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Authorized by: Professional Engineers Ontario
Engineering & Administrative
CERTIFICATED UL AGENCY
Testing For FCC Submissions/Verifications
Industry Canada Approved Test Facility
Qualified SP Facility

TEST REPORT

REPORT DATE:	16 March 2006		REPORT NO: 26045C/26046C
CONTENTS:	Test Matrix Test Results Photographs -		Pages 2 to 3 Pages 4 to 29 Attachments 1 to 6
RESPONSIBLE PARTY:	ASCALADE TECHNOLOGIES INC. 12051 Riverside Way Richmond, BC V6W 1K7 CANADA		
SUBJECT:	Model No.:		**VOIP321XY/ZZ** [Also covers Model CIT300]
	Ringer Equivalence No. (REN):		**0.0B (ac) 0.0 (dc)** **[Note: Customer wants AC REN as 0.1B]** [Refer to Page 4 for REN Calculation]
TEST SPECIFICATION:	TIA-968-A-3 and FCC 47 CFR Part 68, as applicable (NOTE: Tests Conducted are "Type" Tests).		
DATE SAMPLE RECEIVED:	13 & 23 February 2006 [VOIP321XY\ZZ and CIT300]	DATE TESTED:	27 & 28 February 2006; 01 & 10 March 2006
RESULTS:	Equipment tested complies with referenced specification **with the following modifications.** Note: The terms "BS" and "AS" used in report imply "Before Stress" and "After Stress".		
MODIFICATIONS:	**(1) R82 and R83 inductors were replaced with zero ohm SMT resistors.** **(2) Base pcb layout was changed to populate C101 and C102 capacitors.**		
Tested by:	Gary Nova	Approved by:	Robert G. Marshall, P. Eng.
Reviewed by:	Edward Chang	Date:	20 March 2006

TEST MATRIX

TIA-968-A-3 and FCC 47 CFR Part 68 REQUIREMENTS, as applicable	A	B	C	F	P	Q	TEST #	RATIONALE
ENVIRONMENTAL SIMULATION								
Mechanical Shock 4.2.1	x	x	x	x	x	x	25	Page 23
Telephone Line Surge - Type A, Metallic 4.2.2.1	x	x	x	x	x	x	20	Page 20
Telephone Line Surge - Type A, Longitudinal 4.2.2.2	x	x	x	x	x	x	21	N/A
Telephone Line Surge - Type B, Metallic 4.2.3.1	x	x	x	x	x	x	20	Page 20
Telephone Line Surge - Type B, Longitudinal 4.2.3.2	x	x	x	x	x	x	21	N/A
Power Line Surge 4.2.4	x	x	x	x	x	x	22	Page 21
LEAKAGE CURRENT LIMITATIONS (ANALOG AND DIGITAL) 4.3	x	x	x	x	x	x	23	Page 22
HAZARDOUS VOLTAGE LIMITATIONS								
General T & R 4.4	x	x	x	x	x	x	26	Page 24
E&M Leads 4.4.1.1 to 4.4.1.3								
OPS Voltage 4.4.1.4				x			33	N/A
DID Voltage 4.4.1.5							33	N/A
LADC Current and Voltage 4.4.1.6								
Ringdown Voiceband Private Line & Metallic Channel 4.4.1.7								
Physical Separation of Leads 4.4.2	x	x	x	x	x	x	30	N/A
Ringing Source Limitations 4.4.4				x			17	N/A
Intentional Operational Paths to Ground 4.4.5.1		x	x	x	x	x	24	N/A
Intentional Protective Paths to Ground 4.4.5.2	x	x	x	x	x	x	24	N/A
SIGNAL POWER LIMITATIONS 4.5								
Voiceband Signal Power Internal Signal Circuits 4.5.2.1	x	x	x	x			04	N/A
Voiceband Signal Power - Network Control Signals 4.5.2.2	x	x	x				27	Page 25
DC Conditions for Through Transmission (On Premise) 4.5.2.3.1	x	x	x	x				
Data Equipment Connect. For Through Transmission 4.5.2.3.2	x	x	x	x				
Voiceband Signal Power - Data 4.5.2.1, 4.5.2.4	x	x	x	x			04 05	N/A N/A
Through Transmission Amplification 4.5.2.5.1	x	x	x	x		x	12	N/A
Through Transmission 4.5.2.5.2	x	x	x	x		x	14	N/A
Tie Trunk Interfaces 4.5.2.6				x				
DC Conditions for OPS Ports 4.5.2.7				x			40	N/A
Signal Power 3995 Hz - 4005 Hz 4.5.3	x	x	x	x			06 13	Pages 10 and 11 N/A
Voiceband Longitudinal Voltage - 0.1kHz to 4 kHz 4.5.4	x	x	x	x			03	Pages 8 and 9
Non-LADC Metallic Voltage - 4 kHz to 6 MHz 4.5.5.1	x	x	x	x			06	Pages 10 and 11
Non-LADC Longitudinal Voltage - 4 kHz to 6 MHz 4.5.5.2	x	x	x	x			03	Pages 8 and 9
TRANSVERSE BALANCE LIMITATIONS								
Analog 4.6.1, 4.6.2	x	x					28	Page 26
Digital 4.6.1, 4.6.3					x	x	28	N/A

NOTE:

A - Loop Start *
B - Ground Start
C - Reverse Battery
F - Tie Trunk Conventional 2 Wire
P - Digital 1.544 MHz DE
Q - Digital 1.544MHz DD

TEST MATRIX

TIA-968-A-3 and FCC 47 CFR Part 68 REQUIREMENTS, as applicable	A	B	C	F	P	Q	TEST #	RATIONALE
ON-HOOK IMPEDANCE LIMITATIONS 4.7								
DC Resistance 4.7.2.1, 4.7.2.1.1	x						10	Pages 15 and 16
DC Current During Ringing 4.7.2.1.2, 4.7.3.1	x	x					08	Page 13
Ringing Frequency Impedance (Metallic) 4.7.2.1.3, 4.7.3.2	x	x					29	Page 27
Ringing Frequency Impedance (Longitudinal) 4.7.2.1.4	x	x					09	Page 14
REN Calculation 4.7.4	x	x						Calculation
OPS Interfaces for PBX with DID 4.7.6				x				
Stutter Dial Tone Detection 4.7.8.2	x	x					32	N/A
BILLING PROTECTION 4.8								
Call Duration for Data Protective Circuitry 4.8.1	x	x	x				31	N/A
Call Duration for Data Equipment 4.8.5, 4.8.6	x	x	x				31	N/A
On-Hook Signal Requirements 4.8.2	x	x	x				02	Page 7
Loop Current Requirements 4.8.3	x	x					11	Page 17
Signalling Interference 4.8.4	x	x	x				07	Page 12
Operating Requirements for DID (Analog TE) 4.8.7			x				16	N/A
SIX AND EIGHT POSITION MINIATURE PLUGS AND JACKS 6.1	x	x	x	x	x	x		

