





Nemko Korea Co., Ltd.

300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA

TEL:+82 31 322 2333

FAX:+82 31 322 2332

Applicant:

Daewoo Electronics Corporation. M/W Oven Div. R&D Center, 412-2,

Chungchun-Dong, Bupyong-Gu, Incheon,

403-032, Korea

Attn: Mr. Gun-Woo, Ro

Dates of Issue : April 20, 2005

Test Report No.: NK2FE238

Test Site: Nemko Korea Co., Ltd.

EMC site, Korea

FCC ID

Brand Name

Contact Person

C5F7NF1MMO100N

DAEWOO

Daewoo Electronics Corporation.
M/W Oven Div. R&D Center, 412-2,
Chungchun-Dong, Bupyong-Gu, Incheon,
403-032, Korea
Mr. Gun-Woo, Ro

Telephone No.: +82 32 510 7923

Applied Standard: Part 18 & 2
Classification: FCC Subpart C
EUT Type: Microwave oven

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in MP-5:1986.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best 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.

Bulk sung blun
Tested By: S. H. Back

Engineer

Reviewed By: H.H. Kim

Manager & Chief Engineer

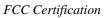
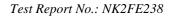
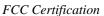




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SCOPE

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 18.

Responsible Party: Daewoo Electronics Corporation.

Contact Person: Mr. Gun-Woo. Ro

Tel No.: +82 32 510 7923

Manufacturer: Daewoo Electronics Corporation.

M/W Oven Div. R&D Center, 412-2, Chungchun-Dong,

Bupyong-Gu, Incheon, 403-032, Korea

Factory: 1) Daewoo Microwave Oven Co., Ltd.

981-1, Jangduck-Dong, Gwangsan-Gu, Kwangju-Shi,

506-251, Korea

2) Daewoo Electronics Corporation.

Detda, Dagang District, Tianjin, Chaina

FCC ID: C5F7NF1MMO100N

Model: KOR-1M0TBrand Name: DAEWOO

EUT Type: Microwave Oven

Electric Rating: 120V, 60Hz AC only, 1.5kW

Clock: 4MHz

Magnetron Type: RM228 / Daewoo Electronics Corp.

Applied Standard: FCC Part 18 & Part 2

Test Procedure(s): MP-5:1986

Dates of Test: Aril 07, 2005 to April 19,2005
 Place of Tests: Nemko Korea Co., Ltd. EMC Site

Test Report No.: NK2FE238



INTRODUCTION

The measurement procedure described in MP5:1986 for Methods of Measurement of radiated, powerline conducted radio noise, frequency and power output was used in determining emissions emanating from **Daewoo Electronics Corporation**.

FCC ID: C5F7NF1MMO100N, Microwave Oven.

These measurement tests were conducted at Nemko Korea Co., Ltd. EMC Laboratory .

The site address is 300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 kilometers (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (18miles) south-southeast from central Seoul.

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 C63.4-2003

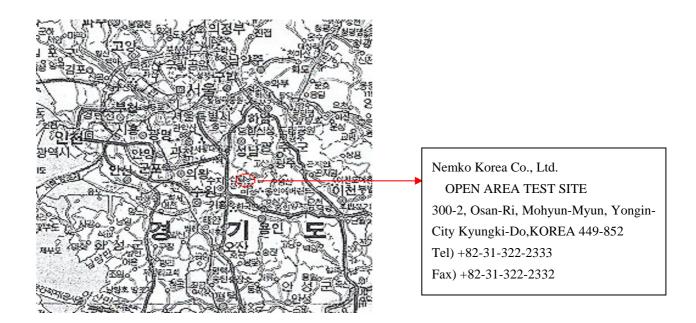


Fig. 1. The map above shows the Seoul in Korea vicinity area.

The map also shows Nemko Korea Corporation Ltd. EMC Lab and Incheon Airport.



DESCRIPTION OF TESTS

Radiation Hazard

A 700-ml water load was placed in the center of the oven.

The power setting was set to maximum power.

While the oven was operating, the Microwave Survey Meter probe was moved slowly around the door seams to check for leakage.

Input Power Measurement

The EUT was placed on a wooden table 0.8m at 1m distance Horn antenna.

