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EMC CENTER

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FCC EVALUATION REPORT FOR CERTIFICATION

Manufacturer : Kimin Electronic Co., Ltd.
293-4, Gongdan-Dong, Gumi-Si,
Gyeongsangbuk-Do, 730-030, Korea
Attn : Mr. Se-bong Jang, General Manager

Date of Issue : October 28, 2005
Test Report No. : GETEC-E3-05-073
Test Site : Gumi College EMC Center

FCC ID	**TGETLL-1000A**
APPLICANT	**Kimin Electronic Co., Ltd.**

Rule Part(s)	**: FCC Part 15 Subpart B**
Equipment Class	**: Class B computing device peripheral**
EUT Type	**: TV Link Loader**
Model No.	**: TLL-1000A**
Trade name	**: KIMIN**

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the vest of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by,

Jae-hoon Jeong, Associate Engineer
GUMI College EMC center

Reviewed by,

Tae-sig Park, Technical Manager
GUMI College EMC center

CONTENTS

1. Scope

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

Responsible Party:	**Kimin Electronic Co., Ltd.**
Contact Person:	**Mr. Se-bong Jang, General Manager**
Manufacturer:	**293-4, Gongdan-dong, Gumi-city, Gyeongsangbuk-do, Korea** **Tel No.: +82-54-462-0100**

- **FCC ID** TGETLL-1000A
- **EUT Type** TV Link Loader
- **Model No.** TLL-1000A
- **Trade Name** KIMIN
- **Rule Part(s)** FCC Part 15 Subpart B
- **Test Procedure(s)** ANSI C63.4 (2003)
- **Dates of Test** October 25 ~ 26, 2005
- **Place of Test** Gumi College EMC Center
- **Test Report No.** GETEC-E3-05-073

2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **Kimin Electronic Co., Ltd. TV Link Loader (Model No.: TLL-1000A)**

These measurement tests were conducted at **Gumi College EMC Center**.
The site address is 407, Bugok-Dong, Gumi-City, Gyeongsangbuk-Do, Korea
This test site is one of the highest point of Gumi 1 college at about 200 kilometers away from Seoul city and 40 kilometers away from Daege city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 on October 19, 1992

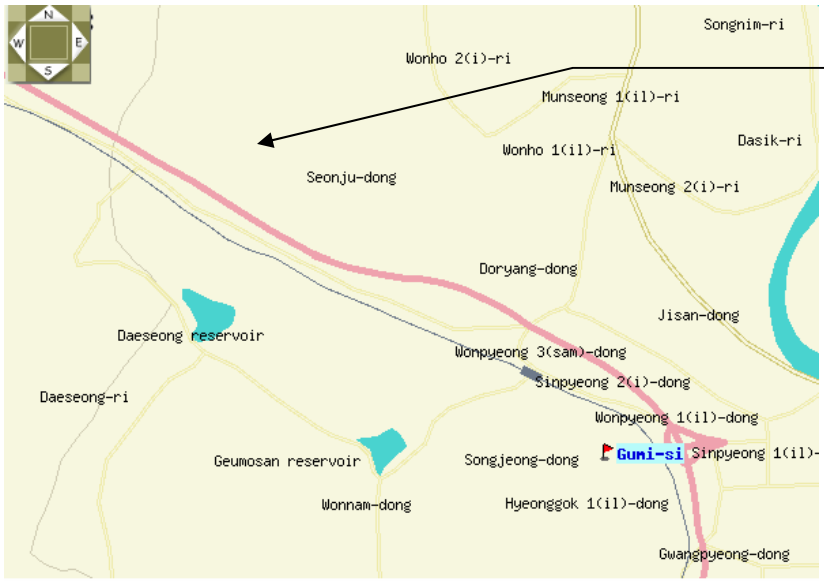

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Fig 1. The map above shows the Gumi College in vicinity area.

