TEST REPORT

Application No.:	HKEM1904000369AT (T31920230010EM)
Applicant:	Lexibook Limited
Address of Applicant:	Unit 8-9, 4th Floor, Kenning Industrial Building, 19 Wang Hoi Road, Kowloon Bay, Kowloon, HongKong
Equipment Under Test (EUT):	
EUT Name:	Radio Alarm Clock
Model No.:	RL800UNI
Country of Origin:	China
Standards:	EN 55032:2015
	EN 55035:2017
	EN 55015:2013:+A1:2015
	EN 61547:2009
Date of Receipt:	2019-04-12, 2019-06-05
Date of Test:	2019-04-16 to 2019-06-11
Date of Issue:	2019-06-13
Test Result :	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EU Declaration of Conformity and compliance with all relevant EU Directives.

CE

Ivan Toa
EMC Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2019-06-13		Original

Authorized for issue by:				
Tested by:				
		Leo Xu /Project Engineer		Date: 2019-06-12
Checked by:				
		Ivan Toa /Reviewer		Date: 2019-06-13

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2 Test Summary

Emission Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Radiated Emission, (30MHz to 1GHz)	EN 55032:2015	EN 55032:2015	Table A.4	PASS
Conducted Emission (150KHz to 30MHz)	EN 55032:2015	EN 55032:2015	Table A.11	N/A
Radiated Disturbance(30MHz-300MHz)	EN 55015:2013+A1:2015	CISPR 32:2015	N/A	Pass
Radiated Electromagnetic Disturbance 9 KHz to 30 MHz	EN 55015:2013+A1:2015	EN 55015:2013	Table 3a	Pass

Immunity Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Electrostatic Discharge	EN 55035:2017	EN 61000-4-2:2009	4kV Contact Discharge 8kV Air Discharge	Pass
Radiated Immunity (80MHz-1GHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz)	EN 55035:2017	EN 61000-4-3:2006 +A1:2008+A2:2010	3V/m	Pass
Electrostatic Discharge	EN 61547:2009	EN 61000-4-2:2009	4kV Contact Discharge 8kV Air Discharge	Pass
Radiated Immunity(80MHz-1GHz)	EN 61547:2009	EN 61000-4-3:2006+A1:2008+A2:2010	3V/m, 80%, 1kHz Amp. Mod.	Pass

Remark:
N/A: Not applicable, this product is battery operated and not connected to the mains while in use.

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3 Contents

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4 General Information

4.1 Details of E.U.T.

Power supply:	4.5V DC(1.5V x 3 "AA" batteries)
Cable:	Antenna cable: 110cm unshielded
Function:	FM Radio Receiver, LED lighting
Modulation Type:	FM
Frequency Range:	FM: 87.5MHz – 108MHz

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radiated emission	±5.26dB (30MHz-1GHz)
2	Radiated Immunity	±1.85dB
3	ESD	± 6.4 %

Remark:
The **Ulab** (lab Uncertainty) is less than **Ucispr** (CISPR Uncertainty), so the test results
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

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4.4 Test Location

All tests were performed at:

SGS IECC Limited (Member of the SGS Group (SGS SA))

No. 16-B, Yip Wo Street, On Lok Tsuen, Fanling, N.T., Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized or accredited by the following organizations:

- **HOKLAS (Lab Code: 125)**

  SGS IECC Limited has been accepted by HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a HOKLAS Accredited Laboratory, this laboratory meets the requirements of ISO/IEC 17025:2005 an it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

- **FCC Recognized Accredited Test Firm(CAB Registration No.: 446297)**

  SGS IECC Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0010, Test Firm Registration Number: 446297.

- **Industry Canada (Site Registration No.: 5193A; CAB Identifier No.: HK0001)**

  SGS IECC Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0001, Site Registration Number: 5193A.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

4.8 Monitoring of EUT for All Immunity Test

Audio: Monitored the sound of EUT
Visual: Monitored the display and working status of the EUT

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5 Equipment List

Radiated Emission (30-1000 MHz)			
Equipment	**Manufacturer**	**Model / Serial No.**	**Calibration Due**
EMI Test Receiver 9kHz to 3.6GHz	Rohde & Schwarz	ESR3 / 102326	2019/08/12
Signal Generator	Rohde & Schwarz	SMT 03 / 832939/017	2020/05/21
Antenna (30-300 MHz)	Schwarzbeck	BBA9106, VHA9103	2020/01/29
Log-periodic Antennas (300MHz-1000MHz)	Schwarzbeck	UHALP9107	2020/01/29
Antenna (30-1000 MHz)	Schaffner	CBL6111C / 2791	2019/10/26
Antenna Mast System	Schwarzbeck	AM9104 / -	--
Turntable with Controller	Drehtisch	DT312 / -	--

