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**Report of Measurements
of Electromagnetic Compatibility Testing**

Test Report File No. : **NC1230** Date of issue: May 27, 1999
Applicant : DeLonghi America Inc.
Model / Serial No. : MW660FU
Product Type : Microwave Oven
Power Supply : 120 Vac , 60Hz
Manufacturer : Same as Applicant
License holder : Same as Applicant
Address : 625 Washington Ave.
: Carlstadt, NJ 07072
Test Result : ☒ **Positive** ☐ **Negative**
Test Project Number : 99ME35781
References(s)

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Report Directory

<u>Title</u>	<u>Section</u>
☒ General Product Description	1.0
☒ Device Configuration During Test	1.1
☐ Deviations from ANSI C63.4 Standard Test Set-up	1.1.1
☒ Device Modifications	1.2
☒ Emissions Test Regulations	2.0
☒ Operational Mode	2.1
☐ Conducted Emissions (Voltage and Current)	2.1.1
☐ Conducted Click Emissions	2.1.2
☐ Reserved for Future Use	2.2.1
☒ Radiated Emissions Test (10 Meter Semi-Anechoic Chamber)	2.2.2
☐ RFI Power Measurements	2.2.3
☐ Harmonic Disturbances	2.2.4
☒ Test Results	2.3
☐ Immunity Test Regulations	3.0
☐ Operational Mode	3.1
☐ Electrostatic Discharge (ESD) Test	3.1.1
☐ Radiated Field (RF) Test	3.1.2
☐ Electrical Fast Transient (EFT)/Burst Test	3.1.3
☐ Surge Transient Tests	3.1.4
☐ Conducted Immunity Tests	3.1.5
☐ Voltage, Dips and Interruptions	3.1.6
☐ Immunity Test Results	3.2
☒ Summary of Test Results	4.0
☒ Emissions Test Data Pages	Appendix A
☒ Photographs	Appendix B

1.0 GENERAL - Product Description

The EUT was a microwave oven, Model number MW660FU, utilizing a 120V, 60Hz power supply and a Samsung Magnetron Model number OM755, rated at 4kV and a operating frequency of 2450MHz.

1.1 Device Configuration During Test

The EUT was operated at maximum power during testing. Water loads as specified in FCC/OST MP-5 were used during testing.

1.1.1 Deviations from ANSI C63.4 Standard Test Set-up

☒ None

☐ As described below:

1.2 Device Modifications Necessary for Compliance

☒ N/A

☐ As described below:

Environmental conditions in the lab:

Temperature:	<u>Range</u> 20-25°C
Relative Humidity	30 - 60 %
Atmospheric pressure	680 - 1060 mbar

2.0 EMISSIONS TEST REGULATIONS:

- | | | |
|---|---|----------------------------------|
| ☐ EN 50081-1 /1992 | ☐ Group 1 | ☐ Group 2 |
| ☐ EN 50081-2 /1993 | ☐ Class A | ☐ Class B |
| ☐ EN 55011 / 3.1991 | | |
| ☐ EN 55013 / 6.1990 | ☐ Household appliances and similar | |
| ☐ EN 55014 / 2.1987 | ☐ Portable tools | |
| | ☐ Semiconductor devices | |
|
 | | |
| ☐ EN 55014 / 12.1993 | ☐ Household appliances and similar | |
| | ☐ Portable tools | |
| | ☐ Semiconductor devices | |
|
 | | |
| ☐ EN 55015 / 1993 | | |
| ☐ EN 55022 / 4.1987 | ☐ Class A | ☐ Class B |
| ☐ EN 55020 / 1994 | | |
| ☐ EN60555-2/1987, EN60555-3/1987 | | |
| ☐ EN61000-3-2, 1995, EN61000-3-3, 1995 | | |
| ☐ VCCI | ☐ Class 1 | ☐ Class 2 |
| ☐ FCC Part, 15, Subpart B | ☐ Class A | ☐ Class B |
| ☐ FCC Part, 15, Subpart C | | |
| ☒ FCC Part 18 | | |
| ☐ CISPR 11 (1990) | | |
| ☐ CISPR 14 (1993) | | |
| ☐ CISPR 22 | | |
| ☐ DENTORI | | |
| ☐ AS3548 | | |
| ☐ (OTHER) _____ | | |

