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AUSTRALIAN STANDARD

AS/CA S043.3:2015

Requirements for Customer Equipment for connection to a metallic local loop interface of a Telecommunications Network — Part 3: DC, low frequency AC and voiceband

Australian STANDARD

Australian Standard – *Requirements for Customer Equipment for connection to a metallic local loop interface of a Telecommunications Network — Part 3: DC, low frequency AC and voiceband*

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FOREWORD

General

This Standard was prepared by Communications Alliance and most recently revised by the *WC58 : VDSL2 and Vectoring* Working Committee. It is one of a series of Telecommunication Standards developed under the Memorandum of Understanding between the Australian Communications Authority (ACA) and the Australian Communications Industry Forum.

Note: On 1 July 2005 the ACA became the Australian Communications and Media Authority (ACMA) and the Memorandum of Understanding continues in effect as if the reference to the ACA were a reference to the ACMA.

Communications Alliance was formed in 2006 and continues the functions previously fulfilled by ACIF.

This Standard is a revision of AS/ACIF S043.3:2001 ***Requirements for Customer Equipment for connection to a metallic local loop interface of a Telecommunications Network — Part 3: DC, low frequency AC and voiceband*** Standard.

This Standard is the result of a consensus among representatives on the Communications Alliance Working Committee to produce it as an Australian Standard.

The requirements in this Standard are consistent with the aims of s376 of the *Telecommunications Act 1997*. Specifically these aims are:

(a) protecting the integrity of a telecommunications network or facility;

(b) protecting the health and safety of persons;

(c) ensuring access to emergency services; and

(d) ensuring interoperability with a standard telephone service.

It should be noted that some Customer Equipment (CE) may also need to comply with requirements in other Standards or other Parts of this Standard.

AS/CA S043 consists of the following parts under the general title ***Requirements for Customer Equipment for connection to a metallic local loop interface of a Telecommunications Network*:**

- Part 1: ***General***
- Part 2: ***Broadband***
- Part 3: ***DC, low frequency AC and voiceband***

The Standard should be read in conjunction with AS/CA S043.1 [6].

Applicable electrical safety Standards and EMC Standards may apply under Commonwealth or State/Territory laws, or both.

Intellectual property rights

Equipment which is manufactured to comply with this Standard may require the use of technology which is protected by patent rights in Australia. Questions

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Standards revision

Australian Standards (AS/CA Standards) developed by the Communications Alliance are updated according to the needs of the industry, by amendments or revision. Users of these Standards should make sure that they possess the latest amendments or editions. Representations concerning the need for a change to this AS/CA Standard should be addressed to:

The Project Manager
Customer Equipment and Cable Reference Panel
Communications Alliance
PO Box 444
Milsons Point NSW 1565

Regulatory notice

This document will be submitted to ACMA, for making as a technical standard under s376 of the *Telecommunications Act 1997*. Until it is made by ACMA compliance with this Standard is voluntary.

The ACMA is a Commonwealth authority with statutory powers to impose requirements concerning telecommunications Customer Equipment and Customer Cabling.

The ACMA requires Australian manufacturers and importers, or their Australian agents, of specified items of Customer Equipment and Customer Cabling to establish compliance with Standards such as this. Items are required to be labelled in accordance with the applicable labelling notices.

Details on current compliance arrangements can be obtained from the ACMA website at http://www.acma.gov.au or by contacting the ACMA below at:

Australian Communications and Media Authority
PO Box 13112
Law Courts PO
Melbourne VIC 8010
Australia

Telephone: +61 3 9963 6800
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Email: info@acma.gov.au

Introduction

This introduction for the AS/CA S043.3 ***Requirements for Customer Equipment for connection to a metallic local loop interface of a Telecommunications Network — Part 3: DC, low frequency AC and voiceband*** Standard is not an authoritative section of this Standard and is only provided as guidance for the user of the Standard to outline its objectives, and the factors that have been taken into account in its development and to list the principal differences between the new and the previous edition.

The reader is directed to the clauses of this Standard for the specific requirements and to the ACMA for the applicable telecommunications labelling and compliance arrangements.

Note: Further information on the telecommunications labelling and compliance arrangements can be found in *The Telecommunications Labelling (Customer Equipment and Customer Cabling) Notice* (the TLN). The TLN can be obtained from the ACMA website at www.acma.gov.au.

The objective of this Standard is to provide the requirements and test methods for customer equipment designed or intended for connection to a Telecommunications Network via a metallic local loop interface and is designed or intended to include one or more of the following:

(i) DC power feeding or signalling.

(ii) Operation in the low frequency AC band, below 300 Hz.

(iii) Operation in the voice frequency band.

(iv) Operation above the voice frequency band up to 20 kHz.

in order to meet the regulatory arrangements for such equipment in Australia.

The objective of this revision is to update to the current template at the same time that revisions were being made to other parts of AS/CA S043.

The principal differences between this edition of AS/CA S043.3 and the previous edition are:

(i) Editorial updates; and

(ii) Update to the current document template for Communications Alliance.

