

PSTN

MEASUREMENT REPORT

Report No.: TS10040068-TEL
Model No.: BR900GI,
BR900GXYYYYYY

Report Issued Date: Apr. 29, 2010

Applicant: American Power Conversion Holdings Inc.
3F, No. 205, Sec. 3, Beisin Rd., Hsindian City, Taipei 231,
Taiwan

Test Method/ Standard: AS/ACIF S002:2005

Test By: Intertek Testing Services Taiwan Ltd.,
Hsinchu Laboratory
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
Shiang-Shan District, Hsinchu City, Taiwan

It may be duplicated completely for legal use with the allowance of the applicant. It shall not be reproduced except in full, without the written approval of Intertek Laboratory. The test result(s) in this report only applies to the tested sample(s).



The test report was prepared by: Sign on File
Shirla Hsiao / Officer

These measurements were taken by: Sign on File
Terry Hsu / Engineer

The test report was reviewed by:

Name Eric Fan
Title Engineer

INTRODUCTION

Client Name	<u>American Power Conversion Holdings Inc.</u>
Product Name	<u>Uninterruptible Power Supply</u>
Description of test item	<u>Uninterruptible Power Supply</u>
Model No. or Part No.	<u>BR900GI</u>
Serial No.	<u>Not Labeled</u>
Date of Receipt of Test Item	<u>Apr. 09, 2010</u>
Date of Test (Start/Finish)	<u>Apr. 15, 2010 ~ Apr. 23, 2010</u>
Condition of Test Item at Time of Receipt	<u>Product Sample</u>
Date of report issue	<u>Apr. 29, 2010</u>
Test Site Location	<u>Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan</u>

Note 1: This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Note 2: When determining the test conclusion, the Measurement Uncertainty of test has been considered.

SUMMARY OF COMPLICANE WITH
Australian Standard AS/ACIF S002: 2005

The Equipment Under Test (EUT) was a Uninterruptible Power Supply. The EUT has one RJ11 port for connection to the PSTN and one RJ11 port for connection to a phone.

Uninterruptible Power Supply, Model No: BR900GI, **COMPLIES** with all relevant mandatory tested clauses of AS/ACIF S002: 2005.

The producer hereby confirms the model BR900GXYYYYYYY were series models to model BR900GI (EUT), and the different model number for marketing strategy.

Explanation of model designation: BR900GXYYYYYYY

The “X” can be I or hyphen.

The “Y” can be any alphanumeric, +, *, #, -, hyphen or blank.

5.1.3. The requirement is specified in AS/NZS 60950.1. The test result does not include in this report.

The product under test does comply with all mandatory requirements. The test results only relate to the mandatory items tested.

Remark:

The meaning of abbreviation characters through this report was listed as follows

P - test object does meet the requirements.

F - test object does not meet the requirements

N - test case does not apply to the test object.

ND - Noted

Test Result

Section	Requirement	Result
5.1	GENERAL	
5.1.1	Fail-safe operation	
5.1.1.1	<p>CE shall not cause harm or damage to a Telecommunications Network or Facility if any of the following events occur:</p> <p>(a) Failure of any mechanical or electrical component in the CE</p> <p>(b) Failure of any power supplies resulting in total or partial loss of power to the CE.</p> <p>(c) Discharge or partial discharge of any battery supply associated with the CE.</p> <p>(d) Incorrect manual operation of the CE.</p>	P P P P
5.1.1.2	CE should not cause harm to a Telecommunications Network or Facility when CE is operated outside the range of operating voltage and environmental conditions specified by the manufacturer.	N
5.1.1.3	The power fail mechanism of the CE should cause the CE to revert to the Off-line condition and remain in that condition for the duration of the failure. In addition, the CE may incorporate an automatic line changeover facility as a response to power failure.	ND
5.1.1.4	On restoration of power after a power failure, the CE shall remain in the OFF-LINE condition until another call sequence is commenced. This requirement applies following the first 30 seconds after power is restored.	ND
5.1.2	Line polarity	
5.1.2.1	The operation of CE shall be independent of exchange line conductor polarity	P
5.1.2.2	CE shall be unaffected by a fleeting test reversal or any other reversal in line polarity which occurs while the CE is in either the Off-line or the On-line condition.	P
5.1.3	Transmitted voltages Voltages transmitted to a Telecommunications Network from CE, in any line condition, are not to exceed the limited for Telecommunication Network Voltages (TNV), as specified in AS/NZS 60950.1.	ND
5.1.4	<p>Line-powered CE</p> <p>The current drawn by CE when connected to a source of –</p> <p>(a) 100 V DC; and</p> <p>(b) 50 V DC;</p> <p>Shall not exceed that which would be drawn by 1 MΩ resistor replacing the CE, This requirement applied 30 seconds after voltage has been applied</p>	P
5.1.5	<p>Line connection</p> <p>Note: Description of Connector</p> <p>RJ-14 socket was supplied for connection to the PSTN.</p> <p>Approved line cord should be supplied for connection to the PSTN.</p>	P
5.1.6	Keypads and dials	
5.1.6.1	The requirements of Clause 5.1.6 only apply to CE with a keypad or rotary dial where the keypad or rotary dial has the primary function of dialling for the purposes of call set-up.	N
5.1.6.2	CE intended for connection to a CSS may have other alpha characters or alphanumeric relationships associated with the keypad digits Such CE are also exempt from the requirements of Clause 5.1.6 but the CE shall carry markings which clearly indicate that the CE may only be connected to the extension or system integral ports of a CSS.	N

