



Technical Specification

for

Cordless Telephones

and

Cordless Telecommunication Systems

IDA TS CT-CTS

Issue 1 Rev 1, April 2006

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| <p style="text-align: center;">NOTICE</p> |
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| <p style="text-align: center;">This Specification is subject to review and revision.</p> |
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1 General Requirements

1.1 Scope of Specification

1.1.1 This Specification defines the minimum technical requirements for operating cordless telephones and cordless telecommunication systems (generally termed "cordless systems"). These cordless systems are intended for in-building or localised on-site operations, providing communications in radius of a few hundred metres. Applications are market segment dependent (residential or business). This Specification applies to common applications of the cordless systems such as cordless telephony (analogue or digital cordless telephones) and cordless PABX (digital cordless systems e.g. DECT and PHS). Other applications may include cordless local area networks and local loop replacement.

1.1.2 Cordless Telephony (Residential)

1.1.2.1 Cordless telephony is an application of cordless system in its basic form, comprising two parts:

- (a) a fixed part (base station), which is connected to a PSTN line; and
- (b) a portable set (mobile handset unit).

1.1.2.2 Each part shall use multi-channel access techniques and individually perform the following operations:

- (a) search for idle channels;
- (b) set up speech paths using the selected channel;
- (c) check identification codes in the signals between the fixed part and the portable set in order to ensure that only associated units will lock to each other.

1.1.2.3 Digital cordless systems which support cordless telephony, DECT systems for instance, may have more advanced features such as connection to 2 PSTN lines, use of 2 or 4 portable sets, intercom facility via the base station and call transfer between handset units.

1.1.3 Cordless PABX

1.1.3.1 In addition to basic cordless telephony, cordless PABX are single cell or multi-cell systems intended to serve small or large businesses for cordless extensions and on-premises communications networks.

1.1.3.2 This Specification has included the technical requirements for operating two types of digital cordless systems, namely DECT and PHS, which support the cordless PABX application.

1.2 Design of Cordless Systems

Cordless systems (cordless telephones and cordless telecommunication systems) shall be designed to meet the following basic objectives:

- (a) The cordless system shall use the radio frequency spectrum efficiently with multi-channel access techniques to conserve the frequency spectrum.
- (b) Where the fixed part of the cordless system is connected to PSTN or ISDN, in addition to complying with the applicable technical requirements defined in §2 of this Specification, it shall comply with the requirements for connection to PSTN or ISDN. The cordless system shall comply with the IDA TS PSTN, TS ISDN-BA or TS ISDN-PRA, whichever is applicable.
- (c) The cordless system shall provide normal telephone features, including the use of alphanumeric keypads for dialling with letters and digits in relationships complying with ITU-T Recommendation E.161 as shown in the figure below.

| | | | |
|------|----------|------|--|
| 1 | 2 | 3 | |
| | ABC | DEF | |
| 4 | <u>5</u> | 3 | |
| GHI | JKL | MNO | |
| 7 | 8 | 9 | |
| PQRS | TUV | WXYZ | |
| * | 0 | # | |

Note:

The associated letters must not impair the legibility of the digit (§ 3.1.1, ITU-T Rec. E.161).

The tactile identifier on the "5" button shall be provided (§ 3.6, ITU-T Rec. E.161).

Alphanumeric Keypad Layout (§ 7.3/ITU-T Rec. E.161)

- (d) The cordless system is intended for operating in unprotected and shared frequency bands. Its operation shall not cause interference with other authorised radio-communication services, and be able to tolerate any interference caused by other radio-communication services, electrical or electronic equipment.
- (e) The cordless system shall not be constructed with any external or readily accessible control which permits the adjustment of its operation in a manner that is inconsistent with this Specification.
- (f) The cordless system shall be marked with the supplier/manufacturer's name or identification mark, and the supplier/manufacturer's model or type reference. The markings shall be legible, indelible and readily visible.