Electrostatic Discharge			
Equipment	**Manufacturer**	**Model No**	**Cal Due Date**
ESD Generator	TESEQ AG	NSG 437	2020-04-14

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Radiated Immunity			
Equipment	**Manufacturer**	**Model / Serial No.**	**Calibration Due**
RF Amplifier 80 - 1000MHz, 175Watts	Milmega	80RF1000-175 / 1048909	2019/10/14
RF Amplifier 0.8 – 2.7GHz, 55Watts	Milmega	AS0827-55 / 1052118	2019/10/14
Antenna	Schwarzbeck	VULP9118E / 9118E908	2020/05/16
Antenna	Schwarzbeck	STLP9149 / 9149-179	2020/05/16
Signal Generator	Rohde & Schwarz	SMT03 / 827786/015	2020/05/16
Dual Directional Coupler 80 - 1000MHz, 200Watts	Amplifier Research	DC6080A / 0339242	2021/01/29
RF Power head with USB interface, 9kHz - 2.7GHz	Dare	RPR1006A / 06D00705SNO-95	2019/08/12
RF Power head with USB interface, 9kHz - 2.7GHz	Dare	RPR1006A / 06D00705SNO-96	2019/08/12
Signal Generator	Rohde & Schwarz	SMB100A SIGNAL GENERATOR	2019/08/12
2.5 - 6GHz Power Amplifier	Rohde & Schwarz	BBA150-E30	2019/10/14

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6 Emission Test Results

6.1 Radiated Disturbance(30MHz-1GHz)

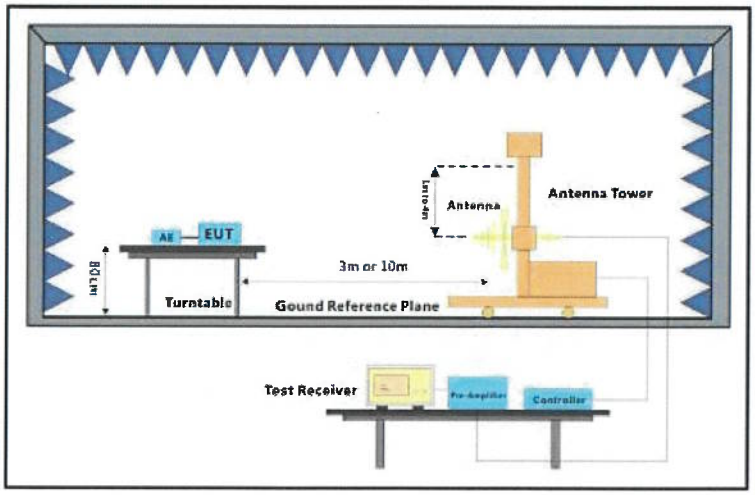
Test Requirement:	EN 55032:2015
Test Method:	EN 55032:2015
Frequency Range:	30MHz to 1GHz
Measurement Distance:	3m
Limit:	
30MHz-230MHz	40 dB(μV/m) quasi-peak
230MHz-1GHz	47 dB(μV/m) quasi-peak
Detector:	Peak for pre-scan
	Quasi-Peak for final measurement

6.1.1 E.U.T. Operation

Operating Environment:

Temperature:	24 °C	Humidity:	58 % RH
	Test voltage: DC 4.5V		
Pretest these mode to find the worst case::	a: FM ON mode.		
	b: Alarm ON mode		
	c: idel mode with clock, keep the EUT standby.		
The worst case for final test:	Test voltage: DC 4.5V		
	b: Alarm ON mode		

6.1.2 Test Setup Diagram



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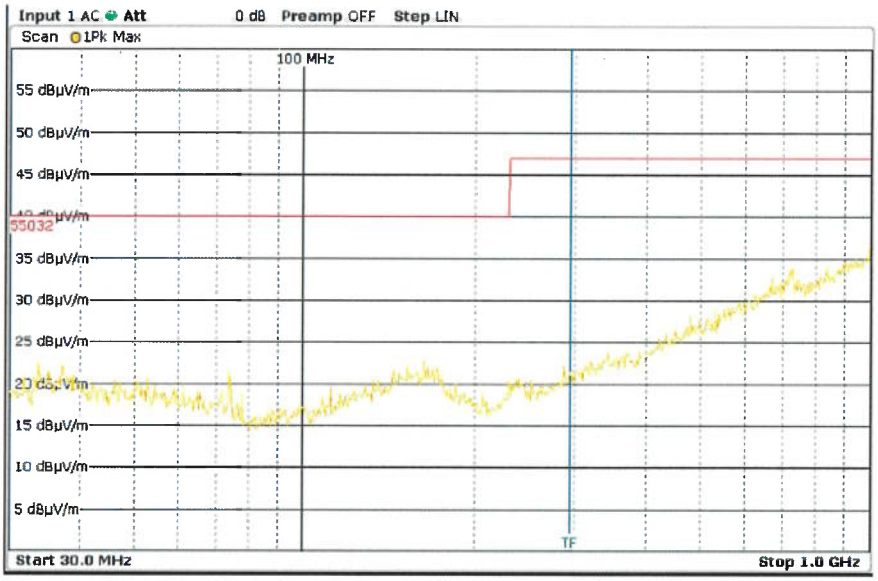
6.1.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

Test mode: Alarm ON mode.

