

TEST REPORT

LABORATORY MEASUREMENTS

Pursuant to 47 CFR Part 15 [10-01-20 Edition] and ANSI C63.4:2014

Report No.:	21110810HKG-002
Applicant:	IKEA of Sweden AB Box 702, SE-343 81 Älmhult, SWEDEN
Equipment Under Test (EUT):	
Product Description:	Tealight
Model:	M2108, M2109
Brand Name:	
Equipment Type:	Class B Digital Device / Unintentional Radiator
Sample Receipt Date:	November 17, 2021
Test Conducted Date:	November 17, 2021 to January 26, 2022
Issue Date:	June 21, 2022
Test Site Location:	1. For Radiated Emission Test: Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. 2. For Other Test: 2nd Floor, Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong SAR, China.
Relevant Standard(s):	47 CFR Part 15 [10-01-20 Edition] and ANSI C63.4:2014
Conclusion:	Test was conducted by client submitted sample. The submitted sample as received complied with the 47 CFR Part 15 requirement.


1. This report supersedes previous report with report number 21110810HKG-002 dated February 10, 2022.
2. Please refer LUM-S22-0008 Letter issued on June 21, 2022 for amendment/ supersede notification.

Prepared and Checked by:

Approved by:

Signed on File

Lai Siu Ming, Henry/jc
Engineer


Digitally signed by Kenneth Yip
DN: cn=Kenneth Yip, o=Intertek,
ou=Intertek Testing Service HK
LTD,
email=kenneth.yip@intertek.com,
c=HK
Date: 2022.06.21 21:29:09 +08'00'

Yip Kai Pong, Kenneth
Manager

Intertek's standard Terms and Conditions can be obtained at our website <http://www.intertek.com/terms/>.

The test report only allows to be revised within the retention period unless further standard or the requirement was noticed.

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

© 2017 Intertek

TEST REPORT

TABLE OF CONTENTS

1 GENERAL INFORMATION3

1.1 Client Information.....3

1.2 General Description3

1.3 Details of EUT.....3

1.4 Description of Peripherals3

1.5 Decision Rule.....3

2 TEST SUMMARY4

3 TEST SPECIFICATIONS5

3.1 Standards5

3.2 Definition of Device Classification5

3.3 EUT Operation Condition.....5

4 CONDUCTED EMISSION MEASUREMENTS6

4.1 Operating Environment6

4.2 Test Setup and Procedure6

4.3 Test Equipment.....7

4.4 Conducted Emission Limits.....7

4.5 Conducted Emission Test Data8

5 RADIATED EMISSION MEASUREMENTS10

5.1 Operating Environment10

5.2 Test Setup and Procedure10

5.3 Test Equipment.....11

5.4 Radiated Emission Limits11

5.5 Field Strength Calculation.....12

5.6 Radiated Emission Test Data13

TEST REPORT

1. GENERAL INFORMATION

1.1 Client Information

Applicant: IKEA of Sweden AB

1.2 General Description of EUT

Product Description: Tealight
Model No.: M2108, M2109
Serial No.: Not Labelled

1.3 Details of EUT

Rated Voltage: M2108 Praktspirea:
Input: 4.6V DC; 1W and/or Battery: 1.2V DC; (1 x AAA HR03) 0.1W
M2109 Praktspirea:
USB Input: 5.0VDC; 5.0 W
Cables: Not Applicable

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

1.4 Description of Peripherals

Description	Remark
AC/DC adaptor (Model: Apple A1357 10W USB Power Adapter; Input: 100-240VAC 50-60Hz; Output: 5.1VDC 2.1A)	Provided by Intertek
1 x USB cable with length of 1.4 meter long	Provided by Intertek

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.

TEST REPORT

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:

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 21110810HKG-002 Annex document.

AMENDMENT HISTORY

Report No.	Issued Date	Content
21110810HKG-002	February 10, 2022	Original Report
21110810HKG-002R1	June 21, 2022	Add Radiated Emission Test Data

TEST REPORT

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 [10-01-20 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 Battery 1.2VDC (1 x 1.2V "AAA" Rechargeable Battery) and/or Powered by USB Port of 5VDC and was running in accordance with the manufacturer's operation manual.