A 700ml water load was placed in the center of the oven and the oven set to maximum power. A 700ml water load was chosen for its compatibility.

Input power and current were measured using a Power Analyzer.

Manufacturers to determine their input ratings commonly use this procedure.

Output Power Measurement

The Caloric Method was used to determine maximum output power.

The initial temperature of a 100ml water load was measured. The water load was placed in the center of the oven. The oven was operated at maximum output power for 120 seconds. Then the temperature of the water re-measured.

Frequency measurements

Following the above test, after operating the oven long enough to assure that stable operating temperature were obtained, the operating frequency was monitored as the input voltage was varied between 80 to 125 percent of the nominal rating. The water load was tested at 1000, 800, 600, 400, 200ml for the load varied.



DESCRIPTION OF TESTS

Conducted Emissions

The Line conducted emission test facility is located inside a 4 X 7 X 2.5 meter shielded enclosure.

It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6.

A 1m X 1.5m wooden table 0.4m height is placed 0.4m away from the vertical wall and 1.5m away from the side of wall of the shielded room

Kyoritsu (KNW-407) of the 50ohm/50uH Line Impedance Stabilization Network(LISN) is bonded to the shielded room.

The EUT is powered from the Kyoritsu LISN.

Power to the LISN is filtered by high-current high insertion loss Power line filters.

The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure.

All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1/2".

If DC power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISN,

All interconnecting cables more than 1 meter were shortened by non inductive bundling (serpentine fashion) to a 1 meter length.

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 spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 150kHz to 30MHz with 20msec sweep time.

The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCS30).

The detector function were set to CISPR quasi-peak mode & average mode.

The bandwidth of receiver was set to 9KHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.

Each EME reported was calibrated using the R&S signal generator.

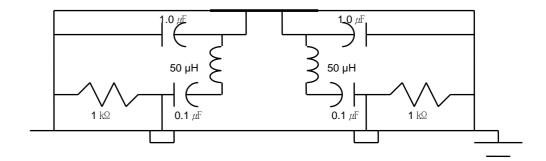


Fig. 2. LISN Schematic Diagram



DESCRIPTION OF TESTS

Radiated Emissions

Preliminary measurement were made indoors at 3 meter using broad band antennas, broadband amplifier, and spectrum analyzer 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, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found. The spectrum was scanned from 30 to 1000MHz using Biconical log Antenna(ARA, LPB-2520/A). Above 1GHz, Doppels Teg Horn antenna (EMCO, DAA-37121) was used. Final Measurements were made outdoors at 10m using Biconical log Antenna (ARA, LPB-2520/A) for measurement from 30MHz to 1000MHz and made indoors at 3m using Doppels Teg Horn antenna (EMCO, DAA-37121) for measurement from 1GHz to 24GHz. Each frequency found during pre-scan measurements was reexamined and investigated using EMI test receiver. (ESCS30)

The detector function were set to CISPR quasi-peak and peak mode and the bandwidth of the receiver were set to 120KHz and 1MHz depending on the frequency or type of signal. The half wave dipole antenna was tuned to the frequency found during preliminary radiated measurements.

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

The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission.

The EUT is rotated about its vertical axis on the turntable, and the polarization and height of the receiving antenna are varied to obtain the highest field strength on the particular frequency under observation.

Each EME reported was calibrated using the R/S signal generator.

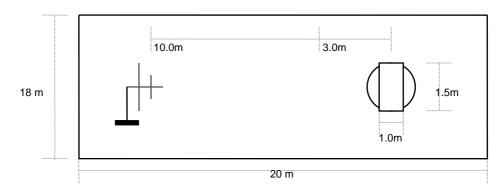


Fig. 3. Dimensions of Outdoor Test Site



Radiation Hazard

Probe Location	Maximum Leakage [mW/Cm2]	Limit [mW/Cm2]
Α	0.10	1.00
В	0.09	1.00
С	0.10	1.00
D	0.10	1.00
All others	0.02	1.00

Input Power Measurement

Operation mode	P rated (W)	P (W)	dP (%)	Required dP (%)
Power Input	1568	1500	4.53	+5%or-10%

