

ENGINEERING TEST REPORT

MICROWAVE OVEN
Model No: DMW658W

FCC PART 18, SUBPART C
MICROWAVE OVEN OPERATING AT ISM
FREQUENCY 2450 MHz $\pm$ 50 MHz

UltraTech's FILE NO.: CSA-127-FCC18

TESTED FOR:

DANBY PRODUCTS LIMITED
5070 Whitelaw Road, R.R. #6 P.O. BOX 1778
Guelph, Ontario
Canada, N1H 6Z9

TESTED BY:

UltraTech Engineering Labs Inc.
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REPORT PREPARED BY: Le Luong

DATE: May 8, 1998

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TABLE OF CONTENTS

1. EXHIBIT 1 - SUMMARY OF TEST RESULTS & GENERAL STATEMENT OF CERTIFICATION	3
2. EXHIBIT 2 - GENERAL INFORMATION	4
2.1. PRODUCT DESCRIPTION	4
2.2. RELATED SUBMITTAL(S)/GRANT	5
2.3. TEST METHODOLOGY	5
2.4. TEST FACILITY	5
2.5. UNITS OF MEASUREMENTS	5
3. EXHIBIT 3 - SYSTEM TEST CONFIGURATION	6
3.1. TEST SYSTEM DETAILS	6
3.2. BLOCK DIAGRAMS OF TEST SETUP FOR EMISSIONS MEASUREMENTS	6
3.3. JUSTIFICATION ON EUT	7
3.4. DEVIATION FROM STANDARD SPECIFICATION	7
3.5. EUTS' OPERATING CONDITION DURING TESTING	7
3.6. SPECIAL ACCESSORIES	7
3.7. EQUIPMENT MODIFICATIONS	7
4. EXHIBIT 4 - TEST DATA	8
4.1. RADIATED EMISSIONS MEASUREMENTS	8
5. EXHIBIT 5 - GENERAL TEST PROCEDURES	11
5.1. ELECTRICAL FIELD RADIATED EMISSIONS MEASUREMENTS - GENERAL TEST METHOD	11

DANBY PRODUCT LIMITED

MICROWAVE OVEN - M/N: DMW658W

1. EXHIBIT 1 - SUMMARY OF TEST RESULTS & GENERAL STATEMENT OF CERTIFICATION

SUMMARY OF RESULTS

A representative test sample of **MICROWAVE OVEN**, Model No.: **DMW658W**, supplied by **DANBY PRODUCTS LIMITED** has been tested and found as follows:

Electric Field Radiated Emissions: Complies with the FCC Part 18, Subpart C, Para. 18.301 with at least 10.9 dB below the limit @ 300 meters.

TESTIMONIAL AND STATEMENT OF CERTIFICATION

THIS IS TO CERTIFY:

- 1) THAT the application was prepared either by, or under the direct supervision of the undersigned.
- 2) THAT the measurement data supplied with the application was taken under the direction and supervision of the undersigned.
- 3) THAT the data was obtained on representative production units, that provided by the applicant.
- 4) THAT, to the best of knowledge and belief of the undersigned, the facts set forth in the application and accompanying technical data are true and correct.

Certified by:



DATE: May 8, 1998

DANBY PRODUCT LIMITED

MICROWAVE OVEN - M/N: DMW658W

2. EXHIBIT 2 - GENERAL INFORMATION**2.1. *Product Description*****APPLICANT**

DANBY PRODUCTS LIMITED
5070 Whitelaw Road, R.R. #6 P.O. BOX 1778
Guelph, Ontario
Canada, N1H 6Z9

Applicant's Representative: Mr. Mike Hamilton, Sr.

MANUFACTURER

DANBY PRODUCTS LIMITED
5070 Whitelaw Road, R.R. #6 P.O. BOX 1778
Guelph, Ontario
Canada, N1H 6Z9

DESCRIPTION OF EQUIPMENT UNDER TEST

PRODUCT NAME: MICROWAVE OVEN

MODEL NUMBER: DMW658W

TYPE OF EQUIPMENT: Microwave Oven

**RF POWER GENERATED
BY AN ISM EQUIPMENT:** Less than 500 Watts

ISM OPERATING FREQ.: 2450 MHz $\pm$ 50 MHz

INPUT SUPPLY: 120 Vac, 60 Hz

INTERFACE PORTS: (1) AC Power Cable (Non-shielded)

2.2. Related Submittal(s)/Grant

Not applicable.

