the requirements of Part 15 of FCC Rules was used for the measurement of conducted power-line radio noise; (50 micro-henries /50 ohms). Chassis and earth-points for grounding of the LISN were earth-grounded.

5.1.6 TEST CONDITIONS AND CONFIGURATION OF THE EUT.

The EUT was configured and operated in all modes of operation so as to find the maximum emanation of emissions from EUT.

The EUT has been designed to use the public AC lines with rated AC voltage as specified in Owner 's Manual of EUT and filtered to meet the requirement. AC power was supplied to the EUT through LISN with characteristics described in 5.1.5 of part I of this report.

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The EUT was placed on a 1m *1.5m * 80Cm high of wooden table which is place on the earth- grounded conducting surface larger than 2 square-meter. The vertical conducting surface was located 40Cm to the EUT. Length of the power lead in excess of 80 Cm horizontally separating the EUT from LISN was folded back-and-forth form at the center of the power cord not exceeding 40 Cm in length.

Each type of accessory provided by manufacturer or typically used and support equipment were connected to the EUT during measurement to the typical usage and applicable as nearly as practicable.

5.2 RADIATED EMISSIONS MEASUREMENT..

5.2.1 TEST SITE.

Preliminary measurements were performed in the anechoic chamber to determine the emissions characteristics of the EUT. Final measurements were made in outdoors as described at 3.1 of Part I in this report.

5. 2. 2 DETECTOR FUNCTION SELECTION AND BANDWIDTH.

In radiated emissions measurement, a field strength meter (ESCS 30, Rohde & Schwarz) that has a CISPR quasi-peak detector was used. The 6dB bandwidth of the detector of instrument is 120 KHz over frequency range of 9 KHz to 2750 MHz. Emissions to be scanned above 1000 MHz may be detected in peak mode.

5. 2. 3 UNIT OF MEASUREMENT.

Test results of radiated emissions measurement are reported in micro-volts per meter at the specific distance. Using the unit of dBuV on the test instrument, the indication unit was converted to field strength unit of uV/m as following method;

$$F(\mathbf{uV/m}) = 10^{(R+CL+AF)/20} \text{ (dBuV/m)}$$

here, F : Field Strength in uV/m
R : Meter Reading Level in dBuV,
CL : Cable Loss from antenna to meter in dB,
AF : Antenna Factor of receiving antenna in dB(/m)

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5. 2. 4 ANTENNAS.

Measurements were made using calibrated half-wave tuned Bi-log antenna in range of 30 to 1000 MHz that are correctable to levels obtained with a tuned dipole antenna.

For emissions above 1000MHz, horn antenna may be used.

Measurements were also made for both horizontal and vertical polarization.

The horizontal distance between the receiving antenna and the closest periphery of the EUT was 3 meters as described in 8.2.3 of ANSI C63.4:2003.

5. 2. 5 FREQUENCY RANGE TO BE SCANNED.

For radiated emissions measurements, the spectrum in the range of 30 to 1000 MHz and above, if found, was investigated. The measurement for power-line emissions from EUT was made in shielded enclosure which provides

5. 2. 6 TEST CONDITIONS AND CONFIGURATION OF EUT.

The EUT was configured and operated in all modes of operation so as to find the maximum emanation of emissions from EUT.

The power was furnished with rated (normal) AC 120 volts, as specified in the Owner's Manual of EUT. The EUT was placed on the 80 Cm high of non-metallic table(1 *1.5 meter). The turn table containing the system was rotated and the antenna height was varied 1~4 m to find the maximum emanation of emissions from EUT.

Each type of accessory provided by manufacturer or typically used and support equipment were connected to the EUT during measurement to the typical usage and applicable as nearly as practicable.

5. 3 OUTPUT SIGNAL MEASUREMENT.

During measurements for output signal levels as the RF-out terminal, a spectrum analyzer was used with characteristics described at 4 and 9.3 of part I in this report.

5. 3. 1 OUTPUT SIGNAL LEVEL MEASUREMENT.

RF-out terminal of EUT is designed to feed modulated signals to a TV broadcast receiver via coaxial cable with 75 ohm of rated output impedance.

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

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* Data conversion method.

$$V_{75}[\text{uV}] = 10^{\frac{(V_r + CF)}{20}} \quad [\text{dBuV}]$$

here,: V_{75} : Voltage at the RF-out terminal of 75 ohm in uV
 V_r : Voltage read at analyzer with 50 ohm input-impedance in dBuV
 CF : Conversion Factor of the matching pad in dB.

5.3.2 OUTPUT TERMINAL CONDUCTED SPURIOUS EMISSION MEASUREMENT.

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 each channel.

To clarify the emissions emanated from RF output terminal of the EUT, RF pre-amplifier was utilized. The gain of pre-amplifier at each frequency measured from EUT were obtained after sufficient warm-up for stabilization of gain.

* Data conversion method.

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

Where, V_{75} : Voltage at the RF-out terminal of 75 ohm in uV,
 V_r : Voltage read at analyzer with 50 ohm 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.

