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PERFORMANCE SPECIFICATION

FOR CORDLESS TELEPHONE

OPERATING IN THE 864.1 TO 868.1 MHz BAND

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 864.1 to 868.1 MHz band, 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 **H**ong **K**ong **T**elecommunications Equipment **E**valuation and **C**ertification (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 to OFTA 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 equipment which has been certified by the Telecommunications Authority (TA). 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 by the TA 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 by the TA can be found in the information note OFTA I 412.

5. Cordless telephones operating in the 864.1 to 868.1 MHz band 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 reserves the right to give separate certification to models he considers to be technical variants and the performance of which may differ between models.

7. The TA may amend any part of this specification as and when he deems necessary.

8. 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.

9. The HKTA specifications and information notes are issued by the TA. The documents can be obtained through one of the following methods :-

- downloading direct through the OFTA's Internet Home Page. The Home Page address is http://www.ofta.gov.hk;
- making a request for hard copies to :-

  Radio Laboratory, Standards Section
  Office of the Telecommunications Authority,
  29/F Wu Chung House,
  213 Queen's Road East, Wanchai, Hong Kong.

  Fax : +852 2343 5824
  Email : radiolab@ofta.gov.hk

10. Enquiries about this specification may be directed to :-

  Radio Laboratory, Standards Section,
  Office of the Telecommunications Authority,
  29/F Wu Chung House,
  213 Queen's Road East, Wanchai, Hong Kong.

  Fax : +852 2343 5824
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AMENDMENT TABLE

Item	Issue No.	Paragraph	Descriptions
1.	Issue 4	Title	Re-title document from "Performance Specification for Radio Equipment Operating in the Band 864.1 to 868.1 MHz for Cordless Telephone Service" to "Performance Specification for Cordless Telephone Operating in the 864.1 to 868.1 MHz Band"
2.	Issue 4	Foreword	Add information of HKTEC Scheme and other editorial changes
3.	Issue 4	Body	Replace the term "handportable part / unit" by "portable part / unit" and the term "fixed part" by "fixed part or base unit". Amend Clause 1.1 on "Scope of Specification". Add a new Clause 1.10 on "Electrical Safety Requirements".

CONTENTS

1 GENERAL

1.1 SCOPE OF SPECIFICATION

This specification covers the minimum performance requirements for cordless telephone operating in the 864.1 to 868.1 MHz band. The requirements apply to both portable unit and base unit of the cordless telephone.

1.2 OPERATING FREQUENCIES

The channel carrier frequencies shall be 864.05+(0.1x **n**) MHz where **n** is 1-40.

The small carrier frequency shall be used for transmission in both directions between the fixed and portable parts. Dynamic channel allocation shall be used.

1.3 ANTENNAS

The antenna for the portable part shall be permanently attached. It shall not be possible to easily detach, substitute or adapt the antenna provided by the manufacturer.

Antennas for the fixed part or base unit may be remotely located.

1.4 TYPE NUMBER

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. The manufacturer first submits to use a type number will have the priority to use that type number.

1.5 CONTROLS

Those controls, which if maladjusted might increase the interfering potentialities of the equipment, shall not be easily accessible, in particular any control which may cause the equipment to operate outside the permitted frequency limits specified on the type approval certificate.

1.6 DECLARATIONS BY THE MANUFACTURER

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

(a) Transmitter
- oscillator frequency and carrier generation formula or, the technique of frequency generator

(b) Receivers
- oscillator frequency and local oscillator generation formula

(c) Power supply
- nominal supply voltage
- type of battery where applicable
- battery end point voltage where applicable

1.7 TRANSMITTER MODULATION

The equipment presented for type approval shall be set up such that, when the radio frequency link between the fixed and portable parts is established, the modulation of the transmitter is representative of normal active use.

1.8 SYNTHESIZERS AND PLL SYSTEMS

Where synthesizers and/or phase locked loop (PLL) systems are utilised for carrier generation, precautions shall be taken to ensure that any lack of synchronisation does not cause deviation outside the permitted frequency limits.

