F C C -
TESTREPORT

REPORT NO.: 05/04-0104

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1.Client information:

Name:	DAEWOO Electronics Corp.
Address:	Microwave Oven R&D Center, # 412-2, Chungchun Dong, Bupyong-Gu, Incheon, 403-032 / KOREA
Name of contact:	Mr. Seong O. Kim, Manager
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2. Equipment under Test:

2.1 Identification of the EUT

Equipment:	Microwave Oven
Model:	KOT-1H2U
Brand name:	Daewoo
Serial-No.:	-/-
Manufacturer:	DAEWOO Electronics Corp. Microwave Oven R&D Center, # 412-2, Chungchun Dong, Bupyong-Gu Incheon, 403-032 / KOREA
Country of origin:	KOREA
Rating:	120V 60Hz AC only, 1.6kW

2.2 Additional information about the EUT

The EUT consists of the following parts:

Component	Type / model	Technical data	Maker
Magnetron	RM228	2.45GHz	Daewoo

3. Test Site

3.1. Shielded room for conducted emission

Measurement of conducted emission from EUT was made in the shielded chamber (Siemens DC-10GHz) that has been found in compliance with Federal Communications Commissions (FCC) requirements of clause 2.948 according to ANSI C63.4-1992 on March 04, 2003.

3.2. Semi-anechoic chamber

Measurement of radiated emissions from EUT was made at semi-anechoic chamber that has been found in compliance with Federal Communications Commissions (FCC) requirements of clause 2.948 according to ANSI C63.4-1992 on March 04, 2003.

4. CALIBRATIONS OF MEASURING INSTRUMENTS

All measurements were made with instruments calibrated according to the requests of EN/IEC 17025 according to which the test site is accredited. Measurement of radiated emissions was made with instruments conforming to American National Standard Specification, ANSI C63.4-1992. The calibration of measuring instrument, including any accessories that may affect test results, was performed according to the requests of EN/IEC 17025.

5. DESCRIPTION OF TEST CONDITION

5.1 Conducted emission measurements

5.1.1 Test site

Measurements were made in shielded chamber as described at 3.1 in this report.

5.1.2 Detector function selection and bandwidth

In conducted emissions measurement CISPR quasi-peak and Average detector were used.
The bandwidth of the detector of instrument is 10 KHz over frequency range of 150kHz to 30 MHz, Conducted emission is detected in CCIR quasi peak and Average mode.

5.1.3 Unit of measurement

Test results of conducted emission measurement are reported in dBμV. Using the unit of dBuV on the test instrument, indication unit was converted to voltage unit of μV as following method for frequencies 150kHz – 30MHz;

$$U = 10^{[R/20]}$$

here,

U: Voltage of conducted emission in μV
R: Meter reading in dB(μV)

5.1.4 Frequency range to be scanned

For conducted emission measurements, the spectrum in the range of 150kHz to 30 MHz , if found, was investigated.

5.1.5 Test conditions and configuration of EUT

The EUT was configured and operated in all modes of operation so as to find the maximum conducted emission generated 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 a 1 m high non metallic table.
Each type of accessory provided by manufacturer or typically used and support equipment were connected to the EUT during measurements to the typical usage and applicable as nearly as practicable.

5.1.6 Measurement uncertainty

Conducted emission measurements: $\pm$ 3.0dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurements uncertainty was calculated in accordance with NAMAS NIS 81: "The treatment of uncertainty in EMC measurement".

The measurement uncertainty was given with a confidence of 95%.

5.2 Radiated emissions measurements

5.2.1 Test site

Measurements were made in semi-anechoic chamber as described at 3.1 in this report.

5.2.2 Detector function selection and bandwidth

In radiated emissions measurement, field strength meters that has CISPR quasi-peak and average detector were used. The bandwidth of the detector of instrument is 120 KHz over frequency range of 30 to 1000 MHz, and 1 MHz over frequency range of 1 to 18 GHz. Emissions to be measured are detected in average mode.