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1 INTERPRETATIVE GUIDELINES

1.1 Categories of requirements

This Standard contains mandatory requirements as well as provisions that are recommendatory only. Mandatory requirements are designated by the words '**shall**' or '**shall not**'. All other provisions are voluntary.

1.2 Compliance statements

Compliance statements, in italics, suggest methodologies for demonstrating CE's compliance with the requirements.

1.3 Definitions, expressions and terms

If there is any conflict between the definitions used in this Standard and the definitions used in the *Telecommunications Act 1997*, the definitions in the Act take precedence.

1.4 Notes

Text denoted as 'Note' is for guidance in interpretation and is shown in smaller size type.

1.5 References

(a) Applicable editions (or versions) of other documents referred to in this Standard are specified in Section 3: REFERENCES.

(b) If a document refers to another document, the other document is a sub-referenced document.

(c) Where the edition (or version) of the sub-referenced document is uniquely identified in the reference document, then that edition (or version) applies.

(d) Where the edition (or version) of the sub-referenced document is not uniquely identified in the reference document, then the applicable edition (or version) is that which is current at the date the reference document is legislated under the applicable regulatory framework, or for a non- legislated document, the date upon which the document is published by the relevant standards organisation.

(e) A number in square brackets '[ ]' refers to a document listed in Section 3: REFERENCES.

1.6 Units and symbols

In this Standard the International System (SI) of units and symbols is used in accordance with Australian Standard AS ISO 1000 [1].

1.7 Parts of Standards

CE scoped by this Standard is to comply with the applicable technology-specific Part(s) of this Standard.

2 SCOPE

2.1 This Standard applies to Customer Equipment (CE) that is designed or intended for connection to:

(a) is designed or intended for connection to a Telecommunications Network via a metallic local loop interface; and

(b) is designed or intended to include one or more of the following capabilities:

i. DC power feeding or signalling.

ii. Operation in the low frequency AC band, below 300 Hz.

iii. Operation in the voice frequency band.

iv. Operation above the voice frequency band up to 20 kHz.

2.2 CE is not excluded from the scope of this Standard by reason only that it is capable of performing functions additional to those described in this Standard.

Note: Requirements for CE designed or intended to interwork with the PSTN for DC loop seizure and clearing, low frequency AC ring signalling, and decadic or DTMF address signalling etc. are defined in AS/CA S002 [3].

3 REFERENCES

	Publication	Title
	Australian Standards	
[1]	AS ISO 1000-1998	The international System of Unit (SI) and its application.
[2]	AS/NZS 60950.1:2003	Information Technology Equipment - Safety
	AS/CA Standards	
[3]	AS/CA S002:2010	Analogue interworking and non-interference requirements for Customer Equipment for connection to the Public Switched Telephone Network
[4]	AS/CA S004:2013	Voice performance requirements for Customer Equipment
[5]	AS/ACIF S006:2008	Requirements for Customer Equipment, operating in the voiceband, for connection to the non-switched Telecommunications Network
	AS/CA S043	Requirements for Customer Equipment for connection to a metallic local loop interface of a Telecommunications Network
[6]	AS/CA S043.1:2015	Part 1: General
[7]	AS/CA S043.2:2015	Part 2: Broadband
	ITU-T Recommendations	
[8]	O.41 (10/94)	Psophometer for use on telephone-type circuits
[9]	O.71 (11/88)	Impulsive noise measuring equipment for telephone-type circuits
[10]	Q.45 bis (11/88)	Transmission characteristics of an analogue international exchange
	ANSI Standards	
[11]	T1.601-1999(R2004)	Integrated Services Digital Network (ISDN) – Basic Access Interface for Use on Metallic Loops for Application at the Network Side of the NT, Layer 1 Specification

4 ABBREVIATIONS AND DEFINITIONS

For the purposes of this Standard, the following abbreviations and definitions and those of Part 1 apply:

4.1 Abbreviations

ACMA	Australian Communications and Media Authority
ACIF	Australian Communications Industry Forum
ANSI	American National Standards Institute
AS	Australian Standard
CE	Customer Equipment
DSL	Digital Subscriber Line
DTMF	Dual Tone Multifrequency
ISO	International Organization for Standardization
ITU-T	International Telecommunications Union – Telecommunication Standardization Sector
PSD	Power Spectral Density
PSTN	Public Switched Telephone Network
RMS	Root Mean Square
TNV	Telecommunication Network Voltage
VF	Voice Frequency

4.2 Definitions

4.2.1 Customer Cabling

Refer to Section 20 of the *Telecommunications Act 1997*.

Note: This covers both internal and external cable of any type, e.g. metallic pair, screened metallic pair, coaxial or optic fibre.

4.2.2 Customer Equipment (CE)

Refer to Section 21 of the *Telecommunications Act 1997*.

4.2.3 Equipment Class

Refer to Clause 4.2.2 of AS/CA S043.2 [7].