RF Output Power Measurement

Quantity of	Starting	Final	Elapsed Time	RF Power
Water	Temperature	Temperature	[seconds]	[watts]
[ml]	[Centigrade]	[Centigrade]	[Seconds]	[watts]
1000	10.1	35.5	120	886

RF Power = (4.187 Joules/Cal) x (Volume in ml) x (Temp. Rise)
120

Balk sungflun
Tested by: S. H. Baek



Operating Frequency measurements

▶ Frequency vs Line Voltage Variation Test

		[Ro	\mathbf{pom} Temperature : 22.0 $^{\circ}$
Line Voltage Variation (Vac)	*)Pole	Frequency [MHz]	Allowed Tolerance for the ISM Band
	Н	Lower : 2424	
00 (000/)	Н	Upper : 2469	
96 (80%)	V	Lower : 2422	
	V	Upper : 2471	
	Н	Lower : 2422	
400 (000/)	Н	Upper : 2474	
108 (90%)	V	Lower : 2401	
	V	Upper : 2476	Lower : 2400MHz
	Н	Lower : 2423	Upper : 2500MHz
122 (1100/)	Н	Upper : 2471	
132 (110%)	V	Lower : 2428	
	V	Upper : 2471	
	Н	Lower : 2416	
150 (125%)	Н	Upper : 2473	
150 (125%)	V	Lower : 2423	

Upper: 2470

NOTE:

*Pol. H =Horizontal V=Vertical
 Initial load : 1000ml of water in the beaker.
 Line voltage varied from 96Vac to 150Vac.

4. ISM Frequency : 2450MHz, Tolerance : \pm 50MHz

RESULT: Pass

Tested by : S. H. Baek

Buck sung blun



► Frequency vs Load Variation Test

[Room Temperature : 22.0 ℃]

T T						
Volume of water (cc)	*)Pole	Frequency [MHz]	Allowed Tolerance for the ISM Band			
	Н	Lower : 2428				
1000	Н	Upper : 2429				
1000	V	Lower : 2410				
	V	Upper : 2470				
	Н	Lower : 2402				
800	Н	Upper : 2474				
800	V	Lower : 2411				
	V	Upper : 2471				
	Н	Lower : 2434				
600	Н	Upper : 2468	Lower : 2400MHz			
600	V	Lower : 2449	Upper : 2500MHz			
	V	Upper : 2468				
	Н	Lower : 2436				
400	Н	Upper : 2471				
400	V	Lower : 2438				
	V	Upper : 2468				
	Н	Lower : 2403				
200	Н	Upper : 2470				
200	V	Lower : 2433				
	V	Upper : 2468				

NOTE:

1. *Pol. H =Horizontal V=Vertical

2. Initial load: 1000ml of water in the beaker.

3. Frequency was measured by using nominal voltage (AC120V).

4. ISM Frequency : 2450MHz, Tolerance : \pm 50MHz

RESULT: Pass

Tested by : S. H. Baek

Buck sung blun



Conducted Emissions

FCC ID: C5F7NF1MMO100N

[Room Temperature : 23.0℃]

Frequency	requency Level(dBµV)		Line	Limit(dBµV)		Margin(dB)	
(MHz)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.32	33.2	14.8	L	59.7	49.7	26.5	34.9
0.68	49.2	23.0	N	56.0	46.0	6.8	23.0
0.87	48.0	20.0	N	56.0	46.0	8.0	26.0
1.02	40.0	18.2	N	56.0	46.0	16.0	27.8
1.16	37.2	12.4	${ m L}$	56.0	46.0	18.8	33.6
1.43	36.4	14.2	L	56.0	46.0	19.6	31.8

^{*)} Correction factor was included to Test Level (dBuV)

NOTES:

- 1. Measurements using CISPR quasi-peak mode & average mode.
- 2. See attached Plots.
- 3. LINE : L = Line , N = Neutral