Section	Requirement	Result
5.1.6.3	The arrangement of numerals (and/or */#, if used), appearing on keypads or rotary dials, shall be in accordance with the layouts in ITU-T Rec E. 161.	N
5.1.6.4	Where letters, in addition to numerals, appear on a keypad or rotary dial, or its surround, the Letters and numerals shall- (a) conform to the associations given in Table 3; (b) be unambiguously associated with the relevant keys; and (c) have a distinct difference in style between the numeric zero and the letter 'O'	N N N
5.1.7	Insulation resistance of ring-in/loop-out PSTN lines	
5.1.7.1	CE in the Off-line state, with the exception of CSS, and those described in Clause 5.1.7.2, shall have an insulation resistance of not less than 1 M Ω between- (a) the two line conductors; (b) each line conductor and TRC terminal, if equipped; and (c) each line conductor and PE terminals, equipped when tested with 250 V d.c. of either polarity, in series with a 600k Ω resistance. Any internal protective devices remain connected for this test.	P N P
5.1.7.2	The requirements apply to CE incorporating a message wait indicator that is intended for connection to a customer switching system	N
5.1.7.3	CSS are to comply with the requirements of AS/ACIF S003.	ND
5.1.8	Emergency services access	
5.1.8.1	General The following requirements apply to CE used to establish connections for voice communication or to establish TTY communication in accordance with ITU-T Recommendation V.18: (a) CE with a dialling capability and used for voice communication shall support the dialling of emergency service number '000'. (b) CE with a handset and with a dialling capability shall support the dialling of emergency service numbers '000' and '106'. (c) TTY terminals that can be connected to a Telecommunications Network shall support the dialling of emergency service number '106' (d) Data modems that can be used in conjunction with a Data Terminal Equipment to provide the functionality of a TTY terminal shall support the dialling of emergency service number '106'	N N N N
5.1.8.2	Access Barring CE should not support access barring of emergency service number '000' and '106'	N
5.1.8.3	Loss of Mains Power Mains-powered CE should continue to support the dialing of emergency service numbers for at least 30 minutes following the loss of mains power.	N
5.1.8.4	Provision of Power-fail Advice CE that does not continue to support emergency dialling for at least 30 minutes after loss of mains power shall have an appropriately worded warning notice included in or with the CE documentation. The warning notice should also be placed on the outside surface of the CE's packaging. A suggested working for the warning notice is as follows: <div style="border: 1px solid black; padding: 10px; text-align: center; margin: 10px auto; width: fit-content;">Warning This equipment will be inoperable when Mains power fails.</div>	N

Section	Requirement	Result
5.2.3.3	Series equipment which is connected to and operates with another CE which is in the Off-line condition shall not reduce ring voltage with frequency in the range 15.3 Hz to 55Hz, to below 50 V r.m.s., for a connection configuration.	P
5.2.4	Bridging equipment	
5.2.4.1	Bridging equipment, including line termination equipment in the off-line state, is high impedance equipment connected in parallel with the line terminating equipment. It does not provide an on-line termination. In general, it remains in the circuit irrespective of whether the line terminating equipment is in the On-line or Off-line condition. Usually it does not perform any line control function and is used, for example, for monitoring and detecting incoming calls.	N
5.2.4.2	Bridging equipment shall have a modulus of impedance of greater than 10 k Ω over frequency range 300 Hz to 3400 Hz.	N
5.3	FUNCTIONAL REQUIREMENTS	
5.3.1	Number storage facility	
5.3.1.1	CE shall not be pre-programmed with, or default to, number beginning with either '000' or '106' in any storage location for automatically dialled numbers, unless the functionality associated with that automated dialling is specifically intended for establishing a voice of TTY call as appropriate to an emergency call person.	N
5.3.1.2	CE should not be pre-programmed with, or default to, any network recognisable number in any storage location for automatically dialled numbers, unless the functionality associated with that automated dialling is specifically intended for establishing a call to that particular network number.	N
5.3.2	Interconnection of PSTN Lines	
5.3.2.1	The interconnection of PSTN lines shall be in accordance with the requirements of AS-ACIF S003 for conference bridges or Clause 5.7 of this Standard for ACTE.	N
5.3.2.2	Metallic interconnection of PSTN lines shall not be used.	N
5.3.3	Intrusion tones	
5.3.3.1	Any CE which provides for the connection of a third party into an established conversation should provide to each party either of the intrusion tones specified in Clause 5.3.3.2- (a) as soon as the intrusion facility is enabled; and (b) with the addition of each new party to the connection.	N N
5.3.3.2	The specifications of the intrusion tone alternatives at the PSTN interface port (+3 dBr relative level point) are- (a) an initial burst of 425 Hz \pm 10Hz for 80ms to 800 ms at a level in the range -7dBm to -13dBm, repeated at intervals of 15 s \pm 3s; or (b) an initial burst of 425 Hz \pm 10 Hz for 800 ms \pm 10% at a level in the range -7dBm to -13dBm.	N N
5.3.3.3	The return loss requirements of Clause 5.4.3. shall be met during intrusion tone connection.	N
5.3.3.4	The intrusion tone facility should not be capable of being disabled by the user.	N