2.1 EUT OPERATION MODE - EMISSIONS TESTS:

- ☐ Standby
- ☐ Test program (H-Pattern)
- ☐ Test program (color bar)
- ☐ Test program (customer specific)
- ☐ Practice operation
- ☒ Normal operation Mode: Maximum Power
- ☒ As per manufacturer's instructions
- ☐ other

File Number: NC1230
Project Number: 99ME35781
Model Number: MW660FU

Issued: May 27, 1999

2.1.1 Conducted Emissions Tests:

☐ Test Applicable ☒ Test Not Applicable

2.1.2 Conducted Click Emissions Tests:

☐ Test Applicable ☒ Test Not Applicable

2.2.1 Reserved for Future Use

2.2.2 Radiated Emissions Test (10 Meter Semi-Anechoic Chamber):

☒ Test Applicable ☐ Test Not Applicable

All Data Pages located in Appendix A.

The measurement antenna distance ☒ 3 ☐ 10 meters from the EUT.

Test equipment used for final radiated emissions tests:

☒ HP 8574A	Hewlett-Packard	EMI Receiver,	Equipment No.: ME5A-461
Consisting of:			
☒ HP - 8566B		Hewlett-Packard	Spectrum Analyzer,
		Resolution BW: 1MHz	
		Video BW: 1MHz	
☒ HP - 85662A		Hewlett-Packard	Analyzer Display
☒ HP - 85650A		Hewlett-Packard	Quasi-Peak Adapter,
		BW: 120kHz	
☒ HP - 85685A		Hewlett-Packard	Preselector
☐ R3261C	Advantest	Spectrum Analyzer	Equipment No.: ME5A-228
		Resolution BW: 1MHz	
		Video BW: 1MHz	
		QP BW: 120kHz	
☐ R3551	Advantest	Pre-Selector	Equipment No.: ME5A-229

For Measurements above 1GHz:

☒ HP - 8566B	Hewlett-Packard	Spectrum Analyzer,	Equipment No.: ME5A-461
	Resolution BW: 1MHz		
	Video BW: 1MHz		
☒ HP - 85662A	Hewlett-Packard	Analyzer Display	Equipment No. ME5A-461
Test Accessories:			
☒ 3104C	EMCO	Biconnical Antenna	Equipment No.: ME5-810
☐ 94455-1	Ailtech	Biconnical Antenna	Equipment No.: ME5-439
☐ 3146	EMCO	Log Periodic Antenna	Equipment No.: ME5-451
☒ 3146	EMCO	Log Periodic Antenna	Equipment No.: ME5-811
☐ 3142	EMCO	BiconiLog Antenna	Equipment No.: ME5A-131
☒ RGA-180	EMCO	Horn Antenna	Equipment No.: ME5-565
☒ 8449B	Hewlett Packard	Preamplifier	Equipment No.: ME5-914

2.2.3 RFI Power Measurements:

☐ Test Applicable ☒ Test Not Applicable

2.2.4 Harmonic Disturbances:

☐ Test Applicable ☒ Test Not Applicable

2.3 TEST RESULTS

☐ Conducted Emissions N/A

☐ Voltage(Section 2.1.1)	☐ MET	☐ NOT MET
☐ Current(Section 2.1.1)	☐ MET	☐ NOT MET
☐ Clicks(Section 2.1.2)	☐ MET	☐ NOT MET

☒ Radiated Emissions(Section 2.2.2) ☒ MET ☐ NOT MET

☐ RFI Power(Section 2.2.3) ☐ MET ☐ NOT MET

☐ Harmonic Disturbances

☐ Steady State(Section 2.2.4)	☐ MET	☐ NOT MET
☐ Fluctuating(Section 2.2.4)	☐ MET	☐ NOT MET

☒ Input Power

Input power was measured using a wattmeter. A load of 275 mL of water was placed in the center of the oven. A 275 mL load was chosen for its compatibility with the U. L. Procedure used by manufacturers to determine their input ratings. The measured input power was 1171W. The manufacturer's rating for the oven is 1550W.

