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PERFORMANCE SPECIFICATION
FOR CORDLESS TELEPHONE
OPERATING IN THE 46MHz AND 49MHz BANDS



TELECOMMUNICATIONS AUTHORITY
HONG KONG

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 cordless telephone operating in the 46 MHz and 49 MHz bands, as covered by the Telecommunications (Telecommunications Apparatus)(Exemption from Licensing) Order (“the Order”).
2. Under section 39 of the Ordinance, a person is exempted from the obligation to hold a licence under the Ordinance so long as the conditions set out in the Order are satisfied. Radiocommunications apparatus falling into the scope of this specification shall meet the requirements stipulated to fulfil the conditions of the Order.
3. At present, the Office of the Telecommunications Authority (OFTA) operates a **Hong Kong Telecommunications Equipment Evaluation and Certification (HKTEC) Scheme**. Details of the HKTEC Scheme can be found in the information note OFTA 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 OFTA I 401. A prescribed label may be affixed to the certified equipment. Details of the labelling arrangement can be found in the Standardisation Guide HKTA 3211.
4. In addition to this specification, radiocommunications apparatus capable of being used for connection as customer premises equipment (CPE) to the public telecommunications networks (PTNs) in Hong Kong should comply with the relevant network connection specification(s) issued by the TA. Manufacturers or suppliers may also apply for a separate certification to verify conformity of the apparatus with the relevant specification(s) before it is connected to the PTNs. Details concerning the application procedure for certification of CPE can be found in the information note OFTA I 412.
5. Cordless telephones operating in the 46 MHz and 49 MHz bands are required to operate on a “no-interference no-protection” basis, i.e. they may not cause radio interference and cannot claim protection from interference. Manufacturers or suppliers of such cordless telephones are advised to consider the potentiality of interference due to the shared use of the frequencies.
6. The TA may amend any part of this specification as and when he deems necessary.
7. 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 TA shall be final.

8. The HKTA specifications and information notes issued by the TA can be downloaded from OFTA's website at <http://www.ofta.gov.hk>. Enquiries about this specification may be directed to:

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AMENDMENT TABLE

Item	Issue No.	Paragraph	Descriptions
1.	Issue 2	Title	Re-title document from "Performance Specification for Radio Equipment Operating in the Bands 46 MHz and 49 MHz for Cordless Telephone Service" to "Performance Specification for Cordless Telephone Operating in the 46 MHz and 49 MHz Bands"
2.	Issue 2	Foreword	Add information of HKTEC Scheme and other editorial changes
3.	Issue 2	Body	Replace the term "handset / handset unit" by "portable unit"; Amend Clause 1.1 on "Scope of Specification"; Amend Clause 1.7 on "Electrical Safety Requirements"; and Amend Clause 1.2 by extending the number of frequency channels from 10 to 25.
4.	Issue 3	Body	Re-structure the contents with regard to the measurement method such that reference to FCC Part 15 is added and the domestic measurement method is moved to Annex 1.
5.	Issue 3	Annex 1 Clause 3.2.2	Amend the range of height variation of measuring antenna.

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1. GENERAL

1.1 SCOPE OF SPECIFICATION

This specification covers the minimum performance requirements for cordless telephone operating in the 46/49 MHz bands. The requirements apply to both the portable unit and the base unit of the cordless telephone.

1.2 OPERATING FREQUENCIES

The cordless telephone shall operate on any one or more of the following pairs of radio frequencies for duplex transmission between the base unit and the portable unit:-

Base Unit Transmit Frequencies (MHz)	Handset Unit Transmit Frequencies (MHz)
43.720	48.760
43.740	48.840
43.820	48.860
43.840	48.920
43.920	49.020
43.960	49.080
44.120	49.100
44.160	49.160
44.180	49.200
44.200	49.240
44.320	49.280
44.360	49.360
44.400	49.400
44.460	49.460
44.480	49.500
46.610	49.670
46.630	49.845
46.670	49.860
46.710	49.770
46.730	49.875
46.770	49.830
46.830	49.890
46.870	49.930
46.930	49.990
46.970	49.970

The equipment shall not contain facilities for transmission of more than one pair of the above frequencies at the same time and transmission of radio frequencies other than those listed above.

