

TELECOM TEST REPORT

According to:

CS03 Part I Issue 9 Amendment 3 October 2006



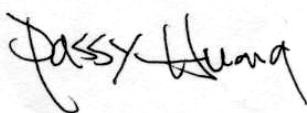
Product.....: HearIt All
Trade Name.....: Phonic Ear
Model No.....: 210-00-010-00
Applicant.....: Phonic Ear A/S
Applicant Address.....: Kongebakken 9, Smørum, DK-2765,
Denmark

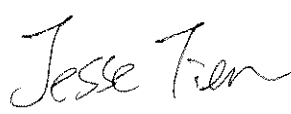
Compliance Test Report

Test Specification : CS03 Part I Issue 9 Amendment 3 October 2006

Description:

Report Number	MLT0810CS03001
Customer	Phonic Ear A/S
Product	HearIt All

Report Prepared By	Passy Huang
Signature	
Date Prepared	27-Oct-08 ~ 10-Nov-08

Report Authorised By	Jesse Tien
Signature	
Date Authorised	03-Dec-08

Sample Receiver Date :27-Oct-08

Issue Date :03-Dec-08

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Report Number: MLT0810CS03001

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1. LABORATORY DETAILS

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Contact Name:	Jesse Tien

2. CUSTOMER DETAILS

Applicant :

Name:	Phonic Ear A/S		
Address:	Kongebakken 9, Smørum, DK-2765, Denmark		
Telephone:	+4539177101	Fax :	+4539277900
Contact Name:	Phonic Ear A/S	E-Mail:	info@phonicear.dk

Manufacturer:

Name:	Innovation Technology Co., Ltd.
Address:	Unit 2301-02, 23/F, Millenium City 3, 370 Kwun Tong Road, Kwun Tong, Kowloon, Hong Kong

Service Center :

Name:	Bernafon Canada Ltd.		
Address:	500 Trillium Drive, Unit 15, Kitchener, Ontario, N2R 1A7, Canada		
Telephone:	+1 519 748 6669	Fax :	
Contact Name	Alan Moore	E-Mail :	am@bernafon.ca

3. EQUIPMENT UNDER TEST

Model No.	210-00-010-00
Product :	HearIt All

4. ENVIRONMENTAL DATA

All measurements were made within 25~27°C, 65~68%R.H.

5. TEST EQUIPMENT UTILISED

Network Emulator	151	MS9610 1567	TAS
Multimeter	34401A	3146A65646	HP
Multimeter	34401A	3146A07047	HP
Longitudinal network	A-105	36987412	MLT
Power Supply	6030D	5714221	GW
FFT Analyzer	35665A	3137A01244	HP
Leakage Current Tester	7430	E090042	EXTEC
Network/Spectrum Analyzer	4195A	2904J02993	HP
TIMS	4934A	2943U2076	HP
S.G	8904A	2948A04894	HP
Telephone Tester	1099	4010040002	SYSGRATION
Multimeter	45	6386049	FLUKE
Scope	TDS 220	B047067	TEK
Surger Tester	1102	60P0319	MLT
Surger Tester	1103	60Q2356	MLT
Differential Probe AMP	1141A / 1142A	US34513714	Agilent
FFT Analyzer	9211C	52020097	ADVANTEST

6. MEASUREMENT UNCERTAINTY

The test equipment utilised is maintained and calibrated to ensure that measurement uncertainties fall within the limits specified in ADLNB document GN/WG2/1 "Guidance Notes On Measurement Uncertainty" dated 19 March 1998

7. MULTIPLE LIST

IDENTIFICATION TRADE NAME AND MODEL NO.