5.2.3 Unit of measurement

Test results of radiated emissions measurement are reported in microvolts per meter at the specific distance. Using the unit of dBuV on the test instrument, indication unit was converted to field strength unit of uV/m as following method for frequencies 30MHz – 1000MHz;

$$F/S = 10^{[(R + CF)/20]}$$

here,

F/S: Field strength in μV/m
R: Meter reading in dB(μV)
CF: Correction factor (includes cable loss, antenna factor, field deviation)

For frequencies above 1000MHz;

$$F/S = 10^{[(R + CF-AG)/20]}$$

here,

F/S: Field strength in μV/m
R: Meter reading in dB(μV)
CF: Correction factor (includes cable loss, antenna factor, field deviation, filter loss)
AG: Preamplifier gain

5.2.4 Antennas

Measurements were made using calibrated bilog antenna in range of 30 to 1000 MHz and horn antenna in range of 1 to 18 GHz to determine the emission characteristics of the EUT. 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.

5.2.5 Frequency range to be scaned

For radiated emissions measurements, the spectrum in the range of 30 to 1000 MHz and above, if found, was investigated.

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 RF energy generated 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 a 1 m high non metallic 1m diameter table. The turn table containing the system was rotated and the antenna height was varied 4 m to find the maximum RF energy generated from EUT.
Each type of accessory provied by manufacturer or typically used and support equipment were connected to the EUT during measurements to the typical usage and applicable as nearly as practicable.

5.2.7 Measurement uncertainty

Radiated emissions measurements, bilog antenna: $\pm$ 4.2dB
Radiated emissions measurements, horn antenna: $\pm$ 4.3dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurements uncertainty was calculated in accordance with NAMAS NIS 81: "The treatment of uncertainty in EMC measurement".

The measurement uncertainty was given with a confidence of 95%.

6. MEASURING INSTRUMENTS AND SET-UP

6.1 Conducted emission

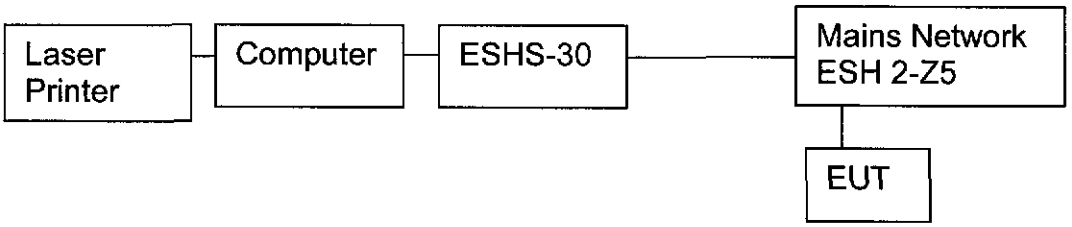
6.1.1 Testreceiver

Rohde & Schwarz, Model ESHS-30 (9kHz – 30MHz)
Detector function: Quasi peak, Average
IF-Bandwidth: 10kHz

6.1.2 Mains Network

Rohde & Schwarz, Model ESH 2-Z5 (9kHz – 30MHz)

6.1.3 Measurement setup



6.2 Radiated emission

6.2.1 Test receiver

a) Rohde & Schwarz, Model ESVS-30 (20MHz – 1000MHz)
Detector function: Average
IF bandwidth: 120kHz
b) Rohde & Schwarz, Model FSMS 26 (100Hz – 26.5GHz)
Detector function: Average
IF bandwidth: 1MHz