3. Test Conditions & EUT Information

3.1 Description of EUT

The Equipment Under Test (EUT) is the **Kimin Electronic Co., Ltd. TV Link Loader (Model No.: TLL-1000A)**
FCC ID.: TGETLL-1000A

Test pattern	PC communication mode IR mode
Power Cord	1.9m Unshielded AC power cord
Cable(s)	1.0m RS 232 cable Connected to the EUT and Notebook PC

3.2 Support Equipment used

Note book PC	COMPAQ U98004 C00 S/N: PP2060 FCC ID: DoC
Serial mouse	LOGITECH M-S69 S/N: 334684-108 FCC ID: JNZ211443
Joy stick	MICRISIFT X05-92626 S/N: 92626002966169 FCC ID: DoC

See "Appendix E – Test Setup Photographs" for actual system test set-up

4. Description of tests

4.1 Conducted Emission

The Line conducted emission test facility is inside a 4×8×2.5 meter shielded enclosure.
The EUT was placed on a non-conducting 1.0 by 1.5 meter table, which is 0.8 meters in height and 0.4 meters away from the vertical wall of the shielded enclosure.
The EUT is powered from the Rohde & Schwarz LISN (ESH2-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH3-Z5). Powers to the LISN are filtered by high-current high insertion loss power line filter.
Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
The RF output of the LISN was connected to the EMI test receiver (Rohde & Schwarz, ESCS30).
The EMI test receiver was scanned from 150kHz to 30MHz with 20msec sweep time to determine the frequency producing the maximum EME from the EUT. The frequency producing the maximum level was re-examined using Quasi-Peak mode of the EMI test receiver.
The bandwidth of Quasi-peak mode was set to 9KHz. Each emission was maximized consistent with typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum diagram emission. Excess cable lengths were bundled at center with 30 – 40 centi-meters.
Each EME reported was calibrated using the R/S signal generator.

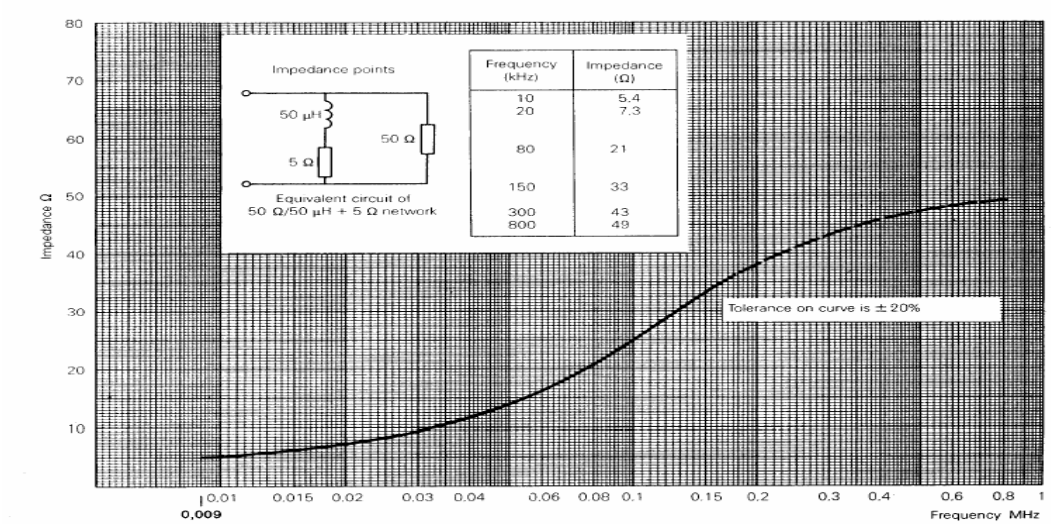


Fig 2. Impedance of LISN

4.2 Radiated Emission

Preliminary measurements were conducted 3m semi anechoic chamber using broadband antennas to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The technology configuration, mode of operation and turntable azimuth with respect to antenna was note for each frequency found.

The spectrum was scanned from 30 to 1000MHz using bicornical log antenna (Schwarzbeck, VULB9160). Above 1GHz, horn antenna (Schwarzbeck, BBHA9120D) was used.

Final measurements were made outdoors at 3m/10m-test range.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was re-examined and investigated using EMI test receiver. The detector function was set to CISPR quasi-peak mode average mode and the bandwidth of the receiver was set to 120KHz or 1MHz depending on the frequency or type of signal.

The EUT, support equipment and interconnecting cables were reconfigured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8m high non-metallic 1.0×1.5 meter table.