2.3. Test Methodology

These tests were conducted on a sample of the equipment for the purpose of Certification (DoC) compliance with Code of Federal Regulations (CFR47-1997), Part 18, Subpart C, Microwave Oven.

The radiated emissions measurements were conducted in accordance with American National Standards Institute FCC/OST MP-5 (1986) AND ANSI C63.4-1992 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40 GHz.

2.4. Test Facility

Radiated Emissions were performed at the Ultratech's 3-10 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario.

The above sites have been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville Open Field Test Site has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049). Last Date of Site Calibration: July 16, 1997.

The above test site is also filed with Interference Technology International Ltd (ITI - An EC Directive on EMC).

2.5. Units of Measurements

Measurements of conducted emissions are reported in units of dB referenced to one microvolt [dB(μ V)].

Measurements of radiated emissions are reported in units of dB referenced to one microvolt per meter [dB(μ V)/m] at the distance specified in the report, wherever it is applicable.

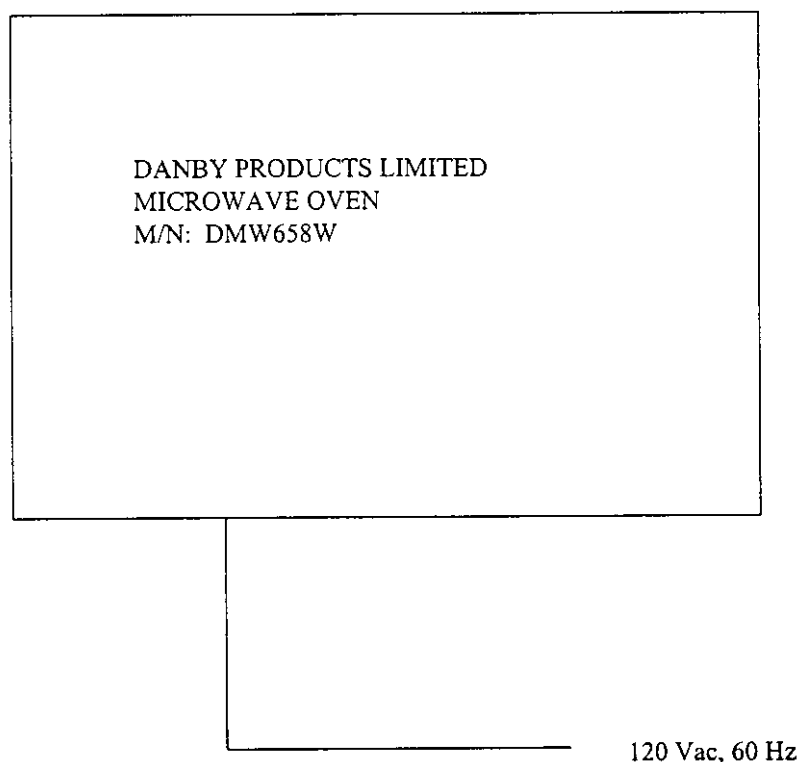
3. EXHIBIT 3 - SYSTEM TEST CONFIGURATION

3.1. *Test System Details*

The following peripherals, FCC identifiers and types interconnecting cables were used with the EUT for testing:

- (1) EUT: DANBY PRODUCTS LIMITED, MICROWAVE OVEN,
Model : DMW658W
Power Supply Cable: Non-shielded

3.2. *Block Diagrams of Test Setup for Emissions Measurements*



3.3. Justification on EUT

No deviation, in both configuration and operation manners, different from normal operation were required.

3.4. Deviation from Standard Specification

None

3.5. EUTs' Operating Condition During Testing

The equipment was powered on and off during testing.

3.6. Special Accessories

No special accessories were required.

3.7. Equipment Modifications

No equipment modifications were necessary in order to achieve compliance to Class B levels.

