



ENGINEERING TEST REPORT

FOR

S518 ADSL PCI Modem
MODEL NO.: S518
Label ID: US: SANDL02BS518

IN ACCORDANCE WITH

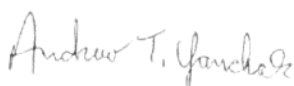


TIA/EIA IS-968 and TIA/EIA IS-883
TECHNICAL REQUIREMENTS
FOR CONNECTION OF TERMINAL EQUIPMENT
TO THE TELEPHONE NETWORK INCLUDING
ADSL MODEMS

UltraTech FILE NO.: SNG17_ACTA

TESTED FOR:

Sangoma Technologies Corp.
50 McIntosh Drive, Suite 120
Markham, Ontario
Canada, L3R 9T3

ISSUE DATE: September 25, 2002

<p>Project Leader: </p> <hr/> <p>Andrew T. Yanchak, C.E.T. Vice President – Operations</p>	<p>Test Technician: </p> <hr/> <p>Mike Tom, EMC Tech. Telecom Department</p>
<p><i>In the opinion of the qualifying engineer and as allowed by Engineering analysis and examination of the test data, the test results contained herein this report is to the best of my knowledge, true and correct and is hereby issued under the authority of:</i></p> <hr/> <p>VICTOR H. KEE, P.ENG.</p>	<p></p> <hr/> <p>Victor H. Kee, P.Eng., Vice President – Engineering</p> <p>Date: <u>Sept. 23, 2002</u></p>

- The test results contained in this test report only apply to the randomly selected test sample(s) as described in Section 1.3 of this report.
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CONDITIONS FOR SUPPLIERS DECLARATION OF CONFORMITY

To maintain the approved equipment in the ACTA database, the following conditions and obligations must be met, as specified in §68.326 and §68.610, and in the Guideline and Procedures, Revision 2.0 document.

TCBs and parties filing a SDoC shall maintain, and have readily available, records containing the following information (unless otherwise noted):

1. Copy of the SDoC; for SDoC filings
2. Copy of the TCB certificate of Approval, for TCB filings
3. The identity of the testing facility, including the name, address, phone number and other contact information.
4. A detailed explanation of the testing procedure utilized to determine whether terminal equipment conforms to the appropriate technical criteria.
5. A copy of the test results for terminal equipment compliance with the appropriate technical criteria.

Responsible parties utilizing SDoCs shall maintain all records required under §68.326(a) for at least ten years after the manufacture of the equipment on file has been permanently discontinued. TCBs shall adhere to the guidelines specified in the National Institute of Standards and Technology ("NIST") accreditation program under the applicable MRAs.

Customer Information

The following statements must be provided to the customer with each piece of approved equipment sold. These customer instructions must be included in the users manual, or as a separate sheet inserted into the users manual.

The statements vary depending on the type of approved equipment. The statements shown below are general statements for any telephone or modem device. For specific types, such as coin-operated telephones, Key Telephone Systems or Private leased lines additional statements may be added or deleted as necessary. If this is the case, please refer to the latest document available on the ACTA website at www.part68.org for details.

Entries highlighted in grey means that company specific information is required to be filled in.

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FCC Customer Instructions:

This equipment complies with the Federal Communications Commission (FCC) rules and regulations governing telephone equipment and the Technical Requirements for Connection to the Telephone Network published by the industry's Administrative Council for Terminal Attachments (ACTA). On the *(insert location of the label)* of this equipment is a label that contains, among other information, a product identifier in the format US:AAAEQ##TXXXX. If requested, this number must be provided to the telephone company.

Applicable USOC Jack: **RJ-11**

The telephone cord and modular plug provided with this equipment is compliant with the criteria of the telecommunication industry. This equipment is designed for connection to the telephone network or premises wiring using a compatible modular jack that is also compliant. See Installation Instructions for details.

The Ringer Equivalence Number (or REN) is used to determine the number of devices that may be connected to a telephone line. Excessive RENs on a telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company. The REN for this product may be printed on the product label or part of the product identifier that has the format US:AAAEQ##TXXXX. The digits represented by ## are the REN without a decimal point (e.g., 03 is a REN of 0.3).

CAUTION: If this equipment is deemed potentially harmful to the telephone network, the telephone company will attempt to notify you in advance of discontinuing service. . If advance notice is not practical, the telephone company will notify you as soon as possible. If service is disconnected, you will be advised of your right to file a complaint with the Federal Communications Commission (FCC) should you believe it necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of this equipment. Should this occur, advance notice you be provided in order for you to make necessary modifications to maintain uninterrupted service.