Equipment: 1

☒ Microwave Leakage

Radiation Leakage was checked with the oven door closed using a microwave leakage meter. Measured power levels did not exceed 0.1 mW/cm². A maximum radiation leakage level is 1.0 mW/cm² is allowed in accordance with UL Standard 923, therefore, the measured radiation levels were well within the specified limit.

Equipment: 2

☒ RF Output Power

The RF output power was measured using the calorimetric method. A 800 mL water load was placed in the center of the oven. The load was heated for 120 seconds and experienced a rise in temperature 16.6°C. Using the equation:

$$\text{Power (W)} = \frac{(4.2 \text{ Joules/Cal}) \times (\text{Volume [mL]}) \times (\text{temp. Rise})}{\text{Time (sec)}}$$

The calculated RF output power is 465W.

Equipment: 3

☒ Frequency Measurement

The fundamental output frequency of the oven was measured over a period of time. During this time period no over spec-out-of-band frequency measurements were observed. The allowable frequency range permitted in Part 18 is from 2.4 to 2.5 GHz. The EUT's fundamental frequency was measured at 2.457vGHz. The EUT was operated until 1000 mL of water boiled down to 200 mL of water while monitoring its fundamental frequency.

☒ Radiated Emissions

Above 1 GHz, peak readings were recorded using a resolution bandwidth of 100 kHz and a video bandwidth of 10 Hz. Selecting these bandwidths allowed the HP Spectrum Analyzer to produce results similar to those obtained using an EMI meter with an averaging function. These were no out-of-specification emissions measured. No open field measurements below 1GHz were performed due to the low levels of Quasi Peak emissions observed.

Equipment –

1.	Power Analyzer	Voltech	PM3000A	Equipment No: ME5A-250
2.	Microwave Leakage Tester	Simpson	380	Equipment No.: ME5-233
3.	Temperature Indicator	Omega	450AKT	Equipment No.: ME4-192

The tractability of the measurements contained in this report is achieved by the use of calibrated equipment which is traceable back to NIST.

3.0 IMMUNITY TEST REGULATIONS:

- ☒ NOT APPLICABLE
- ☐ EN50082-1:1992
- ☐ EN50082-2:1995
- ☐ EN55014-2: 1997
- ☐ FDA - Reviewer Guide
- ☐ Bellcore GR-1089, Core
- ☐ IEC 601-1-2

In accordance with:

- | | | |
|--------------------------------------|--|---------------------------------|
| ☐ IEC 801-2, | ☐ IEC 1000-4-2 | Electrostatic Discharge (ESD) |
| ☐ IEC 801-3, | ☐ ENV50140 | RF Immunity |
| ☐ IEC 801-4, | ☐ IEC 1000-4-4 | Electrical Fast Transient (EFT) |
| ☐ IEC 801-5, | ☐ IEC 1000-4-5 | Surge (Lighting) |
| ☐ IEC 801-6, | ☐ ENV50141 | Conducted Immunity |
| ☐ IEC 801-11, | ☐ IEC 1000-4-11 | Voltage Dips and Interruptions |

3.1 EUT OPERATION MODE - IMMUNITY TESTS:

- ☐ Standby
- ☐ Test program (H-Pattern)
- ☐ Test program (color bar)
- ☐ Test program (customer specific)
- ☐ Practice operation
- ☐ Normal operating Mode:
- ☐ As per manufacture's instructions