Brand /Trade Name	Model No.
N/A	N/A

8. SUMMARY OF TEST RESULTS

Clause Part 1	Clause Title	Test Status
CS-03 2.1	Mechanical Shock	PASS
CS-03 2.2	Dielectric Strength	PASS
CS-03 2.3	Hazardous Voltage Limitations	PASS
CS-03 2.4.1	Telephone Line Surge-Type A	PASS
CS-03 2.4.2	Telephone Line Surge-Type B	PASS
CS-03 2.5	Power Line Surge	PASS
CS-03 3.3.1	Metallic AC Energy	PASS
CS-03 3.3.2.1	Longitudinal Voltage in 100Hz to 4kHz range	PASS
CS-03 3.3.2.2	Longitudinal Voltage in the range of 4kHz to 270kHz	PASS
CS-03 3.3.2.3	Longitudinal Voltage in the range of 270kHz to 6MHz	PASS
CS-03 3.4.1(1)	In-band Transmitted Signal Power –Metallic	PASS
CS-03 3.4.3(1)	Limitations on Internal Signal Sources	N/A
CS-03 3.4.6(1)	Signal power in the 3995-4005Hz frequency band	PASS
CS-03 3.4.6(2),(3)	Out-of-band transmitted signal power -Metallic 4kHz to 30MHz	PASS
CS-03 3.5.1	Billing Protection - Call Duration	N/A
CS-03 3.5.2	Billing Protection - Voice and Data Equipment	PASS
CS-03 3.5.3	Billing Protection - Signaling Interference	PASS
CS-03 3.6.2(1)	Transverse Balance Limitations	PASS
CS-03 3.7.1.1(1)	On Hook Resistance, Metallic and Longitudinal (up to 100V)	PASS
CS-03 3.7.1.1(2)	On Hook Resistance, Metallic and Longitudinal (100V to 200V)	PASS
CS-03 3.7.2	DC Current During Ringing	PASS
CS-03 3.7.3	Metallic and Longitudinal impedance during Ringing	PASS

9. DETAILED TEST RESULT

Environmental Simulation

CS-03 2.1 Mechanical Shock (Unpackaged)

Hand Held Items Normally Used at Head Height:

18 random drops from a height of 1.5meters onto concrete covered with 3mm asphalt tile or similar surface. **N/A**

Desk top Equipment 0-5kg: Six random drops from a height of 750mm onto concrete covered with 3mm asphalt tile or similar surface. **PASS**

CS-03 2.2 Dielectric Strength

From zero to the specified voltage value listed in the table in a period of 30s, applied continuously to the test points for one minute, the current in the mesh formed by the voltage source and those test points shall not exceed 10mA peak at any time during the whole testing period 90s.

- All telephone connection
- All power connection
- All possible combinations of exposed conductive surface on the exterior of such equipment, excluding terminals for connection to other equipment.
- All terminals for connection to approved protective circuitry approved equipment;
- All auxiliary lead terminals
- All E&M lead terminals, and
- All PR, PC, CY1 and CY2 leads

Measurement: Limit < 10mA peak

Test Points	Voltage Applied	Result (uA)		Limit (Peak)
		On-Hook	Off-Hook	
a and c	1000	4	8	10mA
b and c	1500	21	N/A	10mA
a and b	1500	7	N/A	10mA

Measurement (after E.S): Limit < 10mA peak

Test Result: No change

Comments: PASS

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CS-03 2.3 Hazardous Voltage Limitations

The voltage measured between the appropriate leads shall not exceed 70V peak after 1 second. 120Vrms, 60Hz voltage source is applied between the ground and the connection point of hazardous points tied together.

Measurement (before E.S): Limit <70Volt peak

Test Point	Result (V)	Limit (Peak)
Tip-Ring	0.1 V	70 VOLT
Tip-Gnd	0.1 V	70 VOLT
Ring-Gnd	0.1 V	70 VOLT

Measurement (after E.S): Limit < 70Volt peak

Test Result: No change

Comments: PASS

CS-03 2.4.1 Telephone Line Surge-Type A

The surge shall have an open circuit voltage waveform in accordance a front time of 10 μ s maximum and a decay time of 560 μ s minimum, The peak voltage shall be at least 800 V and the peak short circuit current shall be at least 100 A.

Test Condition	ON-HOOK		OFF-HOOK	
	Normal	Reverse	Normal	Reverse
Tip to Ring	PASS	PASS	PASS	PASS

The surge shall have an open circuit voltage waveform in accordance a front time of 10 μ s maximum and a decay time of 160 μ s minimum, The peak voltage shall be at least 1500 V and the peak short circuit current shall be at least 200 A

Test Condition	ON-HOOK		OFF-HOOK	
	Normal	Reverse	Normal	Reverse
T+R to Gnd	PASS	PASS	PASS	PASS

CS-03 2.4.2 Telephone Line Surge-Type B

The surge shall have an open circuit voltage waveform in accordance a front time of 9 μ s \pm 30% and a decay time (td) of 720 μ s \pm 20%.The peak voltage shall be at least 1000 V and the peak short circuit current shall be at least 25A.