Should you experience trouble with this equipment, please contact

(Company name or service center in the U.S.A. and phone number)

for repair or warranty information. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

NOTICE: Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

This equipment is Hearing Aid Compatible

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EXHIBIT 1. GENERAL INFORMATION

1.1. APPLICANT & MANUFACTURER DETAILS

APPLICANT	
Company	Sangoma Technologies Corp.
Address	50 McIntosh Drive, Suite 120 Markham, Ontario Canada, L3R 9T3
Contact: Phone: Fax: Email:	Mr. David Mandelstam 905-474-1990 905-474-9223 dm@sangoma.com

MANUFACTURER	
Company	Sangoma Technologies Corp.
Address	50 McIntosh Drive, Suite 120 Markham, Ontario Canada, L3R 9T3
Contact: Phone: Fax: Email:	Mr. David Mandelstam 905-474-1990 905-474-9223 dm@sangoma.com

1.2. TEST SAMPLE DETAILS

Trade Name/Product:	S518 ADSL PCI Modem
Model:	S518
Serial #:	Pre-Production
Equipment Type:	ADSL Modem
Interface Type	Loop Start
Power Source:	DC powered by Host PC

ENGINEERING
PROTOTYPE _____

PRODUCTION
PROTOTYPE _____

PRODUCTION
UNIT X

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1.3. TEST PROCEDURES

The test procedures and implementation of these test procedures are those specified in ***EIA/TIA TSB-31B – Part 68 Rationale and Measurement Guidelines***, and ***UltraTech's ADSL Testing Guidelines V2.0***.

Aspects of the procedure unique to this device are described in the test plan below.

1.4. TEST PLAN

A discussion of the tests selection is attached overleaf followed by the test data. All after stress measurements where applicable are made after the Type B surges. Type A surges and Power Line surge are performed after stress.

Technical acceptance criteria are those specified in ***EIA/TIA Interim Standard, IS-968 – Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network, July 2001***, and ***EIA/TIA Interim Standard, IS-883 – Supplemental Technical Requirements for Connection of ADSL Modems to the Telephone Network, June 2001***.

1.5. RADIO FREQUENCY GENERATING CIRCUITRY

The Terminal equipment has been tested and found to comply with the Class B digital device requirements of 47 CFR, Part 15, Subpart B.

1.6. MODIFICATIONS

No modifications were required.

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1.7. SUMMARY OF TECHNICAL REQUIREMENTS

Interface Type: Loop Start and ADSL Interface Code: A

FCC Paragraph	Test Description	Compliance (Y/N)	
		Before	After
ENVIRONMENTAL - 68.302			
68.302 (a)	Mechanical Shock	N/A	N/A
68.302 (b)(1)	Telephone Line Surge - Type A Metallic	Y	Y
68.302 (c)(1)	Telephone Line Surge - Type B Metallic	Y	Y
68.302 (b)(2)	Telephone Line Surge - Type A Longitudinal	Y	Y
68.302 (c)(2)	Telephone Line Surge - Type B Longitudinal	Y	Y
68.302 (d)(1)	Power Line Surge (2500 Volts)	N/A	N/A
LEAKAGE CURRENT - 68.304			
68.304	Leakage Current Limitations	Y	Y
HAZARDOUS VOLTAGE LIMITATIONS 68.306			
68.306 (a)	General (Network Connections)	Y	Y
68.306 (b)(2)(3)(4)&(C)	Hazardous Voltage Protection	N/A	N/A
68.306 (e)(2)	Intentional Protective Paths to Ground	N/A	N/A
SIGNAL POWER LIMITATIONS - 68.308			
68.308 (b)(1)(I)	Voiceband Signal Power	Y	Y
68.308 (b)(1)	Voiceband Signal Power Limiting Circuits	N/A	N/A
68.308 (b)(2)(I)	Voiceband Signal Power - Network Control Signals	Y	Y
68.308 (b)(5)(i)(A)-(G)	Through Transmission Amplification	N/A	N/A
68.308 (b)(5)(i)(H)	Through Transmission - SF Cutoff	N/A	N/A
68.308 (b)(5)(ii)	Through Transmission - SF/Guard Bands	N/A	N/A
68.308 (c)(1)	Signal Power 3995 Hz - 4005 Hz	Y	Y
68.308 (d)	Voiceband Longitudinal Voltage - 0.1 kHz to 4 kHz	Y	Y
68.308 (e)(3)(ii)(iii)	NonLADC Longitudinal Voltage - 4 kHz to 6 MHz	Y	Y
TRANSVERSE BALANCE LIMITATIONS - 68.310			
68.310	Analog and ADSL Interfaces	Y	Y
ON-HOOK IMPEDANCE LIMITATIONS - 68.312			
68.312 (b)(1)(2)	DC Resistance	Y	Y
68.312 (b)(3)	DC Current During Ringing	Y	Y
68.312 (b)(4)(5)	Ringer Frequency Impedance (Metallic & Longitudinal)	Y	Y
68.312 (d)(1)	Ringer Equivalence Definition and Calculation	Y	Y
BILLING PROTECTION - 68.314			
68.314 (b)(1)	On-Hook Signal Requirements	Y	Y
68.314 (c)(1)(2)	Loop Current Requirements	N/A	N/A
68.314 (d)(1)	Signaling Interference	N/A	N/A
ADSL TERMINAL EQUIPMENT			
TIA/EIA IS-883, Sec. 5	Power Spectral Density	Y	Y
TIA/EIA IS-883, Sec. 5	Total Signal Power	Y	Y

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1.8. OPERATIONAL CHECK

Feature Tested	Remarks	
	Before Stress	After Stress
ADSL Connection	Normal Operation	Normal Operation
Telephone Connection	Normal Operation	Normal Operation

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EXHIBIT 2. MEASUREMENT DATA – GENERAL EQUIPMENT

2.1. ENVIRONMENTAL SIMULATION – (68.302)

2.1.1. 68.302(a) – MECHANICAL SHOCK

CRITERIA: - *The equipment must not present a potential source of harm to the network or hazard to users as a result of stresses induced by shock.*

PROCEDURE: - IS-968, Section 4.2.1

EQUIPMENT CATEGORY: ☐ Hand-held items normally used at head height.
 ☐ Normally customer carried equipment.