Section	Requirement	Result
5.3.5	(g) Indialled calls shall, if the called extension is engaged, receive a busy tone unless the called extension has been diverted to an alternate answering position. If such a diversion is possible and activated then the requirements of Clauses 5.3.5(c), (d) and (f) apply to the CE. (h) An Answer signal shall not be applied to calls which have had a Busy or NU tone (i) applied as per Clauses 5.3.4.1.	N N N
5.3.6	Automatic Operation The requirements of Clauses 5.3.6.1 to 5.3.6.7 (inclusive) apply to CE designed or intended to perform automatic functions or operations (i.e. functions or operations which are not manually initiated, performed or monitored).	N
5.3.6.1	Automatically Seizing the Line CE shall not automatically seize the line for any purpose, other than to- (a) originate a call; (b) answer a call; (c) force a line into a busy state; (d) detect the presence or absence of a distinctive dial tone in accordance with the requirements or (e) for automatically detecting the state of the line as detailed under Automatic Guard in AS/ACIF S003.	N N N N N
5.3.6.2	Recognition of Telecommunications Network Service Tones CE which relies on the detection of specific pre-answer service tones for automatic operation shall operate normally on receipt of those service tones as transmitted from the Telecommunications Network over the range -9 dBm to -24 dBm and for nominal frequency and cadence. CE for use on international connections should respond to the tones described in the Annex to ITU Operational Bulletin Nr. 781.	N
5.3.6.3	Answering of Incoming Calls	
5.3.6.3.1	The following requirements apply to CE incorporating automatic answering facilities which answer an incoming call: (a) For a Ring-in/Loop-out PSTN line interface, CE should apply a loop (Answer) to the line in not less than 2 s from the commencement of the ring signal being applied by the PSTN; (b) For a Loop-in PSTN line interface (without address digits), CE shall apply a reversal (Answer) to the line in not less than 2 s from the commencement of the loop (Seize) applied by the STN. (c) For a Loop-in PSTN line interface (with address digits), CE shall apply a reversal (Answer) to the line in not less than 2 s from the cessation of the last digit received from the PSTN.	N N N
5.3.6.3.2	CE incorporating automatic answering facilities shall acknowledge the answering of incoming calls from the PSTN by- (a) the transmission of an appropriately worded stored voice or synthesised voice message; or (b) the transmission of one burst of answering tone of $2100\text{Hz} \pm 15\text{Hz}$ for a minimum of 2.6 s up to a maximum of 6.0 s, if a calling tone (CNG) as defined in ITU-T Recommendation V.25 has not been received from the originating CE within 2.5 s. The answering tone should be in the range from -7 dBm to -13 dBm; or (c) a post-answer tone dissimilar from a PSTN dial tone, PSTN ring tone, busy tone, or NU tone.	N N N

Section	Requirement	Result
5.3.6.4	Commencement of Dialling	
5.3.6.4.1	CE which is not able to detect dial tone shall not commence dialling earlier than 2.7 seconds after the seizure state as specified in Clause 5.5.1.4 has been established.	N
5.3.6.4.2	CE which is able to detect dial tone may commence dialling after the presence of dial tone has been detected.	N
5.3.6.5	Automatically Repeated Call Attempts	
5.3.6.5.1	CE shall provide a minimum Off-line period of 5 s following the termination of an unsuccessful call attempt before automatically initiating a subsequent call attempt in a repeated call attempt sequence.	N
5.3.6.5.2	CE shall not automatically initiate more than 15 call attempts, including the initial call, in a repeated call attempt sequence.	N
5.3.6.5.3	If the call attempt sequence described in 5.3.6.5.1 and 5.3.6.5.2 is unsuccessful, CE shall not automatically re-initiate the call attempt sequence to the same number.	N
5.3.6.5.4	CE should provide a minimum Off-line period of 5 s following the termination of an unsuccessful call attempt sequence before automatically initiating a new call attempt sequence to a different number.	N
5.3.6.6	Call Message If a CE transmits a voice message after an automatically initiated call is answered, then that CE should include, in the voice message itself, a stored or synthesised message which identifies the calling party.	N
5.3.6.7	Call Supervision CE which automatically originates or answers calls should be designed to release the PSTN exchange line in less than 30 s after the conclusion of the transfer of information to or from the other CE in the connection.	N
5.4	TRANSMISSION REQUIREMENTS	
5.4.1	Operational interference for transmission other than speech and music CE shall not transmit single frequency tones of power greater than -47 dBm and duration greater than 40ms in the frequency range 2450 Hz to 2850Hz (to avoid possible interference with 'in-band' VF signalling).	N
5.4.2	Power and voltage limits of transmissions other than speech and music	
5.4.2.1	Clause 5.4.2.2 and 5.4.2.3 do not apply to CE which is a transmission medium for voice frequency signals that are generated by other CE.	N
5.4.2.2	The peak-to – peak level of signals transmitted to line, under all user accessible gain control settings and with all DC line conditions shall not exceed 5.0 V when measured across a 600 Ω resistive termination.	N
5.4.2.3	Voiceband transmissions The one-minute mean power level of signals transmitted to line, within the frequency range 300Hz to 3.4 kHz except for DTMF signals, supervisory tones, speech and music shall not exceed -10dBm.	N
5.4.2.4	Signals greater than 3.4 kHz.	N
5.4.2.4.1	The power spectral density (PSD) of signals beyond 3.4 kHz shall not exceed the limit when measured using a noise power bandwidth of 10kHz. Note: For compatibility with 12 kHz Meter Pulse detector circuitry, any signal components generated in the 11kHz to 13 kHz band should not exceed 10mV rms when measured with a 135 Ohms termination or open circuit.	N