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Tested by: S. H. Baek



Radiated Emissions

FCC ID: C5F7NF1MMO100N

▶ 30MHz ~ 1	GHz			[Ro	om Temperat	ure : 23.5℃]
Frequency	Reading	Pol*	AF+CL+Amp	Result(PK)	Limit(10m)	Margin
(MHz)	$(\mathbf{dB}\mu V)$	(H/V)	(dB)**	$(dB\mu V/m)$	$(dB\mu V/m)$	(dB)
50.37	61.8	V	-21.5	40.3	60.44	20.1
55.22	57.4	Н	-21.6	35.8	60.44	24.6
56.19	67.3	V	-21.6	45.7	60.44	14.7
61.04	62.0	V	-21.6	40.4	60.44	20.0
65.89	57.5	V	-21.3	36.2	60.44	24.2
943.74	30.5	V	4.7	35.2	60.44	25.2

<Radiated Measurements at 10meters>

NOTES:

- 1. *Pol. H =Horizontal V=Vertical
- 2. **AF+CL+Amp. = Antenna Factor + Cable Loss + Amplifier.
- 3. Distance Correction factor: 20 * log (300/10)=30dBuV/m
- 4. The limit at 300meters is 20 * LOG (25 * RF Power/500)
- 5. All other emissions were measured while a 700ml load was placed in the center of the oven.
- 6. If no frequencies are specified in the tables, no measurement for peak & average was necessary.

Buck sung blun

Tested by : S. H. Baek



Radiated Emissions

FCC ID: C5F7NF1MMO100N

1GHz .. 24GHz

▶ 1GHz ~ 2	24GHz			[Roon	n Temperatu	<u>ire : 21.5℃]</u>	
Frequency	Reading	Pol*	AF+CL+Amp	K	Limit	Results	Margin
(MHz)	$(dB\mu V)$	(H/V)	(dB)**	(dB)***	(dB <i>µ</i> V/ m)	$(dB\mu V/m)$	(dB)
2330.00	29.0	Н	0.05	-44.03	70.44	29.09	41.35
4048.00	23.4	V	13.36	-40.03	70.44	36.76	33.68
4119.00	28.1	Н	10.30	-40.03	70.44	38.40	32.04
4926.00	39.7	Н	10.23	-40.00	70.44	49.93	20.51
7380.00	40.3	Н	14.55	-40.00	70.44	54.85	15.59
8369.00	33.2	Н	15.75	-40.00	70.44	48.95	21.49
9853.00	43.80	Н	17.20	-40.00	70.44	61.00	9.44
14785.00	38.30	V	25.35	-40.00	70.44	63.65	6.79

<Radiated Measurements at 3meters>

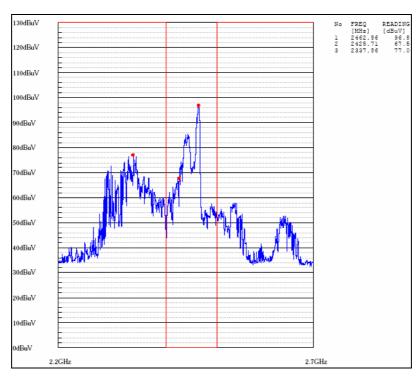
NOTES:

- 1. *Pol. H =Horizontal V=Vertical
- 2. **AF+CL+Amp. = Antenna Factor + Cable Loss + Amplifier.
- 3. ***Computations to determine compliance
- 4. Distance Correction factor: 20 * log (300/3)=40dBuV/m
- 5. The limit at 300meters is 20 * LOG (25 * RF Power/500)
- 6. Load for measurement of radiation on second and third harmonic: Two loads, one of 700ml and the other of 300ml, of water were used. Each load was tested both with the beaker located in the center of the oven and with it in the corner.
- 7. The test was performed at peak detector mode with RBW 1MHz, VBW 1MHz.
- 8. All other emissions were measured while a 700ml load was placed in the center of the oven.
- 9. If no frequencies are specified in the tables, no measurement for peak & average was necessary.