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

EQUIPMENT CATEGORY: ☐ Equipment not normally customer carried.

Weight Class: ☐ 0-20 lbs

One 6 inch face drop on each normal or designated rest face.

One 6 inch face drop on all other surfaces.

One 3 inch face drop on each corner.

RESULTS & ANALYSIS: THIS TEST IS NOT REQUIRED.

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2.1.2. 68.302(b)(c) - TELEPHONE LINE SURGE

2.1.2.1. Type A & Type B Metallic

PROCEDURE: - IS-968, Section 4.2.2 and 4.2.3

TYPE A

One 800 Volt surge (10uS max. x560uS min.) of each polarity was applied across the lead pairs indicated below:

Operation	Equipment Port Tested	Test Points	Normal	Reverse
On-hook	Line	Tip-Ring	(1)	(1)
Off-hook	Line	Tip-Ring	(1)	(1)

TYPE B

One 1000V surge (9μS max. x720μS min.) of each polarity was applied across the lead pairs indicated below:

Operation	Equipment Port Tested	Test Points	Normal	Reverse
On-hook	Line	Tip-Ring	(1)	(1)
Off-hook	Line	Tip-Ring	(1)	(1)

NOTES:

- (1) No effect
- (2) Coil failed (open), leaving the unit permanently on-hook.
- (3) Fuses blew (open) leaving the unit permanently on-hook. When fuses were replaced, unit functioned normally.
- (4) Fuses blew (open) leaving the unit permanently on-hook. When fuses were replaced, unit could not go off-hook.
- (5) The resistors in series with the tip/ring line failed (open), leaving the unit permanently on-hook.
- (6) _____

RESULTS & ANALYSIS: The unit complies with the above requirements.

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2.1.2.2. Type A & Type B Longitudinal

PROCEDURE: - IS-968, Section 4.2.2 and 4.2.3

TYPE A:

One 1500V surge (10 μ S max. x 160 μ S min.) of each polarity was applied between the lead pairs listed below:

Operation	Equipment Port Tested	Test Points	Normal	Reverse
On-Hook	Line	Tip, Ring-Ground	(1)	(1)
Off-Hook	Line	Ring, Ring-Ground	(1)	(1)

TYPE B:

One 1500V surge (9 μ S max. x 720 μ S min.) of each polarity was applied between the lead pairs listed below:

Operation	Equipment Port Tested	Test Points	Normal	Reverse
On-Hook	Line	Tip, Ring-Ground	(1)	(1)
Off-Hook	Line	Ring, Ring-Ground	(1)	(1)

- NOTES:**
- (1) No effect
 - (2) Coil failed (open), leaving the unit permanently on-hook.
 - (3) Fuses blew (open) leaving the unit permanently on-hook. When fuses were replaced, unit functioned normally.
 - (4) Fuses blew (open) leaving the unit permanently on-hook. When fuses were replaced, unit could not go off-hook.
 - (5) The resistors in series with the tip/ring line failed (open), leaving the unit permanently on-hook.

RESULTS & ANALYSIS: The unit complies with the above requirements.

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2.1.3. 68.302(d)(1) - POWER LINE SURGE

PROCEDURE: - IS-968, Section 4.2.4

TEST:

Three 2500V surges (2us max. x10uS min.) of each polarity were applied between the phase and neutral terminals of the input AC power line in the equipment states listed below:

Equipment State	Voltage Level +2500			Voltage Level -2500		
	1	2	3	1	2	3

Observations: (1) Satisfactory

RESULTS & ANALYSIS: THIS TEST IS NOT APPLICABLE

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2.2. LEAKAGE CURRENT LIMITATIONS - (68.304)

PROCEDURE: - IS-968, Section 4.3

The unit was subjected to leakage current tests. Listed below are lead pairs selected and the current measured. The highest of on-hook and off-hook readings are shown.

LEAD CATEGORIES:

- (a) All telephone connections.
- (b) All power connections.
- (c) All possible combination of exposed conductive surfaces on the exterior of such equipment excluding terminals for connection to other equipment.
- (d) All terminals for connection to non-Approved equipment.
- (e) Points having conducting path to the secondaries of any power supply.
- (f) All auxiliary lead terminals.
- (g) All E & M lead terminals.
- (h) All PR, PC, CY1 and CY2 leads.

MEASUREMENT:

Test Points	Voltage Level (Vac)	Operating Condition	Measured Leakage (mA)	
			Before Stress	After Stress
(a)-(c)	1000	Training	0.46	0.46

Note: Maximum Leakage current allowed is 10 mA for all points of connection.

RESULTS & ANALYSIS: The unit complies with the above requirements.

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2.3. HAZARDOUS VOLTAGE LIMITATIONS - (68.306)

2.3.1. 68.306(a) - GENERAL (NETWORK CONNECTIONS)

CRITERIA: - Under no condition of failure of Approved terminal equipment or Approved protective circuitry, or of equipment connected thereto, which can be conceived to occur in the handling, operation or repair of such equipment or circuitry, shall the open circuit voltage on telephone connections exceed 70 volts peak for more than one second, except for voltages for network control signaling and supervision.