1.3 PROTECTION AGAINST UNINTENTIONAL ACCESS

The cordless telephone shall incorporate circuitry which makes use of a digital security code to provide access protection from the portable unit to the base unit and vice versa. When the portable unit is switched on, it shall transmit the code to the base unit which will respond and give access to the telephone line only if the code matches with the base unit. Similarly, ringing of the portable unit shall occur only if the code transmitted by the base unit matches the code set in the portable unit. There must be provision for at least 256 possible discrete digital codes.

1.4 ANTENNA REQUIREMENTS

The cordless telephone shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the equipment. The use of a standard antenna jack or electrical connector is prohibited.

1.5 TYPE NUMBER

The brand name and type number of the cordless telephone shall be clearly indicated on the casing of the portable unit and the base unit. Each type number shall be unique. The manufacturer who first submits to use a type number will have the priority to use that type number.

1.6 CONTROLS

Controls, which if maladjusted might increase the interfering potentialities of the equipment, shall not be made accessible to the end user.

1.7 ELECTRICAL SAFETY REQUIREMENTS

The equipment shall comply with the electrical safety requirements set out in HKTA 2001, Compliance Test Specification Safety and Electrical Protection Requirements for Subscriber Telecommunications Equipment, issued by the Telecommunications Authority (TA).

1.8 DECLARATIONS BY THE MANUFACTURER

When submitting an equipment for type testing, the following information shall be supplied :-

- a. Transmitters
 - i. crystal frequency and carrier generation formula or, technique of frequency generation
 - ii. crystal type where applicable
- b. Receivers
 - i. crystal frequency and local oscillator generation formula
 - ii. crystal type
- c. Power supply
 - i. nominal supply voltage
 - ii. type of battery where applicable
 - iii. battery end point voltage where applicable

For equipment which employs modulation limiter, a family of curves showing the percentage of modulation versus the modulation input voltage shall also be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

2. TECHNICAL REQUIREMENTS

(a) Output level

Electric field strength not to exceed 10 mV/m at 3 m from the apparatus

(b) Spurious emission level

frequency range	limits on spurious emission level
1.705 - 30.0 MHz	electric field strength not to exceed 30 μ V/m at 30 m from the apparatus
30 - 88 MHz	electric field strength not to exceed 100 μ V/m at 3 m from the apparatus
88 - 216 MHz	electric field strength not to exceed 150 μ V/m at 3 m from the apparatus
216 - 960 MHz	electric field strength not to exceed 200 μ V/m at 3 m from the apparatus
above 960 MHz	electric field strength not to exceed 500 μ V/m at 3 m from the apparatus

3. METHOD OF MEASUREMENT

The method of measurement for the equipment shall be in accordance with one of the following:

(a) FCC 47 CFR Part 15

Code of Federal Regulations (USA); Title 47 Telecommunication; Chapter 1 Federal Communications Commission, Part 15 Radio Frequency Devices

(b) Measurement method described in Annex 1 (applicable only up to 31 Dec 2010)

ANNEX 1

DOMESTIC MEASUREMENT METHOD FOR EQUIPMENT

1. INTRODUCTION

This Annex describes the domestic measurement method (applicable only up to 31 Dec 2010) for the equipment. In this Annex, the referred clause numbers, unless otherwise indicated, refer to those in this Annex.

2. TEST CONDITIONS

2.1. GENERAL

Tests shall be made under normal test conditions (Clause 2.3) and also, where stated, under extreme test conditions (Clause 2.4).

2.2. TEST POWER SOURCE

1. During tests, the power supply for the equipment may be replaced by a test power source, capable of producing normal and extreme test voltages as specified in Clauses 2.3.2 and 2.4.2 and also capable of being reduced continuously over the range from the normal equipment operating voltage to zero voltage to simulate a power supply failure.
2. The internal impedance of the test power source shall be low enough for its effects on the test results to be negligible.
3. For the purposes of tests, the supply voltage shall be measured at the input terminals of the equipment.
4. If the equipment is provided with a permanently connected power cable, the test voltage shall be measured at the point of connection of the power cable to the equipment.
5. During the tests the power source voltage shall be maintained within a tolerance of $\pm 3\%$ relative to the voltage at the beginning of each test.
6. In equipment in which batteries are incorporated, the test power source shall be applied as close to the battery terminals as practicable.