Section	Requirement	Result												
5.4.2.4.2	<p>The PSD of signals between 300kHz and 12.040 MHz shall be either-</p> <p>(a) less –120dBm/Hz; or</p> <p>(b) Less than the PSD limit minus 10dB (this is represented in Figure 4 by the dashed line limit).</p> <p>When measures as the total average power within a 1 MHz sliding window (1 MHz bandwidth) which is described in the following Table:</p> <table border="1" data-bbox="331 555 1281 801"> <thead> <tr> <th data-bbox="360 562 496 589">Parameter</th> <th data-bbox="826 562 898 589">Value</th> </tr> </thead> <tbody> <tr> <td data-bbox="360 600 699 627">Bandwidth of sliding window</td> <td data-bbox="826 600 898 627">1MHz</td> </tr> <tr> <td data-bbox="360 638 612 665">Reference frequency</td> <td data-bbox="826 638 970 665">Lower Edge</td> </tr> <tr> <td data-bbox="360 676 472 703">Step size</td> <td data-bbox="826 676 898 703">10kHz</td> </tr> <tr> <td data-bbox="360 714 544 741">Start frequency</td> <td data-bbox="826 714 914 741">300kHz</td> </tr> <tr> <td data-bbox="360 752 544 779">Stop frequency</td> <td data-bbox="826 752 970 779">11.040 MHz</td> </tr> </tbody> </table>	Parameter	Value	Bandwidth of sliding window	1MHz	Reference frequency	Lower Edge	Step size	10kHz	Start frequency	300kHz	Stop frequency	11.040 MHz	N
Parameter	Value													
Bandwidth of sliding window	1MHz													
Reference frequency	Lower Edge													
Step size	10kHz													
Start frequency	300kHz													
Stop frequency	11.040 MHz													
		N												
5.4.3	Impedance													
5.4.3.1	<p>Off-line State</p> <p>The impedance presented by the CE in the off-line state should be greater than 15kΩ over the range 300Hz to 3400Hz.</p>	P												
5.4.3.2	<p>Hold State</p> <p>The impedance presented by the CE in the hold state shall have a return loss greater than 10 dB over the range 300 Hz to 600 Hz and greater than 15 dB over the range 600 Hz to 3.4 kHz against the test network.</p>	N												
5.4.4	<p>Impedance balance</p> <p>The impedance balance about earth of the CE shall be greater than 46 dB over the frequency range 50Hz to 3.4 kHz. This test is to be applied with respect to the TRC terminal and protective earth termination, separately and connected together when either or both of these terminations are provided.</p>	N												
5.4.5	<p>Noise Performance</p> <p>The following requirements for noise generated by STS CE when measure across a 600 Ω port termination (with other equipped ports properly terminated) are to apply when the STS CE is in the On-line state and not transmitting signals:</p> <p>(a) Mean noise power shall not exceed-</p> <p>(i) –62 dBmp (Psophometric), measured using a device compliant with ITU-T Rec. O.41; and</p> <p>(ii) –37 dBm (unweighted), measured using a device with a uniform frequency response over the range 30 Hz to 20 kHz.</p> <p>(b) Single-frequency noise power. Any signal frequency (in particular the sampling frequency and its submultiples where appropriate) over the range 30Hz to 20kHz, measured selectively with a 30 Hz bandwidth, shall not exceed –47 dBm.</p> <p>(c) Impulsive noise. The number of noise counts above a threshold level of –32 dBm shall not exceed five counts in 5 mins, measures using an impulsive noise counter compliant with ITUT Rec. O.71, using the 600 Hz to 3 kHz filter described in 3.5 therein.</p>	N												
		N												
		N												
		N												
		N												
		N												
		N												
		N												
		N												
		N												
		N												