3.1.1 Electrostatic Discharge (ESD) Test:

☐ Test Applicable ☒ Test Not Applicable

3.1.2 Radiated Field (RF Immunity) Test:

☐ Test Applicable ☒ Test Not Applicable

3.1.3 Electrical Fast Transient (EFT)/Burst test:

☐ Test Applicable ☒ Test Not Applicable

3.1.4 Voltage Surge Test:

☐ Test Applicable ☒ Test Not Applicable

3.1.5 Conducted Immunity Test:

☐ Test Applicable ☒ Test Not Applicable

3.1.6 Voltage Dips and Interruptions:

☐ Test Applicable ☒ Test Not Applicable

File Number: NC1230
Project Number: 99ME35781
Model Number: MW660FU

Issued: May 27, 1999

4.0 SUMMARY:

The equipment under test has

☒ met the technical requirements as defined under section(s) ☒ 2.0 and ☐ 3.0

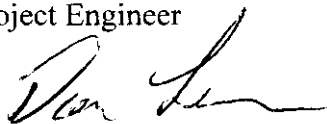
☐ not met the technical requirements as defined under section(s) ☐ 2.0 and ☐ 3.0.

Test Start Date: 5/3/99

Test Completion Date: 05/06/99

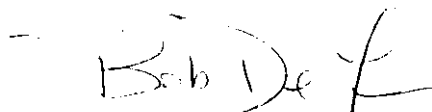
- UNDERWRITERS LABORATORIES, INC. -

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Reviewer



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International EMC Services
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APPENDIX A

EMISSIONS TEST DATA

1. ☐ Conducted Emissions ☐ voltage ☐ current
 - ☐ Peak traces, Data Pages A___ and/through A___
 - ☐ Quasi-Peak traces, Data Pages A___ and/through A___
 - ☐ Average traces, Data Pages A___ and/through A___
- ☐ Discontinuous Interference (Clicks)
 - ☐ No clicks exceeded the steady state quasi-peak limit
 - ☐ Clicks exceeded the steady state quasi-peak limit. The limit was adjusted to _____ dB and no clicks exceeded the adjusted limit.
 - ☐ Clicks exceeded the adjusted limit. See Data Page A___ for details.
2. ☒ Radiated Emissions
 - ☒ Peak traces, Data Page A1.
 - ☒ Discrete Frequencies, Data Page A2.
 - ☒ Fundamental Frequencies, Data Page A3.
3. ☐ RFI Power Measurements
 - ☐ Peak traces, Data Pages A___ and/through A___
 - ☐ Quasi-Peak traces, Data Pages A___ and/through A___
 - ☐ Average Traces, Data Pages A___ and/through A___
4. ☐ Harmonic Disturbances
 - ☐ Steady State Harmonics, Data Pages A___ and/through A___
 - ☐ Fluctuating Harmonics, Data Pages A___ and/through A___
 - ☐ Changing Voltage, Data Pages A___ and/through A___

Radiated Emissions

De'Longhi

Microwave oven MW660FU

File:NC1230,Project:99ME35781

Tested By: DL BL=Hor. GR=VERT.