PART 68 REQUIREMENT	A	B	C	F	P	Q	TEST #	RATIONALE
MISCELLANEOUS FCC								
Limitations on Automatic Redialling 68.318(c)	x	x			x	x	15	N/A
Line Seizure by Automatic Telephone Dialling Systems 68.318(c)	x						15	N/A
Facsimile Machine Sender ID 68.318(d)	x							
Equal Access to Common Carriers 68.318(e)	x	x			x	x		
Belltap Immunity (FCC Form 730, item 31)							34	N/A
HEARING AID COMPATIBILITY 68.316	x					x	18 19	Pages 18 and 19 N/A
HEARING AID COMPATIBILITY - VOLUME CONTROL 68.317	x					x	45	Pages 28 and 29

NOTE:

A - Loop Start *
B - Ground Start
C - Reverse Battery
F - Tie Trunk Conventional 2-Wire
P - Digital 1.544 MHz DE
Q - Digital 1.544 MHz DD

EQUIPMENT EVALUATION SUMMARY

The EUT complied with every applicable requirement of TIA-968-A-3 and FCC Part 68, as applicable, before and after simulated environmental stress testing. It is the judgment of the technically qualified person responsible for preparation of this engineering evaluation that the device now complies, and should continue to comply, with TIA-968-A-3 and FCC Part 68, as applicable under normal conditions of usage throughout its life.

Refer to individual test pages for detailed results.

Ringer Equivalence Definition:

Q = 25M ohms/∞ M ohm
Q = 150K ohms/2000.00 M ohms
Q = 0.00 mA/0.6 mA
Q = Q_{68Hz} = 5x1600/1973.68 K ohms

Q = 0.0 dc
Q = 0.00008 dc
Q = 0.0 dc
Q = 0.004 ac

Ringer equivalence is 0.0 dc
0.0B (ac) [Note: Customer wants AC REN as **0.1B**]

CONCLUSION

The equipment complied with all of the technical requirements of TIA-968-A-3 and FCC Part 68, as applicable before and after environmental stress.

It is the opinion of the technical reviewer that, based on the data presented herein, this equipment complies, and will continue to comply, with TIA-968-A-3, and FCC Part 68, as applicable requirements under all conditions of normal usage.

TEST 01 **OPERATIONAL PERFORMANCE**

REFERENCE: CS-03, Issue 9, Part I, Clause 1.7; Part II, Clause 2.2

CONDITIONS: ON AND OFF HOOK

FEATURES TESTED **(MODEL VOIP321XY/ZZ)**

BEFORE STRESS		AFTER STRESS	BEFORE STRESS		AFTER STRESS
x	MUTE	x		MUSIC-ON HOLD	
	HOLD		x	HANDSET SPEAKERPHONE	x
x	TRANSMISSION	x		CONFERENCE	
x	RINGER DETECTION	x		ON-HOOK DIALLING	
x	REDIAL	x		AUTO-DIALLING	
	ANSWERING MACHINE			MODEM BAUD RATE **BPS**	
x	CALLER ID	x	x	VOICE CALL OVER THE INTERNET Unit tested with the following: (i) desk top PC Dell Dimensions 1100 (ii) monitor MAGDX700T (FCC ID: IAWV7T001) (iii) keyboard (FCC ID: AQ6-7D30)	x

REFERENCE: *FCC Form 730 Item 17(c); *ACTA Guidelines & Procedures Item 12

***NETWORK SIGNALLING**

☐ DUAL-TONE MULTI-FREQUENCY ("DTMF") **(T)**

☐ PULSE **(R)**

✔ **DTMF/PULSE (E)**

☐ NO SIGNALLING **(N)**

NOTE:
T - If the device performs dual-tone multi-frequency ("DTMF") signalling.
R - If the device performs rotary (pulse) signalling.
E - If the device performs either DTMF or pulse signalling (selectable).
N - If the device does no signalling.

RESULTS: OPERATES ACCORDING TO THE OPERATOR'S MANUAL

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 01 **OPERATIONAL PERFORMANCE**

REFERENCE: CS-03, Issue 9, Part I, Clause 1.7; Part II, Clause 2.2

CONDITIONS: ON AND OFF HOOK

FEATURES TESTED **(MODEL CIT300)**

BEFORE STRESS		AFTER STRESS	BEFORE STRESS		AFTER STRESS
x	MUTE	x		MUSIC-ON HOLD	
	HOLD		x	HANDSET SPEAKERPHONE	x
x	TRANSMISSION	x		CONFERENCE	
x	RINGER DETECTION	x		ON-HOOK DIALLING	
x	REDIAL	x		AUTO-DIALLING	
	ANSWERING MACHINE			MODEM BAUD RATE **BPS**	
x	CALLER ID	x	x	VOICE CALL OVER THE INTERNET Unit tested with the following: (i) desk top PC Dell Dimensions 1100 (ii) monitor MAGDX700T (FCC ID: IAWV7T001) (iii) keyboard (FCC ID: AQ6-7D30)	x

REFERENCE: *FCC Form 730 Item 17(c); *ACTA Guidelines & Procedures Item 12

***NETWORK SIGNALLING**

☐ DUAL-TONE MULTI-FREQUENCY ("DTMF") **(T)**

☐ PULSE **(R)**

✔ **DTMF/PULSE (E)**

☐ NO SIGNALLING **(N)**

NOTE:
T - If the device performs dual-tone multi-frequency ("DTMF") signalling.
R - If the device performs rotary (pulse) signalling.
E - If the device performs either DTMF or pulse signalling (selectable).
N - If the device does no signalling.

RESULTS: OPERATES ACCORDING TO THE OPERATOR'S MANUAL

TECHNICIAN: Gary Nova DATE: 01 March 2006

TEST 02 **METALLIC AC ENERGY/ON-HOOK SIGNAL LEVEL**

REFERENCE: CS-03, Issue 9, Part I, Clause 3.3.1/3.3.2; Part II, Clause 3.6.2; Part VII, Clause 3.2.6 TIA-968-A, Clause 4.8.2

CONDI-TION	FREQUENCY BAND	SPECIFICATION	MEASURED VALUES	
			BEFORE STRESS	AFTER STRESS
T-R	200-3995 Hz	-55 dBm (CO Lines & Trunks)	-73 **dBm**	-73 **dBm**
T-R	200-3995 Hz	-55 dBm (Channels & Reverse Battery)		

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 03 **LONGITUDINAL AC SIGNALS**

REFERENCE: CS-03, Issue 9, Clause 3.3.3.1 (1)

A. **LONGITUDINAL VOLTAGE F/4000 TRANSFER FUNCTION (100-4KHz, 500Ω)**
TIA-968-A, Clause 4.5.4

MAX SPECIFICATION	MEASURED VALUES (dBV)	
	BEFORE STRESS	AFTER STRESS
ON-HOOK, -30dBV	-74	-74
OFF-HOOK, 20.7 mA -30dBV	-74	-74
OFF-HOOK, 70 mA -30dBV	-74	-74