Section	Requirement	Result
5.5	SIGNALLING REQUIRMENTS	
5.5.1	Two-wire ring-in/loop-out PSTN line interface.	
5.5.1.1	Ring signal detection and CE performance during ring	
5.5.1.1.1	STS CE which is required to recognise ring signals shall respond to terminal voltages in the rang (a) 50 V r.m.s to 90 V r.m.s over the frequency range 15.3 Hz to 25 Hz; and (b) 40 V r.m.s to 90 V r.m.s over the frequency range 25 Hz to 55 Hz The ring signal shall have a duration of 200 ms and greater, and shall be superimposed on 48 V d.c. of either polarity.	N N
5.5.1.1.2	CE should not recognise as a ring signal an AC voltage of less than 10 V r.m.s, or a ring signal of less than 100 ms duration.	P
5.5.1.1.3	CE in the Off-line state should withstand 2 min of continuous non-cadence, 90 V r.m.s ring signal at 55 Hz superimposed on 48 V d.c. The ring signal should be applied to the terminals of the CE.	P
5.5.1.1.4	Under fault conditions, ring signal voltage may also be applied to the line terminals of the CE which is in the On-line condition. The CE should remain undamaged if this should occur.	N
5.5.1.1.5	When a ring signal of 25 Hz sine wave at 95 V r.m.s. Superimposed on 56 V d.c. (with a total source impedance of 470 Ω) is applied to theline terminals of CE, the DC component of the current flowing shall not exceed 600 μ A.	P
5.5.1.2	Ringer Equivalence Number (REN) CE shall have a REN of not greater than 3.	P
5.5.1.3	Meter Signal detection	
5.5.1.3.1	General	N
5.5.1.3.1.1	A meter pulse received from the PSTN may be either a 50 Hz longitudinal or 12 kHz transverse signal. The availability of either of these signals is subject to negotiation with the carrier or carriage service provider concerned.	N
5.5.1.3.1.2	The meter signal detector is deemed to have operated when an unambiguous output occurs on the application of an input signal. The CE supplier should state the expected response of the CE to the meter signal.	N
5.5.1.3.1.3	The meter signal detector should recognise; meter signals in the range 100 ms to 380 ms inclusive, at a maximum repetition frequency of 1.25 Hz	N
5.5.1.3.1.4	The meter signal detector should not respond to – (a) meter signals less than 50 ms duration; (b) meter signals greater than 500 ms duration; and (c) signals occurring later than 800 ms after a release signal is initiated for an outgoing call.	N N N
5.5.1.3.1.5	The meter signal detector should be responsive – (a) after completion of address signalling; (b) during the release condition of the CE (as specified in Clause 5.5.1.11); and (c) until 800 ms after completion of the call.	N N N
5.5.1.3.1.6	The meter signal detector shall not reduce the transverse line circuit impedance to less	N
5.5.1.3.1.7	Where CE is detecting both Meter Pulses in accordance with the requirements of this	N

Section	Requirement	Result
5.5.1.3.2	50 Hz Longitudinal Meter Signal Detection Requirements Where CE is designed to detect 50 Hz longitudinal meter signals, the following requirements are applicable: (a) The meter signal detector should meet the response limits given in Figure 8. (b) The total detector input current measured during the metering signal shall not exceed 1 mA r.m.s. with an applied meter signal of 50 V r.m.s. applied continuously. (c) The impedance balance shall be greater than 46 dB over the range from 50 Hz to 3.4 kHz at voltage level of 50 V r.m.s.	 N N N
5.5.1.3.3	12 kHz Transverse Meter Signal Detection Requirements Where CE is designed to detect 12 kHz transverse meter signals, the following requirements are applicable: (a) The meter signal detector should meet the response limits. (b) The transverse input impedance shall have a modulus of impedance of greater than 200 Ω with phase angle of 0° to -30° at 12 kHz.	 N N
5.5.1.4	Seizure state	
5.5.1.4.1	During the seizure state the CE acting as a line termination, for a minimum duration of 0.3 s, shall have DC characteristics not with the 'Prohibited' Region A and preferably not with the 'Not Recommended' Region B.	N
5.5.1.4.2	Momentary breaks during the seizure state shall not exceed 2.5 ms	N
5.5.1.4.3	The duration of the transition from the idle state to the low resistance state (i.e. line current rise time) should not exceed 100 ms.	N
5.5.1.5	Hold state	
5.5.1.5.1	During the hold state, the DC characteristics of CE providing a line termination shall not be within the 'Prohibited Region A.	N
5.5.1.5.2	Momentary breaks during hold state shall not exceed 2.5 ms.	N
5.5.1.5.3	CE designed to work in parallel with other CE should not have DC characteristics within the 'Not Recommended' Region B.	N
5.5.1.5.4	Under fault conditions, it is possible for one side of the line to be grounded close to the CE while it is in the on-line state. The CE should remain undamaged if this occurs.	N
5.5.1.6	Supervision of outgoing calls STS CE shall remain on-line and not be adversely affected in its normal operation (before a call is established), if it loses its battery feed potential for up to 300 ms – (a) during the pre-dialling hold period; (b) during inter-digital pauses; and (c) after completion of dialling.	 N N N
5.5.1.7	Dialling digit integrity	
5.5.1.7.1	If CE has a keypad or rotary dial- (a) the decadic signal or DTMF tones it generates shall be consistent with the ITU T Rec. E. 161 layout chosen; (b) the sequence of decadic signal or DTMF tones generated shall correspond to the keys pressed or numbers dialled; and (c) for decadic dialling, the number of pulses transmitted for a digit shall correspond to the numerical value of the digit, with 10 pulses being transmitted for the digit '0'	 N N N
5.5.1.7.2	Any digit storage facility shall – (a) correctly store the digits; and (b) transmit the digits in the same sequence as originally entered, in accordance with the requirements for decadic or DTMF signalling as defined in this Standard.	 N N