1.9 POWER SUPPLY UNITS

The fixed and portable parts shall be operated with their appropriate power supply units which shall be submitted with the equipment at the time of type approval. Means for connecting an external power supply to portable equipment shall be provided.

1.10 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 Equipment Connected to the Public Telecommunications Networks in Hong Kong" issued by the Telecommunications Authority (TA).

2 TEST CONDITIONS, POWER SOURCES AND AMBIENT TEMPERATURES

2.1 NORMAL AND EXTREME TEST CONDITIONS

Type approval tests shall be made under normal test conditions, and also, where stated, under extreme test conditions.

The test conditions and procedures shall be as specified in Clauses 2.2 to 2.5.

2.2 TEST POWER SOURCE

During the approval tests the power source of the equipment shall 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. The internal impedance of the test power source shall be low enough for its effect on the test results to be negligible. For the purpose of tests, the voltage of the power source shall be measured at the input terminals of the equipment.

If the equipment is provided with a permanently connected power cable, the test voltage shall be that measured at the point of connection of the power cable to the equipment.

In equipment with incorporated batteries the test power source shall be applied as close to the battery terminals as practicable.

During test, the power source voltages shall be maintained within a tolerance of ±3% relative to the voltage at the beginning of each test.

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 %

It should be noted that when it is impracticable to carry out the tests under these conditions, a statement giving the actual temperature and relative humidity during the tests, shall be added to the test report.

2.3.2 Normal test power source

2.3.2.1 Mains voltage

The normal test 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 voltage or voltages for which the equipment was designed as declared by the manufacturer. The frequency of the test power source corresponding to the AC mains shall be between 49 and 51 Hz.

2.3.2.2 Regulated lead acid battery power sources

When the radio equipment is intended for operation from the usual type of regulated lead acid battery source, the normal test source voltage shall be 1.1 times the nominal voltage of the battery (6 volts, 12 volts etc.).

2.3.2.3 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 (1.2v per cell).

2.3.2.4 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 ± 10%. The frequency of the test power source shall be between 49 Hz and 51 Hz.

2.4.2.2 Regulated lead acid battery power sources

When the equipment is intended for operation from the usual type of regulated lead acid power source, the extreme test voltages shall be 1.3 and 0.9 times the nominal voltage of the battery.

2.4.2.3 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.

2.4.2.4 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 other types of primary battery - the 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, or designed for operation within extreme voltage limits not in accordance with those quoted above the extreme test voltages shall be those agreed between the equipment manufacturer and the Authority and shall be recorded with the test results.

2.5 PROCEDURE FOR TESTS AT EXTREME TEMPERATURES

2.5.1 Test procedure

Before measurements are made the equipment shall have reached thermal balance in the test chamber. The equipment shall be switched off during the temperature stabilising period. If the thermal balance is not checked by measurements, a temperature stabilising period of at least one hour, or such period as may be decided by the Authority, shall be allowed. The sequence of measurements shall be chosen, and the humidity content in test chamber shall be controlled, so that excessive condensation does not occur.

2.5.1.1 Procedure for equipment designed for continuous operation

If the manufacturer states that the equipment is designed for continuous operation, the test procedure shall be as follows :-

Before tests at the upper temperature, the equipment shall be placed in the test chamber and left until thermal balance is attained. The equipment shall then be

switched on in the idle condition for a period of half an hour after which the equipment shall meet the specified requirements.

For test at the lower temperature, the equipment shall be left in the test chamber until thermal balance is attained, then switched to the standby or receive condition for a period of one minute after which the equipment shall meet the specified requirements.

2.5.1.2 Procedure for equipment designed for intermittent operation

If the manufacturer states that the equipment is designed for intermittent operation, the test procedure shall be as follows :

Before tests at the upper temperature the equipment shall be placed in the test chamber and left until thermal balance is attained. The equipment shall then be switched on for four minutes in the idle condition, after which the equipment shall meet the specified requirements.

For tests at the lower temperature, the equipment shall be left in the test chamber until thermal balance is attained, then switched on for one minute in the idle condition which the equipment shall meet the specified requirements.