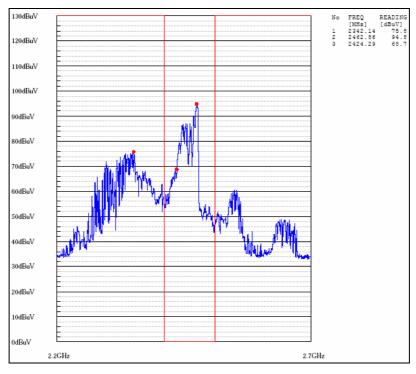
Tested by : S. H. Baek

Buck sungbun



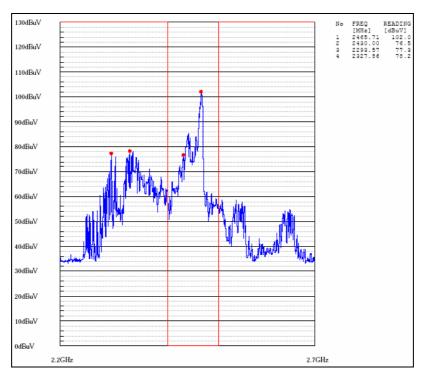


Horizontal (96V, 1000cc)

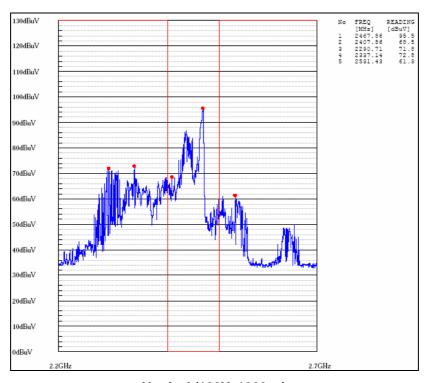


Vertical (96V, 1000cc)



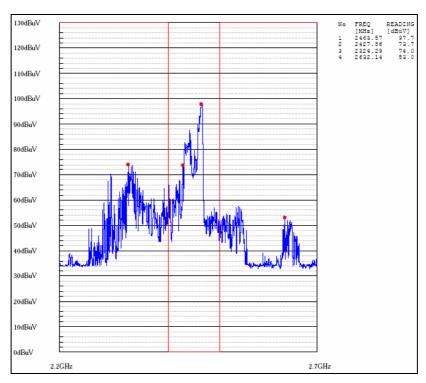


Horizontal (108V, 1000cc)

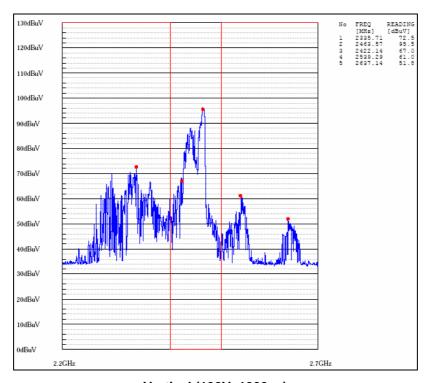


Vertical (108V, 1000cc)



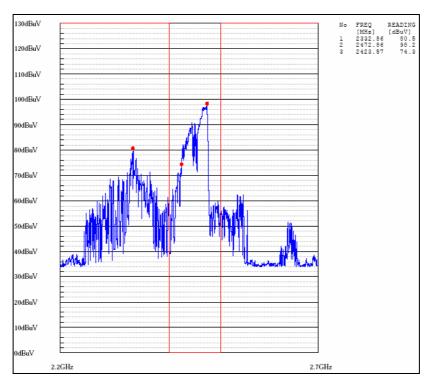


Horizontal (132V, 1000cc)

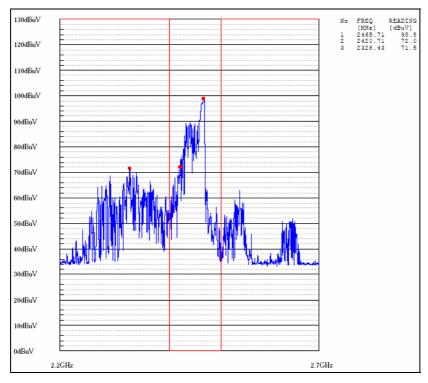


Vertical (132V, 1000cc)





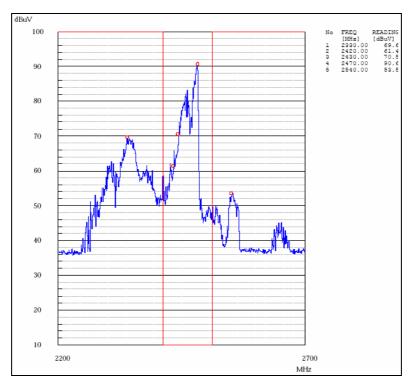
Horizontal (150V, 1000cc)