B. **LONGITUDINAL VOLTAGE (4KHz to 6MHz)**
TIA-968-A, Clause 4.5.5.2

FREQ. RANGE (KHz)	SPEC (dBV)	MEASURED VALUES (dBV)					
		ON HOOK		OFF HOOK 20.7 mA		OFF HOOK 70 mA	
		Before Surge	After Surge	Before Surge	After Surge	Before Surge	After Surge
4 - 12	-36	-70	-70	-70	-70	-70	-70
12 - 42	-60	-87	-87	-84	-84	-84	-84
42 - 270	-62	-87	-87	-84	-84	-84	-84
270 - 6000	-30	-66	-66	-67	-67	-67	-67

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 03 **LONGITUDINAL AC SIGNALS**

REFERENCE: CS-03, Issue 9, Clause 3.3.3.1 (1)

(With VOIP Connected)

A. **LONGITUDINAL VOLTAGE F/4000 TRANSFER FUNCTION (100-4KHz, 500Ω)**
TIA-968-A, Clause 4.5.4

MAX SPECIFICATION	MEASURED VALUES (dBV)	
	BEFORE STRESS	AFTER STRESS
ON-HOOK, -30dBV	-74	-74
OFF-HOOK, 20.7 mA -30dBV	-74	-74
OFF-HOOK, 70 mA -30dBV	-74	-74

B. **LONGITUDINAL VOLTAGE (4KHz to 6MHz)**
TIA-968-A, Clause 4.5.5.2

FREQ. RANGE (KHz)	SPEC (dBV)	MEASURED VALUES (dBV)					
		ON HOOK		OFF HOOK 20.7 mA		OFF HOOK 70 mA	
		Before Surge	After Surge	Before Surge	After Surge	Before Surge	After Surge
4 - 12	-36	-68	-68	-68	-68	-68	-68
12 - 42	-60	-70	-70	-70	-70	-70	-70
42 - 270	-62	-70	-70	-71	-71	-71	-71
270 - 6000	-30	-57	-57	-58	-58	-58	-58

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 10 March 2006

TEST 06 **OUT OF BAND TRANSMITTED SIGNAL POWER**

REFERENCE: CS-03, Issue 9, Cl. 3.4.6 (1), (2), and (3); 3.4.8

A. **The Signal Power in the frequency band from 3995-4005 Hz shall be 18 dB below the maximum permitted power of -9dBm for the Voice Band Signal.**
TIA-968-A, Clause 4.5.3.1

FREQ. RANGE (Hz)	SPEC	MEASURED VALUES (dBm)							
		Telephone		Application Voice		Pre-Recorded Outgoing Messages		Signals on Hold	
		B. S.	A. S.	B. S.	A. S.	B. S.	A. S.	B. S.	A. S.
3995-4005	-27dBm Data/Voice	-80	-80						

B. **METALLIC VOLTAGE**
TIA-968-A, Clause 4.5.5.1

CENTRE FREQ. OF 8KHz BAND (KHz)	SPEC (dBV)	MEASURED VALUES (dBV)					
		ON HOOK		OFF-HOOK 20.7 mA		OFF-HOOK 70 mA	
		B. S.	A. S.	B. S.	A. S.	B. S.	A. S.
4 - 12	-18	-74	-74	-74	-74	-74	-74
12 - 90	-55	-90	-90	-90	-90	-90	-90
90 - 270	-55	-90	-90	-90	-90	-90	-90
270 - 30000	-15	-84	-84	-83	-83	-83	-83

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 27 February 2006

TEST 06 **OUT OF BAND TRANSMITTED SIGNAL POWER**

REFERENCE: CS-03, Issue 9, Cl. 3.4.6 (1), (2), and (3); 3.4.8

(With VOIP Connected)

A. **The Signal Power in the frequency band from 3995-4005 Hz shall be 18 dB below the maximum permitted power of -9dBm for the Voice Band Signal.**
TIA-968-A, Clause 4.5.3.1

FREQ. RANGE (Hz)	SPEC	MEASURED VALUES (dBm)							
		Telephone		Application Voice		Pre-Recorded Outgoing Messages		Signals on Hold	
		B. S.	A. S.	B. S.	A. S.	B. S.	A. S.	B. S.	A. S.
3995-4005	-27dBm Data/Voice	-80	-80						

B. **METALLIC VOLTAGE**
TIA-968-A, Clause 4.5.5.1

CENTRE FREQ. OF 8KHz BAND (KHz)	SPEC (dBV)	MEASURED VALUES (dBV)					
		ON HOOK		OFF-HOOK 20.7 mA		OFF-HOOK 70 mA	
		B. S.	A. S.	B. S.	A. S.	B. S.	A. S.
4 - 12	-18	-74	-74	-75	-75	-75	-75
12 - 90	-55	-90	-90	-90	-90	-90	-90
90 - 270	-55	-89	-89	-90	-90	-90	-90
270 - 30000	-15	-66	-66	-62	-62	-62	-62

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 10 March 2006

TEST 07 **SINGLE FREQUENCY RESTRICTION**

REFERENCE: CS-03, Issue 9, Part I, Cl. 3.5.2, 3.4.8; Part II, Cl. 3.6.4; Part VI, Cl.3.5.4 and Part VII, Cl.3.2.5; TIA-968-A, Clause 4.8.4

CONDITION: OFF-HOOK

CRITERIA: **The energy in the 2450-2750 Hz band shall not exceed the energy in the 800-2450 Hz band.**

MODE	SPECIFICATION (RATIO X/Y)	MEASURED VALUE (RATIO X/Y)	
		BEFORE STRESS	AFTER STRESS
Telephone	<1.0	<0.1	<0.1
Application Voice	<1.0		
Pre-Recorded Outgoing Messages	<1.0		
	<1.0		
	<1.0		
	<1.0		
X = Energy in 2450-2750 Hz Band Y = Energy in 800-2450 Hz Band			

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 08 **DC CURRENT DURING RINGING**

REFERENCE: CS-03, Issue 9, Clause 3.7.2; TIA-968-A, Clause 4.7.2.3 and 4.7.3.1

	SPECIFICATIONS			MEASURED VALUE (mA)	
RINGER TYPE	AC V RMS	DC VOLTS	I max. (mA)	BEFORE STRESS	AFTER STRESS
B	40-130V, 15 Hz	+56.5	3	0.0	0.0
B	40-130V, 15 Hz	-56.5	3	0.0	0.0
A, B & IC	40-130V, 20 Hz	+56.5	3	0.0	0.0
A, B & IC	40-130V, 20 Hz	-56.5	3	0.0	0.0
A, B & IC	40-130V, 30 Hz	+56.5	3	0.0	0.0
A, B & IC	40-130V, 30 Hz	-56.5	3	0.0	0.0
B	62-130V, 35Hz	+56.5	3	0.0	0.0
B	62-130V, 35Hz	-56.5	3	0.0	0.0
B	62-130V, 40Hz	+56.5	3	0.0	0.0
B	62-130V, 40Hz	-56.5	3	0.0	0.0
B	62-130V, 45Hz	+56.5	3	0.0	0.0
B	62-130V, 45Hz	-56.5	3	0.0	0.0
B	62-150V, 50Hz	+56.5	3	0.0	0.0
B	62-150V, 50Hz	-56.5	3	0.0	0.0
B	62-150V, 55Hz	+56.5	3	0.0	0.0
B	62-150V, 55Hz	-56.5	3	0.0	0.0
B	62-150V, 60Hz	+56.5	3	0.0	0.0
B	62-150V, 60Hz	-56.5	3	0.0	0.0
B	62-150V, 64Hz	+56.5	3	0.0	0.0
B	62-150V, 64Hz	-56.5	3	0.0	0.0
B	62-150V, 68Hz	+56.5	3	0.0	0.0
B	62-150V, 68Hz	-56.5	3	0.0	0.0