TEST REPORT

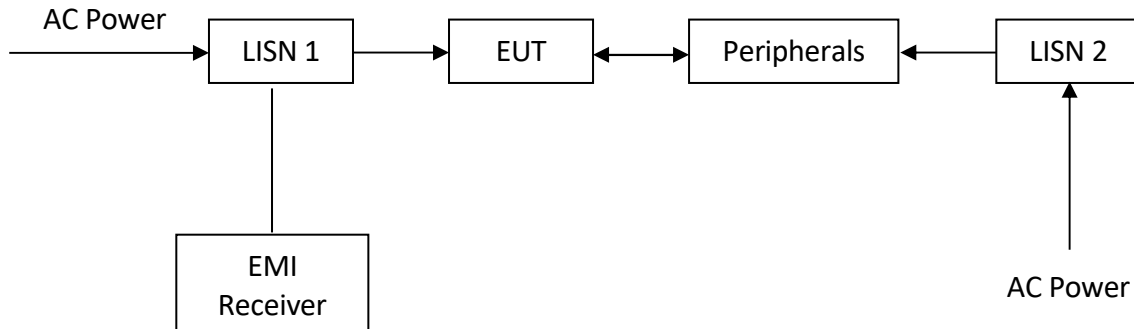
4. CONDUCTED EMISSION MEASUREMENTS (SECTION 15.107 OF 47 CFR PART 15)

4.1 Operating Environment

Temperature: 25°C ± 10°C

Test Voltage: 5VDC

4.2 Test Setup and Procedure



The EUT along with its peripherals were placed on a 1.0m (W) × 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.

TEST REPORT

4.3 Test Equipment

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.
EW-3095	EMI Test Receiver	R&S	ESCI	101430
EW-2501	Artificial Mains Network	R&S	ENV-216	100483

4.4 Conducted Emission Limits

Frequency (MHz)	Maximum RF Line Voltage			
	Class A (dB μ V)		Class B (dB μ V)	
	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%

TEST REPORT

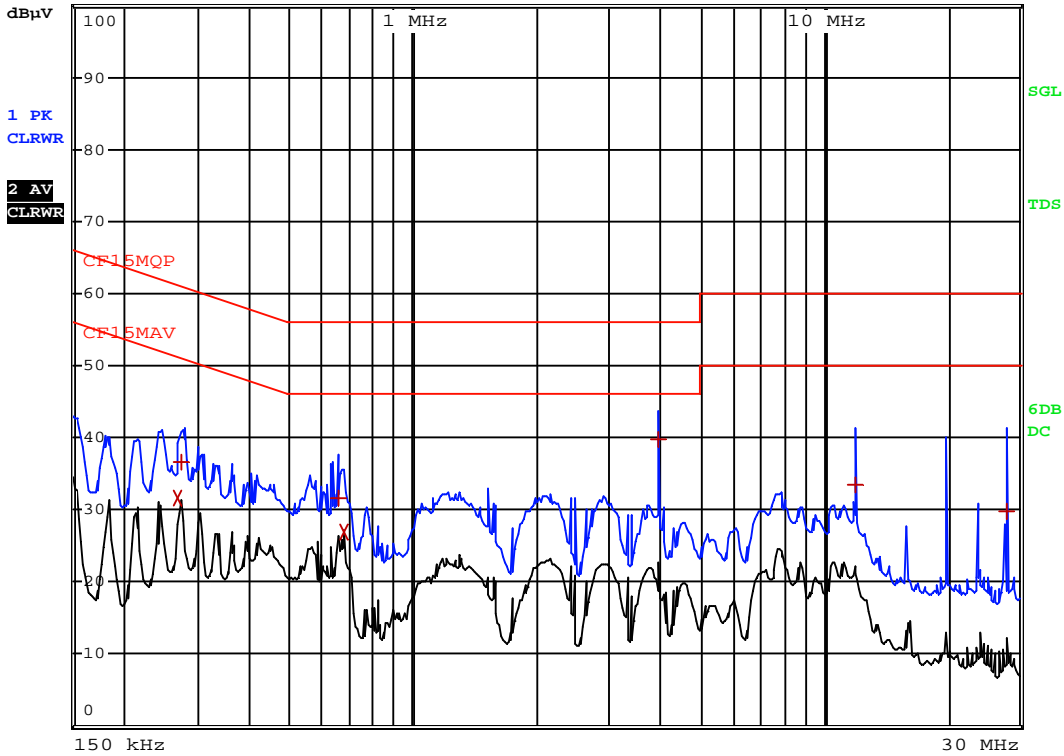
4.5 Conducted Emission Test Data

Phase: Live / Neutral
Model No.: M2108, M2109
Worst Case: Full On With Charging



RBW 9 kHz
MT 1 s

Att 10 dB AUTO PREAMP OFF



21110810HKG-002 (Light full on with USB charging mode)

