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**PERFORMANCE SPECIFICATION**  
**FOR LOW POWER RADIO MICROPHONES,**  
**INCLUDING ASSOCIATED RECEIVING**  
**EQUIPMENT**



## FOREWORD

1. This specification is prescribed under section 32D of the Telecommunications Ordinance (Cap 106) (“the Ordinance”) to set out the technical and evaluation requirements for low power radio microphones and associated receiving equipment. Radiocommunications apparatus falling into the scope of this specification shall meet the stipulated requirements.
2. Under the Ordinance, the possession or use of any radiocommunications apparatus or any apparatus emitting radio frequency energy must be covered by an appropriate licence issued by the Communications Authority (CA) with the exception of those specifically exempted from licensing under the Ordinance, such as those covered by the Telecommunications (Telecommunications Apparatus)(Exemption from Licensing) Order.
3. At present, the Office of the Communications Authority (OFCA) operates a Hong Kong Telecommunications Equipment Evaluation and Certification (HKTEC) Scheme. Details of the HKTEC Scheme can be found in the information note OFCA I 421. Under the Scheme, suppliers or manufacturers of the radiocommunications apparatus may apply for certification of their apparatus against this specification. The application procedures for certification of radiocommunications apparatus can be found in the information note OFCA I 401.
4. The CA may amend any part of this specification as and when it deems necessary.
5. In case of doubt about the interpretation of this specification, the methods of carrying out the test and the validity of statements made by the equipment manufacturers or suppliers about the equipment, the decision of the CA shall be final.
6. The HKCA specifications and information notes are issued by the CA can be obtained from OFCA’s website at <http://www.ofca.gov.hk>. Enquiries about this specification may be directed to:

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## AMENDMENT HISTORY

Item	Issue No.	Paragraph	Descriptions
1.	Issue 3 February 2003	Foreword	Add information of HKTEC Scheme and other editorial changes.
2.	Issue 4 November 2013	2	Add reference to ETSI EN 300 422-1 and US FCC CFR 47 Section 74.861(d) and (e) for equipment using analogue and digital modulation
3.	Issue 4 November 2013	3	Add reference to ETSI EN 300 422-2 and US FCC CFR 47 Section 74.861(d) and (e) for equipment compliance requirements
4.	Issue 4 November 2013	4	Re-number of original test requirements for equipment using analogue modulation

## CONTENTS

- 1 GENERAL
  - 1.1 Scope of specification
  - 1.2 Licensee's responsibility
  - 1.3 Operating frequencies
  - 1.4 Labelling
  - 1.5 Controls
  - 1.6 Declarations by the manufacturer
  
- 2 TECHNICAL REQUIREMENTS
  
- 3 EVALUATION REQUIREMENTS
  
- 4. ALTERNATIVE TEST METHODS AND LIMITS FOR EQUIPMENT USING ANALOGUE MODULATION
  - 4.1 Test conditions: Atmospheric conditions and power supplies
    - 4.1.1 General
    - 4.1.2 Test power source
    - 4.1.3 Normal test conditions
    - 4.1.4 Normal test modulation
  
  - 4.2 Transmitter
    - 4.2.1 Frequency error
    - 4.2.2 Transmitter output power
    - 4.2.3 Maximum permissible frequency deviation
    - 4.2.4 Spurious emissions
  
  - 4.3 Receiver
    - 4.3.1 Receiver spurious emissions
  
  - 4.4 Accuracy of measurement

# **1 GENERAL**

## **1.1 Scope of specification**

This specification covers the minimum performance requirements for low power radio microphones. It covers equipment for both narrow-band and wide-band systems including the associated receiving equipment. In this specification, the term integral antenna shall be taken to mean an antenna connected to the equipment without the use of an external connector.

## **1.2 Licensee's responsibility**

The use of this equipment is subject to the issue of a licence by the Communications Authority. Under the conditions of the licence, it will be the responsibility of the licensee to ensure that the equipment provided conforms with and is maintained to the requirements of this specification.

## **1.3 Operating frequencies**

The equipment shall provide for transmission and reception of analogue modulation or digital modulation emissions on any frequency in the band allocated for radio microphones. The precise operating frequency will be stipulated by the Authority when a licence is issued. For the purpose of type testing, the equipment may be submitted operating on any one channel in the specified frequency band.

## **1.4 Labelling**

The equipment shall be provided with a clear indication of the type number and description under which it is submitted for type testing. Each type number shall be unique and in the event that the Authority finds two manufacturers have used a similar type number, the latecomer manufacturer will be asked to change the type number.

## **1.5 Controls**

Those controls, which if maladjusted might increase the interfering potentialities of the equipment, shall not be easily accessible.