Vertical / Horizontal:

Quasi-peak measurement:



Remark: No emission is detected.

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6.2 Radiated Electromagnetic Disturbance Test: 9 KHz to 30 MHz

Test Requirement: EN 55015

Test Method: EN 55015

Frequency Range: 9 kHz to 30 MHz

Detector: Peak for pre-scan

Quasi-Peak for final test

200 Hz resolution bandwidth between 9 kHz & 150 kHz
9 kHz resolution bandwidth between 150 kHz & 30 MHz

Limit:

Frequency range MHz	**Limits for loop diameter limits 2m** dB (μA)[a]
0.009 to 0.070	88
0.070 to 0.150	88 to 58[b]
0.150 to 3.0	58 to 22[b]
3.0 to 30.0	22

[a] At the transition frequency, the lower limit applies.

[b] Decreasing linearly with the logarithm of the frequency. For electrodeless lamps and luminaires, the limit in the frequency range of 2.2 MHz to 3.0 MHz is 58 dB(μA) for 2 m, 51 dB(μA) for 3 m and 45 dB(μA) for 4 m loop diameter.

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6.2.1 E.U.T. Operation

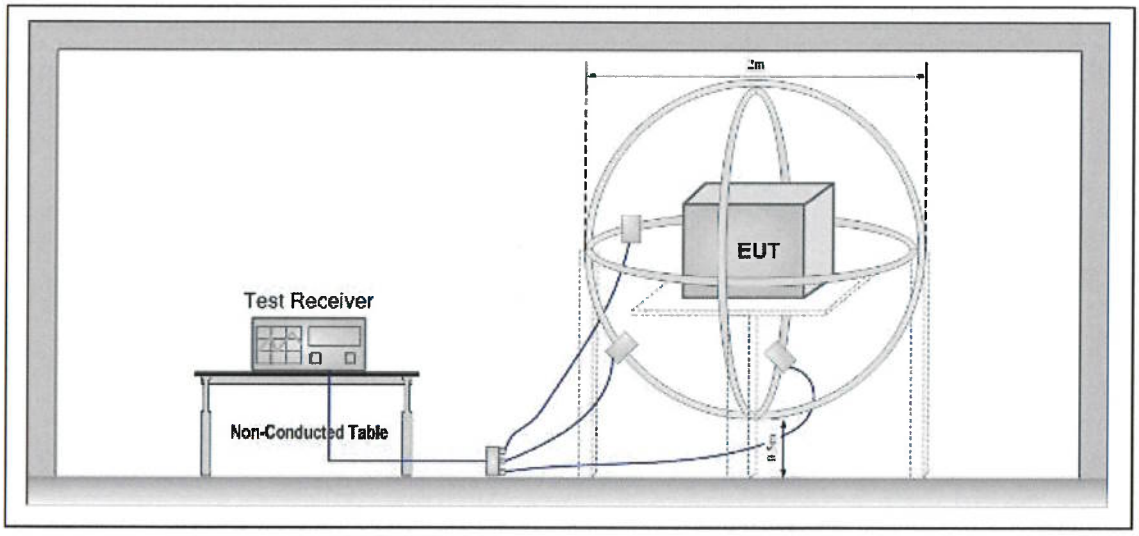
Operating Environment:

Temperature: 24°C Humidity: 53% RH

Test voltage: DC 4.5V

EUT Operation: Test the EUT with light on.

6.2.2 Test Setup and Procedure



1. The magnetic component was measured by means of a loop antenna. The lighting equipment was placed in the centre of the antenna. The position of the mains lead was optimized for maximum current induction.
2. The induced current in the loop antenna was measured by means of a current probe (1 V/A) and the CISPR measuring receiver. During the measurements the EUT remains in a fixed position. By means of a coaxial switch, The currents in the three large loop antennas, originating from the three mutually orthogonal magnetic field components, were measured in sequence. Each value was fulfil the requirements given.
3. There were no special instructions for the supply wiring.
4. The distance between the outer perimeter of the LAS(Loop Antenna System) and nearby objects, such as floor and walls, was at least 0.5 m.
5. To avoid unwanted capacitive coupling between the EUT and the LAS, the maximum dimensions of the EUT allowed a distance of at least 0.20 m between the EUT and the standardized 2 m large loop antennas of the LAS.