The turntable containing the test sample was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission. Each EME reported was calibrated using the R/S signal generator.

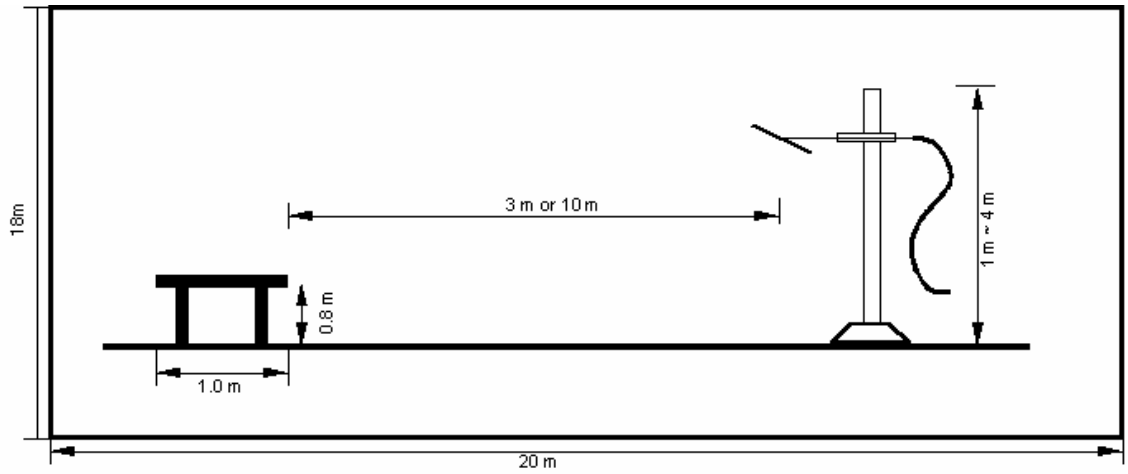


Fig 3. Dimensions of Open Site Test Area

5. Conducted Emission

5.1 Operating environment

Temperature : 24℃
Relative humidity : 57 %

5.2 Test set-up

The conducted emission measurements were performed in the shielded room.
The EUT was placed on wooden table, 0.8m heights above the floor, 0.4m from the reference ground plane (GRP) wall and 0.8m from AMN.
AMN is bonded on horizontal reference ground plane.
The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

5.3 Measurement uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.
The measurement uncertainty was given with a confidence of 95%.

Contribution	Probability Distribution	Uncertainty (±dB)	
		Power Port	Communication port
Receiver specification	Rectangular	0.50	0.50
LISN coupling specification	Rectangular	1.50	
ISN coupling specification	Rectangular		1.50
Mismatch LISN VRC : Γl= 0.20 ISN VRC : Γl= 0.20 ATT VRC(IN) : Γg= 0.03 Uncertainty limits 20log(1± Γl Γg)	U-shaped	0.05 -0.05	0.05 -0.05
Mismatch Receiver VRC : Γl= 0.09 ATT VRC : Γg= 0.11 Uncertainty limits 20log(1± Γl Γg)	U-shaped	0.09 -0.09	0.09 -0.09
System repeatability	Std Deviation	0.11	0.11
Cable and input attenuator calibration	Normal (k=2)	0.04	0.04
Repeatability of EUT			
Combined standard uncertainty Uc(y)	Normal	0.92 -0.92	0.92 -0.92
Extended uncertainty U	Normal (k=2)	1.85 -1.85	1.85 -1.85

5.4 Limit

RFI Conducted	FCC Limit(dB) Class B	
Freq. Range	Quasi-Peak	Average
150kHz – 0.5MHz	66 – 56*	56 – 46*
0.5MHz – 5MHz	56	46
5MHz – 30MHz	60	50
*Limits decreases linearly with the logarithm of frequency.		