4.2.4 Facility

Refer to Section 7 of the *Telecommunications Act 1997*.

4.2.5 Telecommunications Network

Refer to Section 7 of the *Telecommunications Act 1997*.

4.2.6 Voice Frequency (VF)

Those signals nominally confined to frequencies in the range of 300 Hz to 3.4 kHz.

4.2.7 Voiceband

Refer to Clause 4.2.6 for voice frequency (VF) signals.

5 REQUIREMENTS

5.1 DC signals

If CE can deliver DC signals, the CE is to comply with the following requirements:

(a) DC signals **shall not** exceed the TNV-3 limits specified in AS/NZS 60950.1 [2], when measured at the output terminals of the equipment on open circuit.

(b) When DC signals are reversed in polarity for signalling, telemetry or metering purposes, the resulting impulses measured with an instrument incorporating a filter in accordance with ITU–T Rec. O.71 [9] **shall not** exceed a threshold level of –32 dBm.

Note: These requirements align with ITU–T Rec. Q.45 bis [10] for impulse noise.

Compliance with Clause 5.1.1 should be checked by using the methods described in Clauses 6.3.1 and 6.3.2.

5.2 Low frequency AC signals

If CE can deliver AC signals below 300 Hz, the CE is to comply with the following requirements:

(a) AC signals up to 100 Hz delivered by the CE, including ringing signals, **shall not** exceed the TNV-3 limits specified in AS/NZS 60950.1 [2], when measured at the output terminals of the equipment on open circuit.

(b) Signals between 100 Hz and 200 Hz delivered by the CE **shall not** exceed 10 V r.m.s. at the output terminals of the equipment on open circuit.

(c) Signals between 200 Hz and 300 Hz delivered by the CE **shall not** exceed 5.0 V peak to peak at the output terminals of the CE on open circuit.

(d) Levels of noise and distortion products generated by CE are to comply with the following:

i. With the exception of ring signals, for all AC signals below 100 Hz, noise and harmonics of the signals **shall not** exceed 774 mV Psophometric when terminated with 600 Ω measured using a device compliant with ITU–T Rec. O.41 [8].

ii. For ring signals, the noise and harmonics of the ring signals **shall not** exceed 774 mV Psophometric when terminated with the following loads, being:

A. an open circuit; and

B. a 1 µF capacitor in series with a 4 kΩ resistor.

iii. For all signals between 100 Hz and 300 Hz, the peak power level of noise and distortion products above 3.4 kHz **shall** comply with the requirements of Clause 5.4.

(e) The power level of individual spectral components of any longitudinal component of the output signals **shall not** exceed the limits shown in Figure 2.

(f) AC currents delivered by the CE **shall not** exceed 100 mA under normal operating conditions.

Compliance with Clause 5.2 (b) and (c) should be checked by using the method described in Clause 6.3.4.1, without the 600 Ω termination.

Compliance with Clauses 5.2 (d)(i) and (ii) should be checked by using the method described in Clause 6.3.4.5.

Compliance with Clause 5.2 (d)(iii) should be checked by using the method described in Clause 6.3.4.4 with a termination of 600 Ω.

Compliance with Clause 5.2 (e) should be checked by using the method described in Clause 6.3.3.

Compliance with Clause 5.2 (f) should be checked by using an RMS reading ammeter.

5.3 Voiceband signals

5.3.1 The peak-to-peak level of signals transmitted to line **shall not** exceed 5.0 V when measured across a 600 Ω resistive termination.

Compliance with Clause 5.3.1 should be checked by using the method described in Clause 6.3.4.3.

5.3.2 The one-minute mean power level of signals transmitted to line within the frequency range 300 Hz to 3.4 kHz, except for speech and music, **shall not** exceed –10 dBm.

Compliance with Clause 5.3.2 should be checked by using the methods described in Clauses 6.3.4.1 and 6.3.4.2 with R in 6.3.4.1 set to 600 Ω.

5.3.3 The normal operating level of speech and music **shall not** exceed –6 VU.

Compliance with Clause 5.3.3 should be checked by using the methods described in Clauses 6.3.4.6.

5.4 Signals beyond 3.4 kHz

5.4.1 The power spectral density (PSD) of signals beyond 3.4 kHz **shall not** exceed:

(a) the limits in Figure 1 and Table A2 for CE complying with Equipment Class 3a; or

(b) the limits in Figure 1 and Table B2 for CE complying with Equipment Class 3b

when measured using a noise power bandwidth of 10 kHz.

Compliance with Clause 5.4.1 should be checked by using the methods described in Clauses 6.3.4.1 and 6.3.4.4 (a) with R in Clause 6.3.4.1 set to 135 Ω.

5.4.2 The PSD of signals between 300 kHz and 30.175 MHz **shall** be either:

(a) less than –120 dBm/Hz; or

(b) more than 10 dB below the PSD limit shown in Figure 1 (represented by the dashed line).

when measured as the total average power within a 1 MHz sliding window (1 MHz bandwidth) which is described in Table 1.