2.3. NORMAL TEST CONDITIONS

2.3.1. *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 :

Temperature	15°C to 35°C
Relative humidity	10% to 80%

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.

2.3.2. *Normal test source voltage*

2.3.2.1 Mains voltage

The normal test source voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of this specification, the nominal voltage shall be the declared voltage or any of the declared voltages for which the equipment was designed. The frequency of the test power source corresponding to the AC mains shall be between 49 and 51 Hz.

2.3.2.2 Nickel cadmium battery

When the equipment is intended for operation from the usual type of nickel cadmium battery the normal test voltage shall be the nominal voltage of the battery (1.2 V per cell).

2.3.2.3 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.

2.4. EXTREME TEST CONDITIONS

2.4.1 *Extreme temperatures*

For tests at extreme temperatures, measurements shall be made in accordance with the procedures specified in Clause 2.5 at an upper value of 40°C and at a lower value of 0°C.

2.4.2 *Extreme test source voltages*

2.4.2.1 Mains voltage

The extreme test source voltages for equipment to be connected to an AC mains source shall be the nominal mains voltage $\pm 10\%$. The frequency of the test power source shall be between 49 and 51 Hz.

2.4.2.2 Nickel cadmium battery

When the equipment is intended for operation from the usual type of nickel cadmium battery, the extreme test voltages shall be 1.25 and 0.85 times the nominal voltage of the battery.

2.4.2.3 Other power sources

The lower extreme test voltage for equipment with power sources using primary batteries shall be as follows :

- a. for Leclanche type of battery - 0.85 times the nominal voltage
- b. for mercury type of battery - 0.9 times the nominal voltage
- c. for other types of primary battery - end point voltage declared by the equipment manufacturer.

For equipment using other power sources, or capable of being operated from a variety of power sources, the extreme test voltages shall be those declared by the equipment manufacturers and shall be recorded with the test results.

2.5. PROCEDURE FOR TESTS AT EXTREME TEMPERATURES

2.5.1. *General*

Before making measurements, the equipment shall be placed in a temperature controlled chamber for a period of one hour or for such period as may be judged necessary for thermal balance to be obtained. The equipment shall be switched off during the temperature stabilisation period. The sequence of tests shall be chosen and the humidity content in the test chamber shall be controlled so that excessive condensation does not occur.

2.5.2. *Test procedure*

For tests at the upper temperature, after thermal balance has been attained (Clause 2.5.1) the equipment shall be switched on in the transmit condition for half an hour, after which the appropriate tests shall be carried out. For tests at the lower temperature, after thermal balance has been attained (Clause 2.5.1) the equipment shall be switched on for one minute, after which the appropriate tests shall be carried out.

3. ELECTRICAL TEST CONDITIONS

3.1. TEST FIXTURE

1. A test fixture will be required to permit relative measurements to be made on the sample.
2. Any connections provided on the equipment in order to facilitate relative measurements, shall not affect the performance of the equipment either in the test fixture or when making measurements involving the use of radiated fields.
3. This test fixture shall provide input audio coupling and a means of connecting an external power supply.
4. Over the radio frequency measurement range, the following characteristics shall apply to the test fixture :
 - a. the coupling loss shall be as low as possible, and not greater than 30 dB;
 - b. the variation of coupling loss shall not cause errors in measurement exceeding 2 dB;
 - c. the coupling device shall not incorporate any non-linear elements.

3.2. TEST SITE AND GENERAL ARRANGEMENTS FOR MEASUREMENTS INVOLVING THE USE OF RADIATED FIELDS

3.2.1. *Test site*

The test site shall be located on a surface or ground which is reasonably level. On this site, a ground plane of at least 5 metres diameter shall be provided. In the middle of this ground plane, a non-conducting support, capable of rotation through 360° in the horizontal plane, shall be used to support the test sample at 1.5 metres above the ground plane. The test site shall be large enough to allow the erection of a measuring or transmitting antenna at a distance from the test sample of not less than half the wavelength corresponding to the lower frequency to be considered. The distance actually used shall be recorded with the results of the tests carried out on the

site. Sufficient precautions shall be taken to ensure that reflections from extraneous objects adjacent to the site and ground reflections do not degrade the measurements.