5.5 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Calibrated Date
■ -	ESCS30	Rohde & Schwarz	EMI test receiver	839809/003	12. 17. 2004
■ -	ESH3-Z5	Rohde & Schwarz	Artificial mains network	838979/020	12. 17. 2004
■ -	ESH2-Z5	Rohde & Schwarz	Artificial mains network	829991/009	12. 17. 2004

5.6 Test data for power line conducted emission

-. Test Date : October 26, 2005
-. Resolution bandwidth : 9kHz
-. Frequency range : 0.15MHz ~ 30MHz

♦ Operating Condition: PC communication mode

Frequency (MHz)	Insertion Loss	Cable Loss	Pol.	Quasi-Peak[dBuV]			Average[dBuV]			Margin[dBuV]	
				Limit	Reading	Result	Limit	Reading	Result	Quasi	Average
0.195	0.06	-0.22	N	63.82	33.3	**33.14**	53.82	-	-	**30.68**	<<
0.190	0.06	-0.21	N	64.04	30.8	**30.65**	54.04	-	-	**33.38**	<<
0.355	0.07	-0.14	N	58.84	28.1	**28.03**	48.84	-	-	**30.82**	<<
0.545	0.10	-0.20	N	56.00	27.3	**27.20**	46.00	-	-	**28.80**	<<
0.665	0.13	-0.23	H	56.00	29.7	**29.60**	46.00	-	-	**26.40**	<<
0.820	0.14	-0.23	H	56.00	23.5	**23.41**	46.00	-	-	**32.59**	<<

* Comment: Pol: H(Live), N(Neut)
"<<" : The margin is more than 35dB

♦ Operating Condition: IR mode

Frequency (MHz)	Insertion Loss	Cable Loss	Pol.	Quasi-Peak[dBuV]			Average[dBuV]			Margin[dBuV]	
				Limit	Reading	Result	Limit	Reading	Result	Quasi	Average
0.175	0.07	-0.19	N	64.72	34.4	**34.28**	54.72	-	-	**30.44**	<<
0.280	0.09	-0.19	N	60.82	31.4	**31.31**	50.82	-	-	**29.51**	<<
0.355	0.12	-0.14	H	58.84	32.1	**32.07**	48.84	-	-	**26.77**	<<
0.560	0.10	-0.21	N	56.00	27.5	**27.39**	46.00	-	-	**28.61**	<<
0.670	0.11	-0.23	N	56.00	25.0	**24.88**	46.00	-	-	**31.12**	<<
Other Frequency	-	-	-	-	-	-	-	-	-	<<	<<

* Comment: Pol: H(Live), N(Neut)
"<<" : The margin is more than 35dB

6. Radiated Emission

6.1 Operating environment

Temperature : 32℃
Relative humidity : 56 %

6.2 Test set-up

A preliminary scan with peak mode was performed in the semi anechoic chamber and found frequency for open area test site.
The formal radiated emission was measured at 3m/10m-distance open area test site.
The EUT was placed on a non-conductive turntable approximately 0.8 meters above the ground plane.
The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 and 4.0 meters in order to determine the maximum emission levels.
This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

6.3 Measurement uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.
The measurement uncertainty was given with a confidence of 95%.

Contribution	Probability Distribution	Uncertainty (dB)			
		Biconical Ant.		Log-periodic Ant.	
		3m	10m	3m	10m
Ambient signal					
Antenna factor calibration	Normal (k=2)	0.50	0.50	0.50	0.50
Receiver specification	Rectangular	0.50	0.50	0.50	0.50
Antenna directivity	Rectangular	0.25	0.00	1.50	0.25
Antenna phase center variation	Rectangular	0.00	0.00	1.00	0.20
Antenna factor frequency interpolation	Rectangular	0.25	0.25	0.25	0.25
Measure distance variation	Rectangular	0.60	0.40	0.60	0.40
Site imperfections	Rectangular	1.46	-2.32	2.26	2.94
Mismatch Receiver VRC : Γl= 0.09 Antenna VRC : Γg= 0.43 (Bi) 0.23 (Lp) Uncertainty limits 20log(1± Γl Γg)	U-shaped	0.33 -0.35	0.33 -0.35	0.33 -0.18	0.33 -0.18
System repeatability	Std Deviation	0.18	0.18	0.17	0.17
Cable loss calibration	Normal (k=2)	0.05	0.05	0.05	0.05
Combined standard uncertainty Uc(y)	Normal	1.05 -1.05	1.45 -1.45	1.78 -1.77	1.80 -1.78
Extended uncertainty U	Normal (k=2)	2.11 -2.11	2.90 -2.90	3.55 -3.53	3.59 -3.57