Test Condition	ON-HOOK		OFF-HOOK	
	Normal	Reverse	Normal	Reverse
Tip to Ring	PASS	PASS	PASS	PASS

The surge shall have an open circuit voltage waveform in accordance a front time of 9 μ s \pm 30% and a decay time (td) of 720 μ s \pm 20%.The peak voltage shall be at least 1500 V and the peak short circuit current shall be at least 37.5A.

Test Condition	ON-HOOK		OFF-HOOK	
	Normal	Reverse	Normal	Reverse
T+R to Gnd	PASS	PASS	PASS	PASS

CS-03 2.5 Power Line Surge

2500V peak surge with 2us maximum rise time and 10us decay time to half crest is applied to the phase and neutral of the AC power line .The peak short circuit current shall be at least 1000A.

Test Condition	Normal	Reverse
Phase to Neutral	PASS	PASS
Phase to Gnd	N/A	N/A
Neutral to Gnd	N/A	N/A

Comments: PASS

CS-03 3.3.1 Metallic AC Energy

The power delivered into a 2-wire loop simulator circuit or into the transmit and receive pairs of a 4-wire loop simulator or into a 600 ohm termination (where appropriate) in the on-hook state, by loop-start or ground-start equipment shall not exceed -55 dBm within the frequency band from 200-3995 Hz. Network protective circuitry shall also assure that for any input level up to 10 dB above the overload point, the power to a 2-wire loop simulator circuit or the transmit and receive pairs of a 4-wire loop simulator circuit or into a 600 ohm termination (where appropriate) does not exceed the above limits.

Measurement (before E.S): Limit < -55dBm

Mode	Result (dBm)	Limit
On-Hook	-74.9 dBm	-55dBm
Off-Hook	-75.0 dBm	-55dBm

Measurement (after E.S): Limit <= -55dBm

Test Result: No change

Comments: PASS

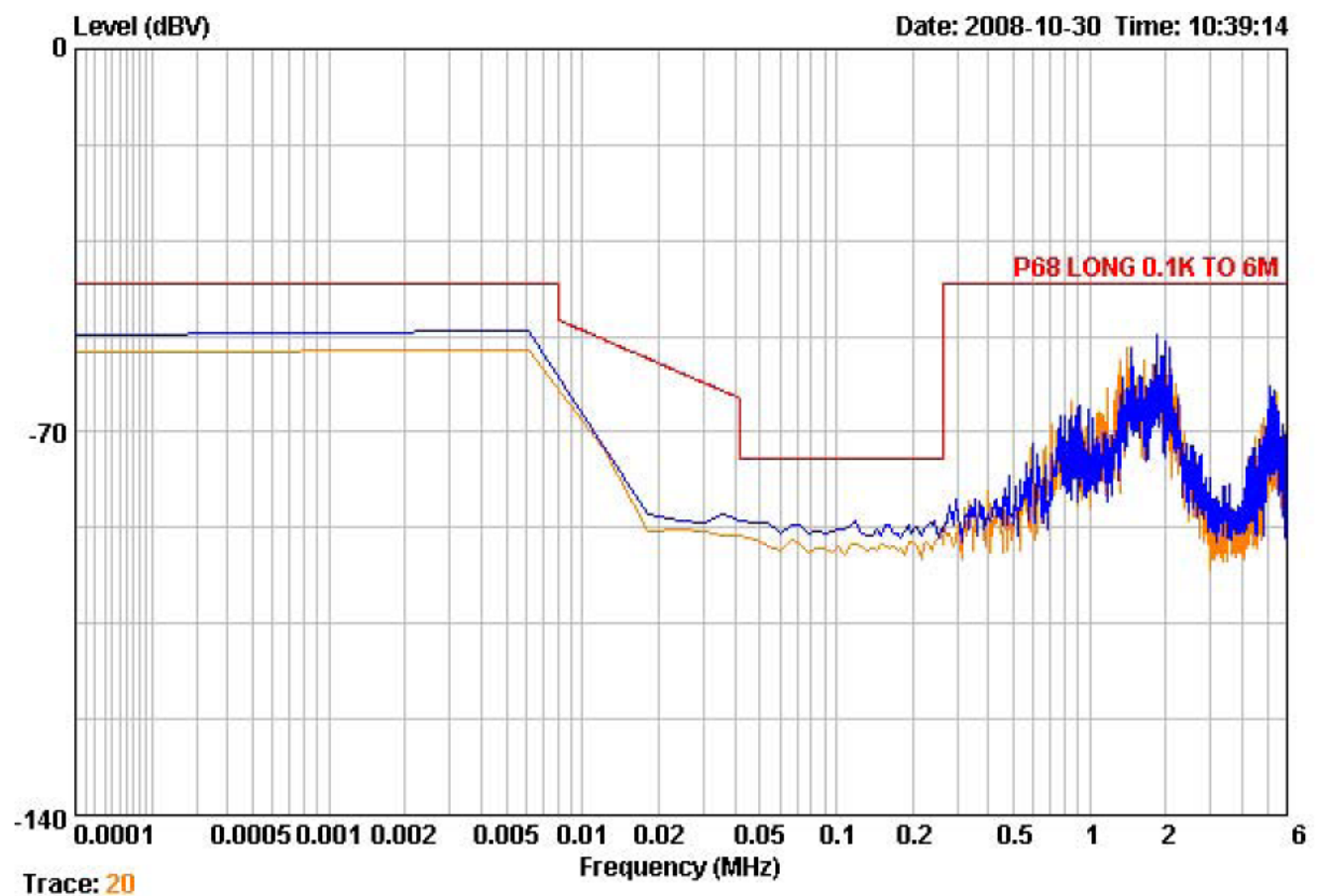
CS-03 3.3.2.1 Longitudinal Voltage in 100Hz to 4kHz range