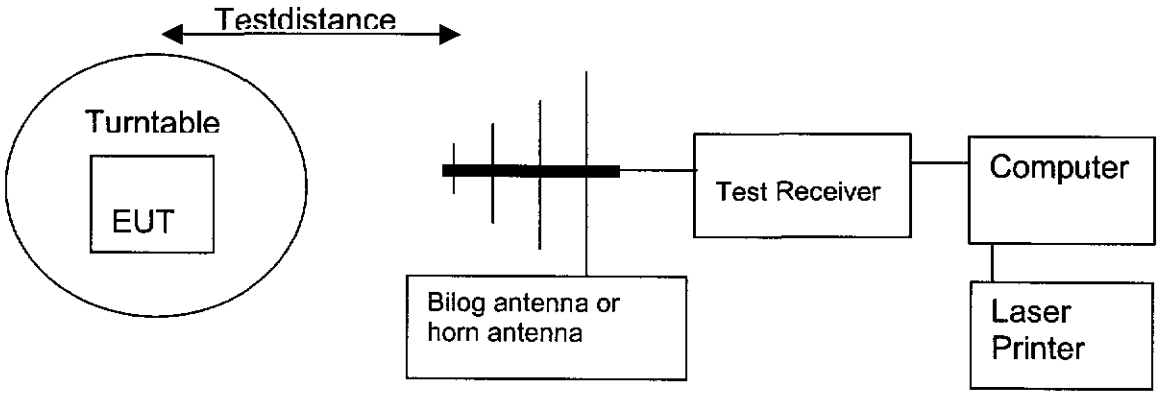
6.2.2 Receiving antennas

a) Chase, Model CBL6111: Bilog antenna(30MHz – 1000MHz)
b) Electro Metrics, Model RGA-60 Horn antenna(1GHz – 18GHz)

6.2.3 Preamplifier / filter

Model MWPAFB003: Amplifier/Filter bank 1GHz – 18GHz
Amplifier gain 30dB

6.2.4 Measurement setup



6.3. Frequency measurements

6.3.1 Test receiver

Rohde & Schwarz, Model FSMS 26 (100Hz – 26.5GHz)
Detector function: Average
IF bandwidth: 1MHz

6.3.2 Receiving antennas

Electro Metrics, Model RGA-60 Horn antenna(1GHz – 18GHz)

7. RF POWER OUTPUT MEASUREMENT AND RESULTS

The Calorimetric Method was used to determine maximum output power. A 1000 ml water load was placed in the center of the oven. A mercury thermometer was used to measure temperatur rise.

$$Power(W) = \frac{(4.2 Joules / Cal) * (Volume\ in\ ml) * (Temperature\ rise)}{Time\ in\ Seconds}$$

Magnetron type: RM228

Quantity of Water [ml]	Starting Temperature [°C]	Final Temperature [°C]	Elapsed Time
1000	10.0	20.1	43

$$Power(W) = \frac{4.2 * 1000 * 10.1}{43}$$

Power (W) = 986

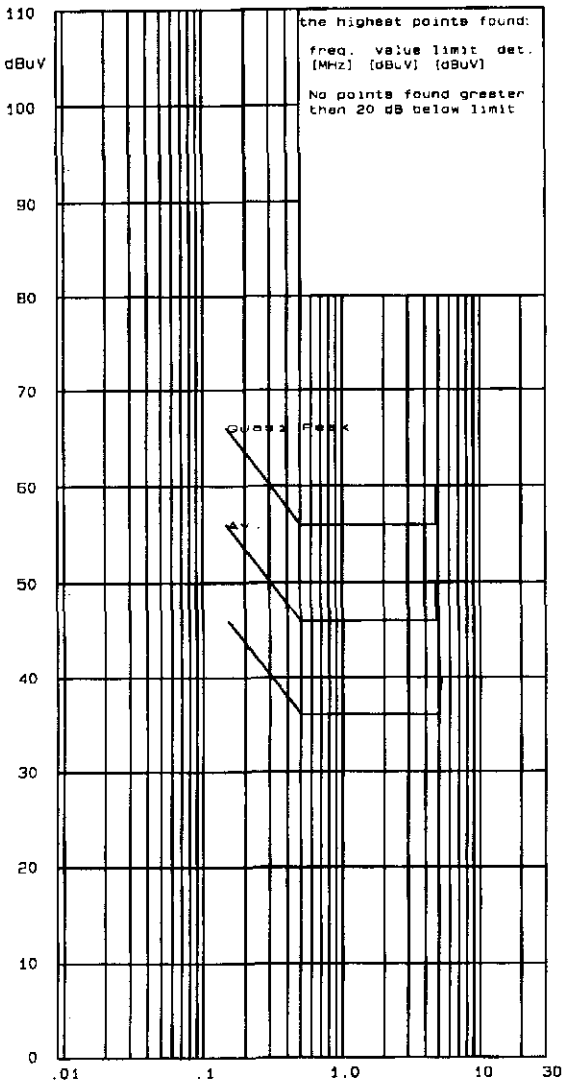
8. TEST DATA
8.1 Conducted emission Section 18.307 (b)