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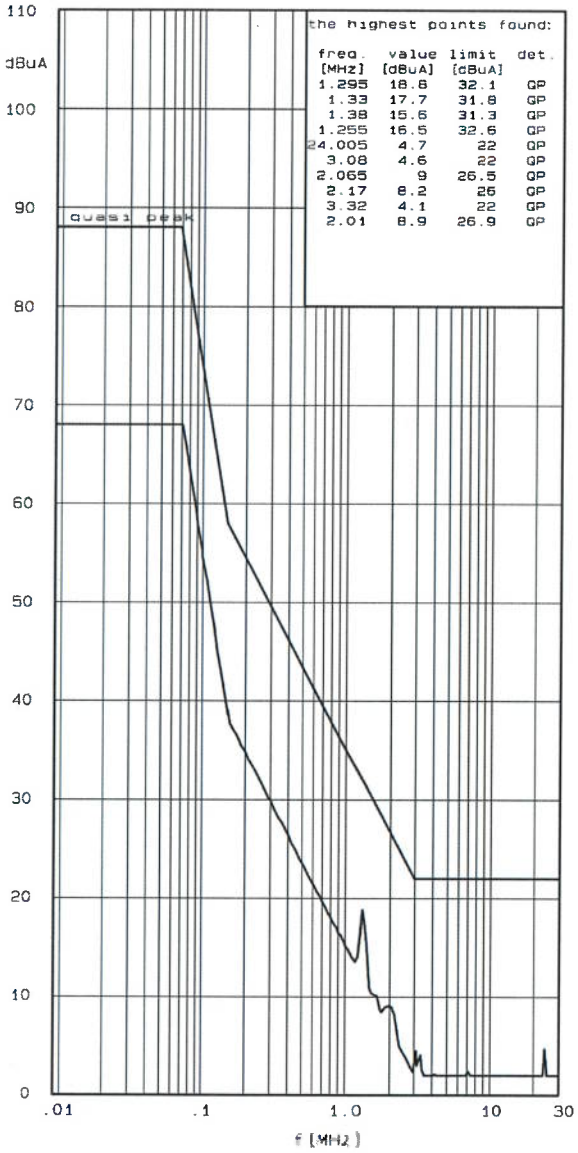
6.2.3 Measurement Data

Quasi-Peak Measurement:

Worst Loop (Loop 1) result:



Remark: Emission below limt 20dB is not shown on the graph.

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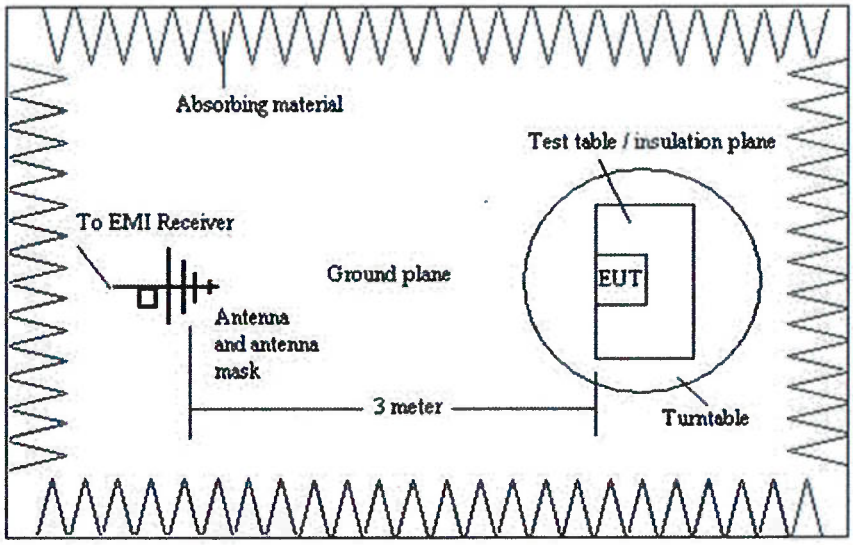
6.3 Radiated Disturbance(30MHz-300MHz)

Test Requirement:	EN 55015:2013+A1:2015
Test Method:	EN 55015:2013
Frequency Range:	30MHz to 300MHz
Limit:	
30MHz-230MHz	40dB(μV/m) quasi-peak
230MHz-300MHz	47dB(μV/m) quasi-peak
Detector:	Peak for pre-scan (120kHz resolution bandwidth) 30M to 300MHz

6.3.1 E.U.T. Operation

Operating Environment:								
Temperature:	24	°C	Humidity:	58	% RH	Atmospheric Pressure:	1020	mbar
Test mode	Test voltage: DC 4.5V EUT Operation: Test the EUT with light on.							