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 09 **ON-HOOK IMPEDANCE**

REFERENCE: CS-03, Issue 9, Clause 3.7.3.1 (2); TIA-968-A, Clause 4.7.2.5

CRITERIA: **The AC Impedance from tip to ground and ring to ground during simulated ringing shall be greater than 100KΩ**

SPECIFICATION			CURRENT (μA) (DC + AC RMS)		IMPEDANCE (KΩ)	
CRITERIA (KΩ)	VOLTAGE/ FREQ (Hz)	RINGER TYPE	BEFORE STRESS	AFTER STRESS	BEFORE STRESS	AFTER STRESS
TIP TO GROUND AC MEASUREMENT:						
>100	130/15	B	0	0	∞	∞
>100	130/20	A&B	0	0	∞	∞
>100	130/30	A&B	0	0	∞	∞
>100	130/35	B	0	0	∞	∞
>100	130/40	B	0	0	∞	∞
>100	130/45	B	0	0	∞	∞
>100	150/50	B	0	0	∞	∞
>100	150/55	B	0	0	∞	∞
>100	150/60	B	0	0	∞	∞
>100	150/64	B	0	0	∞	∞
>100	150/68	B	0	0	∞	∞
RING TO GROUND AC MEASUREMENT:						
>100	130/15	B	0	0	∞	∞
>100	130/20	A&B	0	0	∞	∞
>100	130/30	A&B	0	0	∞	∞
>100	130/35	B	0	0	∞	∞
>100	130/40	B	0	0	∞	∞
>100	130/45	B	0	0	∞	∞
>100	150/50	B	0	0	∞	∞
>100	150/55	B	0	0	∞	∞
>100	150/60	B	0	0	∞	∞
>100	150/64	B	0	0	∞	∞
>100	150/68	B	0	0	∞	∞
Ringer Equivalence: Sensitivity of reading is limited to 1000KΩ						

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 10 **ON-HOOK DC RESISTANCE**

REFERENCE: CS-03, Issue 9, Clause 3.7.1; TIA-968-A, Clause 4.7.2.1 and 4.7.2.2

CRITERIA: **The DC Resistance Tip to Ring, Tip to Ground, Ring to Ground shall be greater than 5MΩ from 1-100 Volts and greater than 30KΩ from 100-200 Volts.**

SPECIFICATION		DC CURRENT (μA)		DC RESISTANCE V/I (MΩ)	
MINIMUM RESISTANCE	DC VOLTAGE APPLIED	BEFORE STRESS	AFTER STRESS	BEFORE STRESS	AFTER STRESS
TIP TO RING					
5MΩ	+1 V	0	0	∞	∞
5MΩ	-1 V	0	0	∞	∞
5MΩ	+5 V	0	0	∞	∞
5MΩ	-5 V	0	0	∞	∞
5MΩ	+10 V	0	0	∞	∞
5MΩ	-10 V	0	0	∞	∞
5MΩ	+20 V	0	0	∞	∞
5MΩ	-20 V	0	0	∞	∞
5MΩ	+30 V	0	0	∞	∞
5MΩ	-30 V	0	0	∞	∞
5MΩ	+40 V	0	0	∞	∞
5MΩ	-40 V	0	0	∞	∞
5MΩ	+50 V	0	0	∞	∞
5MΩ	-50 V	0	0	∞	∞
5MΩ	+60 V	0	0	∞	∞
5MΩ	-60 V	0	0	∞	∞
5MΩ	+70 V	0	0	∞	∞
5MΩ	-70 V	0	0	∞	∞
5MΩ	+80 V	0	0	∞	∞
5MΩ	-80 V	0	0	∞	∞
5MΩ	+90 V	0	0	∞	∞
5MΩ	-90 V	0	0	∞	∞
5MΩ	+100V	0	0	∞	∞
5MΩ	-100V	0	0	∞	∞
30KΩ	+150V	0	0	∞	∞
30KΩ	-150V	0	0	∞	∞
30KΩ	+200V	0.1	0.1	2000.00	2000.00
30KΩ	-200V	-0.1	-0.1	2000.00	2000.00

TEST 10 **ON-HOOK DC RESISTANCE**

SPECIFICATION		DC CURRENT (μA)		DC RESISTANCE V/I (MΩ)	
MINIMUM RESISTANCE	DC VOLTAGE APPLIED	BEFORE STRESS	AFTER STRESS	BEFORE STRESS	AFTER STRESS
RING TO GROUND					
5MΩ	+100V	0	0	∞	∞
5MΩ	-100V	0	0	∞	∞
30KΩ	+150V	0	0	∞	∞
30KΩ	-150V	0	0	∞	∞
30KΩ	+200V	0	0	∞	∞
30KΩ	-200V	0	0	∞	∞
TIP TO GROUND					
5MΩ	+100V	0	0	∞	∞
5MΩ	-100V	0	0	∞	∞
30KΩ	+150V	0	0	∞	∞
30KΩ	-150V	0	0	∞	∞
30KΩ	+200V	0	0	∞	∞
30KΩ	-200V	0	0	∞	∞

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 11 **BILLING PROTECTION** - VOICE & DATA EQUIPMENT

REFERENCE: CS-03, Issue 9, Clause 3.5.1; TIA-968-A, Clause 4.8.3

BILLING PROTECTION

Handset Earpiece/Speakerphone

SPECIFICATIONS			OFF-HOOK MEASURED VALUES (mA)					
LOOP	I (200 Ω) (mA)	I unit -25% (mA)	INIT'L CURRENT		HOLD CURRENT		IN 5 SECONDS	
			BEFORE STRESS	AFTER STRESS	BEFORE STRESS	AFTER STRESS	BEFORE STRESS	AFTER STRESS
+42.5V 1740 Ω	+22	15.5	20.7	20.7	—	—	20.7	20.7
-42.5V 1740 Ω	-22	-15.5	-20.7	-20.7	—	—	-20.7	-20.7
+52.5V 1200 Ω	+37.5	27.4	36.5	36.5	—	—	36.5	36.5
-52.5V 1200 Ω	-37.5	-27.4	-36.5	-36.5	—	—	-36.5	-36.5
+52.5V 400 Ω	+87.5	72.7	96.9	96.9	—	—	97.1	97.1
-52.5V 400 Ω	-87.5	-72.7	-96.9	-96.9	—	—	-97.1	-97.1

CURRENT DOESN'T DECREASE MORE THAN 25% AFTER 5 SECONDS

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 18 **HEARING AID COMPATIBILITY TEST**