DANBY PRODUCT LIMITED

MICROWAVE OVEN - M/N: DMW658W

4. EXHIBIT 4 - TEST DATA**4.1. Radiated Emissions Measurements****PRODUCT NAME:** MICROWAVE OVEN, Model No.: DMW658W**FCC CLASS B LIMIT:** FCC Part 18, Sub. B, Para. 18.301

For any ISM frequency, the RF radiated emissions measured at 3 Meter distance shall not exceed the field strength below:

RF Power Generated by Equipment (Watts)	Field Strength Limit @ 300 Meters (μ V/m)
Below 500	25
Above 500	25 SQRT (power/500)

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23 °C
- Relative humidity: 43 %

POWER INPUT: 120 Vac, 60 Hz**TEST EQUIPMENT:**

- Spectrum Analyzer, Advantest, Model R3271, S/N: 15050203, 100 Hz to 32 GHz)
- Spectrum Analyzer, Advantest, Model 3261A, SN 91720151, Input +25dBm max., 9KHz-2.6GHz, 50 Ohms, built-in Quasi-Peak Detector.
- RF Preselector, Advantest Model R3551, SN 92970002, 9KHz-1GHz, 50 Ohms input/output, input +25 dBm max, 30 dB gain.
- Microwave Amplifier, HP, Model 83017A, Frequency Range 1 to 26.5 GHz, 34-38 dBdB gain nominal.
- Active Loop Antenna, Emco, Model 6507, SN 8906-1167, Frequency Range 1 KHz - 30 MHz, @ 50 Ohms
- Log Periodic/Bow-Tie Antenna, Emco, Model 3143, SN 1029, 20 - 1000 MHz, @ 50 ohms.
- Log Periodic Antenna, A.H. Systems, Model SAS-200/518, SN 343, Frequency Range: 1 - 18 GHz, @ 50 Ohms.
- Horn Antenna, Emco, Model 3160-09, 18-26.5GHz

METHOD OF MEASUREMENTS: Refer to FCC/OST MP-5 (1986) AND ANSI C63.4-1992.

- Detector Function Selection and Bandwidth @ FCC/OST MP-5 (1986), Sec. 2.2.2 : The detector function selector shall be set to **AVERAGE**. The 6 dB BW of the measuring instrument shall not be less than:
 - 200 Hz for measurements below 150 kHz
 - 9 kHz for measurements from 150 kHz to 30 MHz
 - 100 kHz for measurements from 30 to 1000 MHz
 - 1 MHz for measurements above 1 GHz.
- Load for Microwave Oven @ FCC/OST MP-5, Sec. 4.1: For all measurements the energy developed by the oven is absorbed by a dummy load consisting of a quantity of tap water in a beaker. A polypropylene beaker is used as the container. If the oven is provided with a shelf or other utensil support, test shall be made with this support in its initial normal position. For ovens rated at 1000 watts output each quantity shall be increased by 50% for each 500 Watts or fraction thereof in excess of 1000 watts. Additional beakers are used if necessary.
 - ☐ Load for power output measurement: 1000 milli-liters of water in the beaker located in the center of the oven.
 - ☐ Load for frequency measurement: 1000 milli-liters of water in the beaker located in the center of the oven.
 - ☐ Load for measurement of radiation on second and third harmonic: two loads, one of 700 and the other of 300 milli-liters, of water are used. Each load is tested both with the beaker located in the center of the oven and with it in the right front corner.
 - ☐ Load for all other measurements: 700 milli-liters of water, with the beaker located in the centre of the oven.
- Computations to determine compliance:
The measured field strength at 3 meters is converted to the field at 300 meters using the formula:

$$E_{300m} = k \times E_{3m}$$

Where k is give by:

Frequency	k
1830 MHz	0.0046
2745 MHz	0.0070
3660 MHz	0.0090
4575 MHz and above	0.0100

* For frequency between those given in the table, the value k is determined by linear interpolation.