3 ELECTRICAL TEST CONDITIONS

3.1 ARRANGEMENT FOR SIGNALS TO BE APPLIED TO THE FIXED AND PORTABLE RECEIVERS

The cordless telephone equipment utilizes radio frequency link control protocols involving the transmission of a handshake code between the fixed and portable parts to maintain the radio frequency communication link. The British Standard (BS 6833) relevant to cordless telephone apparatus contains a requirement for the radio frequency link to cease operation if a time greater than 10 s has elapsed without a successful handshake taking place.

In order to carry out the radio frequency tests contained in this specification it is necessary to arrange for transmission of the relevant handshake code to be maintained for the duration of the tests. This handshake shall be obtained by coupling the fixed or portable part under test to its associated portable or fixed part or base unit such that reliable handshaking is established. If the equipment is fitted with dynamic radio frequency output power control it should operate at its maximum power.

In the case of equipment with an integral antenna, the required level of coupling shall be achieved by, placing the associated fixed part or base unit (with if necessary an antenna connected) or portable part, at a distance such as to produce the signal

required for link establishment. In the case of equipment with antenna terminals, or when an equipment with an integral antenna is being tested in the test fixture, a radio frequency coupling network shall apply the correct signal level.

Care should be taken to ensure that the coupling method employed causes the minimum effect on the test results.

3.2 ARTIFICIAL ANTENNA

Tests on the transmitter shall be carried out with a substantially non-reactive non-radiating 50 Ω load connected to the terminals, or in the case of equipment with integral antenna, to the test fixture terminal.

3.3 TEST FIXTURE FOR INTEGRAL ANTENNA

In the case of equipment intended for use with an integral antenna, the manufacturer shall supply a test fixture suitable to allow relative measurements to be made on the submitted sample.

This test fixture shall provide a 50 Ω radio frequency terminal at the working frequencies of the equipment.

The test fixture shall provide means of making external connection to at least the radio frequency input and output and of replacing the power source by external power supply.

The performance characteristics of this text fixture under normal and extreme conditions will be subject to the approval of the Authority.

The characteristics of interest to the Authority will be that :

(a) the coupling loss shall not be excessive, that is, not greater than 20 dB;

(b) the variation of coupling loss with frequency shall not cause errors exceeding 2dB in measurements using the test fixture;

(c) the coupling device shall not include any non-linear elements.

The Authority may provide its own test fixture.

3.4 TEST SITE AND GENERAL ARRANGEMENT FOR MEASUREMENTS INVOLVING THE USE OF RADIATED FIELDS

3.4.1 Test site

The test site shall be on a reasonably level surface or ground.

At one point on the site, a ground plane of at least 5 m 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 1.5m above the ground plane. The test site shall be large enough to allow the erection of a measuring or transmitting antenna at a distance of $\lambda/2$ or 3m whichever is the greater. 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 measurement results.

3.4.2 Test antenna

When the site is used for radiation measurements the test antenna shall be used to detect the radiation from both the test sample and the substitution antenna.

This antenna shall be mounted on a support such as to allow the antennas to be used in either horizontal or vertical polarisation and for the height of its centre above ground to be varied over the range 1 to 4 m. Preferably, test antennas with pronounced directivity should be used. The size of the test antenna along the measurement axis shall not exceed 20% of the measuring distance.

The test antenna shall be connected to a test receiver, capable of being tuned to any frequency under investigation and of measuring accurately the relative levels of signals at its input.

3.4.3 Substitution antenna

The substitution antenna shall be a $\lambda/2$ dipole, resonant at the frequency under consideration, or a shortened dipole, calibrated to the $\lambda/2$ dipole. The centre of this antenna shall coincide with the reference point of the test sample it has replaced. This reference point shall be the volume centre of the sample when its antenna is mounted inside the cabinet, or the point where an external antenna is connected to the cabinet.

The distance between the lower extremity of the dipole and the ground shall be at least 0.3 m.

The substitution antenna shall be connected to a calibrated signal generator.