Table 1

PSD measurement parameters for 300 kHz to 30 MHz

Parameter	Value
Bandwidth of sliding window	1 MHz
Reference frequency	Lower edge
Step Size	10 kHz
Start Frequency	300 kHz
Stop Frequency	29.175 MHz

Note 1: The Power Spectral Density requirements contained in Clause 5.4 are the same as in ANSI Standard T1.601 [11], and have been included to ensure spectral compatibility of CE with DSL CE.

Note 2: The purpose of the sliding window measurement is to ensure that CE does not generate noise up to the allowable limit across the entire band.

Compliance with Clause 5.4.2 should be checked by using the methods described in Clauses 6.3.4.1 and 6.3.4.4 (b) with R in 6.3.4.1 set to 135 Ω.

5.5 Longitudinal signals

The power level of individual spectral components of any longitudinal component of the output signals **shall not** exceed the limits shown in Figure 2.

Compliance with Clause 5.5 should be checked by using the methods described in Clauses 6.3.3.

6 TESTING

6.1 Verification of compliance with requirements

Compliance with all mandatory requirements in this AS/CA Standard is to be verified. This may be done by direct measurement, modelling and analysis, operation or inspection.

Methods for demonstrating compliance of CE with the requirements clauses specified in this Standard are described in Clauses 6.2 to 6.3.

Verification of compliance with the referenced standards may be confirmed by test reports to later versions of the referenced standards provided that all clauses of the referenced standards are shown to be met.

Alternative methods of demonstrating compliance to those described may be used if the risk of passing non-compliant CE is not increased because of increased measurement uncertainty.

6.2 Standard test conditions

6.2.1 Unless this Standard provides otherwise, testing for compliance with this Standard should be conducted at the nominal supply voltage of the CE and within the following ranges of atmospheric conditions:

(a) An ambient temperature in the range of 15°C to 25°C inclusive.

(b) A relative humidity in the range of 45% to 75% inclusive.

(c) An air pressure in the range of 86 kPa to 106 kPa inclusive.

6.2.2 Where elements in a test configuration are variable, the test should be carried out over the indicated range for that element.

6.2.3 Unless indicated elsewhere within this Standard:

(a) the accuracy level of all measurements should be better than ± 2% for voltage and current, ± 0.25% for frequency and ± 0.5% for time; and

(b) the tolerance of the nominal 48 V d.c. test source should be ± 0.5 V.

6.2.4 Unless indicated elsewhere within this Standard for an individual test, all component values in the test configuration should have a tolerance of:

(a) ± 1% for resistance;

(b) ± 1% for capacitance; and

(c) –0%, +25% for inductors.

6.3 Parameters to be tested

6.3.1 External Stimulus

6.3.1.1 The requirements specified in Clause 5 should be met in the normal operating modes of the CE unless as otherwise specified.

6.3.1.2 In some CE the power level presented to line is dependent on excitation either internal or external to the equipment. This excitation may be determined from the appropriate product specification or with some CE this will require the connection of the associated CE to provide the stimulus.

6.3.1.3 Compliance with Clause 5 should be checked by performing this excitation then measuring the line signal as described by the appropriate tests.

6.3.1.4 Methods for external stimulus and excitation of the CE include the following:

(a) If the CE includes a voice frequency recording and reproducing element in which the signal recording is achieved either by the user or from signals injected into the recording element from the network, the supplier should provide documentation for the user describing how the power levels of signals transmitted to the network are controlled.

(b) If the signal level control is achieved by means of limiters, this should be checked by injecting voice frequency signals, where indicated in the documentation, at any level necessary to test that the limiters are restricting the signals to the network to the specified required limits.

(c) If the CE generates a modulated VF signal in response to an external stimulus initiated by the user, the supplier should provide documentation for the user describing the operating conditions and any associated signal generating devices.

6.3.2 Impulse measurement

6.3.2.1 Impulses caused by the reversal of DC signals described in Clause 5.1 can be measured with a standard impulse counter set having a high impedance (greater than 100 kΩ // 30 pF) bridged across the line.

6.3.2.2 Figure 3 shows the test configuration. Figure 4 shows the approximate representation of an exchange termination and Figure 5 shows the circuit diagram of a filter which meets the requirements of ITU–T Rec. O.71 [9].

6.3.3 Longitudinal power measurement

The CE under test should be connected to the measuring instrument as shown in Figure 6. A selective measuring set or spectrum analyser having an effective bandwidth sufficiently narrow to measure individual spectral components should be used to explore the frequency band from 200 Hz to 30.175 MHz and to measure the RMS

voltage (V) of any spectral component either using the internal calibration or from comparison with a sinusoidal signal of known RMS voltage and the same frequency.

6.3.4 VF signal level measurement

6.3.4.1 Signal levels and frequencies should be measured using a selective level meter or spectrum analyser with appropriate input dynamic range and frequency range. Power levels specified in Clauses 5.3, 5.4 and 5.5 should be determined as V2/R, the voltage level being measured with a high impedance RMS voltmeter bridged across R, the termination resistor (nominally 600 Ω unless otherwise specified).