Section	Requirement	Result
5.5.1.8	<p>Decadic signalling For the purposes of this Clause, a Break pulse is defined as the DC line condition with less than 2.8 mA of line current flowing and a Make pulse is defined as the DC line condition with greater than 12 mA of line current flowing. CE which generates decadic pulses is to comply with the following: Note: Decadic signalling functionality may not be implemented in all carrier networks. The use of DTMF address signalling is recommended.</p> <p>(a) Characteristics of pulses The following requirements apply for decadic loop-disconnect pulses when the CE is connected in a resistive circuit of 1900Ω and a feed voltage of 48 V d.c..</p> <ul style="list-style-type: none"> (i) 'Break' pulse shall be in the range 60 ms to 70 ms inclusive. N (ii) 'Make' pulse shall be in the range 30 ms to 40 ms inclusive. N (iii) Contact bounce shall not exceed 0.5 ms N <p>(b) Resistance during transmission During transmission of decadic pulses the steady state DC resistance of the CE (when measured in a resistive circuit of 1900Ω) shall be –</p> <ul style="list-style-type: none"> (i) for the Make period: within the requirements of Clause 5.5.1.5.1.; N (ii) for the Break period: greater than 100 kΩ with 100 V d.c. applied; and N (iii) for the inter-digital Pause: Within the requirements of Clause 5.5.1.5.1. N <p>(c) Inter-digital pause timing The inter-digital pause period separating consecutive decadic pulse trains shall be within the range of 750 ms to 3 s unless due to a programmed pause.</p> <p>Note: A pause of 800ms is recommended.</p> <p>Pulse voltage wave shape The voltage when measured in the test circuit shall comply with the following:</p> <ul style="list-style-type: none"> (i) The peak voltage measured across the terminals of the CE shall be less than 230 V. N (ii) For at least the latter half of the Break pulse time the peak-to-peak amplitude of any oscillation shall not exceed 12 V. N 	
5.5.1.9	<p>DTMF signalling CE which generates DTMF signals is to comply with the following: Note: The use of DTMF address signals is preferred as the standard method of operation.</p> <p>(a) Signalling frequencies</p> <ul style="list-style-type: none"> (i) The DTMF signals generated shall consist of pairs of frequencies in accordance with ITU-T Rec.Q.23 and shall be allocated to the various digits, symbols and characters as shown in Table 5. N (ii) The tolerance of each frequency generated shall be less than ± 1.5% N <p>(b) Send levels</p> <ul style="list-style-type: none"> (i) the power level of any fundamental frequency shall be between –5 dBm and –22dBm for line lengths between 0 km and 4.2 km using 040 mm conductor cable. N (ii) For DC line conditions, provided by DC feed resistances between 400 Ω and 2300 Ω, the power level difference between any two fundamental frequencies shall be 2 dB ± 2 dB on a zero line length. The higher frequencies tone shall be at the higher level. N (iii) Compliance with Clause 5.5.1.9(b) should be checked by using the method described in Clause 6.7.8. N <p>(c) Output rise and fall times The output rise and fall times of the envelope of each tone of each digit, measured between 10 % and 90 % of full amplitude, shall be within 5 ms with the CE connected to all line lengths between 0 km and 4.2 km using 0.40 mm cable terminated in 600Ω. N</p> <p>(d) Distortion The total distortion products (measured as harmonics or inter-modulation) shall be at least 20 dB below the level of the lower power fundamental frequency when measured at the line terminals of the CE. N</p>	