TEST RESULTS: Conforms

TEST PERSONNEL:

Hung Trinh

TEST DATE:

April 20th, 1998

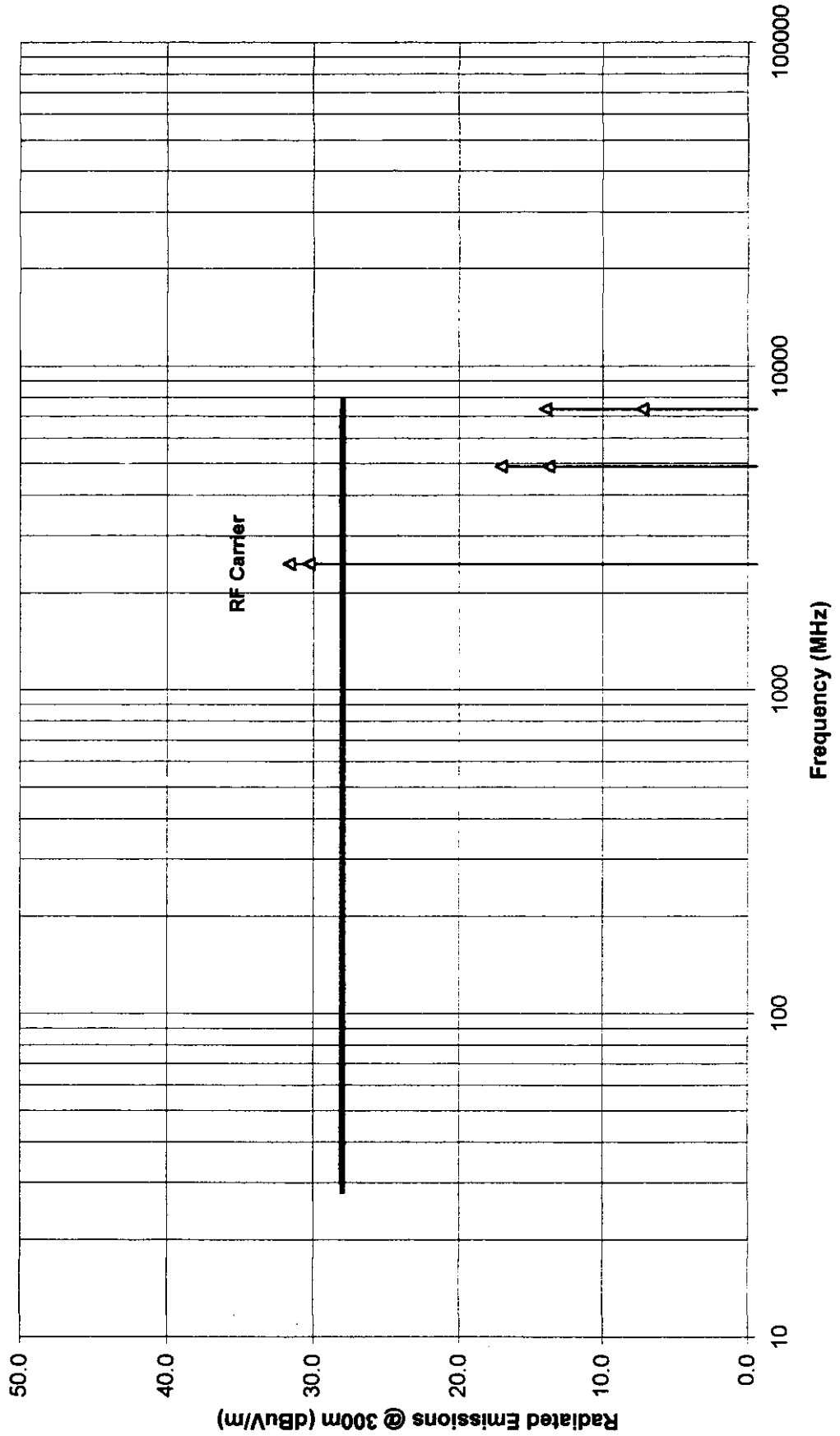
MEASUREMENT DATA:RADIATED EMISSIONS MEASUREMENTSREMARKS

- All rf emissions from 30 to 25,000 MHz were scanned, and all emission levels greater than 30 dB μ V/m were recorded.
- For Frequency range 30 – 1000 MHz
 - ◊ Peak Detector, 100KHz RBW, VBW $\geq$ RBW
 - ◊ CISPR QUASI-PEAK, 120KHz RBW, VBW $\geq$ RBW.
- For Frequency > 1 GHz
 - ◊ Peak Detector, 1 MHz RBW, 1 MHz VBW
 - ◊ Average Detector, 1MHz RBW, 10 Hz VBW