ISM 1/2

Interf. Voltage 150 KHz - 30 MHz

acc. Part 18.307 (b)

Cabin 1



Model/System: KDT-1H2U

pkm/Ser. No: 01/--

Manuf./Imp. : DAE WOO MWO

Date: 12 Apr 2005

Set under Test: MICROWAVE OVEN

Test equipment:

Rohde & Schwarz ESHS-30

Rohde & Schwarz ESH 2-Z5

Connected sets:

Operating mode:

POWER MAX.
1000ml IN CENTER
TESTED ON L1

RFI suppression parts:

05/04-0104
* two dB safety margin for
type approval necessary

Operator: BL

Result: o.k.

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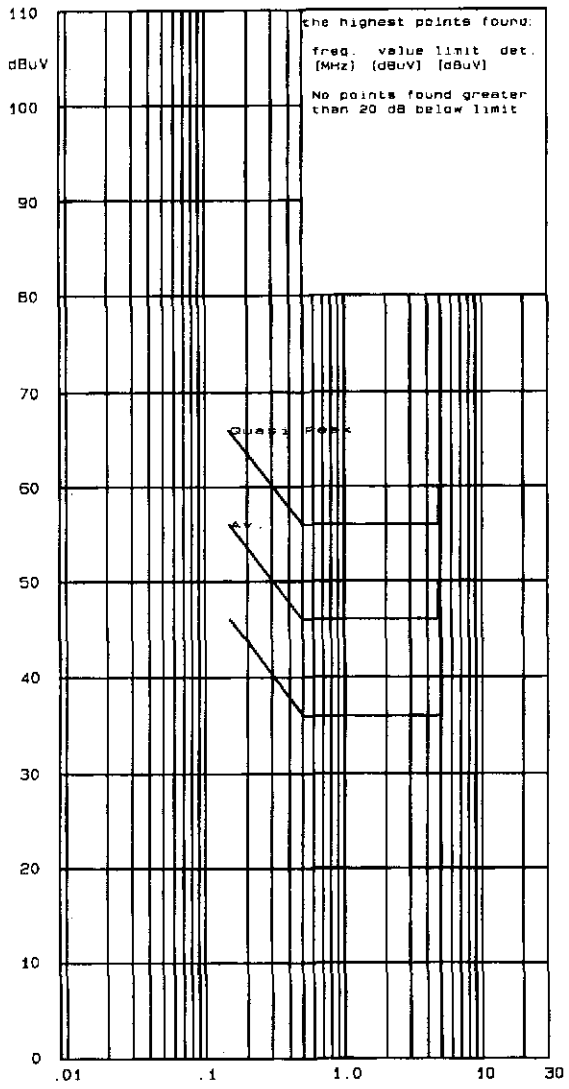
ISM 1/2

Interf. Voltage 150 KHz - 30 MHz

acc. Part 18.307 (b)

Cabin 1



Model/System: KOT-1H2U

pkm/Ser. No: 01/--

Manuf./Imp. : DAE WOO MNO

Date: 12 Apr 2005

Set under Test: MICROWAVE OVEN

Test equipment:

Rohde & Schwarz ESHS-30

Rohde & Schwarz ESH 2-Z5

Connected sets:

Operating mode:

POWER MAX.
1000ml IN CENTER
TESTED ON N

RFI suppression parts:

05/04-0104
* two dB safety margin for type approval necessary

Operator: BL

Result: 0.4

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8.2. Radiated emissions (Section 18.305)