## **1.6 Declarations by the manufacturer**

When submitting an equipment for type testing, the manufacturer shall supply the following information :-

1. Transmitter
  - a. nominal frequency
  - b. crystal frequency and carrier generation formula
  - c. crystal type
  - d. the effective radiated power of the carrier frequency
2. Receiver
  - a. nominal frequency
  - b. crystal frequency and local oscillator generation formula
  - c. value of resistive load into which audio output can be delivered
3. Power supplies
  - a. normal supply voltages
  - b. type(s) of batteries
  - c. battery and point voltage when applicable

## **2. TECHNICAL REQUIREMENTS**

- 2.1 The equipment shall have a transmitter output not exceeding 20 mW and meet the technical requirements in one of the following specifications:
  - a. ETSI EN 300 422-1 “Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 1 : Technical characteristics and methods of measurement” OR
  - b. Code of Federal Regulations (USA), Title 47 Telecommunication, Chapter 1 Federal Communications Commission, Part 74 Experimental Radio, Auxiliary, Special Broadcast and other Program Distributional Services; Subpart H Low Power Auxiliary Stations; Section 74.861(d) and (e).

### **3. EVALUATION REQUIREMENTS**

3.1 The equipment shall be evaluated either

- a. ETSI EN 300 422-2 “Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 2 : Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive”; OR
- b. Code of Federal Regulations (USA), Title 47 Telecommunication, Chapter 1 Federal Communications Commission, Part 74 Experimental Radio, Auxiliary, Special Broadcast and other Program Distributional Services; Subpart H Low Power Auxiliary Stations; Section 74.861(d) and (e); OR
- c. the test methods and limits as given in Section 4 below.

### **4. ALTERNATIVE TEST METHODS AND LIMITS FOR EQUIPMENT USING ANALOGUE MODULATION**

#### **4.1 Test conditions : Atmospheric conditions and power supply**

##### 4.1.1 General

Tests shall be made under normal test conditions (Clause 4.1.3).

##### 4.1.2 Test power source

During type approval tests the power supply for the equipment may be replaced by a test power source capable of producing normal test source voltages as specified in Clauses 4.1.3.2. The power source voltage shall be maintained within a tolerance of  $\pm 3\%$  relative to the voltage at the beginning of each test.

##### 4.1.3 Normal test conditions

###### 4.1.3.1 Normal temperature and humidity

The normal temperature and humidity conditions for tests shall be any convenient combination of temperature and humidity within the following ranges :

- |    |                   |              |
|----|-------------------|--------------|
| 1. | Temperature       | 15°C to 35°C |
| 2. | Relative humidity | 10% to 80%   |

NOTE : When it is impracticable to carry out the tests under the conditions stated above, a note to this effect stating the actual temperature and relative humidity during the tests, shall be added to the test report.

#### 4.1.3.2 Normal test source voltage

##### 4.1.3.2.1 Mains voltage

The normal test source voltage for equipment to be connected to the mains shall be the nominal mains voltage for which the equipment was designed. The frequency of the test power source corresponding to the AC mains shall be  $50 \pm 1$  Hz.

##### 4.1.3.2.2 Other power sources

For operation from other power sources or types of battery, either primary or secondary, the normal test source voltage shall be that declared by the equipment manufacturer.

#### 4.1.4 Normal test modulation

Normal test modulation shall be a sinusoidal signal of frequency 1 kHz with the level adjusted to produced 30% of the maximum permissible frequency deviation (Clause 4.2.4).

## **4.2 Transmitter**

### 4.2.1 Frequency error

#### 4.2.1.1 Definition

The frequency error of the transmitter is the difference between the measured carrier frequency and its nominal value.

#### 4.2.1.2 Method of measurement

1. The transmitter output shall be connected to a test load equal to the impedance for which the transmitter was designed.
2. In the case of equipment with an integral antenna, use may be made of a test fixture (radiation coupling device). In this case the test load is connected to the output terminals of the test fixture.
3. The emission shall be monitored by a frequency counter, and the carrier frequency measured, if possible, in the absence of modulation.
4. The measurement shall be made under normal test conditions (Clause 4.1.3).



#### 4.2.1.3 Limits

The frequency error shall not exceed the values of  $\pm 50$  kHz.

#### 4.2.2 Transmitter output power

##### 4.2.2.1 Definition

For equipment with transmitter output terminals, the transmitter output power is the value of the power of an unmodulated carrier at the output terminals. For equipment with integral antenna, it is the maximum value of the effective radiated power (e.r.p.) of the unmodulated carrier.

The rated output power is the maximum value of the transmitter output power declared by the manufacturer, at which all the requirements of this specification are met.

##### 4.2.2.2 Method of measurement - power level (for transmitter with output terminals)

1. The transmitter output shall be connected to a test load equal to the impedance for which the transmitter was designed.
2. With the transmitter operating without modulation, according to the manufacturer's instructions, the power delivered to the test load shall be measured.