The signal generator and the receiver shall be operated at the frequencies under investigation and shall be connected to the antenna through suitable matching and balancing network.

3.4.4 Optional alternative indoor site

When the frequency of the signals being measured is greater than 80 MHz, use may be made of an indoor site. If this alternative site is used, this shall be recorded in the test report.

The measurement site may be a laboratory room with a minimum area of 6m by 7m and at least 2.7 m in height.

Apart from the measuring apparatus and the operator, the room shall be as free as possible from reflecting objects other than the walls, floor and ceiling.

The site arrangement is shown in principle in Figure 1.

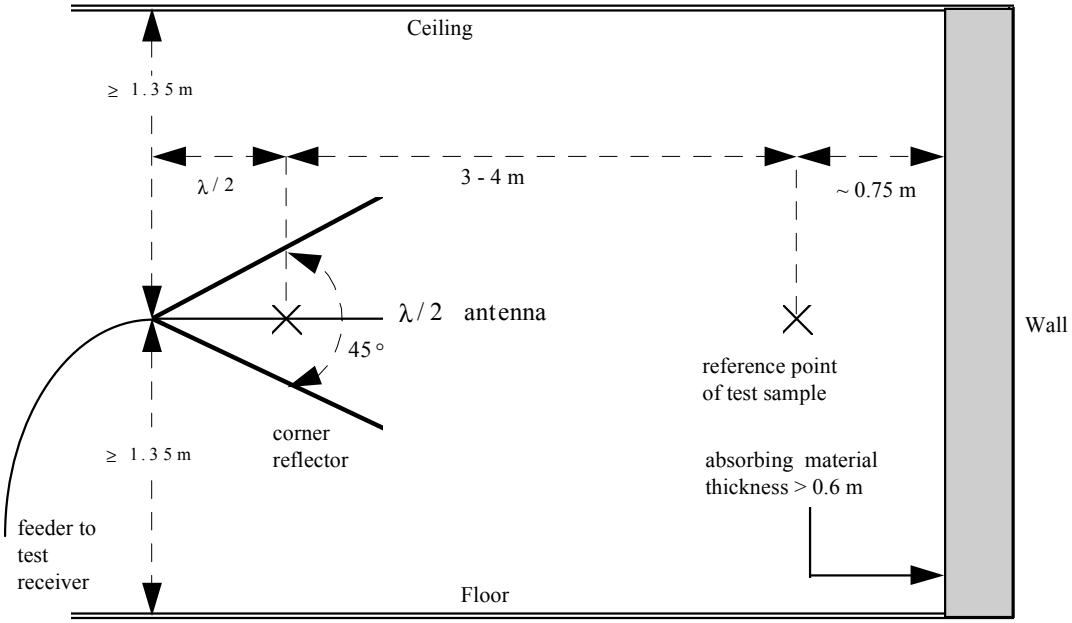

Figure 1 : Indoor site arrangement (shown in horizontal polarization)

The potential reflections from the wall behind the equipment under test are reduced by placing a barrier of absorbent material in front of it. The corner reflector around the test antenna is used to reduce the effect of reflections from the opposite wall and from the floor and ceiling in the case of horizontally polarised measurements.

Similarly, the corner reflector reduces the effects of reflections from the side walls for vertically polarised measurements.

For the lower part of the frequency range (below approximately 175 MHz) no corner reflector or absorbent barrier is needed.

For practical reasons, the λ/2 antenna in Fig. 1 may be replaced by an antenna of constant length, provided that this length is between λ/4 and at the frequency of measurement and the sensitivity of the measuring system is sufficient. In the same way the distance of λ/2 to the apex may be varied.

The test antenna, test receiver, substitution antenna and calibrated signal generator are used in a way similar to that of the general method.

To ensure that errors are not caused by the propagation path approaching the point at which phase cancellation between direct and the remaining reflected signals occurs, the substitution antenna shall be moved through a distance of ± 10 cm in the direction of the test antenna as well as in the two directions perpendicular to this first direction. If these changes of distance cause a signal change of greater that 2 dB, the test sample should be resited until a change of less than 2 dB is obtained.