REFERENCE: CS-03, Issue 9, Part V Clause 4 FCC, Part 68, Clause 68.316

CONDITION: SPEAKER **Kan Tsang** **SD157BH-C1** **(MODEL VOIP321XY/ZZ)**

CRITERIA:
1. AXIAL > -19 dB
2. RADIAL > -27 dB
3. FREQUENCY RESPONSE WITHIN LIMITS ON GRAPH

INPUT: 1KHz AT -10 dBV READING: dB RELATIVE TO 1A/m

1. AXIAL : -5.5 **dB**
2. RADIAL: 0 DEG.: -14.5 **dB** 90 DEG.: -16 **dB**
   180 DEG.: -14.5 **dB** 270 DEG.: -16 **dB**

3. FREQUENCY RESPONSE:

LOW VOLUME

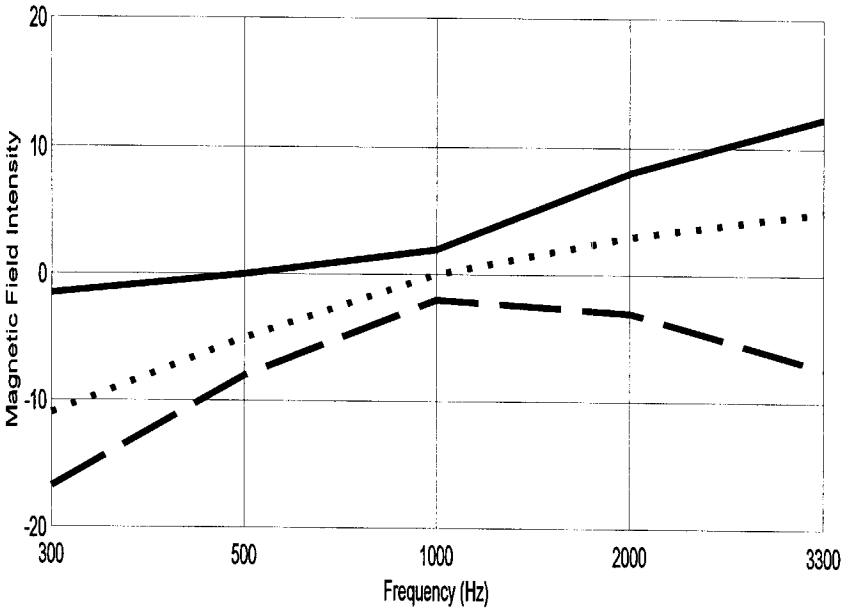

Figure 4.2

Magnetic Field Intensity Frequency Response for Receivers with an Axial Field that Exceeds -19dB Relative to 1 A/m Without Using an Integrator (See Section 4.4 and Figure 2).

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 18 **HEARING AID COMPATIBILITY TEST**

REFERENCE: CS-03, Issue 9, Part V Clause 4 FCC, Part 68, Clause 68.316

CONDITION: SPEAKER **Kan Tsang** **SD157BH-2** **(MODEL CIT300)**

CRITERIA:
1. AXIAL > -19 dB
2. RADIAL > -27 dB
3. FREQUENCY RESPONSE WITHIN LIMITS ON GRAPH

INPUT: 1KHz AT -10 dBV READING: dB RELATIVE TO 1A/m

1. AXIAL : -7.5 **dB**
2. RADIAL: 0 DEG.: -18.5 **dB** 90 DEG.: -19 **dB**
   180 DEG.: -19.5 **dB** 270 DEG.: -19 **dB**

3. FREQUENCY RESPONSE:

LOW VOLUME

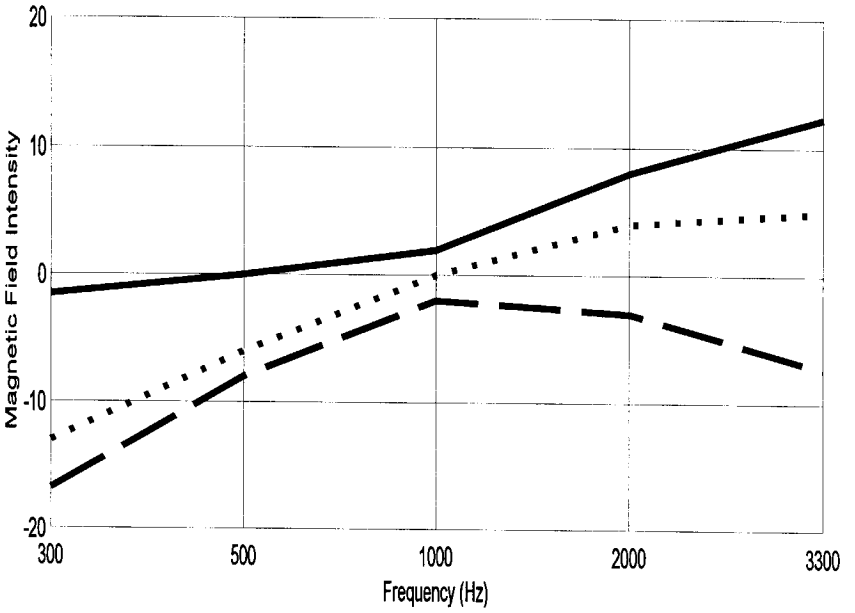

Figure 4.2

Magnetic Field Intensity Frequency Response for Receivers with an Axial Field that Exceeds -19dB Relative to 1 A/m Without Using an Integrator (See Section 4.4 and Figure 2).

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 01 March 2006

TEST 20 **METALLIC VOLTAGE SURGE (TYPE A)**

REFERENCE: CS-03, Issue 9, Clause 2.4; TIA-968-A, Clause 4.2.2.1

CRITERIA: **The unit shall not cause harm to the Network after the Metallic Voltage Surges.**

TEST	CONDITION	APPLIED TO	RESULT *
+800V (10 x 560 μS)	ON-HOOK	T - R	Satisfactory
-800V (10 x 560 μS)	ON-HOOK	T - R	Satisfactory
+800V (10 x 560 μS)	OFF-HOOK/SPEAKERPHONE	T - R	Satisfactory
-800V (10 x 560 μS)	OFF-HOOK/SPEAKERPHONE	T - R	Satisfactory
+800V (10 x 560 μS)	OFF-HOOK (HANDSET)	T - R	Satisfactory
-800V (10 x 560 μS)	OFF-HOOK (HANDSET)	T - R	Satisfactory
+800V (10 x 560 μS)	HOLD	T - R	—
-800V (10 x 560 μS)	HOLD	T - R	—

***Unit operational after surge**

METALLIC VOLTAGE SURGE (TYPE B)

TIA-968-A, Clause 4.2.3.1

TEST	CONDITION	APPLIED TO	RESULT *
+1000V (9 x 720 μS)	ON-HOOK	T - R	Satisfactory
- 1000V (9 x 720 μS)	ON-HOOK	T - R	Satisfactory
+1000V (9 x 720 μS)	OFF-HOOK/SPEAKERPHONE	T - R	Satisfactory
- 1000V (9 x 720 μS)	OFF-HOOK/SPEAKERPHONE	T - R	Satisfactory
+1000V (9 x 720 μS)	OFF-HOOK/HANDSET	T - R	Satisfactory
- 1000V (9 x 720 μS)	OFF-HOOK/HANDSET	T - R	Satisfactory
+1000V (9 x 720 μS)	HOLD	T - R	—
- 1000V (9 x 720 μS)	HOLD	T - R	—