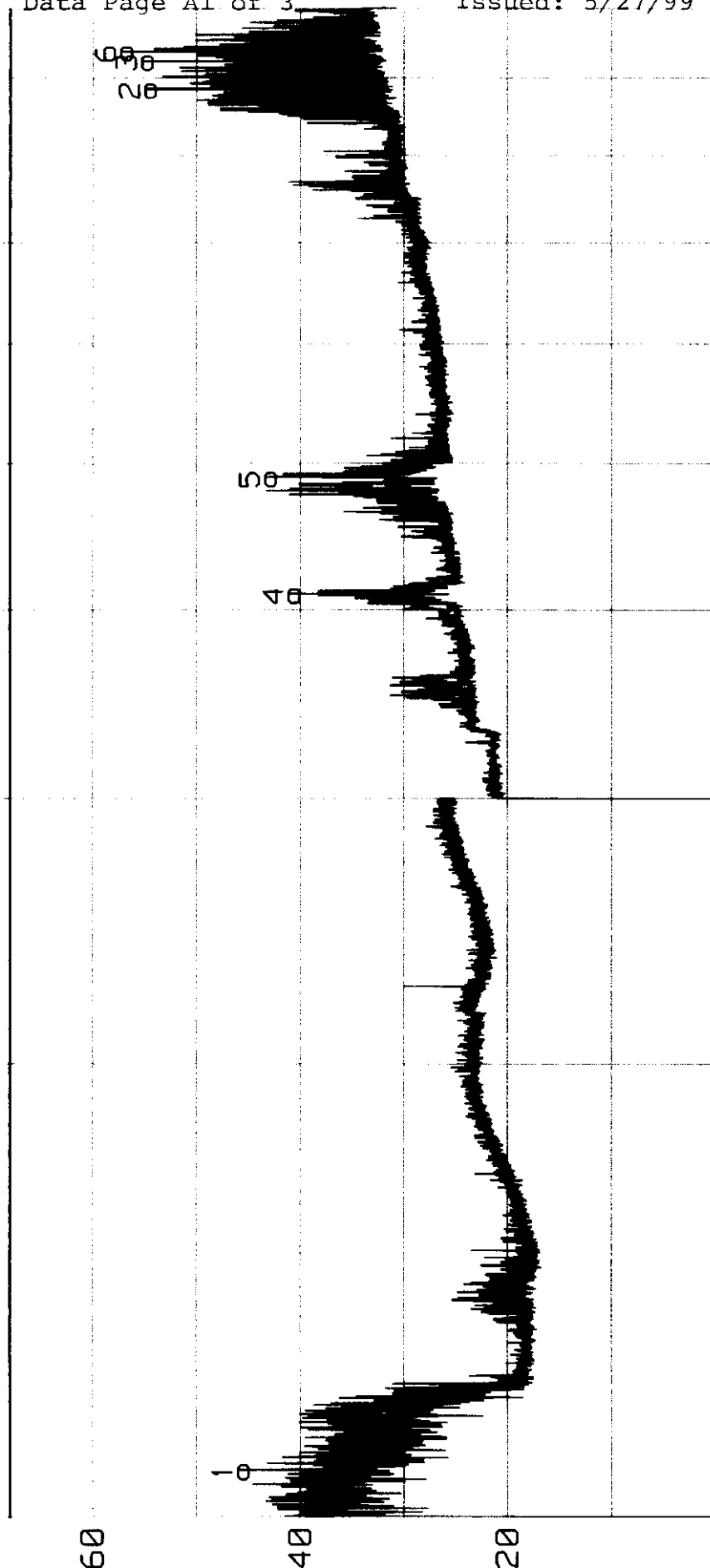
FCC Part 18 ISM 3(M)

Data Page A1 of 3

Issued: 5/27/99

dB[uV/m]

Frequency [MHz]



100

1000

Date Tested: 3 May 199
15:03:40

De'Longhi
Microwave oven MW660FU
File:NC1230,Project:99ME35781
Tested By: DL BL=Hor. GR=VERT.

MKR	TEST	METER	GAIN/LOSS	TRANSDUCER	LEVEL	LIMIT:1	2	3	4
NO.	FREQUENCY	READING	FACTOR	FACTOR		dB[uVolts/meter]			
	[MHz]	[dB(uV)]	[dB]	[dB]					
=====									
1	107.5674	33.6 pk	.8	11.4	45.8	N/A	N/A	N/A	N/A
2	885.2948	28.5 pk	2.8	23.5	54.8	N/A	N/A	N/A	N/A
3	923.3836	28.7 pk	2.8	23.6	55.1	N/A	N/A	N/A	N/A
4	409.8776	22.6 pk	1.7	16.6	40.9	N/A	N/A	N/A	N/A
5	489.5979	22.9 pk	2	18.3	43.2	N/A	N/A	N/A	N/A
6	937.0745	30.4 pk	2.9	23.8	57.1	N/A	N/A	N/A	N/A

pk - Peak detector
qp - Quasi-peak detector
av - Average detector
tm - Trace Math Result