Section	Requirement	Result
5.5.1.9	<p>(e) Timing The timing for automatically and/or repertory dialled DTMF signalling is to be as follows:</p> <ul style="list-style-type: none"> (i) The minimum duration of the DTMF burst representing each digit shall be 50 ms. (ii) The minimum interval between the transmission of digits shall be 70 ms and In no case shall it exceed a maximum period of 3 s unless due to a programmed pause. <p>Note: It is recommended for post answering DTMF information signalling that the digit duration should be a minimum of 100 ms.</p> <p>(f) Line termination characteristics During DTMF signalling over the frequency range 600 Hz to 1660 Hz for DC line conditions, provided by DC feed resistances between 400 Ω and 2300 Ω, the source impedance of the CE shall have a return loss greater than –</p> <ul style="list-style-type: none"> (i) 7 dB with respect to 600 Ω; and (ii) 15 dB with respect to the complex impedance as shown in Figure 5. 	<p>N</p> <p>N</p> <p>N</p> <p>N</p>
5.5.1.10	<p>Recall signal</p> <p>The recall signal used to access enhanced network features, shall be a break in the loop holding condition for a duration of 100 ms \pm 20 ms. The characteristics of the break shall be in accordance with Clause 5.5.1.8(b)(ii)</p>	N
5.5.1.11	<p>Release signal</p> <p>The release of a PSTN connection shall be indicated by the removal of the DC loop condition on the exchange line.</p>	N
5.5.2	<p>Two-wire loop-in PSTN line interface</p> <p>The requirements of Clauses 5.5.2.1 to 5.5.2.10 apply to CE terminating loop-in and indial exchange lines.</p>	N
5.5.2.1	<p>Idle condition</p> <p>CE in the idle condition shall provide a circuit guard signal of not less than 2.2 mA and not more than 3 mA into an external 20 kΩ resistive termination without detecting seizure.</p>	N
5.5.2.2	<p>Seizure state</p> <p>CE shall recognise, as a seizure state or address signal, an external loop with a resistance of up to 2.5 kΩ and is to comply with the following requirements:</p> <ul style="list-style-type: none"> (a) CE shall disregard a loop with a resistance greater than 10 kΩ. (b) The circuit shall provide a minimum current of 14 mA d.c. into the external loop. (c) CE shall recognise a Seizure State if it is present for 40 ms and greater. (d) CE shall detect a loop-disconnect pulse or DTMF pulse (as appropriate) within 150ms after commencement of the Seizure State. (e) If incorrect address signals are detected during transmission of the address signals, then Number Unobtainable (NU) tone shall be returned to the calling party. 	<p>N</p> <p>N</p> <p>N</p> <p>N</p> <p>N</p>
5.5.2.3	<p>Maximum pre-dialling delay response</p> <p>If, after receiving a seizure signal form the exchange, the CE provides a lock-out feature of the form that prevents a seized in-dial circuit from responding to loop-disconnect signals –</p> <ul style="list-style-type: none"> (a) the CE should return busy tone to the line in accordance with the timing sequence; (b) the shorted period in which this may occur should be the maximum pre-dialling delay for the incoming call; and (c) the shortest period should not be less than 10 s. 	<p>N</p> <p>N</p> <p>N</p>

Section	Requirement	Result
5.5.2.4	Answer signal	
5.5.2.4.1	The answer signal conveys to the calling CE that the call has been answered by the called party and comprises a reversal of the DC line polarities, from the normal polarity condition (negative potential on the negative leg and earth potential on the positive leg) to reverse polarity condition (negative potential on the positive leg and earth potential on the negative leg).	N
5.5.2.4.2	The answer signal shall be applied within 500 ms after the on-line condition.	N
5.5.2.5	Clear back signal The clear back signal is the reverse of the answer signal and shall consist of restoring the normal DC potential to the line for a minimum of 40 ms.	N
5.5.2.6	Release guard signal	
5.5.2.6.1	The release guard signal shall prevent the PSTN in-dial line from returning to the idle condition (preventing seizure) until the CE has fully release. This signal comprises the maintenance of the answer condition.	N
5.5.2.6.2	The signal shall be applied within 50 ms of the clear forward signal being recognised, unless the CE is released in this time.	N
5.5.2.7	Blocking signal The blocking signal provides back-busy or blocking to free exchange line circuits. This signal comprises either the removal of DC potential from the negative leg or the disconnection of potential from both sides of the line. A supervisory alarm associated with the exchange line circuit should be operated during the application of this signal.	N
5.5.2.8	Re-answer signal (optional) The re-answer signal from the CE consists of the re-application of the answer signal following 'clear back'. At any time up to the release of the connection the 're-answer' signal will stop the time supervision process in the Telecommunications Network (90 s nominal) which was initiated by the clear back signal.	N
5.5.2.9	Clear forward signal	
5.5.2.9.1	The clear forward signal is the removal of the seizure signal. It initiates the release of the switching path through the CSS and causes the application of release guard and blocking signals to the exchange. The clear forward signal shall be recognised if it is present for 350 ms or greater.	N
5.5.2.9.2	Removal of the seizure signal loop for less than 150 ms shall not be recognised as a clear forward signal.	N
5.5.2.10	Information signalling	
5.5.2.10.1	DTMF signals The following requirements apply to CE that is capable of receiving DTNF signals: (a) CE shall recognise DTMF signals that are within the following limits: (i) A frequency tolerance of $\pm(1.5\% + 2 \text{ Hz})$ from the nominal frequency. (ii) Total RMS power level, measured at the CE terminals, between -6 dBm and -24 dBm with a maximum difference between the high frequency tone and the low frequency tone power level of $+4 \text{ dB}$ to -4dB , relative to that of the low frequency tone. (iii) A break between tone signals of more than 70 ms duration as inter-digital pause. (iv) Valid tone signals of 40 ms duration or greater.	N N N N