5.4 TRANSFER SWITCH ISOLATION MEASUREMENT.

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.

To clarify the emissions emanated from RF output terminal of the EUT, RF pre-amplifier was utilized. The gain of pre-amplifier at each frequency measured from EUT were obtained after sufficient warm-up for stabilization of gain.

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* DATA CONVERSION METHOD.

$$(V_r + CF - PG + AT) / 20$$

$$V_{75}[\mu V] = 10 \quad [dBuV]$$

where, V_{75} : Voltage at the RF-out terminal of 75 ohm in μV
 V_r : Voltage read at analyzer with 50 ohm 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.

6. MEASURING INSTRUMENTS AND SET-UP.

6. 1 POWERLINE CONDUCTED EMISSIONS.

6. 1. 1 Radio Noise Meter.

Rohde & Schwarz, Model ESCS 30{ 9 KHz to 2750 MHz }

Detector function : CISPR Quasi-Peak
IF Bandwidth : 9 KHz

6. 1. 2 Line Impedance Stabilization Network (LISN).

R&S, Model ESH2- Z5
Impedance Characteristic : 50 μH / 50 ohm

6. 2 RADIATED EMISSIONS.

6 2. 1 Field Strength Meter.

Rohde & Schwarz, Model ESCS 30{ 9 KHz to 2750 MHz }
ESPI { 20 Hz to 7 GHz }

Detector function : CISPR Quasi-Peak
IF Bandwidth : 120 KHz

6. 2. 2 Receiving Antennas.

- a) Chase, Model CBL6111 : Bilog antenna { 30 to 1000 MHz }
- b) Schwarzbeck, Model 9120D : Horn antenna { 1 GHz to 9.5 GHz }

6. 3 OUTPUT SIGNAL MEASUREMENTS.

6. 3. 1 Spectrum Analyzer.

Agilent, Model E4402B
Span : 10 MHz SWP : 20 msec.
RBW : 100 KHz VBW : 300 KHz

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6.3.2 RF Pre-amplifier.

Langer EMV-Tech., Model PA203 : About 25 dB

6.3.3 Impedance matching pad.

Rohde & Schwarz, Model RAM : 7.5 dB loss , from 75 ohm to 50 ohm

6.3.4 Attenuator.

Rohde & Schwarz, Model DNF (N type) : 3 dB attenuation

6.4 TRANSFER SWITCH ISOLATION MEASUREMENTS.

6.4.1 Spectrum Analyzer.

Agilent, Model E4402B
Span : 1 MHz SWP : 30 msec.
RBW : 10 KHz VBW : 30 KHz

6.4.2 RF Pre-amplifier.,

Langer EMV-Tech., Model PA203 : About 25 dB

6.4.3 Impedance matching pad.

Rohde & Schwarz, Model RAM : 7.5 dB loss , from 75 ohm to 50 ohm

6.4.4 Attenuator.

Rohde & Schwarz, Model DNF (N type) : 3 dB attenuation

6.4.5 DTV Signal Generator

Model: DVG (MPEG2 MEASUREMENT GENERATOR) S/N: 100164
Model: SFQ 9TV TEST TRANSMITTER) S/N: 100256

[NOTE] 1) The list of instruments and accessories used the measurements are attached at the end of the report, Appendix A and B

2) In every test results, the margins against the limits are shown.
The margins are calculated as following;

$$\text{MARGIN[dB]} = 20\log(R/L)$$

where, R : Corrected Results, [uV] or [uV/m],
L : Corresponding Limit, [uV] or [uV/m]

3) The tight limit is applied at the edge of two frequency band.

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Part II

TEST DATA

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1. POWER LINE CONDUCTED EMISSIONS (*15.107)

PRODUCT : Digital TV Tuner Converter Box(DTT901)
Coupon Eligible Converter Box(Model: NS-DXA1-APT)
MODEL Name : TDVG-H151F
Modulator Maker : LG Innotek Co., Ltd.
TEST DATE : March 3th, 2008

1.1) TDVG-H151F on Digital TV Tuner Converter Box(Model: DTT901) Data;

Tuner Mode

Frequency (MHz)	RF Voltage [dBuV]		Limit [dBuV]		Margin [dB]		Line
	Q-peak	Average	Q-peak	Average	Q-peak	Average	
0.61	36.8	27.0	56.0	46.0	19.2	19.0	L1
1.76	33.5	19.1	56.0	46.0	22.5	26.9	N
3.45	32.6	20.5	56.0	46.0	23.4	25.5	L1
3.68	32.1	22.0	56.0	46.0	23.9	24.0	N

NOTES:

1. All modes of operation were investigated. The RF modulator was switched to Channel 3 or 4 and worst-case emissions are reported
2. All other emissions are non-significant.