LIMIT 1 : FCC Part 18 ISM 3(M)
LIMIT 2 : NONE
LIMIT 3 : NONE
LIMIT 4 : NONE

UL – EMC TEST SYSTEM

Measurements above 1 GHz

Date Tested : 05 May 1999

Delonghi America Inc.
Microwave Oven model MW660FU
File No: NC1230 Proj. No: 99ME35781

DATA POINT [No.]	TEST FREQUENCY [GHz]	LOCATION ML	METER READING [dB (U _v)]	GAIN / LOSS FACTOR [dB]	TRANSDUCER FACTOR [dB]	LEVEL dB _{uv} /m	LEVEL at 3m (uV/m)	LEVEL at 300m (uV/m)	FCC LIMITS at 300m (uV/m)
1	4.913	Center (700)	27.20	-29	35.1	33.3	46.2	0.462	25
2	4.906	Center (300)	25.80	-29	35.1	31.9	39.3	0.393	25
3	4.917	OT (700)	22.10	-29	35.1	28.2	25.7	0.257	25
4	4.908	OT (300)	25.60	-29	35.1	31.7	38.4	0.384	25
5	7.362	Center (700)	24.80	-29	37.8	33.3	46.2	0.462	25
6	7.364	Center (300)	22.50	-29	37.8	31.30	36.7	0.367	25
7	7.360	OT (700)	24.70	-29	37.8	33.50	47.3	0.47	25
8	7.361	OT (300)	33.10	-29	37.8	41.90	124.4	1.244	25
9	9.815	Center (700)	18.30	-28	39.5	29.8	30.9	0.309	25
10	9.817	Center (300)	14.80	-28	39.5	26.3	20.6	0.205	25
11	9.815	OT (700)	14.50	-28	39.5	26.0	19.9	0.199	25
12	9.815	OT (300)	15.10	-28	39.5	26.60	21.3	0.213	25

Detector Mode: Average

Bandwidth: RBW = 100KHz, VBW = 10Hz

Measurements at /meter Height- Horizontal Polarity
Maximum Emissions Emitting from EUT rear left corner
OT- Outer Turntable
There were no measurable emissions past the 4th harmonic.

May 20,1999

DE' LONGHI MICROWAVE OVEN MOD. MW660 FU

120 VAC, 60 Hz

COMPONENTS LIST

COMPONENT	MANUFACTURER	TYPE/MODEL	RATINGS	UL FILE
MAGNETRON	SAMSUNG (KOREA)	0M75S	4KV, 2450MHz	
HIGH VOLTAGE TRANSFORMER	DONG YANG POWER CO. (KOREA)	YN-7002	Pri120V,60Hz YEC Class 180 ins. System	E67837
HIGH VOLTAGE CAPACITOR	DUCATI (ITALY)	416 80 133	0,9uF +/-3%, 2100V,T85	E102953
HIGH VOLTAGE DIODE	FCI (TAIWAN)	HVR-03-09	MAX REV.VOLT. 9 KV	
PROTECTION DIODE	FCI (TAIWAN)	HV06X1P5	--	
FUSE	BUSSMAN (USA)	MDA15	15A, 125V 1"¼ x ¼" TIME DELAY	E19180
alt. FUSE	BUSSMAN (USA)	MWO15	AS ABOVE	E19180
FUSEHOLDER	BUSSMAN (USA)	BK/S-820201	16A, 300VAC, 1"¼ x ¼"	E14853
BLOWER MOTOR	PLASET (ITALY)	64839	120V, 60Hz cl.B, 25W	
TURNTABLE MOTOR	NAKAGAWA (KOREA)	GM 20-12	120V 60Hz, cl.B	E99690
MAGNETRON TEMPERATURE CUTOUT	TEXAS INSTR. (MALAYSIA)	1NT-01 L	16A, 250VAC, opens 145°C T204	E9977
OVEN LAMP (integral with metal holder)	SU-SUNG (KOREA)	120-25	125VAC, 25W T170°C	E109954
INTERLOCK SWITCH (MONITORED)	SODECO-SAIA (SWITZERL.)	XGA-52W	12(3)A,250VAC, T150°C, N.O.	E42460
INTERLOCK SWITCH (MONITOR)	SODECO-SAIA (SWITZERL.)	XGA-42W	AS ABOVE N.C.	E42460
INTERLOCK SWITCH (SECONDARY)	SODECO-SAIA (SWITZERL.)	XGA-52W	12(3)A,250VAC, T150°C, N.O.	E42460