6.3.4.2 For the one-minute mean power level measurements, the voltmeter should have the following elements:

(a) An input band-selection filter with passband 300 Hz to 3.4 kHz.

(b) A square-law detector having a time constant of nominally 100 ms.

(c) An averaging circuit that performs a continuing averaging process over a period of one minute, i.e. computes the value of:

$$\frac{1}{60}\int_{Tn}^{Tn+60} V^2 \, dt$$

where: T_n is time in seconds
V is the RMS voltage indicated by the square-law detector, in volts.

The measurement should be carried out for a sufficient time for the averaging circuit to record a steady value.

Note: In practice, when measuring telephone speech or sustained signals from modems it may be convenient to observe the indication of the square-law detector and then to calculate the one-minute mean value.

6.3.4.3 For determining the measurement of peak-to-peak voltage required by Clause 5, a storage oscilloscope with a minimum bandwidth of DC to 30.175 MHz should be used.

6.3.4.4 Power Spectral Density should be measured using the following:

(a) A 10 kHz noise power bandwidth for frequencies between 3.4 kHz and 30.175 MHz.

(b) A 1 MHz noise power bandwidth for frequencies between 300 kHz and 30.175 MHz as described in Clause 5.4.2.

6.3.4.5 Psophometric voltage measurements.

(a) Measurement of the psophometric content of signals for Clause 5.2 (d)(i) should be performed using a psophometer in accordance with ITU-T Rec. O.41 [8] set to the weighted, 600 Ω terminated mode.

(b) Measurement of the psophometric content of signals for Clause 5.2 (d)(ii) should be performed using a psophometer in accordance with ITU-T Rec. O.41 [8] set in turn to:

i. the weighted, unterminated mode; and

ii. the weighted, unterminated mode but with an external termination of 1 µF in series with 4 kΩ.

Note: Suitable blocking capacitors may be necessary in the test configuration to prevent DC flowing through the psophometer.

6.3.4.6 The level of speech or music as required by Clause 5.3.3 should be measured using a VU meter with characteristics in accordance with AS/CA S004 [4] Appendix A.

