


TEST REPORT

LABORATORY MEASUREMENTS

Pursuant to 47 CFR Part 15 [10-01-21 Edition], ANSI C63.4:2014 and ANSI C63.4a:2017

Report No.:	23080389HKG-001
Company:	IKEA of Sweden AB Box 702, SE-343 81 Älmhult, SWEDEN
Equipment Under Test (EUT):	
Product Description:	Self-ballasted LED Lamp (non-dimmable E26 LED lamp)
Model:	LED2220T2
FCC ID:	FHO-LED2220T2
ITS Registration Number:	523770
Brand Name:	
Equipment Type:	Class B Digital Device / Unintentional Radiator
Sample Receipt Date:	November 16, 2022
Test Conducted Date:	November 16, 2022 to November 22, 2022
Issue Date:	August 15, 2023
Test Site Location:	2nd Floor, Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong SAR, China.
Relevant Standard(s):	47 CFR Part 15 [10-01-21 Edition], ANSI C63.4:2014 and ANSI C63.4a:2017
Conclusion:	Test was conducted by client submitted sample. The submitted sample as received complied with the 47 CFR Part 15 requirement.

Prepared and Checked by:

Approved by:

Signed on File

Lai Siu Ming, Henry
Engineer

Chow Chi Ming, Billy
Manager

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1. GENERAL INFORMATION

1.1 Client Information

Company: IKEA of Sweden AB

1.2 General Description of EUT

Product Description: Self-ballasted LED Lamp (non-dimmable E26 LED lamp)

Model No.: LED2220T2

Serial No.: Not Labelled

1.3 Details of EUT

Rated Voltage: 120VAC 60Hz

Cables: Not Applicable

For more detail features, please refer to user's Manual.

1.4 Description of Peripherals

Not Applicable

1.5 Decision Rule

Decision Rule for compliance: For FCC/IC standard, the measured value must be within the limits of applicable standard without accounting for the measurement uncertainty. For EN/IEC/HKTA/HKTC standard, conformity rules will be used as per standard directly excepted EN/IEC 61000-3-2, EN/IEC 61000-3-3, HKTA1004, HKCA1008, HKTA1019, HKTA1020, HKTA1041 and HKTA1044. For these excepted or not mentioned standards, Cl 4.2.2 of ILAC-G8:09/2019 decision rules will be reference and guard band will be equal to our measurement uncertainty with 95% confidence level ($k=2$). In case, the measured value is within guard band region, undetermined decision will be used.

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2. TEST SUMMARY

Test	Standard	Class	Result
Conducted Emission	Section 15.107 of 47 CFR Part 15	Class B	Pass
Radiated Emission	Section 15.109 of 47 CFR Part 15	Class B	Pass

Remark:

This test report is issued to the Company indicated based on the request of the Applicant of the product mentioned in this report. All technical data is referred to previous report no. 22110641HKG-001 dated December 02, 2022.

The EUT has been tested/evaluated and pass the 47 CFR Part 15 without modification.

The production units are required to conform to the initial sample as received when the units are placed on the market.

Enclosed please find the FCC Labelling and Instruction Manual Requirements.

For all external photos and setup photos, please refer to the 23080389HKG-001 Annex document.

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3. TEST SPECIFICATIONS

3.1 Standards

Both conducted and radiated emission tests were performed according to the procedures in ANSI C63.4:2014. Test results are in compliance with the requirements of 47 CFR Part 15 [10-01-21 Edition].

The EUT setup configuration please refers to the photo of test configuration in item.

3.2 Definition of Device Classification

Unintentional radiator:

A device which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:

A digital device which is marketed for use in commercial or business environment.

Class B Digital Device:

A digital device which is marketed for use by the general public or in a residential environment.

Note:

A manufacturer may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

3.3 EUT Operation Condition

The EUT was powered by 120VAC 60Hz and was running in accordance with the manufacturer's operation manual.