COMPONENT	MANUFACTURER	TYPE/MODEL	RATINGS	UL FILE
POWER SUPPLY CORD	TA-SHING (TAIWAN)	SPT-2 or SPT-3	3x 16 AWG 90 or 105°C	E56356
Alt. POWER SUPPLY CORD	TA-SHING (TAIWAN)	HPN	3x 16 AWG 90°C	E56356
TIMER & POWER SWITCH	COUPATAN (FRANCE)	M2 A	16A, 125Vac motor 120Vac, 60Hz T85, cl. H	
INRUSH CURRENT LIMITER PCB	SELMO (ITALY)	940520	16A, 120VAC, T70°C	
RELAY FOR CURR. LIMITER	OMRON (JAPAN)	G2 R 1A	coil 24VDC, cl. B, T70°C cont 16A, 250VAC	E41643
SELECTOR SWITCH	B&S (GERMANY)	3032-18A	16A, 250VAC T 150	E103987
GRILL HEATER ELEMENT	IRCA (ITALY)	CALROD Dia 6.25 mm	1400W, 120VAC	
alt. GRILL HEAT. ELEMENT	INDUWATT (SPAIN)	As above	As above	
FAN HEATER 1 LOWER ELEMENT	IRCA (ITALY)	As above	95 VAC 271 W	
FAN HEATER 2 UPPER ELEMENT	IRCA (ITALY)	As above	25 VAC 304 W	
alt. FAN HEATER 1 LOWER ELEMENT	INDUWATT (SPAIN)	As above	95 VAC 271 W	
alt. FAN HEATER 2 UPPER ELEMENT	INDUWATT (SPAIN)	As above	25 VAC 304 W	
GRILL REGULATING THERMOSTAT	CAMPINI (ITALY)	60	16A, 250VAC, opens 145°C T180	E82842
Altern. GRILL REG. THERMOSTAT	TEXAS INSTR. (MALAYSIA)	PK-1-1	12.5A, 120VAC, opens 145°C T200	E9977
Altern. GRILL REG. THERMOSTAT	TEXAS INSTR. (MALAYSIA)	1NT-01L	12.5A, 120VAC, opens 145°C T204	E9977
FAN THERMOSTAT	CAMPINI (ITALY)	TY95	16A, 250VAC T 150	E82842
Altern. FAN THERMOSTAT	PRODIGY (ITALY)	TR/86	16A, 250VAC T 150	E79656
OVEN LIMITING THERMOSTAT	TEXAS INSTR. (MALAYSIA)	1NT-01L	12.5A, 120VAC, opens 170°C T204	E9977

FAN HEATER MOTOR	PLASET (ITALY)	54611	120VAC cl.B, 18-23W	
FAN/GRILL CONTROL LAMP	SIGNALLUX (FRANCE)	28 U	120 VAC T 120	
MICROWAVE CONTROL LAMP	SIGNALLUX (FRANCE)	28 U	120 VAC T 120	