1.3 Abbreviations

| | |
|-------|---|
| ADPCM | Adaptive Differential Pulse Code Modulation |
| CVSDM | Continuously Variable Slope Delta Modulation |
| DECT | Digital Enhanced Cordless Telecommunications |
| ETSI | European Telecommunications Standards Institute |
| FDD | Frequency Division Duplexing |
| FDMA | Frequency Division Multiple Access |
| GFSK | Gaussian Frequency Shift Keying |
| ISDN | Integrated Services Digital Network |
| PABX | Private Automatic Branch Exchange |
| PHS | Personal Handy phone System |
| PSTN | Public Switched Telephone Network |
| QPSK | Quadrature Phase Shift Keying |
| RF | Radio Frequency |
| TDD | Time Division Duplex |
| TDMA | Time Division Multiple Access |

2 Technical Requirements

2.1 Analogue Cordless Telephones

The analogue cordless telephone shall comply with the characteristics given in Table 1 of this Specification, operating in its intended frequency band. It shall fulfil the requirements of this Specification on all the permitted frequencies and channels which it is intended to operate.

| Table 1: Characteristics of Analogue Cordless Telephones | | | |
|--|---|--------------------------------|--------------------------------|
| Class of emission | F3E or G3E | | |
| Multiple access scheme | FDMA | | |
| Duplex type | FDD | | |
| Transmit frequency band (MHz) – fixed part – portable set | 1.605 – 1.800 49.67 – 49.97 | 43.72 – 46.97 48.76 – 49.97 | 821 – 822 924 – 925 |
| Transmitted output power (dB μ V/m at 3 m) – fixed part – portable set | ≤ 94 ≤ 90 | ≤ 90 ≤ 90 | ≤ 90 ≤ 90 |
| Frequency stability/tolerance – fixed part – portable set | $\pm 0.1\%$ $\pm 0.01\%$ | $\pm 0.01\%$ $\pm 0.01\%$ | $\pm 0.001\%$ $\pm 0.001\%$ |
| Number of speech channels | 10 | 25 | 40 |
| Operating frequencies and channel selection | Refer to Annex A of this Specification. | | |
| Radio frequency channel spacing | Fundamental emission shall be confined within 20 kHz centred on the actual carrier frequency. | | |
| Spurious emissions | Any emissions, including harmonics on any frequency outside the occupied bandwidth, shall be at least 32 dB below the level of the unmodulated carrier. | | |
| Identification code | There shall be provisions for at least 256 possible discrete digital codes [FCC Part 15.214 (d)]. | | |

2.2 Digital Cordless Systems

2.2.1 DECT

The DECT cordless system shall comply with the characteristics given in Table 2 of this Specification and the DECT common interface requirements given in ETSI EN 300 175-1 to 300 175-8, operating in its authorised frequency band. It shall be capable of communicating on all the 10 DECT RF channels and fulfil the requirements of this Specification on all the permitted frequencies and channels which it is intended to operate.

2.2.2 PHS

The PHS cordless system shall comply with the characteristics given in Table 2 of this Specification and the PHS common air interface standards given in RCR STD-28 V4.1, operating in its authorised frequency band. It shall be capable of and limited to communicating on the PHS channels 1 to 12 and fulfil the requirements of this Specification on all the permitted frequencies and channels which it is intended to operate.