1.2) TDVG-H151F on Coupon Eligible Converter Box(Model: NS-DXA1-APT);

Tuner Mode

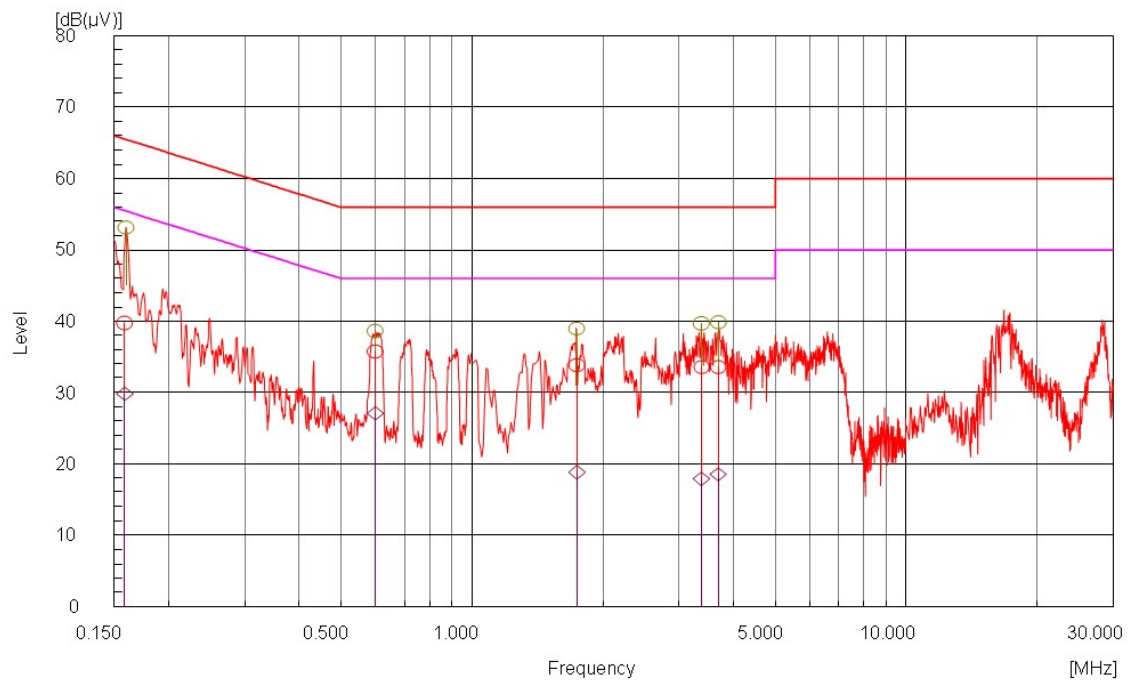
Frequency (MHz)	RF Voltage [dBuV]		Limit [dBuV]		Margin [dB]		Line
	Q-peak	Average	Q-peak	Average	Q-peak	Average	
0.60	37.8	28.5	56.0	46.0	18.2	17.5	N
0.85	34.5	20.5	56.0	46.0	21.5	25.5	N
3.25	34.6	23.4	56.0	46.0	21.4	22.6	L1
3.67	35.5	25.6	56.0	46.0	20.5	20.4	L1

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1.3) TDVG-H151F on Digital TV Tuner Converter Box(Model: DTT901) Data;