CS-03 3.3.2.2 Longitudinal Voltage in the range of 4kHz to 270kHz

CS-03 3.3.2.3 Longitudinal Voltage in the range of 270kHz to 6MHz

The measurement value rms voltage as averaged over 100ms of the telephone interface under specified conditions shall not be exceed the limitations indicated below.

Measurement (before E.S):



Loop current : 20mA ==== Blue
: max mA == Orange

Measurement (after E.S):

Test Result: No change

Comments: PASS

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CS-03 3.4.1(1) In-band Metallic Signal Power Limitations**Voice band Metallic Level**

The power of all signal energy, in the frequency band from 200 to 3995 Hz, delivered by the TE or network protection device to the appropriate simulator (other than non-permissive data equipment or data protective circuitry) shall not exceed -9 dBm when averaged over any 3 second interval.

Measurement (before E.S): Limit < -9dBm

Loop current	20 mA	82 mA	Limit
Result	-13.0 dBm	-12.8 dBm	-9dBm

Measurement (after E.S): Limit < -9dBm

Test Result: No change

Comments: PASS

CS-03 3.4.6(1) Signal power in the 3995-4005Hz frequency band

For all operating conditions of TE and network protective circuitry which incorporate signal sources other than sources intended for network control signaling, the maximum power delivered by such sources in the 3995-4005 Hz band to an appropriate simulator circuit shall not exceed -27dBm.