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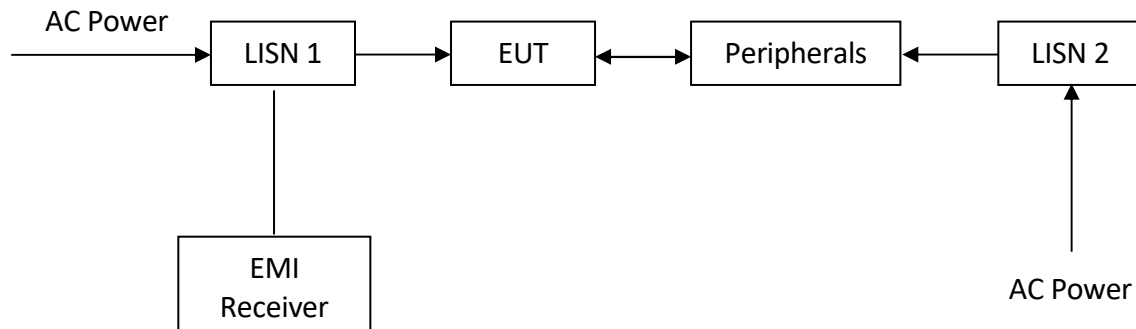
4. CONDUCTED EMISSION MEASUREMENTS (SECTION 15.107 OF 47 CFR PART 15)

4.1 Operating Environment

Temperature: $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$

Test Voltage: 120VAC

4.2 Test Setup and Procedure



The EUT along with its peripherals were placed on a 1.0m (W) \times 1.5m (L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were moved to find the maximum emission.

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4.3 Test Equipment

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.
EW-3481	EMI Test Receiver	ROHDESCHWARZ	ESR7	102354
EW-2874	Artificial Mains Network	ROHDESCHWARZ	ENV-216	101481

4.4 Conducted Emission Limits

Frequency (MHz)	Maximum RF Line Voltage			
	Class A (dBμV)		Class B (dBμV)	
	Q.P.	Ave.	Q.P.	Ave.
0.15~0.50	79	66	66~56	56~46
0.50~5.00	73	60	56	46
5.00~30.0	73	60	60	50

Note: Uncertainty: ± 3.46 dB at a Level of Confidence of 95%

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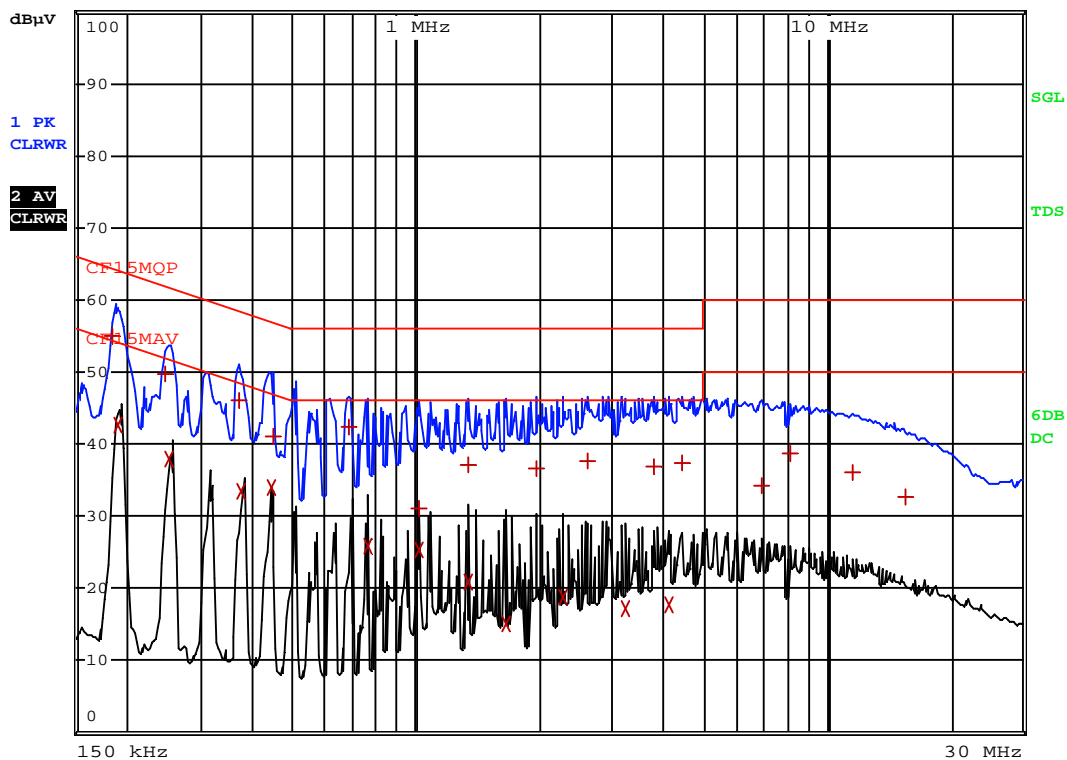
4.5 Conducted Emission Test Data