| Table 2: Characteristics of Digital Cordless Systems | | |
|--|---|--|
| Digital Cordless System | DECT (ETSI) | PHS (Japan) |
| Class of emission | F1W and F7W | G1W and G7W |
| Multiple access scheme | Multi-carrier TDMA | Multi-carrier TDMA |
| Duplex type | TDD | TDD |
| Authorised frequency band (MHz) | 1881.792 – 1897.344 (10 RF Carriers) | 1895.00 – 1898.75 (Channel 1 to 12) |
| Radio frequency channel spacing (kHz) | 1728 | 300 |
| Gross bit rate per carrier (kbit/s) | 1152 | 192 – 3200 |
| Number of speech channels | 12 (per carrier) | 4 (per carrier) |
| Transmission power, mW EIRP – portable set – fixed part | Peak power over time-slot ≤ 250 ≤ 250 | ≤ 20 (personal station) ≤ 20 (cell and relay station, see Note 2) |
| Typical service range (m) – indoor – outdoor (See Note 1) | 30 200 | 50 200 |
| Voice signals – type of modulation – processing | GFSK ADPCM or CVSDM | π/4 QPSK ADPCM |
| Identification code | > 10 ⁷ combinations | > 10 ⁸ combinations |
| <p>Note 1: Outdoor, non-localised or inter-building operation of cordless systems is subject to IDA's licensing. IDA may grant exemption of licensing to inter-building operation of cordless systems if they are located within the same premise i.e. the buildings and areas in between the buildings belong to the same owner.</p> <p>Note 2: Transmission power for public cell stations is ≤ 4 W EIRP, subject to IDA's approval.</p> | | |

3 Testing for Compliance with Technical Requirements

- 3.1 For analogue cordless telephone, the supplier shall demonstrate that the cordless telephone has been tested¹ to comply with the applicable technical requirements stipulated in §2.1 of this Specification, following test methods given in FCC Part 15 Rules for radio frequency devices, § 15.31, § 15.33 and § 15.35.
- 3.2 For DECT cordless system, the supplier shall demonstrate that the system has been tested¹ to comply with the requirements stipulated in §2.2.1 and Table 2 of this Specification, following the test conditions and methods given in ETSI EN 301 406.
- 3.3 For PHS cordless system, the supplier shall demonstrate that the system has been tested¹ to comply with the requirements stipulated in §2.2.2 and Table 2 of this Specification, following measurement methods given in RCR STD-28 V4.1.
- 3.4 The supplier shall also demonstrate that the fixed part (e.g. base station, cell station or relay station), which is directly or indirectly powered by the AC mains, has been tested according to the measurement methods and limits for:
- (a) EMC emissions from the DC power or AC mains power input/output ports defined in IEC CISPR 22; and
 - (b) Electrical safety defined in IEC 60950-1.

¹ IDA accepts test reports from (a) labs recognised by IDA under Mutual Recognition Arrangement (MRA); (b) labs accredited by accreditation bodies recognised by IDA; or (c) equipment manufacturers. The list of testing labs recognised by IDA under MRA is available from IDA's website www.ida.gov.sg, under Policy & Regulation / Telecommunication Equipment Standards & Conformance.

4 References

For the technical requirements captured in this Specification, reference has been made to the following documents:

| | |
|--|--|
| ITU-R M.1033-1 | Technical and Operational Characteristics of Cordless Telephones and Cordless Telecommunication Systems |
| ITU-T Rec. E.161 (02/2001) | Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network |
| FCC Part 15 Subpart A § 15.31 § 15.33 § 15.35 | <u>Radio Frequency Devices</u> <u>General</u> Measurement Standards Frequency Range of Radiated Measurements Measurement Detector Functions and Bandwidths |
| FCC Part 15 Subpart C § 15.214 (d) | <u>Radio Frequency Devices</u> <u>Intentional Radiators</u> Cordless telephones |
| ETSI EN 300 175-1 to EN 300 175-8 | Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 1 to Part 8 |
| ETSI EN 301 406 | Digital Enhanced Cordless Telecommunications (DECT); Harmonised EN for DECT covering essential requirements under article 3.2 of the R&TTE Directive; Generic radio |
| RCR STD – 28 V4.1 | Personal Handy Phone System, ARIB Standard, Japan |
| IEC CISPR 22: 2003-04 | Information Technology Equipment – Radio disturbance characteristics – Limits and methods of measurement |
| IEC 60950-1: 2001-10 | Information Technology Equipment – Safety |
| IDA TS PSTN (Jul 05) | Technical Specification for Terminal Equipment connecting to the Public Switched telephone Network (PSTN) |
| IDA TS ISDN-BA (Jul 05) | Technical Specification for connecting to the Integrated Services Digital Network (ISDN) using Basic Access |
| IDA TS ISDN-PRA (Jul 05) | Technical Specification for connecting to the Integrated Services Digital Network (ISDN) using Primary Rate Access |