PROCEDURE: - IS-968, Section 4.4

MEASUREMENT:

Operating State	Measured Maximum Peak AC Voltage (V)							
	Less Than 70V			Greater than 70V				
	T-R	T-Gnd	R-Gnd	T-R	Time	T-Gnd	Time	R-Gnd
Idle	< 0.001	< 0.001	< 0.001					

*Time refers to duration of ac voltage present

RESULTS & ANALYSIS: The unit complies with the above requirements.

2.3.2. 68.306(e)(2) – INTENTIONAL PROTECTIVE PATHS TO GROUND

CRITERIA: - Approved terminal equipment and protective circuitry having an intentional dc conducting path to earth ground for protection purposes at the leakage current test voltage that was removed during the leakage current test of 68.304 shall, upon its replacement, have a 50 or 60 Hz voltage source applied between simplexed telephone connections and earth ground.

PROCEDURE: - IS-968, Section 4.4

MEASUREMENT:

Component Re-Installed	Measured Leakage Current (μ A)		Maximum Leakage
	Before Stress	After Stress	
			10 mA
			10 mA

RESULTS & ANALYSIS: THIS TEST IS NOT APPLICABLE

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EXHIBIT 3. MEASUREMENT DATA – LOOP START EQUIPMENT

3.1. SIGNAL POWER - (68.308)

3.1.1. 68.308(b)(1)(i) - VOICEBAND SIGNAL POWER LIMITATIONS

CRITERIA: - For Approved terminal equipment or Approved protective circuitry, other than data equipment or data protective circuitry which is Approved in accordance with Sec. 68.308(b)(4), the maximum power of other than live voice signals delivered to a loop simulator circuit shall not exceed -9 dB with respect to one milliwatt, when averaged over any 3-second interval. No manufacturing tolerance is allowed which would permit this power to be exceeded by any unit of equipment.

PROCEDURE: - IS-968, Section 4.5.2

MEASUREMENT: (200-4000 Hz Band)

Operation State	Measured Value (dBm)		Average/3 Sec Specified Maximum (dBm)
	Before Stress	After Stress	
Training	-41	-41	-9

RESULTS & ANALYSIS: The unit complies with the above requirements.

3.1.2. 68.308(b)(1) - VOICEBAND SIGNAL POWER LIMITING CIRCUITS

CRITERIA: - For Approved terminal equipment or Approved protective circuitry with through ports from non-Approved equipment that may be connected to the network, the signal source shall be connected through equipment that ensures appropriate limiting of the signals.

PROCEDURE: - IS-968, Section 4.5.2

MEASUREMENT:

Frequency (Hz)	Input Level (dBV)	Before Stress		After Stress		Loop Current (mA)
		Output Level (dBV) at		Output Level (dBV) at		
		Overload Pt.	Input+10dB	Overload Pt.	Input+10dB	
200						50
500						51
1000						54
2000						54
4000						55

RESULTS & ANALYSIS: Type of Limiting Circuit employed:

THIS TEST IS NOT APPLICABLE

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3.1.3. 68.308(b)(2)(i) - LIMITATIONS ON INTERNAL SIGNAL SOURCES PRIMARILY INTENDED FOR NETWORK CONTROL SIGNALING

CRITERIA: - For all operating conditions of Approved terminal equipment or Approved protective circuitry, the maximum power delivered to a loop simulator circuit shall not exceed one milliwatt, when averaged over any 3-second interval.

PROCEDURE: - IS-968, Section 4.5.2.2

MEASUREMENT:

Operating State/Condition	Loop Current Min/Max	Measured Power level (dBm)		Specified Maximum
		Before Stress	After Stress	
Manual DTMF	23 mA	-	-	+4 dBm
	70 mA	-	-	+4 dBm
Auto DTMF	23 mA			0 dBm
	70 mA			0 dBm

RESULTS & ANALYSIS: TEST IS NOT APPLICABLE.

3.1.4. 68.308(b)(5)(i)(A)-(G) – THROUGH TRANSMISSION AMPLIFICATION

CRITERIA: - Where through-transmission equipment provides a dc electrical signal to equipment connected therewith (e.g. for powering of electro-acoustic transducers), dc conditions shall be provided which fall within the range of conditions provided by a loop simulator circuit.

PROCEDURE: - IS-968, Section 4.5.2.3

MEASUREMENT:

SOURCE: Recorded cassette test tape. **LEVEL:** -11dBV

Frequency Band	Measured Level (dBV)						Allowable Net Amplification
	Before Stress			After Stress			
	Input (a)	Output (b)	Net Gain (a)-(b)	Input (a)	Output (b)	Net Gain (a)-(b)	
Below 3995 Hz							
600 to 3995 Hz (A)							
4 kHz (B)							
Net Gain (A-B)							3 dB
800 to 2450 Hz (C)							
2450 to 2750 Hz (D)							
Net Gain (C-D)							1 dB

RESULTS & ANALYSIS: TEST IS NOT APPLICABLE

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3.1.5. 68.308(c) - SIGNAL POWER 3995Hz – 4005Hz

CRITERIA – For all operating conditions of Approved terminal equipment and Approved 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 Hertz band to an appropriate simulator circuit, shall be 18 dB below maximum permitted power specified in paragraph (b) of this section, for the 200-4000 Hertz band..