Section	Requirement	Result
5.5.2.10.1	(b) CE shall disregard call of the following DTMF signals and condtions: (i) Tone signals of 20 ms duration or less. (ii) Tone signals of –35 dBm or lower power level. (iii) Tone signals with a frequency error in either both frequencies of greater than 3.5%. (iv) Breaks between or within signals of less than 15 ms.	N N N N N
5.5.2.10.2	MFC signals The requirements apply to CE that is capable of receiving MFC address signals.	N
5.5.2.10.3	Decadic signals The following requirements apply to CE that is capable of receiving decadic signals: (a) CE shall recognise decadic signals that are within the following ranges: (i) Break Pulses: 50 ms to 80 ms inclusive. (ii) Make Pulse: 20 ms to 50 ms inclusive. (iii) Inter-digital Pause: a make pulse of 450 ms and greater. (b) CE shall disregard the following decadic signals: (i) Break Pulses; 20 ms and less. (ii) Make Pulses: 12 ms and less. (iii) Inter-digital Pause: a make pulse of 150 ms and less.	N N N N N N
5.6	CORDLESS TELEPHONES	
5.6.1	Cordless telephones should comply with the relevant radiofrequency (RF) Standards for the cordless technology used. Note: For the information of manufacturers and suppliers of cordless telephones, a form of advice recommended for inclusion in the equipment’s handbook and/or packaging, to advise potential users of radio transmitting equipment of the interference potential, is below. <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">IMPORTANT NOTICE</p> <p style="text-align: center;">USERS OF THIS EQUIPMENT SHOULD NOTE THAT, AS WITH ANY RADIO TRANSMITTER, THIS EQUIPMENT IS CAPABLE UNDER SOME CIRCUMSTANCES OF CAUSING INTERFERENCE IN OTHER NEARBY ELECTRONIC EQUIPMENT.</p> <p style="text-align: center;">USERS SHOULD BE CONSIDERATE OR OTHERS IN THIS REGARD AND, WHERE APPROPRIATE, MOVE THEIR CORDLESS TELEPHONE AWAY FROM ANY NERBY AFFECTED EQUIPMENT</p> </div>	N
5.6.2	Cordless telephones should incorporate security measures to protect against unauthorised use of the PSTN line.	N
5.7	AUTOMATIC CALL TRANSFER EQUIPMENT (ACTE)	
5.7.1	General Requirements Some items of CE, including CSS, provide the facility to automatically transfer calls received from the PSTN, back onto the PSTN.	N
5.7.1.1	The following requirements apply to ACTE: (a) A visual signal should be provided when a call is in progress. (b) Amplifier (i) Where an amplifier is used, the gain of the amplifier shall not exceed 20 dB. (ii) The amplifier should incorporate AGC for each direction of speech. (c) Incoming signals received at a level below –48 dBm on each line should not turn on the amplifier, if required, from the quiescent state. (d) The configuration shall be stable and not oscillate when the terminating lines have an impedance with a modulus between 200 Ω and 2 k Ω at a phase angle between –45° and + 20°. (e) Individual lines shall be automatically released from the equipment when either Party A or Party B goes Off-line. This may be achieved by the detection of busy tone, congestion tone, dial tone, or NU tone at that port.	N N N N N N

Section	Requirement	Result
5.7.1.1	The following requirements apply to ACTE: (f) A visual signal should be provided when a call is in progress. (g) Amplifier (i) Where an amplifier is used, the gain of the amplifier shall not exceed 20 dB. (ii) The amplifier should incorporate AGC for each direction of speech. (h) Incoming signals received at a level below -48 dBm on each line should not turn on the amplifier, if required, from the quiescent state. (i) The configuration shall be stable and not oscillate when the terminating lines have an impedance with a modulus between 200Ω and $2 \text{ k}\Omega$ at a phase angle between -45° and $+20^\circ$. (j) Individual lines shall be automatically released from the equipment when either Party A or Party B goes Off-line. This may be achieved by the detection of busy tone, congestion tone, dial tone, or NU tone at that port.	 N N N N N N
5.7.1.2	Disconnection of the line by the ACTE shall be achieved within 6.0 s of Dial Busy, Congestion, or NU Tones being applied to either port of the ACTE.	N
5.7.1.3	ACTE without RVA shall not answer an incoming call until Party C has answered the called. Note: As a result, Party A will have no indication if Party C is engaged or does not answer, but will receive ring tone until Party C answers or the call is released by the PSTN.	N
5.7.2	Recorded Voice Announcement (RVA) option.	
5.7.2.1	ACTE which incorporates an RVA should comply with the following requirements: (a) On detection of the incoming ring signal the ACTE should answer the call and transmit an RVA. (b) This RVA facility should comply with the requirements of AS/ACIF S004	 N N
5.7.2.2	The RVA should identify the Party B ACTE and should include a message similar to the following example: 'The number you have called is unattended at present and your call is being directed to another number. Please wait for normal service tones.'	N
5.7.2.3	The ACTE should commence dialling the Party C as soon as the transmission of the RVA is commenced.	N
5.7.2.4	Interconnection of the speech paths between the A-B and B-C parties should be made immediately the three preceding steps have been completed, so that the ring tone or other service tone associated with Party C will be heard by Party A.	N
5.7.3	Multiple calling option ACTE may be designed to make one attempt to direct a call to a single telephone number or to automatically make multiple attempts to establish a call if the original attempt is found to be unsuccessful. Multiple attempts may be directed to a signal telephone number or to multiple telephone numbers. Any multiple calling facilities of the ACTE should operate in the manner described in Automatic Operation section of this Standard.	N

END OF REPORT BODY

LIST OF ATTACHED APPENDICES

APPENDIX A - Photos

APPENDIX A

Photos