3.5 TRANSCEIVER TEST FACILITY

The manufacturer shall supply facilities to enable control of those functions of the equipment which are associated with the parameters measured in this specification.

Adequate operating instructions relevant to the equipment submitted for the test shall be provided.

Control of switching between the normal active mode (at maximum rated transmitter power) and the idle mode shall be [provided.

Connections shall be provided to enable external access to the equipment power supply.

The manufacturer shall ensure that the control and connection facilities provided do not have a significant effect on the measured results.

4 TRANSMITTER

4.1 TRANSMITTER CARRIER POWER

4.1.1 Definition

The transmitter carrier power is the mean power delivered to the artificial antenna during a radio frequency cycle or, in the case of equipment with integral antenna, the effective radiated power in the direction of maximum field strength under specified conditions of measurement (Clause 3.4) if possible in the absence of modulation. The rated output power is the carrier power declared by the manufacturer.

4.1.2 Method of measurement for equipment with an antenna connection

The handshake code between the fixed and portable parts is established as described in (Clause 3.1).

The transmitter shall be connected to an artificial antenna (Clause 3.2), and the power delivered to this artificial antenna shall be measured.

The mean power measured shall be multiplied by 2 to obtain the carrier power.

The measurements shall be made under normal test conditions (Clause 2.3) and extreme test conditions (Clauses 2.4.1 and 2.4.2 applied simultaneously).

4.1.3 Method of measurements for equipment with an integral antenna

4.1.3.1 Method of measurement under normal test conditions

On a test site, fulfilling the requirements of Clause 3.4.1 the sample shall be placed on the support in the following position :

(a) for equipment with an internal antenna it shall stand so that the axis, of the equipment which in its normal use is closest to the vertical, shall be vertical;

(b) for equipment with a rigid external antenna, the antenna shall be vertical;

(c) for equipment with non-rigid external antenna, the antenna shall be extended vertically upwards by a non-conducting support.

The handshake code between the fixed and portable parts is established as described in Clause 3.1. The test receiver shall be tuned to the frequency of the signal being measured.

The test antenna shall be oriented for vertical polarisation and shall be raised or lowered through the specified height range until a maximum signal level is detected on the test receiver. The transmitter shall be rotated through 360 ° until the maximum signal is received.

It should be noted that the maximum may be a lower value than the value obtainable at heights outside the specified limits.

The transmitter shall be replaced by the substitution antenna, as defined in Clause 3.4.3 and the test antenna raised or lowered as necessary to ensure that the maximum signal is still received. The input signal to the substitution antenna shall be adjusted in level until an equal or a known related level to that detected from the transmitter is obtained in the test receiver.

The carrier power is equal to the power supplied to substitution antenna, increased by the known relationship if necessary.

The measurement shall be repeated for any alternative antenna supplied by the manufacturer.

A check should be made at other planes of polarisation to ensure that the value obtained above is the maximum. If larger values are obtained, this fact should be recorded in the test report.

4.1.3.2 Method of measurement under extreme test conditions

The equipment shall be placed in the test fixture (Clause 3.3). The handshake code between the fixed portable parts is established as described in Clause 3.1. The power delivered to the artificial antenna shall be measured. The measurements shall be made under normal test conditions (Clause 2.3) and extreme test conditions (Clauses 2.4.1 and 2.4.2 applied simultaneously).

The mean power measured shall be multiplied by 2 to obtain the carrier power.

4.1.4 Limits

The carrier output power or effective radiated power under normal test conditions and under extreme test conditions shall not exceed 10 mW.

4.2 ADJACENT CHANNEL POWER (NARROWBAND MEASUREMENT)

4.2.1 Definition

The adjacent channel power is that part of the total power output of a transmitter under defined conditions of modulation, which falls within a specified passband centred on the nominal frequency of either of the adjacent channels. This power is the sum of the mean power produced by the modulation, hum and noise of the transmitter.

Adjacent channel power for the purpose of this specification will be deemed to include performance of the transmitter under extreme test conditions.