Analogue Cordless Telephones

Operating Frequencies and Channel Selection

A.1 1.605 – 1.800 MHz/ 49 MHz

| Channel No. | Transmitter Frequency | |
|-------------|-----------------------|--------------|
| | Base Station | Handset Unit |
| 1 | 1.665 MHz | 49.670 MHz |
| 2 | 1.695 MHz | 49.845 MHz |
| 3 | 1.725 MHz | 49.860 MHz |
| 4 | 1.755 MHz | 49.770 MHz |
| 5 | 1.785 MHz | 49.875 MHz |
| 6 | 1.695 MHz | 49.830 MHz |
| 7 | 1.725 MHz | 49.890 MHz |
| 8 | 1.755 MHz | 49.930 MHz |
| 9 | 1.785 MHz | 49.990 MHz |
| 10 | 1.635 MHz | 49.970 MHz |

A.2 46 MHz/ 49 MHz

| Channel No. | Transmitter Frequency | |
|-------------|-----------------------|--------------|
| | Base Station | Handset Unit |
| 1 | 43.720 MHz | 48.760 MHz |
| 2 | 43.740 MHz | 48.840 MHz |
| 3 | 43.820 MHz | 48.860 MHz |
| 4 | 43.840 MHz | 48.920 MHz |
| 5 | 43.920 MHz | 49.020 MHz |
| 6 | 43.960 MHz | 49.080 MHz |
| 7 | 44.120 MHz | 49.100 MHz |
| 8 | 44.160 MHz | 49.160 MHz |
| 9 | 44.180 MHz | 49.200 MHz |
| 10 | 44.200 MHz | 49.240 MHz |
| 11 | 44.320 MHz | 49.280 MHz |
| 12 | 44.360 MHz | 49.360 MHz |
| 13 | 44.400 MHz | 49.400 MHz |
| 14 | 44.460 MHz | 49.460 MHz |
| 15 | 44.480 MHz | 49.500 MHz |
| 16 | 46.610 MHz | 49.670 MHz |
| 17 | 46.630 MHz | 49.845 MHz |
| 18 | 46.670 MHz | 49.860 MHz |
| 19 | 46.710 MHz | 49.770 MHz |
| 20 | 46.730 MHz | 49.875 MHz |
| 21 | 46.770 MHz | 49.839 MHz |
| 22 | 46.830 MHz | 49.890 MHz |
| 23 | 46.870 MHz | 49.930 MHz |
| 24 | 46.930 MHz | 49.990 MHz |
| 25 | 46.970 MHz | 49.970 MHz |