6.4 Limit

Frequency (MHz)	FCC Limit @ 3m. dB μV/m	CISPR Limit @ 10m. dB μV/m
30 – 88	40.0	30.0
88 – 216	43.5	30.0
216 – 230	46.0	30.0
230 – 960	46.0	37.0
960 – 1000	54.0	37.0
> 1000	54.0	No Specified limit

6.5 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Calibrated Date
■ -	ESI	Rohde & Schwarz	EMI test receiver	830482/010	12. 17. 2004
■ -	ESCS30	Rohde & Schwarz	EMI test receiver	839809/003	12. 17. 2004
■ -	HK116	Rohde & Schwarz	Biconical antenna	826861/018	11. 19. 2004
■ -	HL223	Rohde & Schwarz	Log-periodic antenna	829228/011	11. 19. 2004

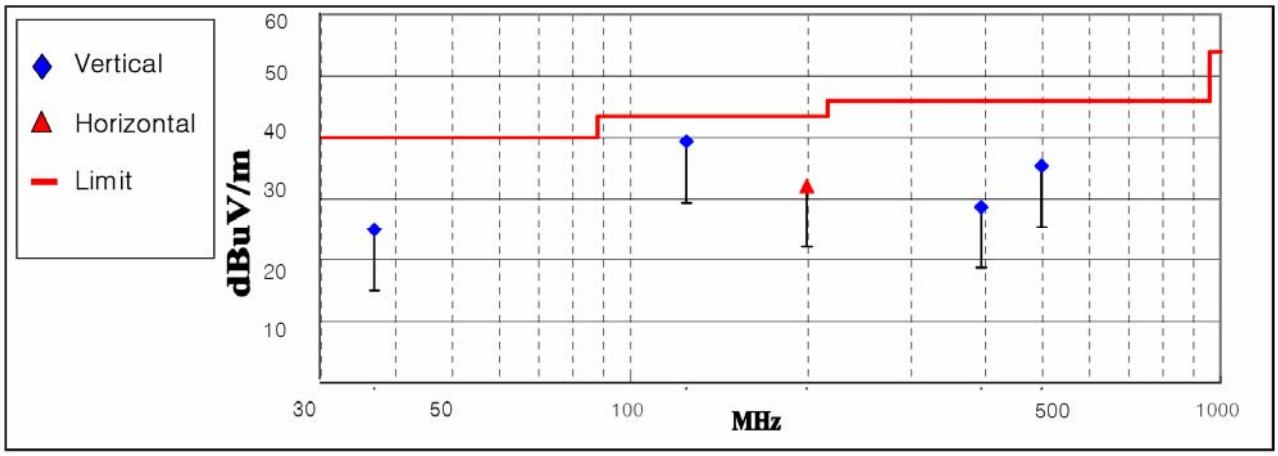
6.6 Test data for radiated emission

-. Test Date : July 6, 2005
-. Resolution bandwidth : 120kHz
-. Frequency range : 30MHz ~ 1000MHz

♦ Operating Condition: PC communication mode

Frequency (MHz)	Measurement Level				Limit (dBuV/m)	Margin (dBuV/m)	Positioning System		
	Reading Value(dBuV)	Antenna Factor(dB)	Cable Loss(dB)	Test Result (dBuV/m)			Pol. (H/V)	Height (cm)	Angle (deg)
36.87	11.5	11.68	1.80	**25.0**	**40.0**	**15.0**	**V**	**102**	**112**
124.56	25.1	11.30	2.98	**39.4**	**43.5**	**4.1**	**V**	**145**	**314**
199.24	14.7	13.57	3.89	**32.2**	**43.5**	**11.3**	**H**	**358**	**15**
393.54	7.1	15.57	6.04	**28.7**	**46.0**	**17.3**	**V**	**197**	**145**
497.71	11.2	17.61	6.59	**35.4**	**46.0**	**10.6**	**V**	**153**	**30**
Other Frequency	-	-	-	-	-	<<	-	-	-