3.2.2. *Measuring antenna*

The measuring antenna is used to detect the radiation from the test sample. It shall be a $\lambda/2$ dipole resonant at the frequency under consideration, or a shortened dipole, calibrated against the $\lambda/2$ dipole. This antenna is mounted on a support capable of allowing the antenna to be used either horizontally or vertically polarised and for the height of its centre above ground to be varied over the range 1 to 4 metres. For field strength measurement, the antenna is connected to a measuring receiver, capable of being tuned to any frequency under investigation and of measuring accurately the levels of signals at its input.

3.2.3. *Determination of field strength in direction of maximum radiation*

The device under test shall be rotated to determine the field strength in the direction of maximum radiation. This shall be done at a selected frequency or frequencies. If there is evidence that the direction of maximum field strength changes markedly with frequency, the direction of maximum field strength shall be redetermined at each new frequency. The highest value measured shall be taken as the level of the radiation. The height of measuring aerial shall be adjusted for maximum indication for each test frequency.

3.3. NORMAL TEST MODULATION

Where stated, the transmitter shall have normal test modulation as follows :

- a. transmitters with a device to limit modulation or peak envelope shall be modulated by a 2500 Hz tone at an input level of 16 dB greater than that necessary to produce 50 % modulation.
- b. transmitters without a device to limit modulation or peak envelope power shall be modulated by a 2500 Hz tone of sufficient level to produce at least 85 % modulation. If 85 % modulation is unattainable, the highest percentage modulation shall be used.

To facilitate the application of audio frequency input signals to the equipment, the manufacturer shall provide temporary electrical connections.

3.4. MEASUREMENT DETECTOR FUNCTIONS AND BANDWIDTHS

The radiated emission limits shown in this specification are based on the following, unless otherwise specified elsewhere in this specification :

- a. On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified.
- b. On any frequency or frequencies above 1000 MHz, the limits are based on the use of measurement instrumentation employing an average detector function. When the average radiated emission measurements are specified in this specification, including emission measurements below 1000 MHz, there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated.

4. TRANSMITTER TEST

4.1 FREQUENCY ERROR

The frequency tolerance of the carrier signal shall be maintained within ± 0.01 % of the operating frequency. The measurement shall be made under normal test conditions (Clause 2.3) and repeated under extreme conditions (Clause 2.4.1 and Clause 2.4.2 applied simultaneously).

4.2 FUNDAMENTAL EMISSION

The field strength of the fundamental emission shall not exceed 10,000 microvolts/meter at 3 meters as stipulated in clause 2(a) of the main specification. The emission limit is based on measurement instrumentation employing an average detector.

4.3 OUT-OF-BAND EMISSION

The fundamental emission shall be confined within a 20 kHz centred on the actual carrier frequency, as adjusted by the frequency tolerance of the transmitter at the time testing is performed. Modulation products outside this 20 kHz band shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the limit specified in clause 2(b) of the main specification, whichever permits the higher emission levels. Emissions on any frequency more than 10 kHz removed from this 20 kHz band shall consist solely unwanted emissions and shall not exceed the general field strength limit as specified in clause 2(b) of the main specification. Tests to determine compliance with this requirement shall be performed using the normal test modulation as prescribed in Clause 3.3.

5. RECEIVER TEST

5.1 RECEIVER SPURIOUS EMISSIONS

Spurious radiation from receivers are any radiation from an integral antenna or the chassis and case of the receiver. The receiver spurious emissions shall not exceed the general emission limit as specified in clause 2(b) of the main specification.

6. ACCURACY OF MEASUREMENT

The tolerance for the measurement of the following parameters shall be as follows :-

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 | $\pm 10 \%$ |
| 13. | Attenuation of attenuators | $\pm 0.5 \text{ dB}$ |
| 14. | Temperature | $\pm 1 \text{ }^\circ\text{C}$ |
| 15. | Humidity | $\pm 5 \%$ |

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