PROCEDURE: - IS-968, Section 4.5.3

MEASUREMENT:

Operation State	Measured Level (dBm)				Limit (18 dB below maximum permitted power)
	Before Stress		After Stress		
	23 mA	70 mA	23 mA	70 mA	
Data Transmission	< -70	< -70	< -70	< -70	-27

RESULTS & ANALYSIS: The unit complies with the above requirements.

3.1.6. 68.308(d) - VOICEBAND LONGITUDINAL VOLTAGE - 0.1 TO 4 kHz

CRITERIA: - Longitudinal voltage in the 100 Hz to 4 kHz frequency range requires that the weighted root-mean squared voltage averaged over 100 milliseconds that is result of all the component longitudinal voltages in this band after weighting according to the curve in Figure 68.308(a) shall not exceed the maximum indicated under the conditions stated in subsection (f).

PROCEDURE: - IS-968, Section 4.5.4

MEASUREMENT:

Operating Condition	Maximum Specification (dBV)	Measured Value On-Hook (dBV)	Measured Value Off-Hook - 23.0mA (dBV)	Measured Value Off-Hook - 70.0mA (dBV)
Before Stress				
Transmitting	-30	-	< -70	< -70
Idle	-30	< -70	< -70	< -70
After Stress				
Transmitting	-30	-	< -70	< -70
Idle	-30	< -70	< -70	< -70

RESULTS & ANALYSIS: The unit complies with the above requirements.

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3.1.7. 68.308(e)(2)(i)(ii) - LONGITUDINAL VOLTAGE - 4 kHz TO 6 MHz

CRITERIA: - The root-mean-squared voltage as averaged over 100 milliseconds at the telephone connections of Approved terminal equipment and Approved protective circuitry in all the possible 8 kHz bands within the indicated frequency range and under the conditions specified in paragraph (e) of this section, shall not exceed the maximum indicated in the measurement table below.

PROCEDURE: - IS-968, Section 4.5.5.2

MEASUREMENT:

Frequency Band (kHz)	Measured Total RMS Value in Specified Frequency Band (dBV)						Maximum RMS Voltage (dBV)
	Before Stress			After Stress			
	On-Hook	Off-Hook 23.0mA	Off-Hook 70.0mA	On-Hook	Off-Hook 23.0mA	Off-Hook 70.0mA	
4-16	-49.0	-40.0	-40.0	-49.0	-40.0	-40.0	-36.5
12-46	-62.7	< -70.0	< -70.0	-62.7	< -70.0	< -70.0	-40.2
42-270	-69.9	< -70.0	< -70.0	-69.9	< -70.0	< -70.0	-62.0
270-6000	-65.7	-62.9	-62.9	-65.7	-62.9	-62.9	-30.0

Note: Off-hook results achieved by using a 600 Ohm termination across the Telephone jack of the TE under test.

RESULTS & ANALYSIS: The unit complies with the above requirements.

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3.2. TRANSVERSE BALANCE LIMITATIONS- (68.310)

CRITERIA: - The minimum balance requirements specified in 68.310(a), shown below shall be equaled or exceeded under all reasonable conditions of the application of earth ground to the equipment or protective circuit under test.

ON-HOOK: 200-1000 \geq 60 dB
1000-4000 \geq 40 dB
OFF-HOOK: 200-4000 \geq 40 dB

For approved one-port equipment for loop start, data and non-data applications the one-port shall be driven from a 600 ohms metallic source having a 500 Ohm longitudinal impedance.

For ADSL equipment, the minimum balance shall not exceed 35 dB in the frequency range from 12 kHz to 1.544 MHz from a 100 Ohm metallic source having a 90 Ohm longitudinal impedance.

PROCEDURE: - IS-968, Section 4.6

MEASUREMENT:

Frequency (Hz)	Worst Case Balance Measured (dB)					
	Before Stress			After Stress		
	On-Hook	Off-Hook 23.0mA	Off-Hook 100.0mA	On-Hook	Off-Hook 23.0mA	Off-Hook 100.0mA
200	82.13	--	--	89.13	--	--
500	74.33	--	--	78.63	--	--
1000	67.74	--	--	72.44	--	--
2000	61.45	--	--	65.35	--	--
3000	57.33	--	--	60.13	--	--
4000	53.89	--	--	55.49	--	--

Frequency (kHz)	Balance (dB)	
	Before Stress	After Stress
12	72	72
50	71	68
100	72	71
192	69	68
300	65	66
700	57	58
1544	50	50

Note: No Off-hook state. Off-hook state is dependent on telephone set connected to the Telephone Jack of the ADSL modem.

RESULTS & ANALYSIS: The unit complies with the above requirements.

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3.3. ON-HOOK IMPEDANCE LIMITATIONS - (68.312)

3.3.1. 68.312 (b)(1)(2) - ON-HOOK DC RESISTANCE

CRITERIA: - Approved terminal equipment and Approved protective circuitry having a 2-wire network ports and for operation on loop start telephone facilities shall conform to the following limitations:

- (1) The DC resistance between tip and ring conductors, and between each of the tip and ring conductors and earth ground shall be greater than 5 Mega-Ohms for all DC voltages up to and including 100 volts.
- (2) The DC resistance between tip and ring conductors, and between each of the tip and ring conductors, and between each of the tip and ring conductors and earth ground shall be greater than 30 k-ohms for all DC voltages between 100 - 200V.