Date: 21.JAN.2022 15:42:32

TEST REPORT

4.5 Conducted Emission Test Data

Phase: Live / Neutral
Model No.: M2108, M2109
Worst Case: Full On With Charging

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CF15MQP			
Trace2:	CF15MAV			
Trace3:	---			
	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2	CISPR Average	271.5 kHz	31.59 L1	-19.47
1	Quasi Peak	276 kHz	36.60 N	-24.33
1	Quasi Peak	654 kHz	31.63 L1	-24.36
2	CISPR Average	676.5 kHz	26.92 L1	-19.07
1	Quasi Peak	3.966 MHz	39.88 L1	-16.11
1	Quasi Peak	11.8995 MHz	33.44 L1	-26.55
1	Quasi Peak	27.7575 MHz	29.67 L1	-30.32

21110810HKG-002 (Light full on with USB charging mode)

Date: 21.JAN.2022 15:42:15

TEST REPORT

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

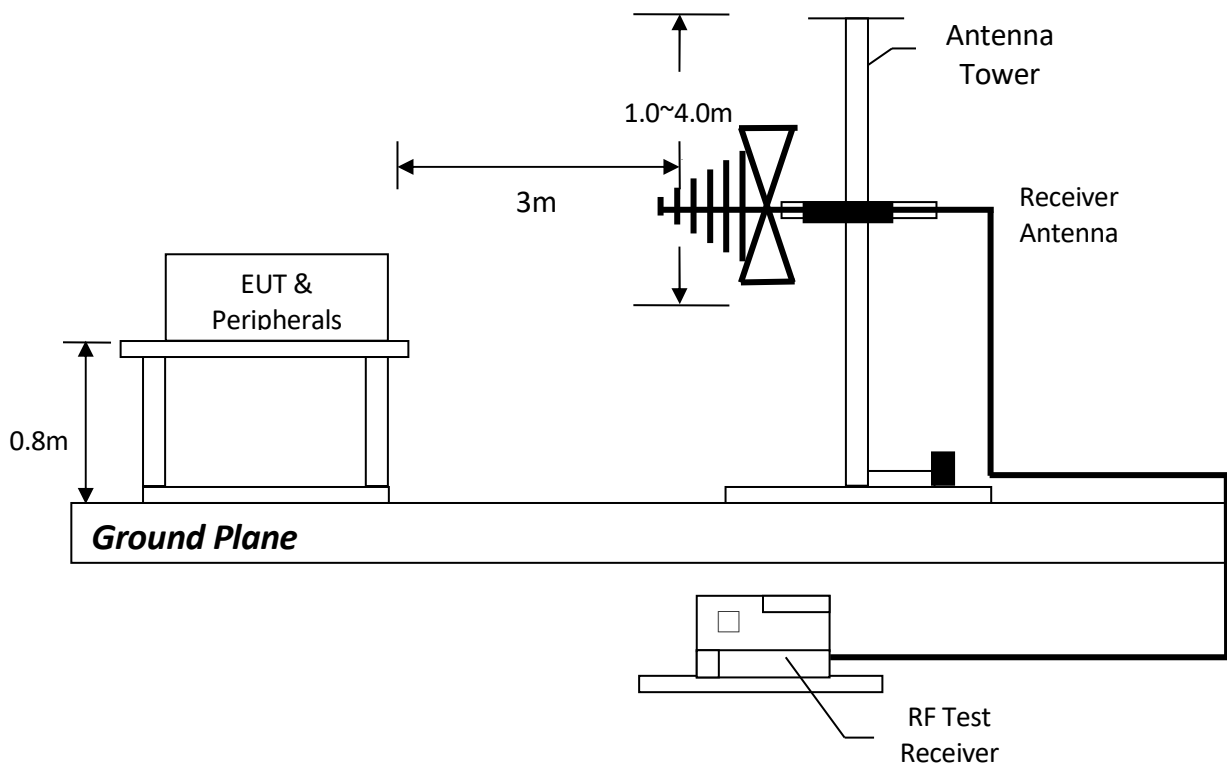
5.1 Operating Environment

Temperature: $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ Test Voltage: 5VDC

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.