Phase: Live / Neutral
Model No.: LED2220T2
Worst Case: Light On Mode



RBW 9 kHz
MT 1 s

Att 10 dB AUTO PREAMP OFF



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4.5 Conducted Emission Test Data

Phase: Live / Neutral
Model No.: LED2220T2
Worst Case: Light On Mode

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CF15MQP			
Trace2:	CF15MAV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	186 kHz	55.09 L1		-9.12
2 CISPR Average	190.5 kHz	42.68 L1		-11.32
1 Quasi Peak	249 kHz	49.64 N		-12.14
2 CISPR Average	253.5 kHz	37.81 L1		-13.82
1 Quasi Peak	370.5 kHz	46.10 L1		-12.38
2 CISPR Average	379.5 kHz	33.52 L1		-14.76
2 CISPR Average	442.5 kHz	33.91 L1		-13.09
1 Quasi Peak	447 kHz	41.02 L1		-15.90
1 Quasi Peak	685.5 kHz	42.26 L1		-13.74
2 CISPR Average	762 kHz	25.76 L1		-20.23
2 CISPR Average	1.014 MHz	25.20 L1		-20.79
1 Quasi Peak	1.0185 MHz	31.01 L1		-24.98
1 Quasi Peak	1.3335 MHz	37.04 L1		-18.96
2 CISPR Average	1.3335 MHz	20.92 L1		-25.07
2 CISPR Average	1.653 MHz	15.18 L1		-30.82
1 Quasi Peak	1.968 MHz	36.71 L1		-19.28
2 CISPR Average	2.2875 MHz	18.71 L1		-27.29
1 Quasi Peak	2.607 MHz	37.67 L1		-18.32
2 CISPR Average	3.2415 MHz	17.17 L1		-28.82
1 Quasi Peak	3.813 MHz	36.93 L1		-19.07

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4.5 Conducted Emission Test Data

Phase: Live / Neutral
Model No.: LED2220T2
Worst Case: Light On Mode

EDIT PEAK LIST (Final Measurement Results)					
Trace1:	CF15MQP				
Trace2:	CF15MAV				
Trace3:	---				
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB	
2 CISPR Average	4.128 MHz	17.68	L1	-28.31	
1 Quasi Peak	4.4475 MHz	37.44	L1	-18.55	
1 Quasi Peak	6.9225 MHz	34.24	L1	-25.75	
1 Quasi Peak	8.124 MHz	38.75	L1	-21.24	
1 Quasi Peak	11.5485 MHz	36.17	L1	-23.82	
1 Quasi Peak	15.603 MHz	32.56	L1	-27.43	

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5. RADIATED EMISSION MEASUREMENTS (SECTION 15.109 OF 47 CFR PART 15)