* Comment: "<<" : The margin is more than 30dB

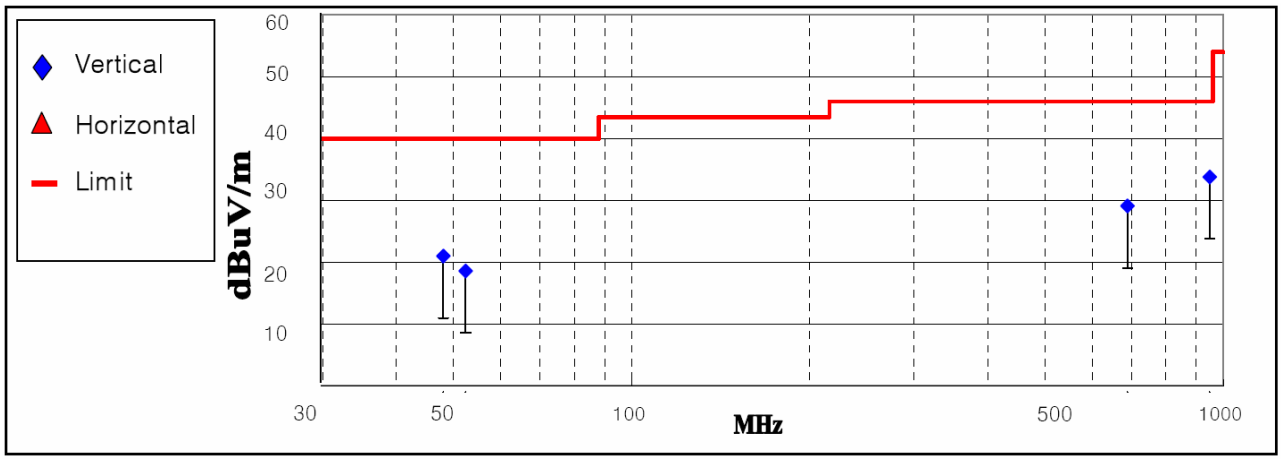


< Fig 4. Radiated emission result _ PC communication mode >

♦ Operating Condition: IR mode

Frequency (MHz)	Measurement Level				Limit (dBuV/m)	Margin (dBuV/m)	Positioning System		
	Reading Value(dBuV)	Antenna Factor(dB)	Cable Loss(dB)	Test Result (dBuV/m)			Pol. (H/V)	Height (cm)	Angle (deg)
48.02	9.6	9.43	1.96	**21.0**	**40.0**	**19.0**	**V**	**121**	**63**
52.36	7.5	9.06	2.02	**18.6**	**40.0**	**21.4**	**V**	**159**	**158**
688.86	1.3	19.99	7.82	**29.1**	**46.0**	**16.9**	**V**	**180**	**197**
948.60	1.5	22.88	9.44	**33.8**	**46.0**	**12.2**	**V**	**167**	**12**
Other Frequency	-	-	-	-	-	<<	-	-	-

* Comment: "<<" : The margin is more than 30dB



< Fig 5. Radiated Emission result _ IR mode >

7. Sample Calculations

$$dB\mu V = 20 \text{ Log }_{10}(\mu V/m)$$
$$dB\mu V = dBm + 107$$
$$\mu V = 10^{(dB\mu V/20)}$$

7.1 Example 1 :

■ **20.3 MHz**

Class B Limit = **250 μV** = **48 dBμV**

Reading = **- 67.8 dBm(Calibrated level)**

Convert to dBμV = **- 67.8 dBm + 107** = **39.2 dBμV**

$10^{(39.2dB\mu V/20)}$ = **91.2 μV**

Margin = **39.2 – 48** = **-8.8**

= **8.8 dB below Limit**

7.2 Example 2 :

■ **66.7 MHz**

Class B Limit = **100 μV/m** = **40.0 dBμV/m**

Reading = **- 76.0 dBm(Calibrated level)**

Convert to dBμV/m = **- 67.8 dBm + 107** = **31.0 dBμV/m**

Antenna Factor + Cable Loss = **5.8 dB**

Total = **36.8 dBμV/m**

Margin = **36.8 – 40.0** = **-3.2**

= **3.2 dB below Limit**

8. Recommendation & conclusion

The data collected shows that the **Kimin Electronic Co., Ltd. TV Link Loader (Model No.: TLL-1000A)** was complies with §15.107 and 15.109 of the FCC Rules.