4.2.2 Method of measurement

The adjacent channel power shall be measured with a spectrum analyser which conforms to Clause 4.2.3.

Equipment with an antenna terminal shall have the terminal connected to a spectrum analyser by a coupling device which provides the appropriate input level to the spectrum analyser. Equipment with an integral antenna shall be placed in the test fixture (Clause 3.3) and the radio frequency output of the test fixture shall be applied to the spectrum analyser at the appropriate input level. The handshake code between the fixed and portable parts is established as described in Clause 3.1. The transmitter shall be operated at the measured carrier power (Clause 4.1) under normal test

conditions (Clause 2.3) such as to produce a modulated output representative of normal active use (Clause 1.7).

The spectrum analyser shall be adjusted so that the spectrum of the transmitter output, including that part which falls in the adjacent channels, is displayed.

For the purpose of this test the integration bandwidth used in this measurement shall be 80 kHz with a tolerance of ±5%.

The centre frequency of the bandwidth within which measurements are to be made shall have a 100 kHz separation from the nominal carrier frequency of the transmitter.

The adjacent channel power is the sum of the power levels of each of the discrete components and of the noise falling in the appropriate bandwidth.

The sum may be automatically calculated by the spectrum analyser, or an automatic power level integrating device may be used to obtain it (see Clause 4.2.4).

In the latter case, the relative power level of the modulated transmitter is initially measured by integration over the appropriate bandwidth, centred on the nominal frequency. The measurement is repeated with this bandwidth centred on the nominal frequency of the adjacent channel and the input level to the integrating device is increased until the same power level at the output of the device is obtained.

The difference between the input levels, in dB, gives the ratio of the adjacent channel power to the carrier power.

The adjacent channel power, expressed as an effective radiated power, is calculated by applying this ratio to the carrier power as determined in Clause 4.1

The measurement shall be repeated for the other adjacent channel.

4.2.3 Characteristics of the spectrum analyser

Characteristics of the spectrum analsyer shall meet at least the following requirements :

It shall be possible to measure the amplitude of a signal or noise at a level 3 dB or more above the noise level of the spectrum analyser, as displayed on the screen, to an accuracy of ±2 dB in the presence of a signal separated in frequency by 10 kHz at a level 90 dB above that of the signal to be measured.

The reading accuracy of the frequency marker shall be within ± 2 kHz.

The accuracy of relative amplitude measurements shall be within ±1 dB.

It shall be possible to adjust the spectrum analyser to allow the separation on its screen of two components with a frequency difference of 1 kHz.

The video bandwidth should be relatively low e.g. 1 kHz.

4.2.4 Integrating and power summing' device

This device would only be used if the sum of the components and the noise has not been calculated automatically. It is connected to the video output of the spectrum analyser, described in Clause 4.2.3. It shall be possible to sum the effective power of all discrete components and the noise power falling in the selected bandwidth and to measure this as a ratio relative to the carrier power.

The position and the width of the integration range selected can be indicated on the spectrum analyser by brightening the trace.

When measuring power levels as low as 50 nW, the output of the device should exceed the integral noise level by at least 10 dB.

The measurement shall be repeated under extreme conditions (Clauses 2.4.1 and 2.4.2 applied simultaneously).

4.2.5 Limits

The adjacent channel power under either normal or extreme test conditions shall not exceed 10 μW when integrated within a bandwidth of 80 kHz ± 5%.

4.3 OUT OF BAND POWER ARISING FROM TRANSMITTER TRANSIENTS

4.3.1 Definition

The out-of-band power arising from transmitter transients is the peak power of the modulation products, arising from the rapid switching on and off of the transmitter, which fall within a defined frequency band either side of the nominal frequency.

4.3.2 Method of measurement

If the transmitter is equipped with an antenna terminal it shall be connected to a spectrum analyser by a coupling device which provides the appropriate input level to the spectrum analsyer. If the transmitter is equipped with an integral antenna it shall be placed in the test fixture (Clause 3.3) and the radio frequency output of the test fixture applied to the spectrum analyser at the appropriate input level.