Measurement (before E.S): < -27dBm

Loop current	20 mA	82 mA	Limit
Result	-87.1 dBm	-88.4 dBm	-27dBm

Measurement (after E.S): Limit < -27dBm

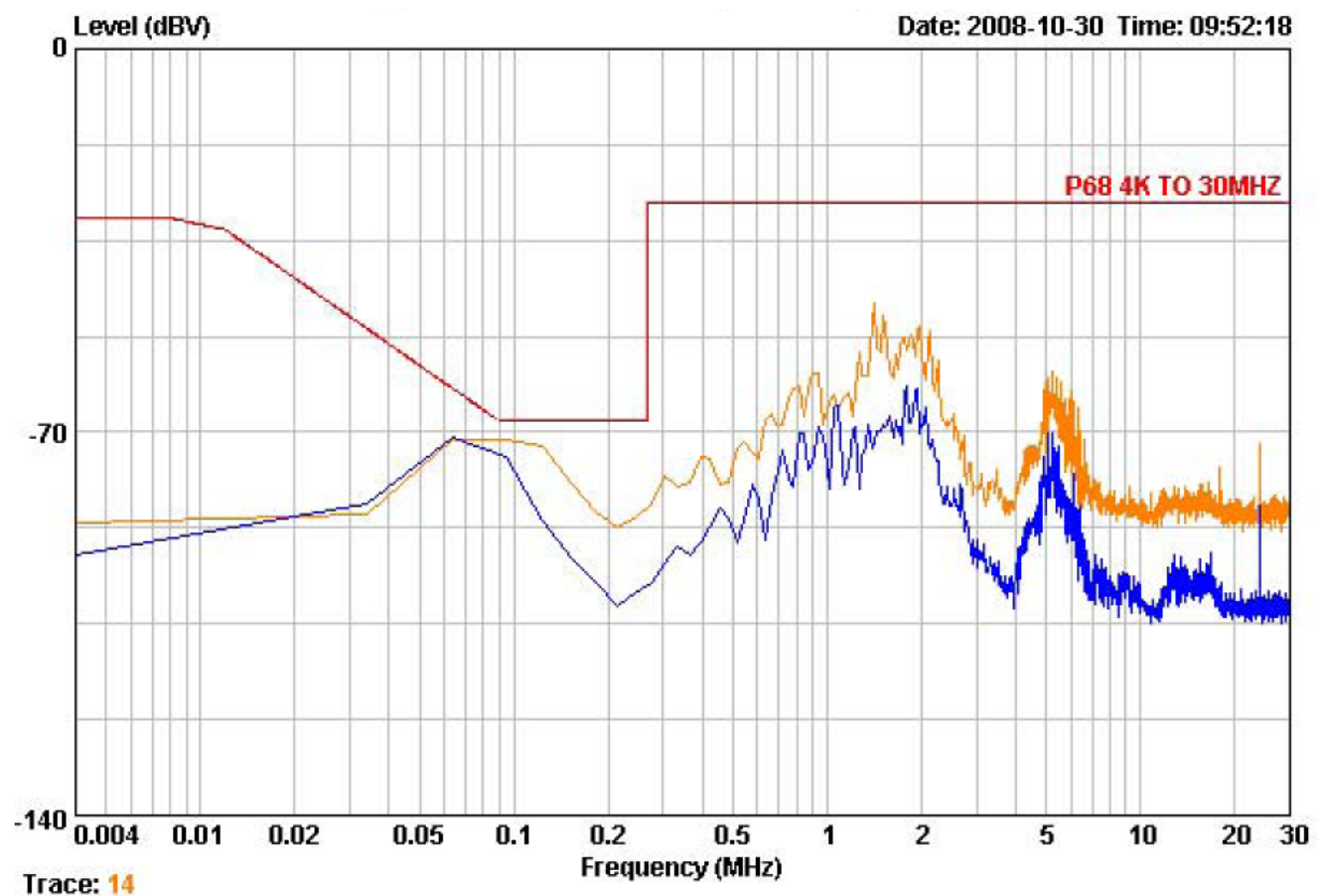
Test Result: No change

Comments: PASS

CS-03 3.4.6(2),(3) Out-of-band transmitted signal power -Metallic 4kHz to 30MHz

The signal level within the specified frequency band, when averaged over 100 ms between tip and ring of the TE shall not exceed the limitations indicated below.

Measurement (before E.S):



Loop current : 20mA ==== Blue
: max mA == Orange

Measurement (after E.S): Limit < -27dBm

Test Result: No change

Comments: PASS

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CS-03 3.5.2 Billing Protection - voice and data equipment Loop Current Requirements

For the loop current, the line seizure/ off-hook DCR must be less than 200 ohm, or the line current shall not decrease by more than 25% from its maximum value attained during this 5-second interval.

Measurement (before E.S):

Current(mA)	Normal		Reverse	
	Volt (V)	Res(Ω)	Volt (V)	Res(Ω)
20	8.24	412.0	8.22	411.0
30	9.43	314.3	9.46	315.3
40	10.61	265.3	10.58	264.5
50	11.50	230.0	11.60	232.0
60	12.65	221.9	12.57	220.5
70	13.40	191.4	13.53	193.3
80	14.32	179.0	14.23	177.9
90	15.01	166.8	15.08	167.6
100	15.90	159.0	15.88	158.8

Variation Of The Loop Current : <25%

Time	Normal				Reverse			
	Current (mA)	Volt (V)	Res (Ω)	Deviation (%)	Current (mA)	Volt (V)	Res (Ω)	Deviation (%)
1 sec.	82.0	14.1	171.8	0.0	82.1	14.1	172.1	0.0
2 sec.	82.0	14.1	171.8	0.0	82.1	14.1	172.1	0.0
3 sec.	82.0	14.1	171.8	0.0	82.1	14.1	172.1	0.0
4 sec.	82.0	14.1	171.8	0.0	82.1	14.1	172.1	0.0
5 sec.	82.0	14.1	171.8	0.0	82.1	14.1	172.1	0.0

CS-03 3.5.2 Billing Protection - voice and data equipment Loop Current Requirements

Measurement (after E.S): Limit < -27dBm

Test Result: No change

Comments: PASS

CS-03 3.5.3 Billing Protection - Signalling Interference

The energy measured within the band 2450-2750 Hz must be less than the energy measured within the band 800-2450 Hz.