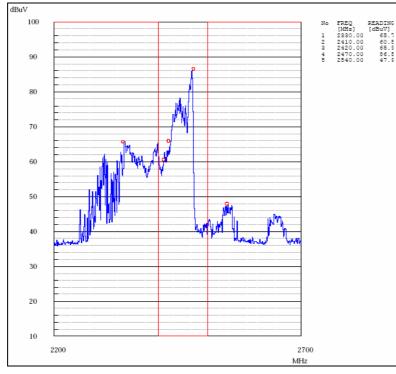
Vertical (150V, 1000cc)



• Frequency vs Load Variation Test



Horizontal (120V, 1000cc)

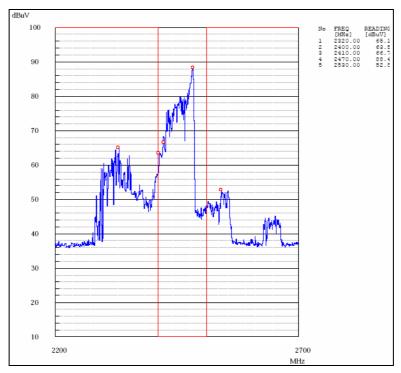


Vertical (120V, 1000cc)

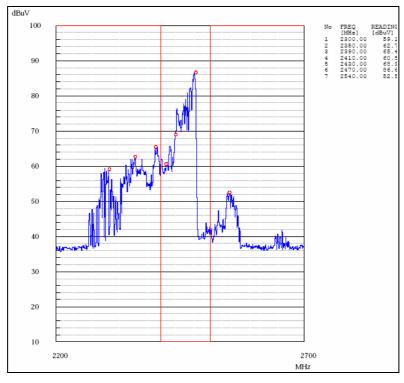
Daewoo Electronics Corporation. FCC ID:C5F7NF1MMO100N



Frequency vs Load Variation Test



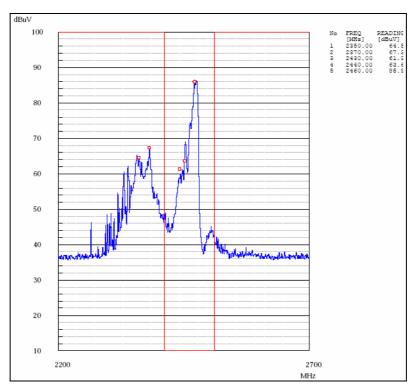
Horizontal (120V, 800cc)



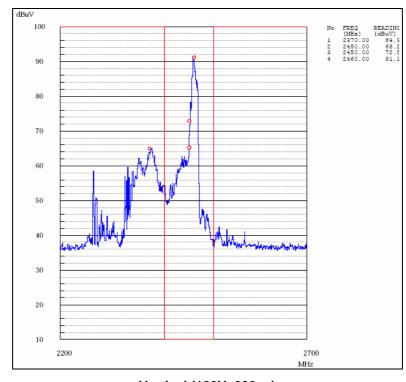
Vertical (120V, 800cc)



Frequency vs Load Variation Test



Horizontal (120V, 600cc)

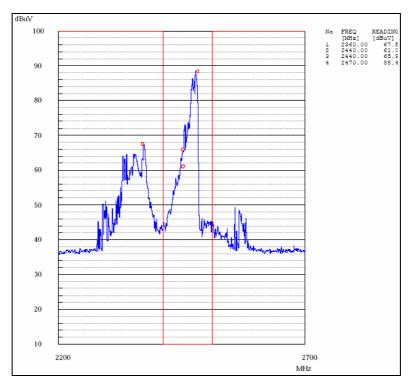


Vertical (120V, 600cc)

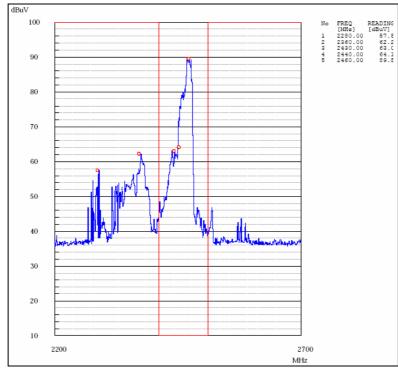
Daewoo Electronics Corporation. FCC ID:C5F7NF1MMO100N