6.3.2 Test Setup



6.3.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

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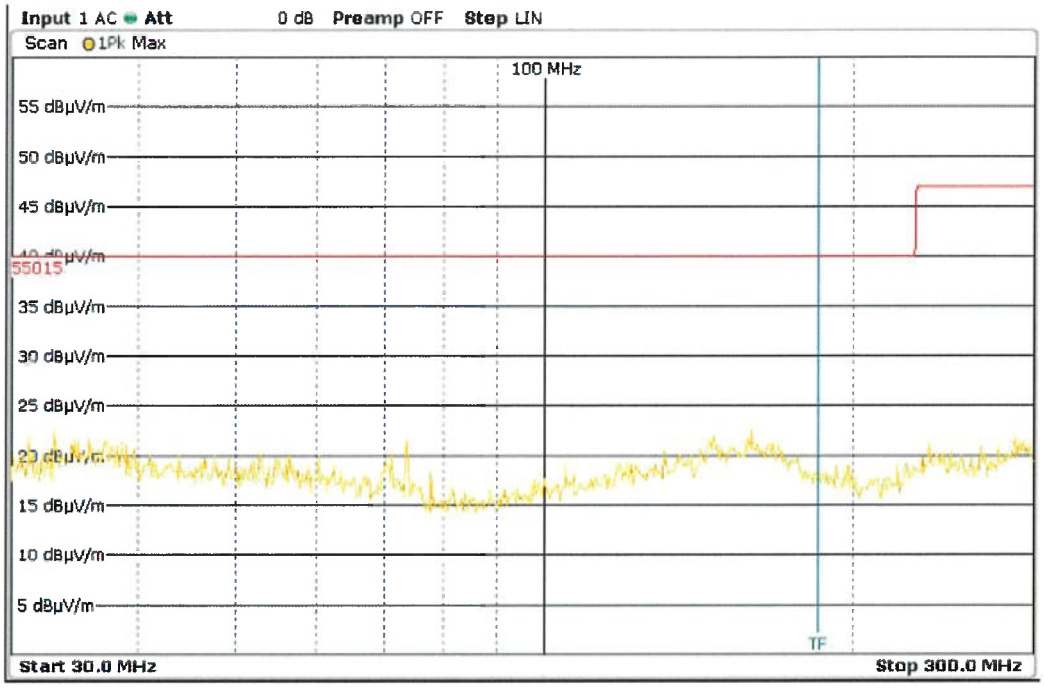

Remark: No emission is detected.

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7 Immunity Test Results

7.1 General Performance Criteria Description in EN 55035:2017

Criterion A The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Criterion B During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.
If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Criterion C Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.
Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

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7.2 Performance Criteria Description for Broadcast reception function

The broadcast reception function shall comply with the general performance criteria given in

Clause 8 and any relevant annex with the deviations defined in Table A.2.

NOTE For the continuous RF electromagnetic field immunity test specified in the table clauses 1.2 and 1.3, deviations apply for in-band frequencies. The deviations depend on the class of the broadcast receiver (Group 1 or 2) and are defined in Table A.2.

Table A.2 – Modified test levels for performance criterion A for the broadcast reception function

<table>
<tr><th>Performance criteria</th><th>Test type table clause</th><th>Group 1</th><th>Group 2</th></tr>
<tr><td rowspan="2">A</td><td>1.2
1.3</td><td>The disturbance level is reduced to 1 V/m for in-band frequencies.</td><td rowspan="2">No test requirements apply</td></tr>
<tr><td>2.1
3.1
4.1</td><td>The disturbance level is reduced to 1 V for in-band frequencies.</td></tr>
<tr><td colspan="4">In-band is defined as the entire tuneable operating range of the selected broadcast reception function.
The tuned channel ±0,5 MHz (lower edge frequency – 0,5 MHz up to the upper edge frequency + 0,5 MHz of the tuned channel) is excluded from testing.
NOTE In some countries, there is a requirement to test the tuned channels. Refer to the relevant regional requirements for guidance.</td></tr>
</table>

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7.3 Performance Criteria Description for Audio output function

Performance criterion A

General

During the test the audio output function shall be maintained and the requirements of G.7.1.2 or G.7.1.3 shall be met.

Devices supporting telephony functions

For devices that support telephony functions the limits of Table G.3 shall apply. With respect to Table G.3,

- the interference ratio (electrical or acoustic) shall meet the limits in column 3; or,
- the acoustic level of the demodulated audio shall be less than the limits in column 4; or,
- the digitally coded level of demodulated audio shall be less than limits in column 5; or,
- the analogue level of the demodulated audio shall be less than the limits in column 6.

Table G.3 – Performance criterion A – Limits for devices supporting telephony

Type of immunity test	Frequency range MHz	Acoustic or electrical interference ratio	Equivalent direct measurement		
			dB(SPL)	Digital dBm0	Analogue dBm
Conducted [a]	0,15 to 30	–20 dB	55	–50	–50
	30 to 80	–10 dB	65	–40	–40
Radiated	80 to 1 000	0 dB	75	–30	–30

[a] At the step in the frequency range, the lower limit shall be applied.