***Unit operational after surge.**

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 22 **LONGITUDINAL VOLTAGE/POWER LINE SURGE**

REFERENCE: CS-03, Issue 9, Clause 2.5; TIA-968-A, Clause 4.2.4

CRITERIA: **The unit shall not cause harm to the Network after the Longitudinal Voltage/Power Line Surges.**

TEST	CONDITION	APPLIED TO	RESULT
+2500V (2 x 10)	ON-HOOK	PHASE TO NEUTRAL	Satisfactory
+2500V (2 x 10)	ON-HOOK	PHASE TO NEUTRAL	Satisfactory
+2500V (2 x 10)	ON-HOOK	PHASE TO NEUTRAL	Satisfactory
-2500V (2 x 10)	ON-HOOK	PHASE TO NEUTRAL	Satisfactory
-2500V (2 x 10)	ON-HOOK	PHASE TO NEUTRAL	Satisfactory
-2500V (2 x 10)	ON-HOOK	PHASE TO NEUTRAL	Satisfactory

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 23 **LONGITUDINAL STEADY STATE VOLTAGE (DIELECTRIC STRENGTH)/LEAKAGE CURRENT**

REFERENCE: CS-03, Issue 9, Clause 2.2; TIA-968-A, Clause 4.3

CRITERIA: **Leakage Current shall not exceed 10mA Peak**

Points Tested		
x	a)	Tip, Ring and other Telephone Connections
x	b)	Commercial Power Connections
x	c)	Exposed Conductive Surfaces or Exposed Circuitry
	d)	Terminals to Certified (approved) protective circuitry or Non-certified (non-approved) Equipment
	e)	All Auxiliary Lead Terminals
	f)	All E & M Lead Terminals
	g)	All PR, PC, CY1 and CY2 Leads

	TEST COMBINATIONS	TEST VOLTAGE Vrms, 60Hz	CRITERIA	MEASURED VALUE (mA Peak)	
				BEFORE STRESS	AFTER STRESS
x	(a) and (b)	1500	10mA	0.07	0.07
x	(a) and (c)	1000	10mA	3.38	3.38
	(a) and (d)	1000	10mA		
	(a) and (e)	1000	10mA		
	(a) and (f)	1000	10mA		
	(a) and (g)	1000	10mA		
x	(b) and (c)	1500	10mA	0.05	0.05
	(b) and (d)	1500	10mA		
	(b) and (e)	1500	10mA		
	(b) and (f)	1500	10mA		
	(b) and (g)	1500	10mA		
	(c) and (e)	1000	10mA		
	(c) and (f)	1000	10mA		
	(d) and (e)	1000	10mA		
	(d) and (f)	1000	10mA		
	(e) and (f)	1000	10mA		

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 25 **MECHANICAL SHOCK**

REFERENCE: CS-03, Issue 9, Clause 2.1; TIA-968-A, Clause 4.2.1

CRITERIA: **The unit shall not cause harm to the Network after the Drop Shock Stresses**

EQUIPMENT WEIGHT: Unpackaged (lb): **1.6**

EQUIPMENT	TEST	DAMAGE
UNPACKAGED Handheld	(All drops onto concrete covered with 3 mm asphalt tile.) 18 random 1.5 m drops.	 None
Desk Top (0-5 kg)	One 750 mm drop on each normal or designated rest face.	None
	One 750 mm drop on other faces and corners.	None
	One 750 mm drop on each corner.	None
	One 750 mm edgewise and corner-wise drop on each edge and corner adjacent to rest face.	None

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 26 **HAZARDOUS VOLTAGES**

REFERENCE: CS-03 , Issue 9, Clause 2.3.1; TIA-968-A, Clause 4.4.1

CRITERIA: **Voltage shall not exceed 70 V Pk after 1 second.**

VOLTAGE MEASURED AT:	MEASURED VALUE PEAK VOLTAGE (V)	
MEASURED LEADS	B. S.	A. S.
TIP TO RING	0	0
TIP TO GROUND	—	—
RING TO GROUND	—	—
TIP & RING TO GROUND	—	—

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 27 **NETWORK CONTROL SIGNALLING**

REFERENCE: CS-03, Issue 9, Clause 3.4.3; TIA-968-A, Clause 4.5.2.2

CRITERIA: **Limitation on Signal Sources Primarily Intended for Network Signalling in Voice and Data Equipment.**

Handset Earpiece/Speakerphone

SPECIFICATION				SIGNAL LEVEL IN dBm MEASURED WITH VARIOUS LOOP CURRENTS					
				BEFORE STRESS (dBm)			AFTER STRESS (dBm)		
BUTTON DESIGNATION	LIMIT (dBm)								
	DTMF	TIE TRUNK	OTHER	20 mA	40 mA	70 mA	20 mA	40 mA	70 mA
"0"	0	-4	-9	-8	-8	-8	-8	-8	-8
"1"	0	-4	-9	-8	-8	-8	-8	-8	-8
"2"	0	-4	-9	-8	-8	-8	-8	-8	-8
"3"	0	-4	-9	-8	-8	-8	-8	-8	-8
"4"	0	-4	-9	-8	-8	-8	-8	-8	-8
"5"	0	-4	-9	-8	-8	-8	-8	-8	-8
"6"	0	-4	-9	-8	-8	-8	-8	-8	-8
"7"	0	-4	-9	-8	-8	-8	-8	-8	-8
"8"	0	-4	-9	-8	-8	-8	-8	-8	-8
"9"	0	-4	-9	-8	-8	-8	-8	-8	-8
"*"	0	-4	-9	-8	-8	-8	-8	-8	-8
"#"	0	-4	-9	-8	-8	-8	-8	-8	-8

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 28 **TRANSVERSE BALANCE**

REFERENCE: CS-03, Issue 9, Clause 3.6; TIA-968-A, Clause 4.6

CRITERIA: **Transverse Balance Shall not be less than minimum values specified below.**

SPECIFICATION		dB BALANCE							
		ON-HOOK		OFF-HOOK					
		BEFORE STRESS	AFTER STRESS	BEFORE STRESS			AFTER STRESS		
FREQ. (Hz)	MINIMUM BALANCE REQUIREMENT			LOOP CURRENT (mA)			LOOP CURRENT (mA)		
				20	45	70	20	45	70
200	60 On Hook (40 Off Hook and Data)	>90	>90	>90	>90	>90	>90	>90	>90
400	60 On Hook (40 Off Hook and Data)	>90	>90	>90	>90	>90	>90	>90	>90
600	60 On Hook (40 Off Hook and Data)	>90	>90	>90	>90	>90	>90	>90	>90
800	60 On Hook (40 Off Hook and Data)	>90	>90	>90	>90	>90	>90	>90	>90
1000	60 On Hook (40 Off Hook and Data)	>90	>90	>90	>90	>90	>90	>90	>90
2000	40	>90	>90	>90	>90	>90	>90	>90	>90
3000	40	90	90	>90	>90	>90	>90	>90	>90
4000	40	90	90	>90	>90	>90	>90	>90	>90