Frequency vs Load Variation Test



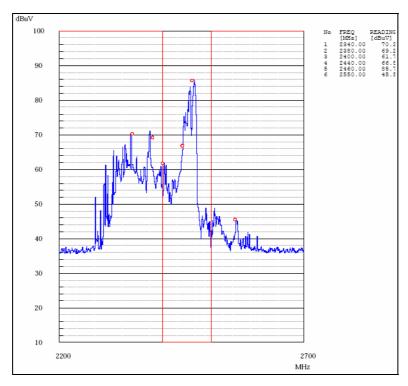
Horizontal (120V, 400cc)



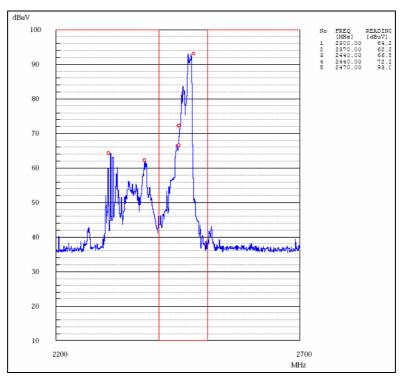
Vertical (120V, 400cc)



• Frequency vs Load Variation Test



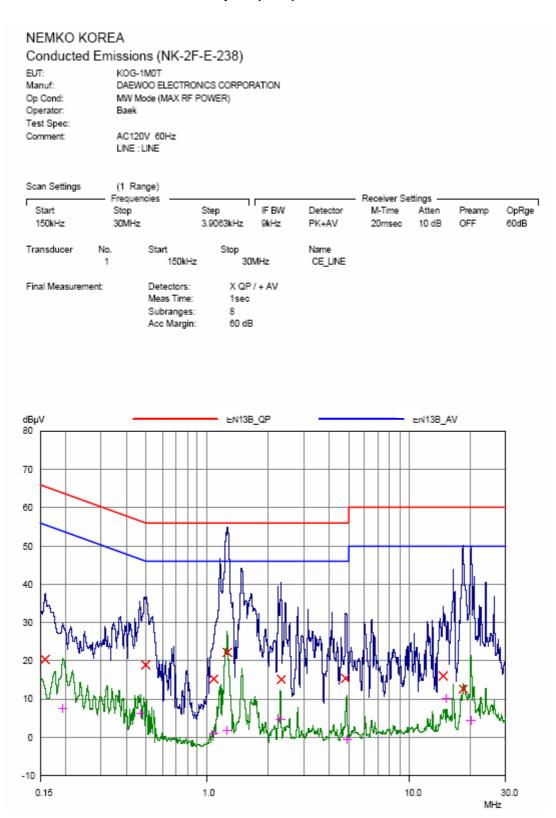
Horizontal (120V, 200cc)



Vertical (120V, 200cc)



Conducted Emission at the Mains port (Line)





• Conducted Emission at the Mains port (Neutral)

NEMKO KOREA

Conducted Emissions (NK-2F-E-238)

EUT: KOG-1M0T

Manuf: DAEWOO ELECTRONICS CORPORATION

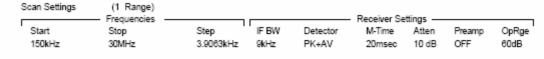
Op Cond: MW Mode (MAX RF POWER)

Operator: B

Test Spec:

Comment: AC120V 60Hz

LINE: NEUTRAL

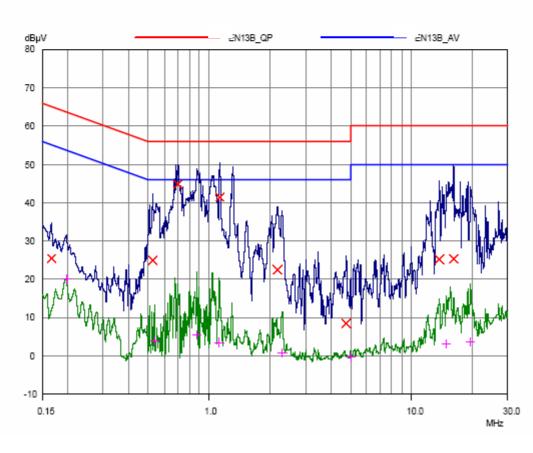


 Transducer
 No.
 Start
 Stop
 Name

 1
 150kHz
 30MHz
 CE_UNE

Final Measurement: Detectors: X QP / + AV Meas Time: 1 sec

Subranges: 8 Acc Margin: 60 dB





ACCURACY OF MEASUREMENT

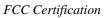
The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95%