Magnetron type: RM228, RF Power Output: 986 W

Test distance: 3m

Freq. (MHz)	Pol.	Reading at 3m (dBuV)	CF-AG (dB/m)	F/S at 3m (dBuV/m)	K-Factor	F/S at 300m (uV/m)	Limit at 300m µV/m
87,2	H	25,5	12	37,5	0.01	<1	35,1
2338	H	41	12	53	0.01	4,5	35,1
2536	H	43	13	56	0.01	6,3	35,1
4115	H	46	14	60	0.01	10,0	35,1
4862	H	58	13	71	0.01	35,5	35,1
7374	H	54	15	69	0.02	28,2	35,1
9843	H	46	16	62	0.01	12,6	35,1
12174	H	31	16	47	0.01	2,2	35,1
14768	H	50	15	65	0.01	17,8	35,1
17061	H	29	19	48	0.01	2,5	35,1

Result: Positive

Limit (at 300m) = $25 * \sqrt{\frac{RF - power}{500}}$ (µV/m)

- Field Strength (at 300m) (uV/m) = K * 10 $^{[Fieldstrength\ at\ 3m(dB\mu V/m)/20]}$

NOTES:
1. Two representative modes (Full power and defrost) of operation were investigated.

2. A glass beaker was used as the container and the test was made with a shelf in its initial normal position.

3. Load for measurement of radiation on second and third harmonic: Two loads, one of 700 and the other of 300 ml, 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.

4. Load for all other measurements: 700ml of water, with the beaker located in the center of the oven

5. All other emissions are non-significant.

6. AF = Antenna Factor CF = Conversion Factor F/S = Field Strength

7. The tests were made with average detector for frequency range of 30 MHz to 18 GHz.

8.3. Frequency measurements

The operating frequency range of the magnetron has been measured with 2.421GHz to 2.487GHz and is within the ISM frequency 2.450GHz +/-50MHz

CONCLUSIONS:

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the relevant clauses of Federal Communications Commission Rules for Microwave ovens (Part 18)

effected by:

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14.04.2005	G. Raithel Dipl.-Ing. (FH)	
(date)	*(name)*	*(signature)*

9. List of instrument used

Test place	Kind of equipment	Type	Manufacturer	PKM-Identno.
Conducted emissions cabin 1 9kHz - 30MHz	EMI test receiver	ESHS-30	Rohde&Schwarz	10571
	Line impedance stabilisation network	ESH3-Z5	Rohde&Schwarz	10139
	shielded room	1 GHz Typ B83102	Siemens	10111
Conducted emissions cabin 2 9kHz - 30MHz	EMI test receiver	ESHS-30	Rohde&Schwarz	10552
	Line impedance stabilisation network	ESH3-Z5	Rohde&Schwarz	10140
	shielded room	10 GHz Typ B83102	Siemens	10391
Radiated emissions 30MHz - 1000MHz	EMI test receiver	ESVS-30	Rohde&Schwarz	10572
	EMI test antenna	CBL6111	Chase	10022
	Antenna mast system	AM9104	Schwarzbeck	10099
	RF-cable	K4	Suhner	20707
	AC-Linefilter	FV2-10-D	Timonta	10755
	Turntable	DT 310	Deisel	10774
Radiated emission 1000MHz – 18GHz	Spectrum Analyzer (100Hz – 26.5GHz)	FSMS 26	Rohde & Schwarz	10965
	Horn antenna (1GHz – 18GHz)	RGA-60	Electro Metrics	10018
	Antenna mast system	AM9104	Schwarzbeck	10099
	RF-cable	K4	Suhner	20707
	AC-Linefilter	FV2-10-D	Timonta	10755
	Turntable	DT 310	Deisel	10774
Frequency measurements	Spectrum Analyzer (100Hz – 26.5GHz)	FSMS 26	Rohde & Schwarz	10965
	Antenna mast system	AM9104	Schwarzbeck	10099
	RF-cable	K4	Suhner	20707
	AC-Linefilter	FV2-10-D	Timonta	10755
	Turntable	DT 310	Deisel	10774

Appendix A

Photos of tested sample