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 29 **METALLIC AC IMPEDANCE DURING RINGING**

REFERENCE: CS-03, Issue 9, Clause 3.7.3.1 (1); TIA-968-A, Clause 4.7.2.4

CRITERIA: **During Ringing Voltage application AC Impedance shall exceed 1400Ω @ 20Hz or 1000Ω @ 30Hz (1600Ω from 15Hz - 68Hz depending on Ringer Type - FCC only).**

SPECIFICATION			AC CURRENT (μA)		IMPEDANCE (KΩ)	
FREQ. (Hz)	VOLTAGE (VAC)	RINGER TYPE	BEFORE STRESS	AFTER STRESS	BEFORE STRESS	AFTER STRESS
15	40	B	2.00	2.00	20000.00	20000.00
15	130	B	11.00	11.00	11818.18	11818.18
20	40	A&B	3.00	3.00	13333.33	13333.33
20	130	A&B	16.00	16.00	8125.00	8125.00
30	40	A&B	5.00	5.00	8000.00	8000.00
30	130	A&B	26.00	26.00	5000.00	5000.00
35	62	B	12.00	12.00	5166.67	5166.67
35	130	B	30.00	30.00	4333.33	4333.33
40	62	B	14.00	14.00	4428.57	4428.57
40	130	B	36.00	36.00	3611.11	3611.11
45	62	B	16.00	16.00	3875.00	3875.00
45	130	B	40.00	40.00	3250.00	3250.00
50	62	B	17.00	17.00	3647.06	3647.06
50	150	B	50.00	50.00	3000.00	3000.00
55	62	B	19.00	19.00	3263.16	3263.16
55	150	B	56.00	56.00	2678.57	2678.57
60	62	B	21.00	21.00	2952.38	2952.38
60	150	B	64.00	64.00	2343.75	2343.75
64	62	B	23.00	23.00	2695.65	2695.65
64	150	B	70.00	70.00	2142.86	2142.86
68	62	B	25.00	25.00	2480.00	2480.00
68	150	B	76.00	76.00	1973.68	1973.68

FCC RINGER TYPE: **B**

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 45 **HEARING AID COMPATABILITY - VOLUME CONTROL**

REFERENCE: CS-03, Issue 9, Part V, Clause 6. FCC Part 68, Clause 68.317

CONDITION: SPEAKER: **Kan Tsang** **SD157BH-C1** **(MODEL VOIP321XY/ZZ)**
SEALING RING: **Yes**

FREQ.	0 KM						2.7 KM						4.6 KM					
	MIN. VOLUME (ROLR 41-51dB)				MAXIMUM VOLUME				MIN. VOLUME (ROLR 43-53dB)				MAXIMUM VOLUME				MIN. VOLUME (ROLR 45-55dB)				MAXIMUM VOLUME			
	dBS PL	dBPa	Calculations		dBSPL	dBPa	Calculations		dBS PL	dBPa	Calculations		dBS PL	dBPa	Calculations		dBS PL	dBPa	Calculations		dBS PL	dBPa	Calculations	
300 Hz	77.0	-16.0			98.0	5.0			77.0	-16.0			98.0	5.0			75.5	-17.5			96.5	3.5		
	300				300				300				300				300				300			
400 Hz	83.0	-12.0	0.1249	0.4833	0.0604	103.5	8.5	0.1249	1.4296	0.1786	82.5	-12.5	0.1249	0.4764	0.0595	103.5	8.5	0.1249	1.4296	0.1786	80.5	-14.5	0.1249	0.4342	0.0542	101.0	6.0	0.1249	1.2849	0.1605
	400					400					400					400					400					400				
500 Hz	87.0	-8.0	0.0969	0.5958	0.0577	107.0	12.0	0.0969	1.7170	0.1664	86.5	-8.5	0.0969	0.5804	0.0562	106.5	11.5	0.0969	1.6928	0.1640	84.0	-11.0	0.0969	0.5153	0.0499	104.0	9.0	0.0969	1.4852	0.1439
	500					500					500					500					500					500				
600 Hz	90.0	-4.5	0.0792	0.7241	0.0573	109.0	14.5	0.0792	2.0048	0.1588	89.0	-5.5	0.0792	0.6954	0.0551	108.0	13.5	0.0792	1.9261	0.1525	87.0	-7.5	0.0792	0.6189	0.0490	105.5	11.0	0.0792	1.6899	0.1338
	600					600					600					600					600					600				
700 Hz	92.5	-2.0	0.0669	0.8454	0.0566	110.5	16.0	0.0669	2.2229	0.1487	91.5	-3.0	0.0669	0.8023	0.0537	109.0	14.5	0.0669	2.0813	0.1392	89.0	-5.5	0.0669	0.7126	0.0477	106.5	12.0	0.0669	1.8260	0.1222
	700					700					700.0					700					700					700				
1000 Hz	97.0	3.0	0.1549	1.0353	0.1604	111.0	17.0	0.1549	2.3722	0.3675	95.5	1.5	0.1549	0.9682	0.1500	109.5	15.5	0.1549	2.1931	0.3397	92.5	-1.5	0.1549	0.8372	0.1297	106.5	12.5	0.1549	1.8987	0.2941
	1K					1K					1K					1K					1K					1K				
1500 Hz	96.0	2.0	0.1761	1.1402	0.2008	109.5	15.5	0.1761	2.3424	0.4125	94.0	0.0	0.1761	1.0408	0.1833	107.5	13.5	0.1761	2.1387	0.3766	90.0	-4.0	0.1761	0.8678	0.1528	103.5	9.5	0.1761	1.7838	0.3141
	1.5K					1.5K					1.5K					1.5K					1.5K					1.5K				
2000 Hz	94.0	-2.0	0.1249	1.0055	0.1256	108.0	12.0	0.1249	2.0621	0.2576	91.5	-4.5	0.1249	0.8951	0.1118	105.5	9.5	0.1249	1.8354	0.2292	87.0	-9.0	0.1249	0.7178	0.0897	100.5	4.5	0.1249	1.4548	0.1817
	2K					2K					2K					2K					2K					2K				
2300 Hz	93.5	-4.0	0.0607	0.8559	0.0520	107.0	9.5	0.0607	1.7589	0.1068	91.0	-6.5	0.0607	0.7509	0.0456	104.5	7.0	0.0607	1.5432	0.0937	86.0	-11.5	0.0607	0.5861	0.0356	99.0	1.5	0.0607	1.1736	0.0712
	2.3K					2.3K					2.3K					2.3K					2.3K					2.3K				
2700 Hz	93.0	-6.0	0.0696	0.7708	0.0536	106.5	7.5	0.0696	1.5623	0.1087	90.0	-9.0	0.0696	0.6680	0.0465	103.0	4.0	0.0696	1.3376	0.0931	84.5	-14.5	0.0696	0.5080	0.0354	97.5	-1.5	0.0696	1.0031	0.0698
	2.7K					2.7K					2.7K					2.7K					2.7K					2.7K				
3000 Hz	93.0	-6.5	0.0458	0.7211	0.0330	106.0	6.5	0.0458	1.4429	0.0661	89.5	-10.0	0.0458	0.6085	0.0279	102.5	3.0	0.0458	1.2014	0.0550	83.5	-16.0	0.0458	0.4506	0.0206	96.5	-3.0	0.0458	0.8896	0.0407
	3K					3K					3K					3K					3K					3K				
3300 Hz	93.0	-6.5	0.0414	0.7117	0.0295	106.5	7.0	0.0414	1.4238	0.0589	89.0	-10.5	0.0414	0.5849	0.0242	102.5	3.0	0.0414	1.1700	0.0484	83.0	-16.5	0.0414	0.4273	0.0177	96.0	-3.5	0.0414	0.8437	0.0349
	3.3K					3.3K					3.3K					3.3K					3.3K					3.3K				
SE	0.7024				4.3453				0.5813				3.6249				0.3945				2.4566			
ROLR:	47.04				31.21				48.69				32.79				52.05				36.17			
GAIN: (12-18dB)					15.83								15.90								15.88			