PROCEDURE: - IS-968, Section 4.7

MEASUREMENT:

Voltage (Vdc)	Before Stress (μ A)				Impedance (MW)			
	T/R	R/T	T/G	R/G	T/R	R/T	T/G	R/G
1	NMS	NMS	0.02	0.01	> 5 M	> 5 M	50.00	100.00
10	NMS	NMS	0.20	0.01	> 5 M	> 5 M	50.00	1000.00
20	NMS	NMS	0.42	0.01	> 5 M	> 5 M	47.62	2000.00
30	NMS	NMS	0.66	0.01	> 5 M	> 5 M	45.45	3000.00
40	NMS	NMS	0.85	0.01	> 5 M	> 5 M	47.06	4000.00
50	NMS	NMS	1.07	0.01	> 5 M	> 5 M	46.73	5000.00
60	NMS	NMS	1.28	0.01	> 5 M	> 5 M	46.88	6000.00
70	NMS	NMS	1.15	0.01	> 5 M	> 5 M	60.87	7000.00
80	NMS	NMS	1.70	0.01	> 5 M	> 5 M	47.06	8000.00
90	NMS	NMS	1.92	0.01	> 5 M	> 5 M	46.88	9000.00
100	NMS	NMS	2.20	0.01	> 5 M	> 5 M	45.45	10000.00
150	NMS	NMS	3.30	0.01	> 5 M	> 5 M	45.45	15000.00
200	NMS	NMS	4.45	0.01	> 5 M	> 5 M	44.94	20000.00

NOTES: Continuous Sweeps of the DC voltage from 1 to 100 volts and 100 to 200 volts were conducted, and the highest currents were within these intervals.

Continued on next page...

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Voltage (Vdc)	After Stress (μ A)				Impedance (M Ω)			
	T/R	R/T	T/G	R/G	T/R	R/T	T/G	R/G
1	NMS	NMS	0.02	0.01	> 5 M	> 5 M	50.00	100.00
10	NMS	NMS	0.20	0.01	> 5 M	> 5 M	50.00	1000.00
20	NMS	NMS	0.42	0.01	> 5 M	> 5 M	47.62	2000.00
30	NMS	NMS	0.66	0.01	> 5 M	> 5 M	45.45	3000.00
40	NMS	NMS	0.85	0.01	> 5 M	> 5 M	47.06	4000.00
50	NMS	NMS	1.07	0.01	> 5 M	> 5 M	46.73	5000.00
60	NMS	NMS	1.28	0.01	> 5 M	> 5 M	46.88	6000.00
70	NMS	NMS	1.15	0.01	> 5 M	> 5 M	60.87	7000.00
80	NMS	NMS	1.70	0.01	> 5 M	> 5 M	47.06	8000.00
90	NMS	NMS	1.92	0.01	> 5 M	> 5 M	46.88	9000.00
100	NMS	NMS	2.20	0.01	> 5 M	> 5 M	45.45	10000.00
150	NMS	NMS	3.30	0.01	> 5 M	> 5 M	45.45	15000.00
200	NMS	NMS	4.45	0.01	> 5 M	> 5 M	44.94	20000.00

NOTES: Continuous Sweeps of the DC voltage from 1 to 100 volts and 100 to 200 volts were conducted, and the highest currents were within these intervals.

RESULTS & ANALYSIS: The unit complies with the above requirements.

3.3.2. 68.312 (b)(3) - DC CURRENT DURING RINGING

CRITERIA: - During the application of simulated ringing, as listed in Table 68.312(a), to a loop start interface, the total dc current shall not exceed 3.0 mA. The equipment must comply for each ringing type which is listed as part of the ringer equivalence.

PROCEDURE: - IS-968, Section 4.7.3.1

MEASUREMENTS: Ringer Type B

Frequency (Hz)	Voltage (Vac)	Total DC Current (μA)				Specified Maximum Limit (μA)
		Before Stress		After Stress		
		Normal	Reverse	Normal	Reverse	
15.3	40.0	32.00	32.00	31.8	33.0	3000
	130.0	105.00	105.00	107.00	107.00	3000
20.0	40.0	0.42	0.42	0.45	0.45	3000
	130.0	14.00	14.00	14.50	14.50	3000
30.0	40.0	0.20	0.20	0.27	0.25	3000
	130.0	1.10	1.10	1.13	1.12	3000
40.0	62.0	2.36	2.36	2.5	2.46	3000
	130.0	4.80	4.80	5.00	5.10	3000
50.0	62.0	3.42	3.42	3.40	3.40	3000
	150.0	3.77	3.77	3.70	3.70	3000
68.0	62.0	7.14	7.14	7.10	7.10	3000
	150.0	8.70	8.70	8.70	8.70	3000

RESULTS & ANALYSIS: The unit complies with the above requirements.

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3.3.3. 68.312 (b)(4) – RINGING FREQUENCY IMPEDANCE (METALLIC)

CRITERIA: - During the application of simulated ringing as listed in Table 68.312(a), to a loop start interface, the total impedance between the tip and ring conductors shall be greater than or equal to the value specified in Table 68.312(a). The equipment must comply for each ringing type which is listed as part of the ringer equivalence.