A.3

821 – 822MHz/ 924 – 925 MHz

| Channel No. | Transmitter Frequency | |
|-------------|-----------------------|--------------|
| | Base Station | Handset Unit |
| 1 | 821.0125 MHz | 924.0125 MHz |
| 2 | 821.0385 MHz | 924.0375 MHz |
| 3 | 821.0625 MHz | 924.0625 MHz |
| 4 | 821.0875 MHz | 924.0875 MHz |
| 5 | 821.1125 MHz | 924.1125 MHz |
| 6 | 821.1375 MHz | 924.1375 MHz |
| 7 | 821.1625 MHz | 924.1625 MHz |
| 8 | 821.1875 MHz | 924.1875 MHz |
| 9 | 821.2125 MHz | 924.2125 MHz |
| 10 | 821.2375 MHz | 924.2375 MHz |
| 11 | 821.2625 MHz | 924.2625 MHz |
| 12 | 821.2875 MHz | 924.2875 MHz |
| 13 | 821.3125 MHz | 924.3125 MHz |
| 14 | 821.3375 MHz | 924.3375 MHz |
| 15 | 821.3625 MHz | 924.3625 MHz |
| 16 | 821.3875 MHz | 924.3875 MHz |
| 17 | 821.4125 MHz | 924.4215 MHz |
| 18 | 821.4375 MHz | 924.4375 MHz |
| 19 | 821.4625 MHz | 924.4625 MHz |
| 20 | 821.4875 MHz | 924.4875 MHz |
| 21 | 821.5125 MHz | 924.5125 MHz |
| 22 | 821.5375 MHz | 924.5375 MHz |
| 23 | 821.5625 MHz | 924.5625 MHz |
| 24 | 821.5875 MHz | 924.5875 MHz |
| 25 | 821.6125 MHz | 924.6125 MHz |
| 26 | 821.6375 MHz | 924.6375 MHz |
| 27 | 821.6625 MHz | 924.6625 MHz |
| 28 | 821.6875 MHz | 924.6875 MHz |
| 29 | 821.7125 MHz | 924.7125 MHz |
| 30 | 821.7375 MHz | 924.7375 MHz |
| 31 | 821.7625 MHz | 924.7625 MHz |
| 32 | 821.7875 MHz | 924.7875 MHz |
| 33 | 821.8125 MHz | 924.8125 MHz |
| 34 | 821.8375 MHz | 924.8375 MHz |
| 35 | 821.8625 MHz | 924.8625 MHz |
| 36 | 821.8875 MHz | 924.8875 MHz |
| 37 | 821.9125 MHz | 924.9125 MHz |
| 38 | 821.9375 MHz | 924.9375 MHz |
| 39 | 821.9625 MHz | 924.9625 MHz |
| 40 | 821.9875 MHz | 924.9875 MHz |

Addendum/Corrigendum

| Changes to IDA TS CT-CTS, Issue 1, Dec 04 | | | |
|--|----------------|--|-----------------------|
| Page | TS Ref. | Items Changed | Effective Date |
| 3 | § 1.1.1 | Editorial change: added "Other applications may include cordless local area networks and local loop replacement." | Apr 06 |
| 4 | § 1.2 | Updated references to the related IDA Technical Specifications: IDA TS PSTN, TS ISDN-BA and TS ISDN-PRA. | Apr 06 |
| 7 | § 2.2 | Updated references to the technical requirements: <ul style="list-style-type: none"> - ETSI EN 300 175-1 to 175-8 and EN 301 406 for DECT; and - RCR STD-28 V4.1 for PHS. Updated the following PHS requirements in Table 2: <ul style="list-style-type: none"> - Bit rate per carrier is 192 – 3200 kbit/s. - Max transmission power for the personal and cell/relay station is 20 mW EIRP (added Note 2 to indicate that the max transmission power for public cell station is 4 W EIRP, subject to IDA's approval). | Apr 06 |
| 8 | § 3 | Updated references to the test methods: ETSI EN 300 406 for DECT and RCR STD-28 V4.1 for PHS. Added requirements for the fixed part to be tested according to IEC CISPR 22 for EMC and IEC 60950-1 for electrical safety. | Apr 06 |

| Changes to IDA TS 1, DECT and PHS | | | |
|--|----------------|--|-----------------------|
| Page | TS Ref. | Items Changed | Effective Date |
| — | — | This Specification supersedes the following IDA Type Approval Specifications: <ol style="list-style-type: none"> a. IDA TS 1 Issue 1 Rev 6 b. IDA TS DECT Issue 1 Rev 6 c. IDA TS PHS V1 Issue 1 Rev 6 d. IDA TS PHS V2 Issue 1 Rev 3 | Dec 04 |
| — | — | Title of Specification has been renamed as "Technical Specification for Cordless Telephones and Cordless Telecommunication Systems" (IDA TS CT-CTS Issue 1). Changes are mainly editorial in nature. There are no changes in the technical requirements except for adding the provision for analogue cordless telephones to operate in the 821/924 MHz frequency band. | Dec 04 |