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 28 February 2006

TEST 45 **HEARING AID COMPATABILITY - VOLUME CONTROL**

REFERENCE: CS-03, Issue 9, Part V, Clause 6. FCC Part 68, Clause 68.317

CONDITION: SPEAKER: **Kan Tsang** **SD157BH-2** **(MODEL CIT300)**
SEALING RING: **Yes**

FREQ.	0 KM						2.7 KM						4.6 KM					
	MIN. VOLUME (ROLR 41-51dB)				MAXIMUM VOLUME				MIN. VOLUME (ROLR 43-53dB)				MAXIMUM VOLUME				MIN. VOLUME (ROLR 45-55dB)				MAXIMUM VOLUME			
	dBSPL	dBPa	Calculations		dBSPL	dBPa	Calculations		dBSPL	dBPa	Calculations		dBSPL	dBPa	Calculations		dBSPL	dBPa	Calculations		dBSPL	dBPa	Calculations	
300 Hz	89.0	-4.0			104.0	11.0			85.5	-7.5			104.0	11.0			83.5	-9.5			102.0	9.0		
	300				300				300				300				300				300			
400 Hz	92.5	-2.5	0.1249	0.8442	0.1054	107.0	12.0	0.1249	1.8260	0.2281	92.0	-3.0	0.1249	0.7650	0.0955	107.0	12.0	0.1249	1.8260	0.2281	90.0	-5.0	0.1249	0.6890	0.0861	104.5	9.5	0.1249	1.6228	0.2027
	400					400					400					400					400					400				
500 Hz	93.0	-2.0	0.0969	0.8890	0.0861	107.5	12.5	0.0969	1.8987	0.1840	92.5	-2.5	0.0969	0.8660	0.0839	107.0	12.0	0.0969	1.8738	0.1816	90.0	-5.0	0.0969	0.7698	0.0746	104.5	9.5	0.0969	1.6440	0.1593
	500					500					500					500					500					500				
600 Hz	92.5	-2.0	0.0792	0.9006	0.0713	107.0	12.5	0.0792	1.9235	0.1523	92.0	-2.5	0.0792	0.8774	0.0695	106.0	11.5	0.0792	1.8496	0.1465	89.0	-5.5	0.0792	0.7598	0.0602	103.5	9.0	0.0792	1.6228	0.1285
	600					600					600					600					600					600				
700 Hz	92.0	-2.5	0.0669	0.8890	0.0595	106.5	12.0	0.0669	1.8987	0.1270	91.0	-3.5	0.0669	0.8550	0.0572	105.5	11.0	0.0669	1.8019	0.1205	88.5	-6.0	0.0669	0.7402	0.0495	102.5	8.0	0.0669	1.5607	0.1044
	700					700					700.0					700					700					700				
1000 Hz	91.5	-2.5	0.1549	0.8774	0.1359	105.5	11.5	0.1549	1.8496	0.2865	90.0	-4.0	0.1549	0.8219	0.1273	104.0	10.0	0.1549	1.7329	0.2684	87.0	-7.0	0.1549	0.7119	0.1103	101.0	7.0	0.1549	1.4812	0.2294
	1K					1K					1K					1K					1K					1K				
1500 Hz	91.0	-3.0	0.1761	0.8660	0.1525	105.0	11.0	0.1761	1.8019	0.3173	89.0	-5.0	0.1761	0.7905	0.1392	103.0	9.0	0.1761	1.6446	0.2896	85.0	-9.0	0.1761	0.6588	0.1160	99.0	5.0	0.1761	1.3707	0.2414
	1.5K					1.5K					1.5K					1.5K					1.5K					1.5K				
2000 Hz	91.0	-5.0	0.1249	0.8122	0.1014	105.5	9.5	0.1249	1.7112	0.2137	88.5	-7.5	0.1249	0.7226	0.0903	103.0	7.0	0.1249	1.5220	0.1901	84.0	-12.0	0.1249	0.5790	0.0723	98.0	2.0	0.1249	1.2047	0.1505
	2K					2K					2K					2K					2K					2K				
2300 Hz	90.5	-7.0	0.0607	0.7315	0.0444	104.5	7.0	0.0607	1.5432	0.0937	88.0	-9.5	0.0607	0.6418	0.0390	102.0	4.5	0.0607	1.3540	0.0822	83.0	-14.5	0.0607	0.5009	0.0304	97.0	-0.5	0.0607	1.0423	0.0633
	2.3K					2.3K					2.3K					2.3K					2.3K					2.3K				
2700 Hz	90.0	-9.0	0.0696	0.6588	0.0459	104.0	5.0	0.0696	1.3707	0.0954	86.5	-12.5	0.0696	0.5641	0.0393	101.0	2.0	0.0696	1.1879	0.0827	81.0	-18.0	0.0696	0.4290	0.0299	95.0	-4.0	0.0696	0.8927	0.0621
	2.7K					2.7K					2.7K					2.7K					2.7K					2.7K				
3000 Hz	89.5	-10.0	0.0458	0.6085	0.0279	103.5	4.0	0.0458	1.2660	0.0580	86.0	-13.5	0.0458	0.5066	0.0232	100.0	0.5	0.0458	1.0684	0.0489	80.0	-19.5	0.0458	0.3751	0.0172	94.0	-5.5	0.0458	0.7805	0.0357
	3K					3K					3K					3K					3K					3K				
3300 Hz	90.0	-9.5	0.0414	0.6004	0.0249	104.0	4.5	0.0414	1.2492	0.0517	86.0	-13.5	0.0414	0.4934	0.0204	100.0	0.5	0.0414	1.0265	0.0425	79.5	-20.0	0.0414	0.3558	0.0147	93.5	-6.0	0.0414	0.7402	0.0306
	3.3K					3.3K					3.3K					3.3K					3.3K					3.3K				
SE	0.6483				3.3645				0.5367				2.8678				0.3681				1.9414			
ROLR:	47.74				33.43				49.38				34.82				52.65				38.21			
GAIN: (12-18dB)					14.31								14.56								14.44			

RESULTS: MEETS THE REFERENCED TECHNICAL REQUIREMENT

TECHNICIAN: Gary Nova DATE: 01 March 2006