PROCEDURE: - IS-968, Section 4.7.3.2

MEASUREMENT: Ringer Type B

Frequency (Hz)	Voltage (Vac)	AC Current (mA)		AC Impedance (kΩ)		Specified Minimum (kΩ)
		Normal	Reverse	Normal	Reverse	
Before Stress						
15.3	40	0.32	0.32	125.0	125.0	1.6
	130	1.45	1.45	89.7	89.7	1.6
20	40	1.07	1.07	37.4	37.4	1.6
	130	1.65	1.65	78.8	78.8	1.6
30	40	1.18	1.18	33.9	33.9	1.6
	130	2.13	2.13	61.0	61.0	1.6
40	62	1.62	1.62	38.3	38.3	1.6
	130	2.63	2.63	49.4	49.4	1.6
50	62	1.84	1.84	33.7	33.7	1.6
	150	3.51	3.50	42.7	42.9	1.6
68	62	1.95	1.95	31.8	31.8	1.6
	150	4.40	4.40	34.1	34.1	1.6
After Stress						
15.3	40	0.32	0.32	125.0	125.0	1.6
	130	1.45	1.45	89.7	89.7	1.6
20	40	1.07	1.07	37.4	37.4	1.6
	130	1.65	1.65	78.8	78.8	1.6
30	40	1.18	1.18	33.9	33.9	1.6
	130	2.13	2.13	61.0	61.0	1.6
40	62	1.62	1.62	38.3	38.3	1.6
	130	2.63	2.63	49.4	49.4	1.6
50	62	1.84	1.84	33.7	33.7	1.6
	150	3.51	3.50	42.7	42.9	1.6
68	62	1.95	1.95	31.8	31.8	1.6
	150	4.38	4.37	34.2	34.3	1.6

RESULTS & ANALYSIS: The unit complies with the above requirements.

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3.3.4. 68.312 (b)(5) – RINGING FREQUENCY IMPEDANCE (LONGITUDINAL)

CRITERIA: - During the application of simulated ringing as listed in Table 68.312(a), to a loop start interface, the total impedance between each of the tip and ring conductors and ground shall be greater than 100 kohms. The equipment must comply for each ringing type, which is listed as part of the ringer equivalence.

Frequency (Hz)	Voltage (Vac)	AC Current (mA)		AC Impedance (kΩ)		Specified Minimum (kΩ)
		Normal	Reverse	Normal	Reverse	
Before Stress						
15.3	40	0.0500	0.0200	800.0	2000.0	1.6
	130	0.1380	0.0200	942.0	6500.0	1.6
20	40	0.0620	0.0200	645.2	2000.0	1.6
	130	0.1760	0.0200	738.6	6500.0	1.6
30	40	0.0850	0.0200	470.6	2000.0	1.6
	130	0.2530	0.0200	513.8	6500.0	1.6
40	62	0.1620	0.0200	382.7	3100.0	1.6
	130	0.3320	0.0200	391.6	6500.0	1.6
50	62	0.1980	0.0200	313.1	3100.0	1.6
	150	0.4730	0.0200	317.1	7500.0	1.6
68	62	0.2630	0.0200	235.7	3100.0	1.6
	150	0.6380	0.0200	235.1	7500.0	1.6
After Stress						
15.3	40	0.0500	0.0200	800.0	2000.0	1.6
	130	0.1380	0.0200	942.0	6500.0	1.6
20	40	0.0620	0.0200	645.2	2000.0	1.6
	130	0.1760	0.0200	738.6	6500.0	1.6
30	40	0.0850	0.0200	470.6	2000.0	1.6
	130	0.2530	0.0200	513.8	6500.0	1.6
40	62	0.1620	0.0200	382.7	3100.0	1.6
	130	0.3320	0.0200	391.6	6500.0	1.6
50	62	0.1980	0.0200	313.1	3100.0	1.6
	150	0.4730	0.0200	317.1	7500.0	1.6
68	62	0.2630	0.0200	235.7	3100.0	1.6
	150	0.6380	0.0200	235.1	7500.0	1.6

RESULTS & ANALYSIS: The unit complies with the above requirements.

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3.3.5. 68.312 (d)(1)(2) - RINGER EQUIVALENCE NUMBER (REN)

CRITERIA: - (1) For individual equipment intended for operation on loop-start or ground-start telephone facilities, the ringer equivalence is five times the impedance limitation listed in Table 68.312(a), divided by the minimum measured ac impedance, as defined in paragraph (b)(1)(iv) of this section, during the application of simulated ringing as listed in Table 68.312(a).

- (1) Five times the impedance limitation listed in Table 68.312(a), divided by the minimum measured AC impedance, during the application of simulated ringing as listed in Table 68.312(a):

For Ringer Type B:

Minimum Impedance:	<u>31.8 kΩ</u>
Calculated REN:	<u>0.2B</u>

RESULT & ANALYSIS: The highest AC REN is **0.2B**

3.4. BILLING PROTECTION - (FCC 68.314)

3.4.1. 68.314(b)(1) - ON-HOOK SIGNAL REQUIREMENTS

CRITERIA: - 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 Ω termination (where appropriate) in the on-hook state, by loop-start or ground-start equipment shall not exceed -55dBm with the frequency band from 200 to 4000 Hertz.