The equivalent direct measurement values are presented to show the equivalency of the interference ratio in comparison to a direct measured value. These values may be used if the direct measurement method of the test is used.

The values within this table are aligned with CISPR 24, noting that the test levels are different between this document and CISPR 24.

For terminals connected to digital wired network ports (such as Ethernet, ISDN), measurements of the demodulated 1 kHz may be performed on a remote AE, ideally of the same design.

NOTE The amplitude demodulation disturbances will arise, almost invariably, from semi-conductor junctions behaving as inadvertent square law detectors. This means that for a 10 dB increase in the applied test level, for example, from 1 V to 3 V, the demodulated line noise will increase by 20 dB. This 20dB offset was used to derive the values in Table G.3.

For all other devices

The measured acoustic interference ratio and/or the measured electrical interference ratio during the test shall be –20 dB or better.

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Performance criterion B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended.

The performance level may be replaced by a permissible loss of performance.

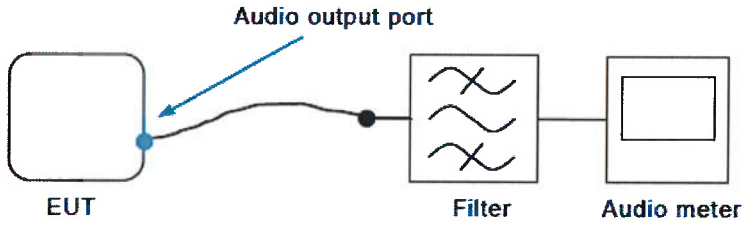
If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Test setup examples



The filter is the audio filter specified in G.6.1 and is typically incorporated into the audio meter. Additional filtering might be necessary to ensure that the RF disturbance signal does not interfere with the measurement.

Figure G.1 – Example basic test setup for electrical measurements

(direct connection to EUT)

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7.4 Performance Criteria Description in EN 61547:2009

Criterion A During the test no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Criterion B During the test the luminous intensity may change to any value. After the test the luminous intensity shall be restored to its initial value within 1 min.

Regulating controls need not function during the test, but after the test the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Criterion C During and after the test any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal if necessary by temporary interruption of the mains supply and/or operating the regulating control.

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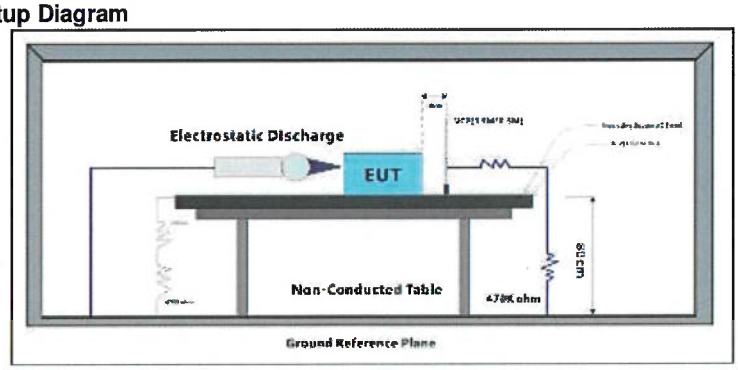
7.5 Electrostatic Discharge

Test Requirement:	EN 55035:2017
Test Method:	EN 61000-4-2:2009
Performance Criterion:	B
Discharge Impedance:	330Ω/150pF
Number of Discharge:	Minimum 10 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

7.5.1 Test Setup Diagram



7.5.2 E.U.T. Operation

Operating Environment:

Temperature: 25.9 °C Humidity: 58 % RH Atmospheric Pressure: 1012 mbar

Test mode: a: FM ON mode.

b: Alarm ON mode

c: idel mode with clock, keep the EUT standby.

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7.5.3 Test Results:

Observations: Test Point:

1. All insulated enclosure and seams.
2. All accessible metal parts of the enclosure.
3. All side

Discharge type	Level (kV)	Polarity	Test Point	Result / Observations
Air Discharge	8	+	1	B
Air Discharge	8	-	1	B
Contact Discharge	4	+	2	N/A
Contact Discharge	4	-	2	N/A
Horizontal Coupling	4	+	3	A
Horizontal Coupling	4	-	3	A
Vertical Coupling	4	+	3	A
Vertical Coupling	4	-	3	A

Results:

N/A: Not applicable (no such test points or not required by Standard).

A: No degradation in the performance of the EUT was observed.

B: During discharge 8kV directly applied to the display, the digit of the display will be blurred, it can be self-recovered.