The handshake code between the fixed and portable parts is established as described in Clause 3.1. The transmitter shall be operated at the measured carried power (Clause 4.1) under normal conditions (Clause 2.3) such as to produce a modulated output representative of normal active use (Clause 1.7).

The spectrum analyser shall be adjusted so that the spectrum of the transmitter output, including the part which falls in the bands 0.5 MHz either side of the nominal frequent is displayed.

4.3.3 Characteristics of the spectrum analyser

Characteristics of the spectrum analyser shall meet at least the following requirements.

The spectrum analyser shall be suitable for making measurements on signals resulting from switching transients.

The spectrum analyser shall be provided with a 4 pole synchronously tuned intermediate frequency filter.

The spectrum analyser shall be operated in the peak hold mode.

There solution bandwidth shall be set to 10 kHz and the video bandwidth to 3 MHz.

The levels displayed on the spectrum analyser at frequencies 100 kHz and 0.5 MHz above and below the nominal signal frequency shall be recorded.

4.3.4 Limits

The power level of any modulation products at a frequency separated by 100 kHz from the nominal frequency shall not exceed 2.5 μW and those by 0.5 MHz from the nominal frequency shall not exceed 1 nW.

4.4 INTERMODULATION ATTENUATION

This requirement applies to transmitter/receivers to be contained (nested) in a single enclosure or a single unit containing two or more transmitters/receivers which are not separable.

4.4.1 Definition

For the purpose of this specification the intermodulation attenuation is a measure of the capability of a transmitter to inhibit the generation of signals in its non-linear elements caused by the presence of the carrier and an interfering signal.

4.4.2 Method of measurement

Two transmitters/receivers of the type which will be contained (nested) in a single enclosure shall be operated in the enclosure immediately adjacent to each other/ Where the transmitter/receivers are equipped with antenna terminals, these shall be connected to the antenna combining system and the antenna which will be employed with the commercial product.

On a test site, fulfilling the requirements of Clause 3.4 the sample shall be placed on the support in the following position :

(a) For equipment with an internal antenna, it shall stand so that the axis of the equipment which is in its normal use is closest to vertical shall be vertical.

(b) For equipment with a rigid external antenna, the antenna shall be vertical.

(c) For equipment with a non-rigid external antenna, the antenna shall be extended vertically upwards by a non-conduction support.

The handshake codes for the two systems is established as described in Clause 3.1.

The transmitters shall be operated at the power levels measured under Clause 4.1.

Radiation of any third order intermodulation products shall be detected by the test antenna and a spectrum analyser with a resolution bandwidth of 10 kHz and a video bandwidth of 30 kHz.

At the frequencies at which products are detected, the equipment under test shall be rotated to obtain the maximum response, and the effective radiated power of that product determined by a substitution measurement.

The measurement shall be repeated with the test antenna in the orthogonal polarisation plane.

4.4.3 Limit

The effective radiated power of the products measured in a 10 kHz bandwidth shall not exceed 4 nW.

4.5 PREVENTION OF MISOPERATION DUE TO ADVERSE POWER SUPPLY CONDITIONS

4.5.1 Definition

For the purpose of this specification misoperation shall be defined as the generation of emissions outside the specified limits due to a reduction of power supply voltages.

4.5.2 Method of measurement

(a) The transmitter/receiver under test shall be placed in the test fixture or connected to a suitable artificial load. The handshake code between the fixed and portable parts is established as described in Clause 3.1. The emission shall be monitored on a spectrum analyser.

(b) The radiated spectrum shall be monitored whilst the supply voltage (AC or DC) shall be slowly reduced from the normal value to zero at the rate recommended by the equipment manufacturer.

(c) The levels of adjacent channel power and spurious emissions shall be measured and recorded.

4.5.3 Limits

The adjacent channel power and spurious emission limits laid down in the relevant clauses for the various parameters shall not be exceeded.