##### 4.2.2.3 Method of measurement - effective radiated power (for transmitter with integral antenna)

1. On a suitable radiation test site, the transmitter shall be placed on a non-conducting support, capable of rotation through  $360^\circ$  in the horizontal plane, at 1.5 metres above the ground. The transmitter shall be orientated for maximum vertically polarised radiation.
2. For equipment with rigid external antenna, the antenna shall be vertical. For equipment with non-rigid external antenna, the antenna shall be extended vertically by a non-conducting support.
3. The test antenna shall be oriented for vertical polarization and shall be raised or lowered through the specified height range until a maximum signal level is detected on the test receiver.
4. The radiation from the transmitter shall be detected by a receiver and test antenna at a distance of at least equal to 2 wavelengths of the operating frequency.

5. The transmitter shall be rotated to obtain the maximum signal at the measuring receiver.
6. The transmitter shall be replaced by a signal generator, operating at the nominal frequency of the transmitter and a substitution antenna of known gain.
7. By a substitution measurement the e.r.p. to give the same signal in the measuring receiver shall be determined.

#### 4.2.2.4 Limits

The transmitter output power of the equipment shall not exceed 20 mW.

#### 4.2.3 Maximum permissible frequency deviation

##### 4.2.3.1 Definition

The frequency deviation is the difference between the instantaneous frequency of the modulated radio frequency signal and the carrier frequency in the absence of modulation. For type approval purposes, only the maximum value of the frequency deviation available in the transmitter will be measured. The maximum permissible frequency deviation is the maximum value of deviation under any conditions of modulation.

##### 4.2.3.2 Method of measurement

1. The transmitter output shall be connected to a test load equal to the impedance for which the transmitter was designed.
2. In the case of equipment with an integral antenna, use may be made of a test fixture (radiation coupling device). In this case the test load is connected to the output terminals of the test fixture.
3. The emission shall be monitored by a modulation meter capable of measuring the peak value of both positive and negative frequency deviation including that due to any harmonics and intermodulation products in the transmitter.
4. The transmitter shall then be modulated by an audio frequency signal which is injected into the microphone input of the transmitter. The signal shall be 20 dB above the level necessary to produce normal test modulation (Clause 4.1.4) and the modulation frequency varied from 50 Hz - 20 kHz.
5. At each test frequency, the peak deviation shall be measured.

##### 4.2.3.3 Limit

At any modulating frequency, the frequency deviation shall not exceed  $\pm 75$  kHz.

#### 4.2.4 Spurious emissions

##### 4.2.4.1 Definition

Spurious emissions are emissions other than those of the carrier and sidebands associated with normal modulation. Such emissions include harmonic, parasitic and intermodulation products.

##### 4.2.4.2 Method of measurement - output power level (for transmitter with output terminals)

1. The transmitter output shall be connected to a test load and the emission monitored by a spectrum analyser.
2. At each frequency at which a spurious emission is observed, the level relative to the carrier level shall be recorded.

##### 4.2.4.3 Method of measurement - effective radiated power (for transmitter with integral antenna)

1. On a suitable radiation test site, the transmitter shall be arranged as described in Clause 4.2.2.3.
2. The radiation from the transmitter shall be detected by a receiver and vertically polarized test antenna at a distance of at least equal to 2 wavelengths of the operating frequency.
3. At each frequency at which a spurious emission is observed, the transmitter shall be rotated to obtain the maximum signal at the test receiver.
4. The transmitter shall be replaced by a signal generator and a substitution antenna of known gain, and, by a substitution method the e.r.p. to give the same signal in the test receiver shall be determined.
5. The measurement shall be repeated with the test antenna in the horizontal polarization plane.

##### 4.2.4.4 Limits

The power of any spurious emission in the frequency band between 30 and 2000 MHz shall not exceed :

1. 80 nW in 87-137 MHz and 470 - 790 MHz
2. 300 nW outside the frequency bands above

### **4.3 Receiver**

#### 4.3.1 Receiver spurious emissions

##### 4.3.1.1 Definition

Spurious emissions from receivers are any emissions present at the input terminals or radiated from the chassis and case of the receiver.

##### 4.3.1.2 Methods of measurement

The methods of measurement shall be described in Clause 4.2.4.3 except that the test sample shall be the receiver.

##### 4.3.1.3 Limit

Any spurious emission from a receiver shall not exceed 20 nW.

### **4.4 Accuracy of measurement**

The tolerance for the measurement of the following parameters shall be as given below :

1. DC voltage	± 3%
2. AC mains voltage	± 3%
3. AC mains frequency	± 0.5%
4. Audio-frequency voltage, power, etc.	± 0.5 dB
5. Audio frequency	± 1%
6. Distortion and noise etc. of audio frequency generators	1%
7. Radio frequency	± 50 Hz
8. Radio-frequency voltage	± 2 dB
9. Radio-frequency field strength	± 3 dB
10. Radio-frequency carrier power (erp)	± 2 dB
11. Impedance of artificial loads, combining units, cables, plugs, attenuators, etc.	± 5%
12. Source impedance of generators and input impedance of measuring receivers	± 10%
13. Attenuation of attenuators	± 0.5 dB
14. Temperature	± 1°C
15. Humidity	± 5%

**- END -**