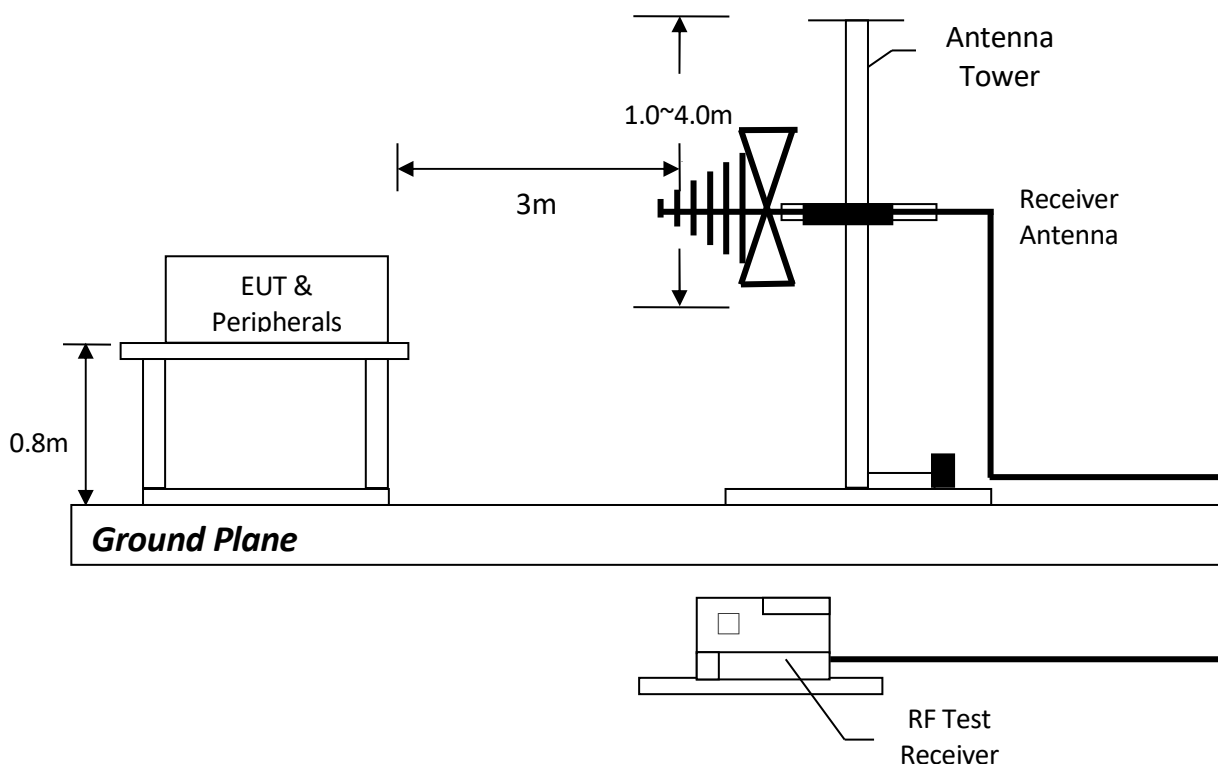
5.1 Operating Environment

Temperature: $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ Test Voltage: 120VAC

5.2 Test Setup and Procedure

The figure below shows the test setup, which is utilized to make these measurements.

The frequency spectrum from 30MHz to 1000MHz was investigated.



The equipment under test was placed on the top of rotation table 0.8 meter above ground plane.

The table was 360 degrees to determine the position of the highest radiation.

EUT is set 3 meters from the EMI receiving antenna, which is mounted on a variable height mast. The antenna height is varied between one meter and four meters above ground to find the maximum value of the field strength. Both horizontal polarization and vertical polarization of the antenna are set to make the measurement. The bandwidth was setting on the EMI meter 120kHz.

The levels are quasi peak value readings. The frequency spectrum from 30MHz to 1000MHz was investigated.

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5.3 Test Equipment

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.
EMC701	Multi-functional Anechoic Chamber (NSA)	Albatross	Nil	B83117-C1634-T161
EMC701	Multi-functional Anechoic Chamber (SVSWR)	Albatross	Nil	B83117-C1634-T161
EMC700	Low-loss RF and Microwave Coaxial cable-12m	Huber+Suhner	SF118/11N/11N /12000MM	800018/118
EMC597	EMI Test Receiver	R & S	ESU40	1000190
EMC577	Bi-conical Antenna	R & S	HK116	100242
EMC044	Log Periodic Antenna	R & S	HL223	841516/019
EMC586	Double-Ridged Waveguide Horn	EMCO	3117	00094998
EMC660	Microwave Preamplifier	COM-POWER Corporation	PAM-118A	551091

5.4 Radiated Emission Limits

According to Section 15.109 of 47 CFR Part 15, except for Class A digital device, the field strength of radiated emission from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Class B Radiated Emission Limits:

Frequency (MHz)	Field Strength (dBμV/m)
30-88	40.0
88-216	43.5
216-960	46.0
Above 960	54.0

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5.5 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + \text{Corr.}(AF \ \& \ CF)$$

Where FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

Corr. = Cable Attenuation Factor + Antenna Factor in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + \text{Corr.}$$