NOTES :

1. If a back up power supply is provided in the base unit (i.e. a replaced by a variable DC power supply).

2. Any non-repetitive transient condition (of duration less than 50ms) shall be ignored.

5. SPURIOUS EMISSIONS

5.1 SPURIOUS EMISSIONS OF THE COMBINED TRANSMITTER/RECEIVER

5.1.1 Definition

Spurious emissions are emissions at frequencies other than those of the carrier and sidebands associated with normal modulation.

The level of spurious emissions shall be measured as :

(a) their power level in a transmission line or antenna and

(b) their effective radiated power when radiated by the cabinet and structure of the equipment. This is also known as “cabinet radiation”.

For equipment which can only be used with an integral antenna, only the measurement mentioned under (b) applies.

5.1.2 Method of measuring the power level (a)

Spurious emissions shall be measured as the power level of any discrete signal delivered into a 50Ω load. This may be done by connecting the transmitter/receiver output through an attenuator to a spectrum analyser with a resolution bandwidth of 10 kHz and a video bandwidth of 30 kHz or by monitoring the relative levels of the spurious signals delivered to an artificial antenna (Clause 3.2).

The handshake code between the fixed and portable parts is established as described in Clause 3.1. The measurements shall be made over the frequency range 100 kHz to 4 GHz, except for the channel on which the transmitter/receiver is operating and its adjacent channels.

The measurement shall be repeated with the transmitter/receiver in the idle mode.

5.1.3 Method of measuring the effective radiated power (b)

On a test site, fulfilling the requirements of Clause 3.4, the sample shall be placed at the specified height on a non-conducting support. The handshake code between the fixed and portable parts is established as described in Clause 3.1.

The transmitter/receiver shall be operated with the carrier power delivered to an artificial antenna (Clause 3.2), except in the case of testing equipment with an integral antenna.

Radiation of any spurious components shall be detected by the test antenna and a spectrum analyser with a resolution bandwidth of 10 kHz and a video bandwidth of 30 kHz over the frequency range 25 MHz to 4 GHz, except for the channel on which the transmitter is intended to operate and its adjacent channels.

At each frequency at which a component is detected, the sample shall be rotated to obtain the maximum response and the effective radiated power of that component determined by a substitution measurement.

The measurement shall be repeated with the test antenna in the orthogonal polarisation plane.

The measurements shall be repeated with the transmitter in the idle mode.

5.1.4 Limits

The power of any spurious emission in the specified range of frequencies when the equipment is in the active mode, shall not exceed the value of 4 nW in the frequency bands :

41	to 68	MHz
87.5	to 118	MHz
162	to 230	MHz
470	to 862	MHz

and shall not exceed a value of 250 nW on other frequencies below 1 GHz.

On frequencies above 1 GHz the power of any spurious emission shall not exceed a value of 1 μW.

The power of any spurious emission in the specified range of frequencies, when the equipment is inthe idle mode, shall not exceed 0.2 nW in the range 864.1 MHz to 868.1 MHz (when measured in a 1 kHz bandwidth), 2 nW in the range 100 kHz to 1 GHz and 20 nW in the range 1 GHz to 4 GHz.

6 COMMON AIR INTERFACE

The cordless telephone apparatus shall meet the Common Air Interface Specification given in Specification No. MPT 1375 issued by the Department of Trade and Industry, United Kingdom.

7 ACCURACY OF MEASUREMENT

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

(a)	DC voltage	± 3%
(b)	AC mains voltage	± 3%
(c)	AC mains frequency	± 0.5%
(d)	Audio frequency voltage, power etc.	± 0.5dB
(e)	Audio frequency	± 1%
(f)	Distortion and noise etc. of audio frequency generators	± 1%
(g)	Radio frequency	± 50Hz
(h)	Radio frequency voltage	± 2dB
(i)	Radio frequency field strength	± 3dB
(j)	Radio frequency carrier power	± 2dB
(k)	Impedance of artificial loads, combing units, cables, plugs, attenuators etc.	± 10%
(l)	Source impedance of generators and input impedance of measuring receivers	± 0.5dB
(m)	Attenuation of attenuators	± 0.5dB
(n)	Temperature	± 1° C
(o)	Relative humidity	± 5%

- END -