1.3.1) Tuner Mode

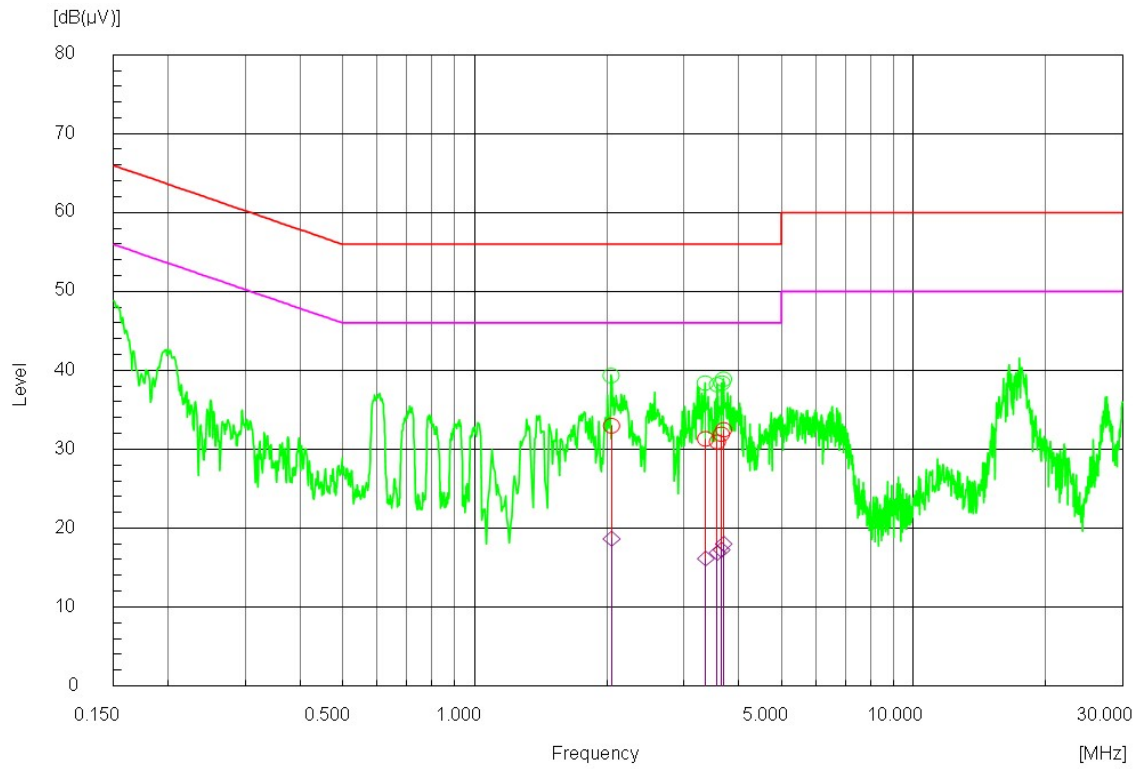


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1.4) TDVG-H151F on Coupon Eligible Converter Box(Model: NS-DXA1-APT);

1.4.1) Tuner Mode



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2. RADIATED EMISSIONS (* 15.109)

PRODUCT : Digital TV Tuner Converter Box(DTT901)
 Coupon Eligible Converter Box(Model: NS-DXA1-APT)
 MODEL Name : TDVG-H151F
 Modulator Maker : LG Innotek Co., Ltd.
 TEST DATE : March 3th, 2008

2.1) TDVG-H151F on Digital TV Tuner Converter Box(Model: DTT901) Data;

<i>FREQ.</i> [MHz]	<i>Reading</i> [dBuV]	<i>AF</i> [dB/m]	<i>CL</i> [dB]	<i>Pol.</i> (Hor / Ver)	<i>F/S</i> [uV/m]	<i>Limit</i> [uV/m]	<i>Margin</i> [dB]
30.3	15.00	18.60	1.40	Hor	56.2	100	-5.0
83.5	25.10	7.40	2.30	Ver	55.0	100	-5.2
106.2	23.00	10.40	2.50	Ver	62.4	150	-7.6
185.6	19.50	8.10	3.20	Ver	34.7	150	-12.7
525.0	18.00	17.90	5.90	Hor	123.0	200	-4.2
875.0	11.80	21.60	8.30	Ver	121.6	200	-4.3

* Sample Calculation at 30.3 MHz = 10 $\frac{[(15.0+17.2+0.5)/20]}{10}$ = 56.2 uV/m

NOTES:

1. All modes of operation were investigated. The RF modulator was switched to Channel 3 or 4 and worst-case emissions are reported.
2. All other emissions are non-significant.
3. AF = Antenna factor CL = Cable loss F/S = Field Strength

2.2) TDVG-H151F on Coupon Eligible Converter Box(Model: NS-DXA1-APT);

<i>FREQ.</i> [MHz]	<i>Reading</i> [dBuV]	<i>AF</i> [dB/m]	<i>CL</i> [dB]	<i>Pol.</i> (Hor / Ver)	<i>F/S</i> [uV/m]	<i>Limit</i> [uV/m]	<i>Margin</i> [dB]
30.3	15.60	18.60	1.40	Hor	60.3	100	-4.4
106.2	24.15	7.40	2.50	Ver	50.4	150	-9.5
155.8	25.12	10.40	3.00	Ver	84.3	150	-5.0
185.6	19.20	8.10	3.20	Ver	33.5	150	-13.0
525.0	15.60	17.90	5.90	Hor	93.3	200	-6.6
875.0	10.30	21.60	8.30	Ver	102.3	200	-5.8

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3. OUTPUT TERMINAL SIGNAL LEVEL (* 15.115)

PRODUCT : Digital TV Tuner Converter Box(DTT901)
 Coupon Eligible Converter Box(Model: NS-DXA1-APT)
 MODEL Name : TDVG-H151F
 Modulator Maker : LG Innotek Co., Ltd.
 TEST DATE : March 2th, 2008

3.1) TDVG-H151F on Digital TV Tuner Converter Box(Model: DTT901) Data;

CH	Frequency (MHz)	Reading [dBuV]	M/P Loss (dB)	RF Voltage [uV]	Limit [uV]	Margin [dB] Q-peak
3 (Visual)	61.25	59.95	7.5	2357.76	3000	-2.1
3 (Aural)	65.75	45.10		426.58	671	-3.9
4 (Visual)	67.25	60.01	7.5	2374.11	3000	-2.0
4 (Aural)	71.75	45.38		440.55	671	-3.7

$$* \text{ Sample Calculation at 61.25 MHz} = 10 \frac{[(59.95+7.5)/20]}{10} = 2357.76 \text{ uV}$$

NOTES:

1. All modes of operation were investigated and worst -case emissions are reported.
2. Output Impedance of RF-Output Terminal : 75 ohm
3. MP = Impedance Matching Pad

3.2) TDVG-H151F on Coupon Eligible Converter Box(Model: NS-DXA1-APT);

CH	Frequency (MHz)	Reading [dBuV]	M/P Loss (dB)	RF Voltage [uV]	Limit [uV]	Margin [dB] Q-peak
3 (Visual)	61.25	59.73	7.5	2298.79	3000	-2.3
3 (Aural)	65.77	44.21		385.03	671	-4.8
4 (Visual)	67.27	58.75	7.5	2053.53	3000	-3.3
4 (Aural)	71.77	43.86		369.83	671	-5.2

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4. OUTPUT TERMINAL CONDUCTED SPURIOUS EMISSIONS

PRODUCT : Digital TV Tuner Converter Box(DTT901)
 Coupon Eligible Converter Box(Model: NS-DXA1-APT)
 MODEL Name : TDVG-H151F
 Modulator Maker : LG Innotek Co., Ltd.
 TEST DATE : March 2th, 2008

4.1) TDVG-H151F on Digital TV Tuner Converter Box(Model: DTT901) Data ;

CH	Frequency (MHz)	Reading [dBuV]	M/P Loss [dB]	PreAmp Gain [dB]	Attn. [dB]	Output Level [uV]	Limit [uV]	Margin [dB]
3	122.3	32.65	7.5	20.0	3.0	14.4	95	-16.4
	185.2	31.50		20.0		12.6		-17.6
	246.8	19.84		20.0		3.3		-29.2
4	134.3	31.50	7.5	20.0	3.0	12.6	95	-17.6
	213.5	26.50		20.0		7.1		-22.6
	298.7	16.40		20.0		2.2		-32.7

$$* \text{ Sample Calculation at 122.3 MHz} = 10 \frac{[(32.65+7.5-20.0+3.0)/20]}{10} = 14.4 \text{ uV}$$

NOTES:

1. Frequency range of 30 MHz to 1000 MHz removed by more than 4.6 MHz below or 7.4 MHz above the video carrier frequency of EUT was investigated at each channel.
2. All other emissions are not significant.

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4.2) TDVG-H151F on Coupon Eligible Converter Box(Model: NS-DXA1-APT);

CH	Frequency (MHz)	Reading [dBuV]	M/P Loss [dB]	PreAmp Gain [dB]	Attn. [dB]	Output Level [uV]	Limit [uV]	Margin [dB]
3	122.2	35.50	7.5	20.0	3.0	20.0	95	-13.6
	189.5	30.50		20.0		11.2		-18.6
	245.1	29.80		20.0		10.4		-19.3
	310.5	17.50		20.0		2.5		-31.6
				20.0		0.3		
				20.0		0.3		
4	134.2	35.90	7.5	20.0	3.0	20.9	95	-13.2
	184.5	33.50		20.0		15.8		-15.6
	269.3	31.50		20.0		12.6		-17.6
	336.3	20.50		20.0		3.5		-28.6
				20.0		0.3		
				20.0		0.3		

TDVG-H151F Test Report

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5. TRANSFER SWITCH ISOLATION (* 1 5 . 1 1 5)

PRODUCT : Digital TV Tuner Converter Box(DTT901)
 Coupon Eligible Converter Box(Model: NS-DXA1-APT)
 MODEL Name : TDVG-H151F
 Modulator Maker : LG Innotek Co., Ltd.
 TEST DATE : March 2th, 2008

5-1) TDVG-H151F on Digital TV Tuner Converter Box(Model: DTT901) Data;

CH	Frequency (MHz)	Reading [dBuV]	M/P Loss [dB]	PreAmp Gain [dB]	Attn. [dB]	Output Level [uV]	Limit [uV]	Margin [dB]
3	61.250	11.10	7.5	20.0	3.0	1.20	3.0	-7.9
4	67.250	10.78	7.5	20.0	3.0	1.16	3.0	-8.3

NOTES:

1. The transfer switch is internal to the device and is access automatically.
2. The transfer isolation switch provides automatic selection of either antenna/TV or VCR.

$$* \text{ Sample Calculation at 61.250 MHz} = 10 \frac{[(11.1 + 7.5 - 20.0 + 3.0) / 20]}{=} = 1.20 \text{ uV}$$

5-2) TDVG-H151F on Coupon Eligible Converter Box(Model: NS-DXA1-APT);