Example

Assume a receiver reading of 23.0 dB μ V is obtained. The Corr. factor of 9 dB is added. The net field strength for comparison to the appropriate emission limit is 32.0 dB μ V/m. This value in dB μ V/m is converted to its corresponding level in μ V/m.

$$RA = 23.0 \text{ dB}\mu\text{V}$$

$$\text{Corr.} = 9 \text{ dB}$$

$$FS = 23 + 9 = 32.0 \text{ dB}\mu\text{V/m}$$

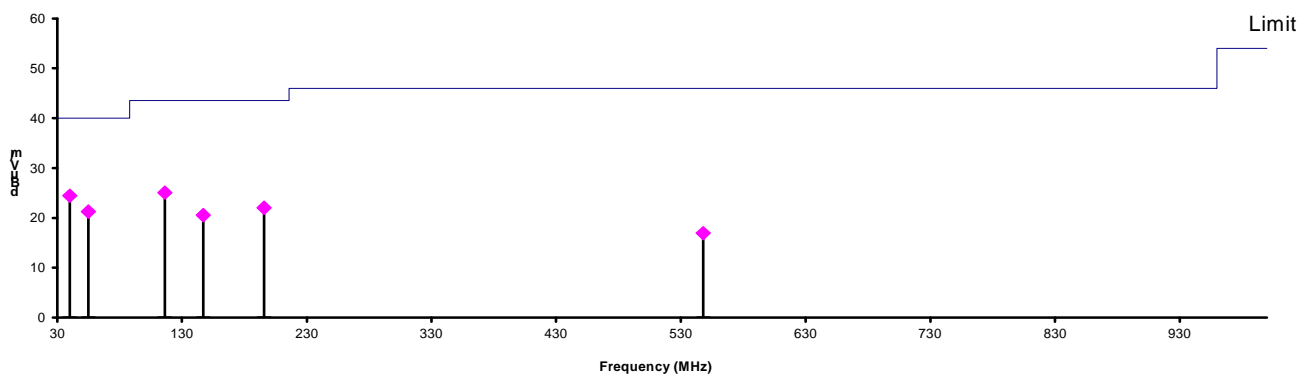
$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32.0 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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5.6 Radiated Emission Test Data

Pursuant to Section 15.109 of 47 CFR Part 15: Emissions Requirement

Polarity: Horizontal / Vertical
Model No.: LED2220T2
Worst Case: Light On Mode



Polarization	Frequency (MHz)	Corr. Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	39.894	14.8	24.5	40.0	-15.5
V	55.026	8.6	21.2	40.0	-18.8
V	116.136	8.5	25.1	43.5	-18.4
V	146.982	9.0	20.5	43.5	-23.0
V	195.676	10.5	22.0	43.5	-21.5
V	547.980	22.2	16.9	46.0	-29.1

- Notes:
1. Quasi-Peak Detector Data
 2. Negative sign (-) in the margin column signify levels below the limit.
 3. Frequency range scanned: 30 MHz to 1000 MHz.
 4. Only emissions significantly above equipment noise floor are reported.
 5. Uncertainty: ± 6.1 dB at a Level of Confidence of 95%.
 6. The correction factor included cable loss + antenna factor.

FCC LABELLING AND INSTRUCTION MANUAL REQUIREMENTS

Devices subject to FCC Part 15, Subpart B (not certification) must be labelled with the following statement. The label can be affixed at any space external to the product except the battery door or detachable parts.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

In addition, for a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.**
- Increase the separation between the equipment and receiver.**
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.**
- Consult the dealer or an experienced radio/ TV technician for help.**

If shielded cables or other specialized accessories are necessary for the unit to achieve compliance, a statement similar to the following should be added:

Shielded cables must be used with this unit to ensure compliance with the Class B FCC limits.

FCC LABELLING AND INSTRUCTION MANUAL REQUIREMENTS

Devices subject to FCC Part 15, Subpart B shall be labelled with an **unique identifier**. e.g. model number, serial number, etc. However, the identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified or type accepted equipment. The importer or manufacturer shall maintain adequate identification records to facilitate positive identification for each verified device.

Receivers associated with the operation of a licensed radio service subject to FCC Part 15, Subpart B (not certification) must be labelled with the following statement. The label can be affixed at any space external to the product except the battery door or detachable parts.

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

In addition, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.