Measurement (before E.S):

Freq (Hz)	Result (dBm)	
	20 mA	82 mA
800 - 2450	-13.0 dBm	-12.2 dBm
2450 - 2750	-48.5 dBm	-49.9 dBm

Measurement (after E.S):

Test Result: No change

Comments: PASS

CS-03 3.6.2(1) Transverse Balance Limitations

The longitudinal balance must meet the limitation listed below for the specific type of circuit.

State	Frequency (Hz)	Limit
Off-hook	200 Hz <= f <= 4000 Hz	40 dB
On-hook	200 Hz <= f <= 1000 Hz	60 dB
On-hook	1000 Hz <= f <= 4000 Hz	40 dB

Measurement (before E.S):

Freq (Hz)	Result (dB)			Limit
	0mA	20mA	82 mA	
200	94.7	97.9	99.1	>=60dB
400	88.3	90.0	90.6	>=60dB
600	84.6	86.6	87.4	>=60dB
800	81.9	83.6	84.1	>=60dB
1000	80.0	81.7	82.1	>=40dB
2000	73.9	75.8	76.0	>=40dB
3000	70.4	72.3	72.5	>=40dB
4000	67.9	69.7	70.1	>=40dB

Measurement (after E.S):

Test Result: No change

Comments: PASS

CS-03 3.7.1.1(1) On Hook Resistance, Metallic and Longitudinal (up to 100V)

CS-03 3.7.1.1(2) On Hook Resistance, Metallic and Longitudinal (100V to 200V)

The DC resistance between tip and ring, tip and ground, ring and ground must be above the limit.

Measurement (before E.S):

Tip-Ring

Vdc	uA (nor.)	uA (rev.)
10	0.13	0.19
20	0.15	0.21
30	0.17	0.24
40	0.23	0.25
50	0.24	0.26
60	0.26	0.30
70	0.27	0.32
80	0.29	0.34
90	0.34	0.35
100	0.35	0.37
150	0.50	0.49
200	0.54	0.59

Resistance (M ohm)

Normal	Reverse	Limit
769.2	537.6	5M ohm
1324.5	975.6	5M ohm
1724.1	1255.2	5M ohm
1739.1	1600.0	5M ohm
2066.1	1923.1	5M ohm
2281.4	2013.4	5M ohm
2592.6	2194.4	5M ohm
2721.1	2388.1	5M ohm
2678.6	2586.2	5M ohm
2824.9	2688.2	5M ohm
3030.3	3055.0	30K ohm
3676.5	3413.0	30K ohm

Resistance (G ohm)

Tip-Gnd

Vdc	Normal	Reverse
10	1.52	2.70
20	2.47	3.92
30	3.09	4.41
40	3.36	4.71
50	3.36	4.63
60	3.55	4.72
70	3.72	4.64
80	3.70	4.82
90	3.69	4.71
100	3.79	4.63
150	3.66	4.36
200	3.53	4.12

Resistance (G ohm)

Ring-Gnd

Normal	Reverse	Limit
2.27	3.03	5M ohm
2.70	3.77	5M ohm
3.57	4.35	5M ohm
3.92	4.49	5M ohm
4.00	4.50	5M ohm
4.26	4.44	5M ohm
4.35	4.55	5M ohm
4.28	4.44	5M ohm
4.37	4.50	5M ohm
4.33	4.44	5M ohm
4.04	4.18	30K ohm
3.82	3.97	30K ohm

CS-03 3.7.1.1(1) On Hook Resistance, Metallic and Longitudinal (up to 100V)

CS-03 3.7.1.1(2) On Hook Resistance, Metallic and Longitudinal (100V to 200V)

Measurement (after E.S):

Test Result: No change

Comments: PASS

CS-03 3.7.2 DC Current During Ringing

During the simulated ringing signal 150Vrms superimposed on 56.5Vdc, the DC current must be less than 3mA.