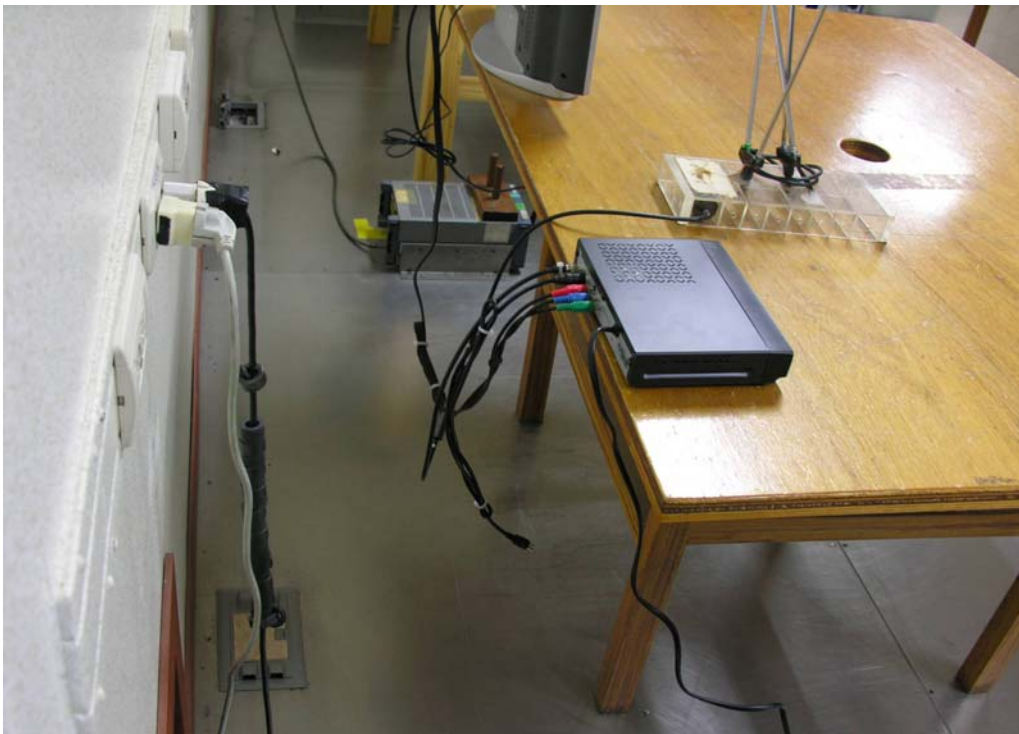
CH	Frequency (MHz)	Reading [dBuV]	M/P Loss [dB]	PreAmp Gain [dB]	Attn. [dB]	Output Level [uV]	Limit [uV]	Margin [dB]
3	61.250	10.60	7.5	20.0	3.0	1.14	3.0	-8.4
4	67.250	11.18	7.5	20.0	3.0	1.21	3.0	-7.9

TDVG-H151F Test Report

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Appendix A

Photograph of Test Set-up (Power line conducted emissions)



TDVG-H151F Test Report

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Photographs of Test Set-up (Radiated emissions)



TDVG-H151F Test Report

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Appendix B

List Of Test Equipment

Type	Model	Cal.	Due	S / N
EMI Test Receiver	R&S, ESPI	05/10/2008		100128
Test receiver	R&S,ESCS 30	08/24/2008		100093
Pre-Amplifier	Langer EMV-Tech.,PA203	08/24/2008		9/2004
Pre-Amplifier	Langer EMV-Tech.,PA203	08/24/2008		10/2004
Pre-Amplifier	Langer EMV-Tech.,PA203	08/24/2008		13/2004
MPEG2 MEASUREMENT GENERATOR	R&S, DVG	12/04/2008		100164
TV TEST TRANSMITTER	R&S, SFQ	1/03/2009		100256
Dipole Antenna	Schwarzbeck,VHAP	05/28/2008		N/A
Dipole Antenna	Schwarzbeck,UHAP	05/28/2008		N/A
Bilog Antenna	Chase,CBL611	02/01/2010		1234
Biconical Antenna	S/B, BBA9106	09/07/2008		N/A
Biconical Antenna	S/B, BBA9106	09/07/2008		N/A
Log-periodic Antenna	Schwarzbeck, 9110D	09/07/2008		1513
Log-periodic Antenna	Schwarzbeck, 9110D	09/07/2008		1538
Horn Antenna	Schwarzbeck,9120D	03/30/2008		184
Absorbing Clamp	R&S, MDS21	09/22/2008		860846/004
Absorbing Clamp	R&S, MDS21	03/05/2009		860844/012
Artificial Mains Network	ESH2-Z5	08/27/2008		892602/012
Test receiver	ESPI3	02/01/2009		101012
Spectrum Analyzer	E4402B	02/14/2009		MY44211573

TDVG-H151F Test Report

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Appendix C

List of Support Device and Accessories in the test

1. EUT : Digital TV Tuner Converter Box(DTT901)
Coupon Eligible Converter Box(Model: NS-DXA1-APT)
Model : TDVG-H151F S / N : N/A

2. Accessories

1.5 m. unshielded RCA cables for Video/Audio

IEC-106 Antenna

3. TV Monitor

Model : LTDR2100K S/N : TS2010K00034600015

4. DTV Signal Generator

Model: DVG (MPEG2 MEASUREMENT GENERATOR)
Model: SFQ 9TV TEST TRANSMITTER)

S/N: 100164
S/N: 100256

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Appendix D

SAMPLE LABEL :

According to Labeling Requirements per * 2.295 & * 15.19



→ The Label shown shall be affixed on the bottom of the device. See the attached photograph.



THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES.
OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:
1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE AND
2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING
INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

↓
The statement is written on the label of the device.
See the attached photograph

TDVG-H151F Test Report

Test Report No. : 4521-080304IH

CERTIFICATE

Issued date : March 4, 2008
EUT : Digital TV Tuner Converter Box(DTT901)
Coupon Eligible Converter Box(Model: NS-DXA1-APT)
Model No. : TDVG-H151F Serial No. : N / A
FCC ID No. : BEJ9QKE00710
Manufacturer : LG Electronics Inc. Trade name : Zenith, INSIGNIA
Applicant & Address : LG Electronics Inc,
20 Yoido-Dong Youngdungpo-Gu, Seoul, 150-721 Korea
Regulation : Subpart B of Part 15, 47 C.F.R; FCC Rules (Docket 87-389)
Procedure : MP-3; ANSI C63.4 : 2003
Test Location : LG Electronics Digital-media Research Lab.
Measurement facility (3 & 10 m site)

I hereby certify that the measurements shown in Part II of this report were made in accordance with the procedures indicated and energy emitted by this equipment was found to be within the limits applicable.

I further certify that on the basis of the measurements, the equipment tested is capable of operation in accordance with the requirements set forth in Part 15 of the FCC rules & Regulations under normal use and maintenance.

LG Electronics Inc. hereby assumes responsibility for the certification of compliance to applicable FCC limits in every measurement.

ISSUED BY



In-Ha Kim

Research Engineer

REVIEWED BY



M. K. Lee

Technical Manager

TDVG-H151F Test Report

Test Report No. : 4521-080304IH

LG Electronics Inc. Pyungtaek Digital-media Standards Team

19-1, Cheongho-ri, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, KOREA
Tel.: 82-31-610-5336, FAX: 82-31-610-5355

Report of Measurements for TV Receiver under FCC Part 15

Manufacture : Shanghai LG Electronics Co.,Ltd.
No.600 Yun Qiao Road, JinQiao Export
Processing Zone, Pu Dong New Area,
Shanghai, China. 201206

PRODUCT : Digital TV Tuner Converter Box(DTT901)
Coupon Eligible Converter Box(Model: NS-DXA1-APT)

EUT Model Name : TDVG-H151F
Serial No : N/A

Description of the Modulator & Tuner unit ;
Tuner Maker : LG Innotek Co., Ltd.
Tuner type : TDVG-H151F

Frequency range tuned by the receiver : 54 ~ 807 MHz

This receiver meets FCC Regulations covering comparable systems of VHF and UHF TV tuning .

Measurement Procedure : EIA RS – 378 , MP – 2 , ANSI C63.4 : 2003

Date of Measurements : March 2 ~ 3, 2008

Measurements Results : The results obtained from the measuring of this device
Are as shown in the attached sheets.
And comply with new rules adapted under Docket 87-389

1. Peak Picture Sensitivity : UHF – VHF < 8.0 dBuV
2. UHF Noise figure : Meet noise figure of 14 dB
3. Radiation of VHF/UHF Portion : Highest 41.5 dBuV/m at 1694 MHz
4. Antenna Power conduction : Highest 33.6 dBuV at 1694 MHz



In-Ha Kim
Research engineer
Digital-media standards team

TDVG-H151F Test Report

Test Report No. : 4521-080304IH

1. Peak Picture Sensitivity :

1) LGIT Tuner (TDVG-H151F,) : Limit UHF-VHF < 8 dBuV Result : O . K

2. UHF Noise Figure ;

2-1) TDVG-H151F on Digital TV Tuner Converter Box(Model: DTT901) Data;

Channels (UHF)	Reading (dB)	Matching Loss(dB)	Noise Figure (dB)	Limit (dB)
14	9.2	1.75	7.45	14.0
20	9.6		7.85	
26	9.8		8.05	
32	10.2		8.45	
38	10.3		8.55	
44	10.1		8.35	
50	10.5		8.75	
56	10.6		8.85	
62	10.3		9.15	
69	10.9		8.55	
4.0dB subtracted for power splitter, < 0.3 dB added for IF amp contribution				

2-2) TDVG-H151F on Coupon Eligible Converter Box(Model: NS-DXA1-APT);

Channels (UHF)	Reading (dB)	Matching Loss(dB)	Noise Figure (dB)	Limit (dB)
14	9.3	1.75	7.55	14.0
20	9.5		7.75	
26	9.8		8.05	
32	9.6		7.85	
38	10.1		8.35	
44	10.3		8.55	
50	9.9		8.15	
56	10.2		8.45	
62	10.5		8.75	
69	11.2		9.45	
4.0dB subtracted for power splitter, < 0.3 dB added for IF amp contribution				