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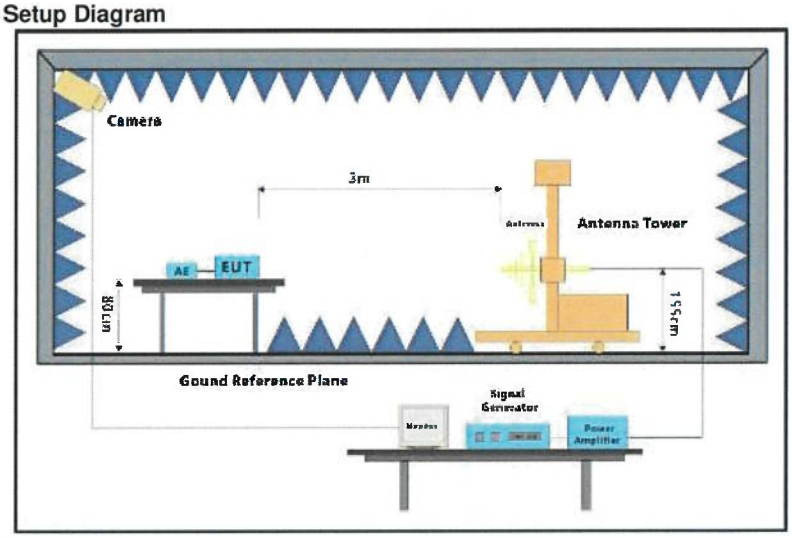
7.6 Radiated Immunity (80MHz-1GHz,1800MHz,2600MHz,3500MHz,5000MHz)

Test Requirement:	EN 55035:2017
Test Method:	EN 61000-4-3:2006 +A1:2008+A2:2010
Performance Criterion:	A
Frequency Range:	80MHz to 1GHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz
Antenna Polarisation:	Vertical and Horizontal
Modulation	1kHz,80% Amp. Mod,1% increment

7.6.1 Test Setup Diagram



7.6.2 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 59 % RH Atmospheric Pressure: 1015 mbar

Test mode: b: Alarm ON mode

c: idel mode with clock, keep the EUT standby.

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7.6.3 Test Results:

Frequency	Level (V/m)	EUT Face	Dwell time	Result / Observations
80MHz-1GHz	3	Front	2s	A
80MHz-1GHz	3	Back	2s	A
80MHz-1GHz	3	Left	2s	A
80MHz-1GHz	3	Right	2s	A
1800MHz	3	Front	2s	A
1800MHz	3	Back	2s	A
1800MHz	3	Left	2s	A
1800MHz	3	Right	2s	A
2600MHz	3	Front	2s	A
2600MHz	3	Back	2s	A
2600MHz	3	Left	2s	A
2600MHz	3	Right	2s	A
3500MHz	3	Front	2s	A
3500MHz	3	Back	2s	A
3500MHz	3	Left	2s	A
3500MHz	3	Right	2s	A
5000MHz	3	Front	2s	A
5000MHz	3	Back	2s	A
5000MHz	3	Left	2s	A
5000MHz	3	Right	2s	A

Results:

A: No degradation in the performance of the EUT was observed.

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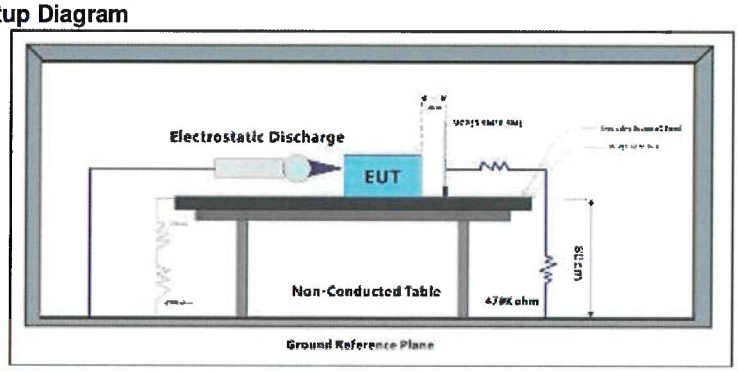
7.7 Electrostatic Discharge

Test Requirement:	EN 61547
Test Method:	EN 61000-4-2
Performance Criterion:	B
Discharge Impedance:	330Ω/150pF
Number of Discharge:	Minimum 10 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

7.7.1 Test Setup Diagram



7.7.2 E.U.T. Operation

Operating Environment:

Temperature: 25.9 °C Humidity: 58 % RH Atmospheric Pressure: 1012 mbar

Test mode: EUT Operation: Test the EUT with light on.