TEST REPORT

5.3 Test Equipment

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.
EW-3481	EMI Test Receiver 7GHz	ROHDESCHWARZ	ESR7	102354
EW-3016	Signal and Spectrum Analyzer (10Hz to 40GHz)	ROHDESCHWARZ	FSV40	101076
EW-3061	BiConiLog Antenna - 26MHz to 6000MHz	EMCO	3142E	00166104
EW-1015	Double Ridged Guide Antenna (1GHz - 18GHz)	EMCO	3115	0003-6092
EW-2781	RF Cable 14m (1GHz to 26.5GHz)	GREATBILLION	SMA m/SHF5MPU /SMA m ra14m,26G	R286105301

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 (dB μ V/m)
30-88	40.0
88-216	43.5
216-960	46.0
Above 960	54.0

TEST REPORT

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.

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

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

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

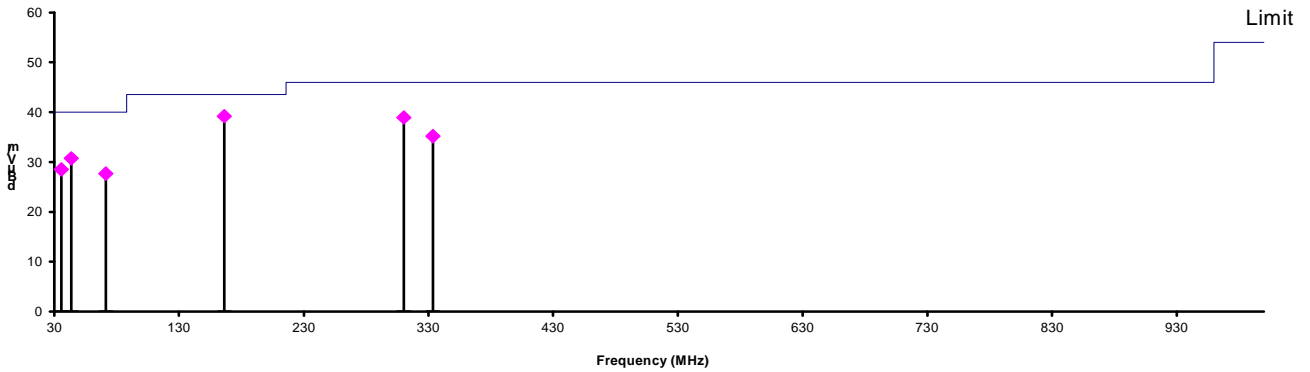
$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(32.0 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

TEST REPORT

5.6 Radiated Emission Test Data

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

Polarity: Horizontal / Vertical
Model No.: M2108, M2109
Worst Case: Full On With Charging



Polarization	Frequency (MHz)	Corr. Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	35.603	14.0	28.5	40.0	-11.5
V	43.647	10.0	30.8	40.0	-9.3
V	71.313	8.3	27.7	40.0	-12.3
H	166.259	11.2	39.2	43.5	-4.3
H	310.188	15.6	38.9	46.0	-7.1
H	333.466	16.9	35.2	46.0	-10.8