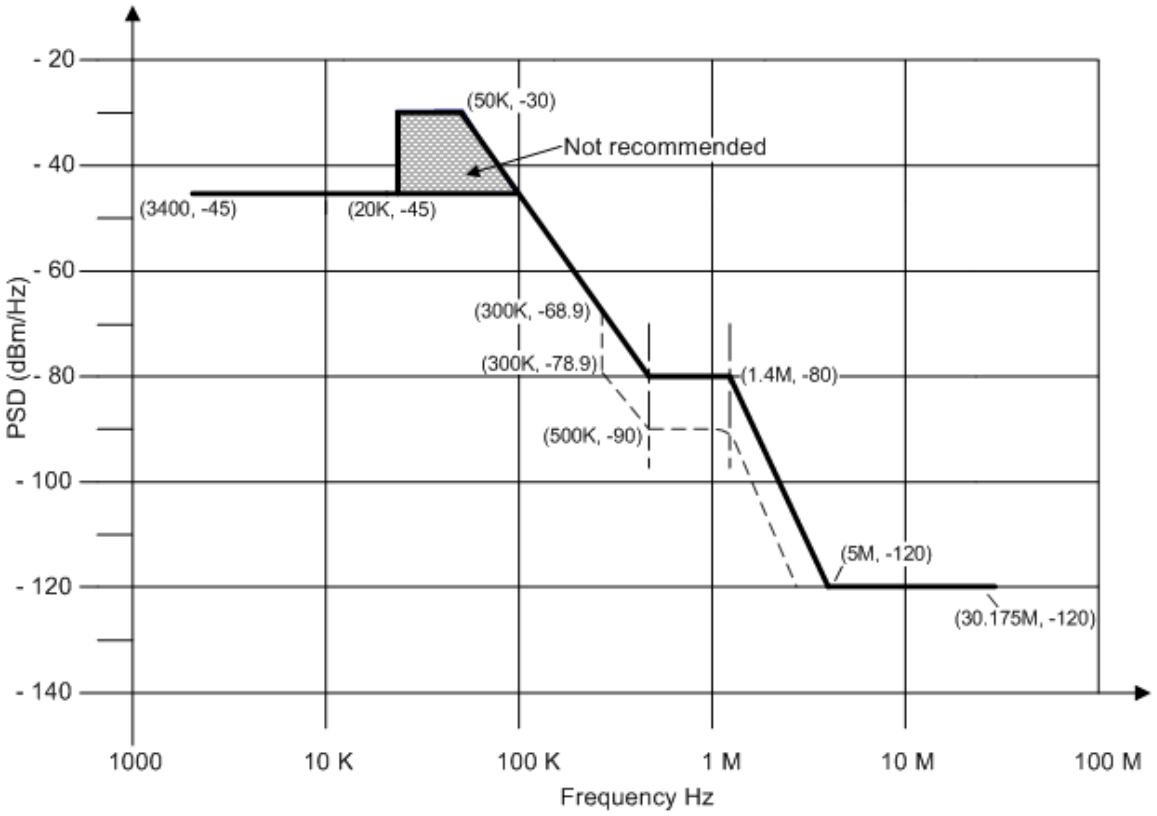


Figure 1
Power level limits above 3.4 kHz

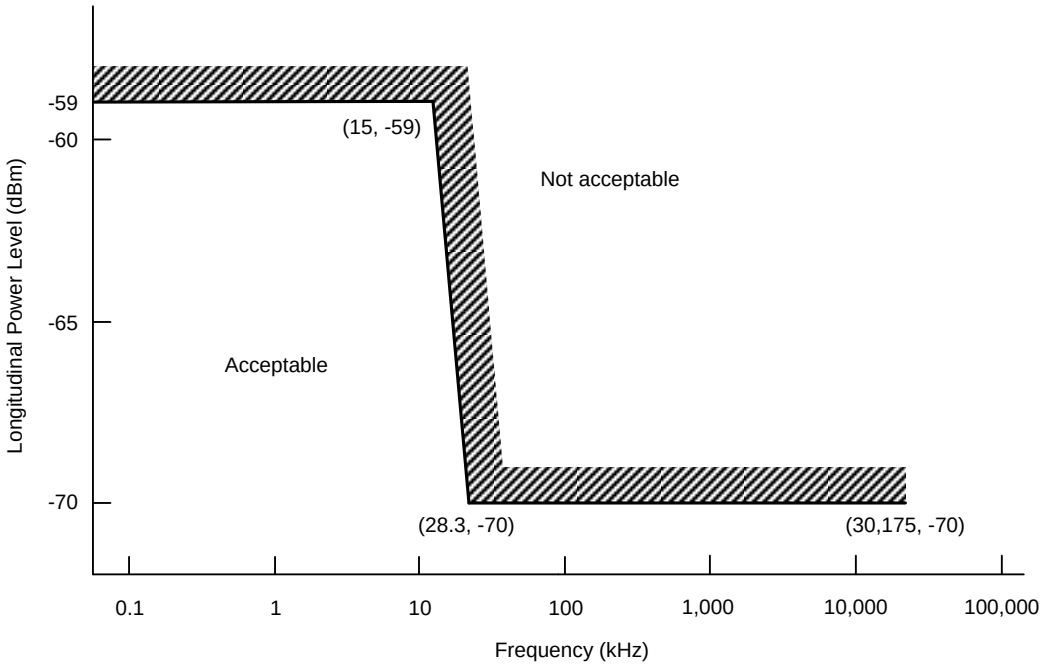
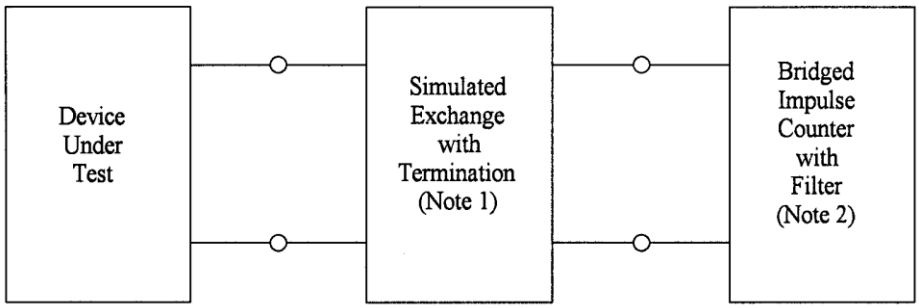


Figure 2
Longitudinal power level limits



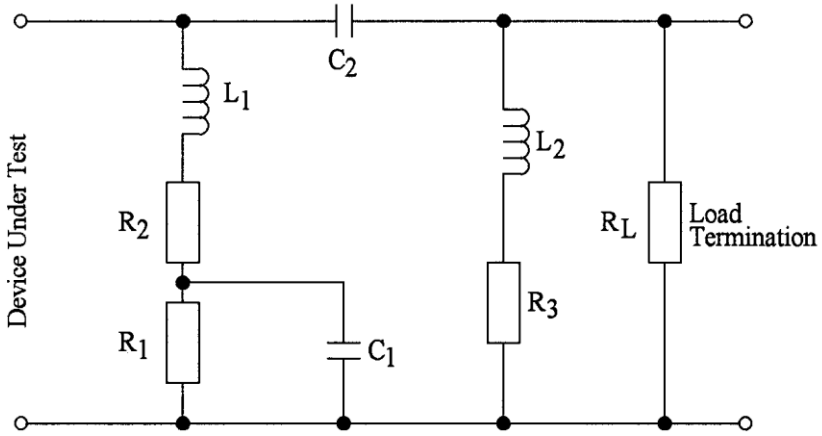
Note 1: Typical Circuit As shown in Figure 6.