1. Radiation Uncertainty Calculation

Contribution	Probability Distribution	Uncertainty(+/-dB)
Antenna Factor	Normal (k=2)	± 0.5
Cable Loss	Normal (k=2)	± 0.04
Receiver Specification	Rectangular	± 2.0
Antenna directivity		
Antenna Factor variation with Height	7	
Antenna Phase Center Variation	Rectangular	± 1.0
Antenna Factor Frequency Interpolation	7	
Measurement Distance Variation		
Site Inperfections	Rectangular	± 2.0
Mismatch:Receiver VRC ri=0.3		
Antenna VRC rR=0.1(Bi)0.4(Lp)	U-Shaped	+ 0.25 / - 0.26
Uncertainty Limits 20Log(1+/-ri rR)		
System Repeatibilty	Std.deviation	± 0.05
Repeatability of EUT		-
Combined Standard Uncertainty	Normal	± 1.77
Expended Uncertainty U	Normal (k=2)	± 3.5

2. Conducted Uncertainty Calculation

Contribution	Probability Distribution	Uncertainty(+/-dB)
Receiver Specification	Normal (k=2)	± 2.0
LISN coupling spec.	Normal (k=2)	± 0.4
Cable and input attenuator cal.	Rectangular	± 0.4
Mismatch:Receiver VRC ri=0.3		
LISN vrc rg=0.1	U-Shaped	± 0.26
Uncertainty Limits 20Log(1+/-ri rR)		
System Repeatibilty	Std.deviation	± 0.68
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.18
Expended Uncertainty U	Normal (k=2)	± 2.4





LIST OF TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Calibration Date
1	*Test Receiver	R & S	ESCS 30	2004.08
2	*Test Receiver	R & S	ESCS 30	2004.12
3	Amplifier	НР	8447F	2004.07
4	*Amplifier	НР	8447F	2005.01
5	Amplifier	НР	8447F	2004.10
6	*Amplifier	НР	8449B	2005.03
7	*Spectrum Analyzer	НР	8566B	2005.03
8	Spectrum Analyzer	НР	8568B	2004.10
9	*Spectrum Analyzer	Anritsu	MS2668C	2004.12
10	*Logbicon Super Antenna	Schwarzbeck	VULB9166	2004.05
11	*Doppels Teg Horn	EMCO	DAA-37121	2004.10
12	*Biconical Log Antenna	ARA	LPB-2520/A	2004.05
13	High Voltage Probe	R & S	ESH2-Z3	2004.06
14	*Microwave Survey Meter	Holaday Industries	H1-1801	2004.07
15	Signal Generater	R & S	SMP02	2005.03
16	*LISN	R & S	ESH3-Z5	2004.10
17	*LISN	Kyoritsu	KNW-407	2005.03
18	LISN	Kyoritsu	KNW-408	2004.12
19	*Position Controller	EM Eng.	N/A	N/A
20	*Turn Table	EM Eng.	N/A	N/A
21	*Antenna Mast	EM Eng.	N/A	N/A
22	*Anechoic Chamber	EM Eng.	N/A	N/A
23	*Shielded Room	EM Eng.	N/A	N/A
24	*Position Controller	Seo-Young EMC	N/A	N/A
25	*Turn Table	Seo-Young EMC	N/A	N/A
26	*Antenna Mast	Seo-Young EMC	N/A	N/A
27	*Anechoic Chamber	Seo-Young EMC	N/A	N/A
28	*Shielded Room	Seo-Young EMC	N/A	N/A

^{*)} Test equipment used during the test



APPENDIX D - SCHEMATIC DIAGRAM



APPENDIX E - USER'S MANUAL



APPENDIX F - BLOCK DIAGRAM