TDVG-H151F Test Report

Test Report No. : 4521-080304IH

3. Radiated Emission Measurements

3-1) TDVG-H151F on Digital TV Tuner Converter Box(Model: DTT901) Data;

Frequency to which tuned		Frequency of the emission (MHz)	Result at 3 m (dBuV/m)	Limit at 3 m (dBuV/m)
Channel	(MHz)			
2	55.25	101	<20	43.5
3	61.25	107	<20	43.5
4	67.25	113	<20	43.5
5	77.25	123	<20	43.5
6	83.25	129	<20	43.5
7	175.25	221	<20	46.0
8	181.25	227	<20	46.0
9	187.25	233	<20	46.0
10	193.25	239	<20	46.0
11	199.25	245	<20	46.0
12	205.25	251	<20	46.0
13	211.25	257	<20	46.0
14	471.25	517	27.0	46.0
		1034	<40	54.0
19	501.25	547	28.0	46.0
		1094	<40	54.0
28	555.25	601	23.9	46.0
		1202	<40	54.0
36	603.25	649	25.3	46.0
		1298	<40	54.0
44	651.25	697	24.0	46.0
		1394	<40	54.0
53	705.25	751	26.2	46.0
		1502	<40	54.0
61	753.25	799	28.8	46.0
		1598	<40	54.0
69	801.25	847	29.0	46.0
		1694	<40	54.0

TDVG-H151F Test Report

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3-2) TDVG-H151F on Coupon Eligible Converter Box(Model: NS-DXA1-APT);

Frequency to which tuned		Frequency of the emission (MHz)	Result at 3 m (dBuV/m)	Limit at 3 m (dBuV/m)
Channel	(MHz)			
2	55.25	101	<20	43.5
3	61.25	107	<20	43.5
4	67.25	113	<20	43.5
5	77.25	123	<20	43.5
6	83.25	129	<20	43.5
7	175.25	221	<20	46.0
8	181.25	227	<20	46.0
9	187.25	233	<20	46.0
10	193.25	239	<20	46.0
11	199.25	245	<20	46.0
12	205.25	251	<20	46.0
13	211.25	257	<20	46.0
14	471.25	517	26.3	46.0
		1034	<40	54.0
19	501.25	547	29.8	46.0
		1094	<40	54.0
28	555.25	601	27.0	46.0
		1202	<40	54.0
36	603.25	649	32.1	46.0
		1298	<40	54.0
44	651.25	697	31.0	46.0
		1394	<40	54.0
53	705.25	751	34.5	46.0
		1502	<40	54.0
61	753.25	799	34.1	46.0
		1598	<40	54.0
69	801.25	847	36.0	46.0
		1694	41.5	54.0

TDVG-H151F Test Report

Test Report No. : 4521-080304IH

4. Antenna Power Conduction Measurements

4-1) TDVG-H151F on Digital TV Tuner Converter Box(Model: DTT901) Data;

Frequency to which tuned		Frequency of the emission (MHz)	Result (dBuV)	Limit (dBuV)
Channel	(MHz)			
2	55.25	101	<35.0	51.8
3	61.25	107	<35.0	
4	67.25	113	<35.0	
5	77.25	123	<35.0	
6	83.25	129	<35.0	
7	175.25	221	<35.0	
8	181.25	227	<35.0	
9	187.25	233	<35.0	
10	193.25	239	<35.0	
11	199.25	245	<35.0	
12	205.25	251	<35.0	
13	211.25	257	<35.0	
14	471.25	517 1034	<30.0 33.0	
19	501.25	547 1094	<30.0 31.5	
28	555.25	601 1202	<30.0 34.5	
36	603.25	649 1298	<30.0 35.8	
44	651.25	697 1394	<30.0 35.5	
53	705.25	751 1502	<30.0 36.9	
61	753.25	799 1598	<30.0 37.0	
69	801.25	847 1694	<30.0 34.2	

TDVG-H151F Test Report

Test Report No. : 4521-080304IH

4-2)TDVG-H151F on Coupon Eligible Converter Box(Model: NS-DXA1-APT);

Frequency to which tuned		Frequency of the emission (MHz)	Result (dBuV)	Limit (dBuV)
Channel	(MHz)			
2	55.25	101	<35.0	51.8
3	61.25	107	<35.0	
4	67.25	113	<35.0	
5	77.25	123	<35.0	
6	83.25	129	<35.0	
7	175.25	221	<35.0	
8	181.25	227	<35.0	
9	187.25	233	<35.0	
10	193.25	239	<35.0	
11	199.25	245	<35.0	
12	205.25	251	<35.0	
13	211.25	257	<35.0	
14	471.25	517 1034	<30.0 32.5	
19	501.25	547 1094	<30.0 32.8	
28	555.25	601 1202	<30.0 30.3	
36	603.25	649 1298	<30.0 32.6	
44	651.25	697 1394	<30.0 31.8	
53	705.25	751 1502	<30.0 32.0	
61	753.25	799 1598	<30.0 33.5	
69	801.25	847 1694	<30.0 34.2	