Note 2: Typical Filter Circuit As shown in Figure 7.

Note 3: All measurements to accuracy better than:
± 2% voltage and current,
± 0.5% time,
± 0.25% frequency,
± 0.2 dB power level.

Figure 3

Test configuration for measurement of impulses caused by DC signals



L_1 = 4 H ± 20% up to 125 mA d.c. over the range 100 Hz to 4000 Hz

L_2 = 2 H ± 20% up to 125 mA d.c. over the range 100 Hz to 4000 Hz

R_1 = 560 Ω ± 2%

R_2 = 172 Ω ± 2%

R_3 = 400 Ω ± 2%

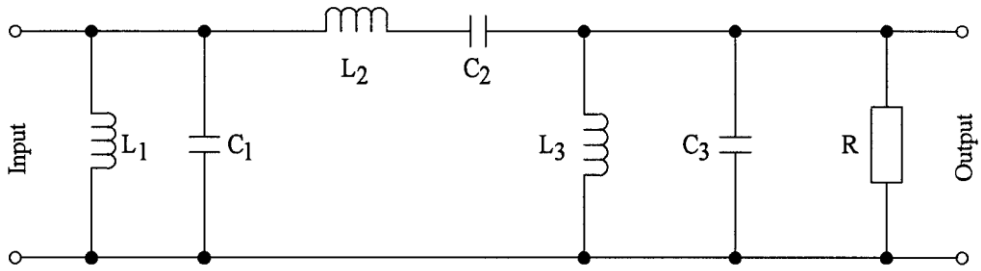
R_L = 600 Ω ± 2%

C_1 = 10 µF ± 2%

C_2 = 1 µF ± 2%

Figure 4

Simulated exchange with termination (unbalanced representation)



$R = 800\ \Omega \pm 2\%$
$C_1 = 121\ nF \pm 2\%$
$C_2 = 938\ nF \pm 2\%$
$C_3 = 80.4\ nF \pm 2\%$
$L_1 = 300\ mH \pm 2\%$
$L_2 = 38.6\ mH \pm 2\%$
$L_3 = 450\ mH \pm 2\%$

Figure 5
Filter to approximate ITU–T Rec. O.71 [9]

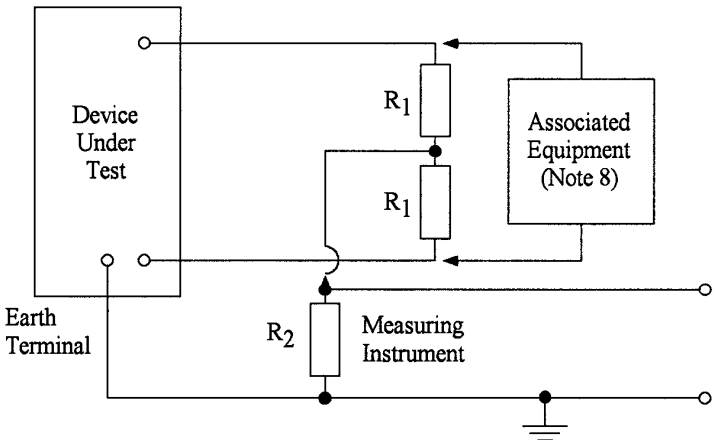


Figure 6
Test circuit for measurement of longitudinal power level

Note 1: If the equipment has separate protective and signal earth terminals they are connected together.

Note 2: The two resistors R1 are to be matched to within 0.01%.

Note 3: The measuring instrument is of high impedance, and capable of measuring over the frequency range 200 Hz to 30.175 MHz.

Note 4: The measuring instrument is calibrated in dBm as if it was measuring across a resistive load.

Note 5: The adequacy of the balance is checked by repeating measurements with appropriate connection reversal, or equipment disconnection.

Note 6: The value of the resistors R1 and R2 are to be 300 Ω for CE signals with fundamental frequency components in the DC to 20 kHz range.

Note 7: The value of the resistors R1 and R2 are to be 70 Ω for CE signals with fundamental frequency components in the 3.4 kHz to 30.175 MHz range when the CE is not being tested with any associated equipment.

Note 8: This figure does not show DC coupling, if required, of the test loads. This must be carefully considered to ensure correct longitudinal power level measurements and correct operation of the CE.

APPENDIX

A EQUIPMENT CLASS 3a

Table A1 provides the Group B test criteria and referenced documents for Equipment Class 3a.

The test termination impedance for Equipment Class 3a is TN12 or 600 Ω as appropriate.

Technologies to which Class 3a applies are analogue PSTN lines or voiceband leased lines for which:

(a) all signalling is confined to either DC to 3.4 kHz or 300 Hz to 3.4 kHz; and,

(b) does not use any earth referenced signalling such as E&M or longitudinal AC or DC.