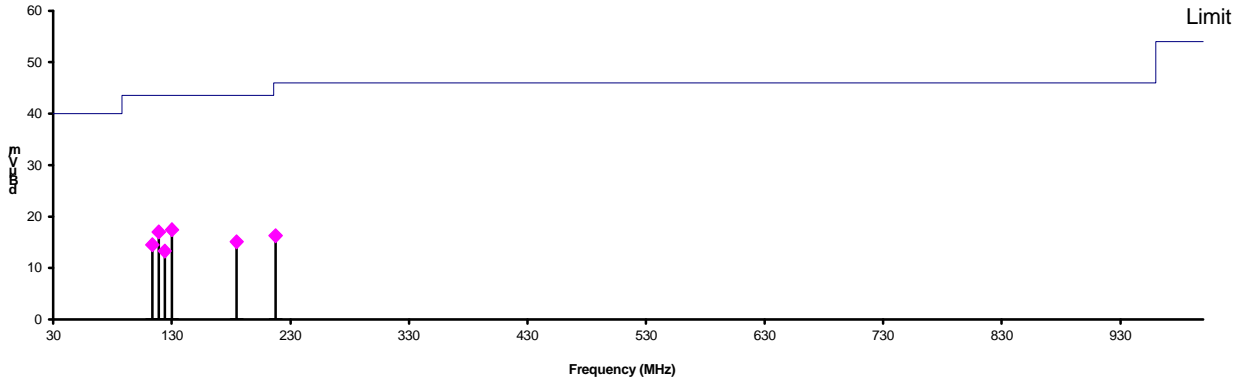
- Notes:
1. Quasi-Peak Detector Data
 2. Negative sign (-) in the margin column signify levels below the limit.
 3. Frequency range scanned: 30 MHz to 1000 MHz.
 4. Only emissions significantly above equipment noise floor are reported.
 5. Uncertainty: ± 6.61dB at a Level of Confidence of 95%.
 6. The correction factor included cable loss + antenna factor.

TEST REPORT

5.6 Radiated Emission Test Data

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

Polarity: Horizontal / Vertical
Model No.: M2108, M2109
Worst Case: Large Tealight - Standalone On Mode



Polarization	Frequency (MHz)	Corr. Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	113.541	9.6	14.5	43.5	-29.0
V	118.876	9.0	17.0	43.5	-26.5
V	124.090	8.9	13.3	43.5	-30.2
V	130.274	9.3	17.4	43.5	-26.1
H	184.836	11.5	15.1	43.5	-28.4
V	217.574	12.7	16.3	46.0	-29.7

- 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: ± 6.61dB at a Level of Confidence of 95%.
 6. The correction factor included cable loss + antenna factor.

Points to note for Supplier's Declaration of Conformity

47 CFR FCC Part 2 – Frequency Allocations and Radio Treaty Matters; General Rules and Regulations

47 CFR FCC Part 2.909 Responsible party.

- (a) In the case of equipment that requires the issuance of a grant of certification, the party to whom that grant of certification is issued is responsible for the compliance of the equipment with the applicable standards. If the radio frequency equipment is modified by any party other than the grantee and that party is not working under the authorization of the grantee pursuant to Part 2.929(b), the party performing the modification is responsible for compliance of the product with the applicable administrative and technical provisions in this chapter.
- (b) For equipment subject to Supplier's Declaration of Conformity the party responsible for the compliance of the equipment with the applicable standards, who must be located in the United States (see Part 2.1077), is set forth as follows:
 - (1) The manufacturer or, if the equipment is assembled from individual component parts and the resulting system is subject to authorization under Supplier's Declaration of Conformity, the assembler.
 - (2) If the equipment by itself, or, a system is assembled from individual parts and the resulting system is subject to Supplier's Declaration of Conformity and that equipment or system is imported, the importer.
 - (3) Retailers or original equipment manufacturers may enter into an agreement with the responsible party designated in paragraph (b)(1) or (b)(2) of this section to assume the responsibilities to ensure compliance of equipment and become the new responsible party.
 - (4) If the radio frequency equipment is modified by any party not working under the authority of the responsible party, the party performing the modifications, if located within the U.S., or the importer, if the equipment is imported subsequent to the modifications, becomes the new responsible party.

47 CFR FCC Part 2.1074 Identification.

- (a) Devices subject only to Supplier's Declaration of Conformity shall be uniquely identified by the party responsible for marketing or importing the equipment within the United States. However, the identification shall not be of a format which could be confused with the FCC Identifier required on certified equipment. The responsible party shall maintain adequate identification records to facilitate positive identification for each device.
- (b) Devices subject to authorization under Supplier's Declaration of Conformity may be labeled with the following logo on a voluntary basis as a visual indication that the product complies with the applicable FCC requirements. The use of the logo on the device does not alleviate the requirement to provide the compliance information required by Part 2.1077.



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.