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7.7.3 Test Results:

Observations: Test Point:

1. All insulated enclosure and seams.
2. All accessible metal parts of the enclosure.
3. All side

Discharge type	Level (kV)	Polarity	Test Point	Result / Observations
Air Discharge	8	+	1	A
Air Discharge	8	-	1	A
Contact Discharge	4	+	2	N/A
Contact Discharge	4	-	2	N/A
Horizontal Coupling	4	+	3	A
Horizontal Coupling	4	-	3	A
Vertical Coupling	4	+	3	A
Vertical Coupling	4	-	3	A

Results:

N/A: Not applicable (no such test points or not required by Standard).

A: No degradation in the performance of the EUT was observed.

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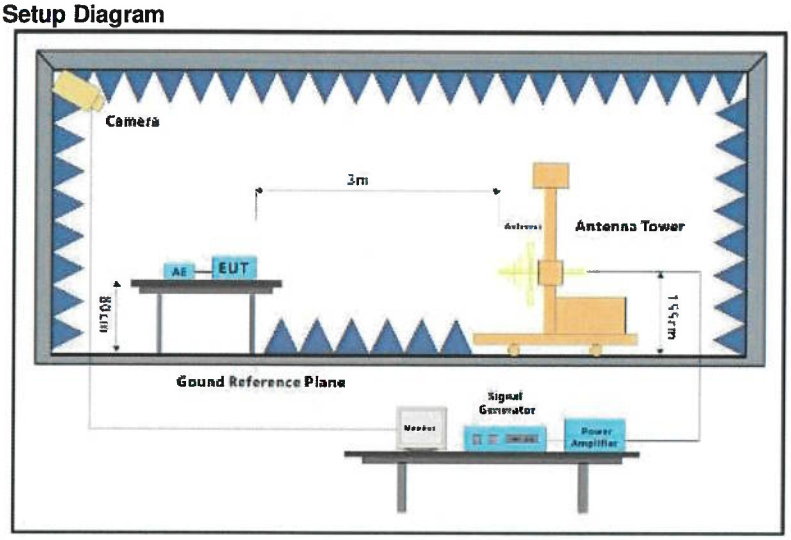
7.8 Radiated Immunity 80 MHz to 1000 MHz

Test Requirement:	EN 61547
Test Method:	EN 61000-4-3
Performance Criterion:	A
Frequency Range:	80MHz to 1GHz
Antenna Polarisation:	Vertical and Horizontal
Modulation	1kHz,80% Amp. Mod,1% increment

7.8.1 Test Setup Diagram



7.8.2 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 59 % RH Atmospheric Pressure: 1015 mbar

Test mode: EUT Operation: Test the EUT with light on.

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7.8.3 Test Results:

Frequency	Level	Modulation	Antenna Polarization	EUT Face	Result / Observations
80 MHz-1 GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment	V	Front	A
			H		A
			V	Rear	A
			H		A
			V	Left	A
			H		A
			V	Right	A
			H		A

Remarks:

Front: The front of the EUT faces to transmitting antenna (refer to Radiated Immunity test setup photo)

A: No degradation in the performance of the E.U.T. was observed.

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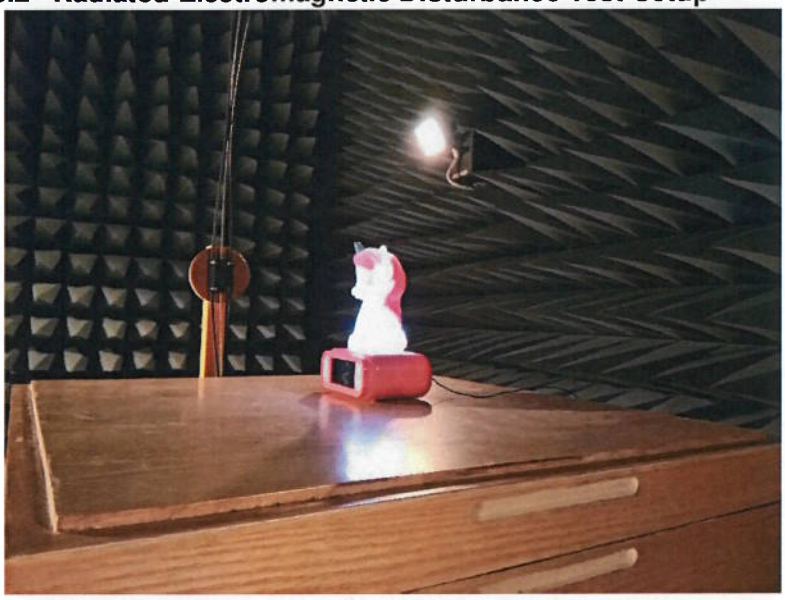
8 Photographs

8.1 Radiated Emissions & Radiated Disturbance Test Setup

8.2 Radiated Electromagnetic Disturbance Test Setup



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8.3 Electrostatic Discharge Test Setup

8.4 Radiated Immunity Test Setup

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8.5 EUT Constructional Details (EUT Photos)

- End of the Report -

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