Examples of services using CE within this Equipment Class are PSTN POTS without Customer Loop Metering, PSTN LoopIn/Indial lines, voiceband leased lines using dry circuits.

These are compatible with (may be deployed on the same line as) ADSL/VDSL.

Table A1

Test criteria for Equipment Class 3a

Parameter	Sub-parameter	Group A	Group B
Total average power	Level	–	–10 dBm0 (300 Hz to 3.4 kHz)
	Frequency range	–	0 to 3.4 kHz or 300 Hz to 3.4 kHz
	Averaging time	–	≥ 10 s
PSD mask	–	–	AS/CA S002 [3] or AS/ACIF S006 [5]
Line code	–	–	Not Applicable

Table A2
Group B PSD mask for Equipment Class 3a

Frequency band f (kHz)	PSD (dBm/Hz)	Testing Requirements
3.4 < f < 100	–45	PSD
100 ≤ f < 500	$-45 - 15.074 \times \log_2(f / 100)$	PSD
500 ≤ f < 1400	–80	PSD
1400 ≤ f < 5000	$-80 - 27.226 \times \log_2(f / 1400)$	PSD
5000 ≤ f < 29040	–120	PSD
29040 ≤ f < 30175	–120	PSD

Note 1: PSD requirements for Equipment Class 3a are contained in AS/CA S002 [3], AS/ACIF S006 [5] and this Standard.

Note 2: Refer to Figure 1 for a representation of the PSD.

Note 3: Below 300 kHz the peak PSD shall be measured with a 100 Hz resolution bandwidth. Above 300 kHz the peak PSD shall be measured with a 10 kHz resolution bandwidth.

APPENDIX

B EQUIPMENT CLASS 3b

Table B1 provides the Group B test criteria and referenced documents for Equipment Class 3b. The test termination impedance for Equipment Class 3b is TN12 or 600 Ω or other specified impedances as appropriate.

Technologies to which Class 3b applies are analogue PSTN lines, voiceband or audio leased lines for which:

(a) all signalling is confined to the range DC to 20 kHz:

(b) may use earth referenced signalling such as E&M or longitudinal AC or DC;

(c) may use outband signals above the voiceband.

Examples of services using CE within this Equipment Class are PSTN POTS with Customer Loop Metering, PSTN/centrex phone lines, voiceband leased lines using E&M signalling.

These services are incompatible with services using CE in Equipment Classes 6a to 6h, 10a to 10n and 10v in ASACIF S043.2 [7] (i.e. not to be used on the same line as ADSL and VDSL).

Table B1

Test criteria for Equipment Class 3b

Parameter	Sub-parameter	Group A	Group B
Total average power	Level	–	–10 dBm0 (300 Hz to 3.4 kHz)
	Frequency range	–	0 to 20 kHz or 0 Hz to 3.4 kHz
	Averaging time	–	≥ 10 s
PSD mask	–	–	AS/CA S002 [3] or AS/CA S043.3
Line code	–	–	Not Applicable

Table B2

Group B PSD mask for Equipment Class 3b

Frequency band f (kHz)	PSD (dBm/Hz)	Testing Requirements
3.4 < f < 100	–45	PSD
100 ≤ f < 500	$-45 - 15.074 \times \log_2(f / 100)$	PSD
500 ≤ f < 1400	–80	PSD
1400 ≤ f < 5000	$-80 - 27.226 \times \log_2(f / 1400)$	PSD
5000 ≤ f < 29040	–120	PSD
29040 ≤ f < 30175	–120	PSD

Note 1: PSD requirements for Equipment Class 3b are contained in AS/CA S002 [3] and this Standard.

Note 2: Refer to Figure 1 for a representation of the PSD.

Note 3: Below 300 kHz the peak PSD shall be measured with a 100 Hz resolution bandwidth. Above 300 kHz the peak PSD shall be measured with a 10 kHz resolution bandwidth.

PARTICIPANTS

The Working Committee responsible for the revisions made to this Standard consisted of the following organisations:

Organisation	Membership
AAPT	Voting
Adtran Networks	Voting
Advanced Circuits and Systems	Voting
Alcatel-Lucent	Voting
Corning Systems	Voting
Huawei	Voting
iiNet	Voting
International Copper Association (ICAA)	Voting
Layer10	Voting
NBN Co	Voting
Netcomm Wireless	Voting
OneAccess	Voting
M2	Voting
Optus	Voting
Telstra	Voting
ACCC	Non-Voting
ACMA	Non-Voting

This Working Committee was chaired by Peter Cooke. James Duck of Communications Alliance Ltd provided project management support.

NOTES

Communications Alliance was formed in 2006 to provide a unified voice for the Australian communications industry and to lead it into the next generation of converging networks, technologies and services.

In pursuing its goals, Communications Alliance offers a forum for the industry to make coherent and constructive contributions to policy development and debate.

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It is committed to the achievement of the policy objective of the *Telecommunications Act 1997* - the greatest practicable use of industry self-regulation without imposing undue financial and administrative burdens on industry.

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