FREQUENCY (MHz)	RF LEVEL @ 3m (dB μ V/m) Peak	RF LEVEL @ 3m (dB μ V/m) Average	k Factor	RF LEVEL @ 300m (dB μ V/m) Average	ANTENNA PLANE (H/V)	LIMIT @ 300m (dB μ V/m) Average	MARGIN (dB)	PASS/ FAIL
2450.00	122.13	75.78	0.0062	31.7	V	* Note A	N/A	PASS
2450.00	119.31	74.44	0.0062	30.3	H	* Note A	N/A	PASS
4900.00	73.72	57.06	0.0100	17.1	V	28.0	-10.9	PASS
4900.00	74.09	53.78	0.0100	13.8	H	28.0	-14.2	PASS
7350.00	71.07	53.98	0.0100	14.0	V	28.0	-14.0	PASS
7350.00	64.56	47.31	0.0100	7.3	H	28.0	-20.7	PASS

*Note A: Limit not applicable on fundamental frequencies.

DANBY PRODUCTS LIMITED - MICROWAVE OVEN (M/N: DMW658W)
 Radiated Emissions Measurements at 300 Meter OFTS
 MICROWAVE OVEN @ POWER RATING: less than 500 Watts



5. **EXHIBIT 5 - GENERAL TEST PROCEDURES**

5.1. **Electrical Field Radiated Emissions Measurements - General Test Method**

- The radiated emission measurements were performed at the UltraTech's 3 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario. The Attenuation Characteristics of OFTS have been filed to FCC.
- Radiated emissions measurements were made using the following test instruments:
 - 1) Calibrated EMCO active loop antenna in the frequency range from 10 KHz to 1 MHz
 - 2) Calibrated EMCO biconilog antenna in the frequency range from 30 MHz to 2000 MHz.
 - 3) Calibrated A.H. Systems log periodic antenna in the frequency range above 1000 MHz (1GHz - 18 GHz).
 - 4) Horn Antennas:
 - a) Horn Antenna, Emco, Model 3160-09, 18-26.5GHz
 - b) Horn Antenna, Emco, Model 3160-10, 26.5-40GHz
 - c) Mixer, Tektronix, P/N 118-0098-00, 18-26.5GHz
 - d) Mixer, Tektronix, P/N 119-0098-00, 26.5-40GHz
 - e) Mixer, HP, P/N R3434A, 12.4-18GHz
 - f) Mixer, HP, P/N R3434B, 18-26.5GHz
 - g) Mixer, HP, P/N R3434C, 26.5-40GHz
 - 5) Calibrated Advantest spectrum analyzer and pre-selector/pre-amplifier. In general, the spectrum analyzer would be used as follows:
 - The rf electric field levels were measured with the spectrum analyzer set to PEAK detector (1 KHz RBW and 1 KHz VBW for frequency below 30 MHz, 100 KHz RBW and VBW $\geq$ RBW for Frequency below 1 GHz and 1 MHz RBW and 1 MHz VBW for frequency greater than 1 GHz).
 - If any rf emission was observed to be a broadband noise, the spectrum analyzer's CISPR QUASI-PEAK detector (120 KHz RBW and 1MHz VBW) was then set to measure the signal level.
 - If the signal being measured was narrowband and the ambient field was broadband, the bandwidth of the spectrum analyzer was reduced.
- The EUT was set-up in its typical configuration and operated in its various modes as described in 3.2 of the test report.
- The frequencies of emissions was first detected. Then the amplitude of the emissions was measured at the specified measurement distance using required antenna height, polarization, and detector characteristics.
- During this process, cables and peripheral devices were manipulated within the range of likely configuration.
- For each mode of operation required to be tested, the frequency spectrum was monitored. Variations in antenna heights (from 1 meter to 4 meters above the ground plane), antenna polarization (horizontal plane and vertical plane), cable placement and peripheral placement were explored to produce the highest amplitude signal relative to the limit.