Measurement (before E.S): Limit <3mA (3000uA)

Freq (Hz)	Result (uA)		Limit (uA)
	Normal	Reverse	
17	10.0	10.0	3000
20	16.0	15.0	3000
23	8.0	8.0	3000
27	14.0	13.0	3000
30	10.0	13.0	3000
33	10.0	11.0	3000

Measurement (after E.S): Limit <3mA (3000uA)

Test Result: No change

Comments: PASS

CS-03 3.7.3 Metallic and Longitudinal impedance during Ringing

(1) During the application of simulated ringing, as listed in Table 3.7, to a loop-start or a ground-start interface, the impedance between the tip and ring conductors (defined as the quotient of applied AC voltage divided by resulting true rms current) shall be greater than the value specified in Table 3.7

Measurement (before E.S):

Tip to Ring

Impedance (k ohm)

Freq (Hz)	Vac	mA (nor.)	mA (rev.)	Normal	Reverse	Limit
17	130	1.45	1.45	89.7	89.7	1.4
20	130	1.69	1.69	76.9	77.1	1.4
23	130	1.93	1.93	67.5	67.5	1.4
27	130	2.24	2.24	58.0	58.0	1.0
30	130	2.47	2.47	52.6	52.6	1.0
33	130	2.70	2.70	48.1	48.1	1.0

Measurement (after E.S):

Test Result: No change

Comments: PASS

CS-03 3.7.3 Metallic and Longitudinal impedance during Ringing

(2) During the application of simulated ringing, as listed in Table 3.7, to a loop-start interface, the impedance between each of the tip and ring conductors and ground shall be greater than 100 kohms.

Measurement (before E.S):

Tip to Gnd

Impedance (M ohm)

Freq (Hz)	Vac	uA (nor.)	uA (rev.)	Normal	Reverse	Limit
17	130	1.51	1.13	86.15	114.64	≥ 0.1
20	130	1.72	1.31	75.80	99.54	≥ 0.1
23	130	1.94	1.48	67.04	87.72	≥ 0.1
27	130	2.22	1.70	58.45	76.47	≥ 0.1
30	130	2.43	1.86	53.48	69.93	≥ 0.1
33	130	2.63	2.02	49.49	64.26	≥ 0.1

Ring to Gnd

Impedance (M ohm)

Freq (Hz)	Vac	uA (nor.)	uA (rev.)	Normal	Reverse	Limit
17	130	1.51	1.14	86.32	114.04	≥ 0.1
20	130	1.72	1.31	75.76	99.09	≥ 0.1
23	130	1.94	1.49	66.87	87.42	≥ 0.1
27	130	2.22	1.71	58.45	76.11	≥ 0.1
30	130	2.42	1.87	53.70	69.71	≥ 0.1
33	130	2.65	2.03	49.09	64.10	≥ 0.1

Measurement (after E.S):

Test Result: No change

Comments: PASS

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Ringer Equivalence Definition(REN)

Measurement (before E.S):

a.On-Hook Resistance (CS-03 3.7.1.1)

Rdc1 : minimum dc resistance (100Vdc) = 2688.2 M ohm

Rdc2 : minimum dc resistance (200Vdc) = 3413.0 M ohm

b.On-Hook Ringing Current (CS-03 3.7.2)

Idc : maximum dc ringing current = 16 uA

c.On-Hook AC Impedance(CS-03 3.7.3)

Rac1:minimum on-hook ac impedance(lowest freq.) = 89.7 k ohm

Rac2:minimum on-hook ac impedance(highest freq.)= 48.1 k ohm

Calculation:

$$1.\text{renRdc1} = 25 / \text{Rdc1, Mohm} = 0.01$$

$$2.\text{renRdc2} = 150 / \text{Rdc2, Kohm} = 0.00$$

$$3.\text{renIdc} = \text{Idc} / (3/5), \text{ mA} = 0.03$$

$$4.\text{renRac1} = (1.4*5) / \text{Rac1, Kohm} = 0.08$$

$$5.\text{renRac2} = (1.0*5) / \text{Rac2, Kohm} = 0.10$$

Results:

$$\text{AC REN (max4/5)} = 0.10$$

$$\text{DC REN (max 1/2)} = 0.01$$

Measurement (after E.S):

Test Result: No change

Comments: PASS