The maximum radiated emission for a given mode of operation was found by using the following step-by-step procedure:

Step1: Monitor the frequency range of interest at a fixed antenna height and EUT azimuth.

- Step2: Manipulate the system cables to produce highest amplitude signal relative to the limit. Note the amplitude and frequency of the suspect signal.
- Step3: Rotate the EUT 360 degrees to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, go back to the azimuth and repeat Step 2. Otherwise, orient the EUT azimuth to repeat the highest amplitude observation and proceed.
- Step4: Move the antenna over its full allowed range of travel (1 to 4 meters) to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, return to Step 2 with the highest amplitude observation and proceed.
- Step5: Change the polarization of the antenna and repeat Step 2 through 4. Compare the resulting suspected highest amplitude signal with that found for the other polarization. Select and note the higher of the two signals. This signal is termed the highest observed signal with respect to the limit for this EUT operational mode.
- Step6: The effects of various modes of operation is examined. This is done by varying the equipment modes as steps 2 through 5 are being performed.
- Step7: After completing steps 1 through 6, record the final highest emission level, frequency, antenna polarization and detector mode of the measuring instrument.

Calculation of Field Strength:

The field strength is calculated by adding the calibrated antenna factor and cable factor, and subtracting the Amplifier gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where	FS	=	Field Strength
	RA	=	Receiver/Analyzer Reading
	AF	=	Antenna Factor
	CF	=	Cable Attenuation Factor
	AG	=	Amplifier Gain

Example: If a receiver reading of 60.0 dB μ V is obtained, the antenna factor of 7.0 dB/m and cable factor of 1.0 dB are added, and the amplifier gain of 30 dB is subtracted. The actual field strength will be:

$$\text{Field Level} = 60 + 7.0 + 1.0 - 30 = 38.0 \text{ dB}\mu\text{V/m.}$$

$$\text{Field Level} = 10^{(38/20)} = 79.43 \mu\text{V/m.}$$

Notes: The frequency and amplitude of at least six highest conducted emissions relative to the limit are recorded unless such emissions are more than 20 dB below the limit. If less than six emissions are within 20dB of the limit, the background or receiver noise level shall be reported at representative frequencies.

FCC ID # NZ9658

Listing of Exhibits (A~T)

- **Exterior View Microwave Oven Assembly with Cabinet Wrapper (A~G):**

Exhibit “A”: Front View Microwave Oven Assembly 6” x 8” Color Photograph.

Exhibit “B”: Left Side View Microwave Oven Assembly 6” x 8” Color Photograph.

Exhibit “C”: Right Side View Microwave Oven Assembly 6” x 8” Color Photograph.

Exhibit “D”: Top View Microwave Oven Assembly 6” x 8” Color Photograph.

Exhibit “E”: Bottom View Microwave Oven Assembly 6” x 8” Color Photograph.

Exhibit “F”: Inside View Microwave Oven Cavity 6” x 8” Color Photograph.

Exhibit “G”: Rear View Microwave Oven Assembly 6” x 8” Color Photograph.

- **Interior View Microwave Oven Assembly without Cabinet Wrapper (H~K):**

Exhibit “H” Right Side View Electrical Components 6” x 8” Color Photograph.

Exhibit “I” Right Side View (Close-up) Electrical Components 6” x 8” Color Photograph.

Exhibit “J” Left Side View Inner Cabinet

Exhibit “K”: Top View Inner Cabinet

- **Microwave Oven Labels/Diagrams (L~O):**

Exhibit “L”: Identification Rating Label (Model No./ Serial No. /Electrical Specifications).

Exhibit “M”: FDA Safety Certification / Caution / Warning Label.

Exhibit “N”: Electrical Schematic Wiring Diagram.

Exhibit “O”: Label “Caution Microwaves”

- **Certification Testing under FCC Part 18 Subpart C:**

Exhibit “P”: FCC Part 18, Subpart C Measurement Method (Report Format)

Exhibit “Q”: Original Copy “Operating Instructions”

Exhibit “R”: Location of all related Labels (L, M, O) at the rear of the unit.

Exhibit “S”: Block diagram indicating signal path and frequency at each block.

Exhibit “T”: Description of the circuit functions, describing how the unit operates.