PROCEDURE: - IS-968, Section 4.8

MEASUREMENT:

Operating State	Measured Value (dBm)		Specified Limit (dBm)
	Before Stress	After Stress	
On-Hook	< -70.0	< -70.0	-55.0

RESULTS & ANALYSIS: The unit complies with the above requirements.

3.4.2. 68.314(c)(1) - LOOP CURRENT REQUIREMENTS

Not applicable, loop current draw depends on telephone system attached to phone port of the EUT.

3.4.3. 68.314(d)(1)- SIGNALING INTERFERENCE

Not Applicable, off-hook state is dependent on telephone set attached to phone port of the EUT.

EXHIBIT 4. MEASUREMENT DATA - ADSL EQUIPMENT

4.1. POWER SPECTRAL DENSITY

CRITERIA: - The transmit PSD within the 25.875 kHz to 1104 kHz passband shall be no greater than -36.5 dBm/Hz, and the transmit PSD within the 25.875 kHz to 138 kHz passband shall be no greater than -34.5 dBm/Hz.

The Upstream and Downstream PSD shall not exceed the limits given in the PSD Masks as shown in ANSI T1.413-1998, Section 6.14 and Section 7.4.

PROCEDURE: - Ultratech ADSL Guidelines.

MEASUREMENT:

Frequency Band	Peak Measurement (dBm/Hz)		Peak Limit (dBm/Hz)
	Before Stress	After Stress	
U-C (Downstream)	-46.5	-48.7	-36.5
U-R (Upstream)	-37.8	-39.8	-34.5

Frequency Band (MHz)	Peak Measurement (dBm/Hz)		Peak Limit (dBm/Hz)
	Before Stress	After Stress	
0.307-11.040 (U-R)	-105.0	-105.5	-90.0
3.093-11.040 (U-C)	-106.0	-106.0	-90.0

RESULTS & ANALYSIS: The unit complies with the above requirements.

4.2. TOTAL SIGNAL POWER

CRITERIA:

Total signal power for upstream or downstream shall not exceed the following limits:

(A) TOTAL SIGNAL POWER (U-R) = 12.5 dBm

(B) TOTAL SIGNAL POWER (U-C) = 20.4 dBm

MEASUREMENT:

	Measured Total Power (dBm)		Limit (dBm/Hz)
	Before Stress	After Stress	
Upstream	10.8	10.9	12.5
Downstream	9.9	10.0	20.4

1 MHz Sliding Window: (Maximum reading)

Frequency Band (MHz)	Peak Measurement (dBm)		Peak Limit (dBm/Hz)
	Before Stress	After Stress	
1.630-11.040 (U-R)	-71.0	-70.0	-50.0
4.545-11.040 (U-C)	-69.2	-69.0	-50.0

RESULTS & ANALYSIS: The unit complies with the above requirements.

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EXHIBIT 5. SUBMITTED APPLICATION PACKAGE

- Cover Letter
- Application Form
- Supplier's Declaration of Conformity
- Indemnification Letter
- List of Authorized Submitters Letter (If Applicable)

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September 23, 2002

ATIS

c/o ACTA Secretariat
1200 G Street N.W., Suite 500
Washington, DC 20005

Subject: Original Filing in Accordance with Guidelines & Procedures for Submittal of Information to ACTA for Inclusion in the Database of Approved Telephone Terminal Equipment ("TTE"), Revision 2.3.

Product: S518 ADSL PCI Modem
Model: S518
Label ID: US: SANDL02BS518



31040/SIT



C-1376

Canada
46390-2049

NVLAP
200093-0



00-034

Dear ACTA Secretariat,

We **UltraTech Engineering Labs Inc.**, listed as an authorized submitter on behalf of **Sangoma Technologies Corp.** are submitting an original filing for the above product.

Enclosed on the CD, please find the application form and Indemnification Letter and a copy of the SDoC document.

A check for US\$300.00 is also included.

The SDoC for the above product will be posted on the applicant's website.

Should you have any questions, please do not hesitate to contact us at the following Toll-Free number:

1-877-765-4713

Yours truly,

A handwritten signature in black ink, appearing to read "Victor H. Kee".

Victor H. Kee, P. Eng.,
V.P., Engineering

VHK/MT

Encl.

3000 Bristol Circle,
Oakville, Ontario, Canada
L6H 6G4

Telephone (905) 829-1570
Facsimile (905) 829-8050

Website: www.ultratech-labs.com
Email: vic@ultratech-labs.com



Administrative Council for Terminal Attachments

c/o ATIS
1200 G Street, NW
Suite 500
Washington, D.C. 20005

TELEPHONE TERMINAL EQUIPMENT (TTE) SUBMISSION FORM Ver. 1.04

*Please refer to the *Guidelines & Procedures for submittal of information to ACTA for inclusion in the database of approved Telephone Terminal Equipment ("TTE")* for a detailed item description of each field.

1a. Name of Organization Granting Approval
or Submitting Request for RPC

NOTE: For SDoC filings only. Information of
external company filing for Responsible Party, if
applicable

Company Name: Sangoma Technologies Corp.				Company Name: Ultratech Engineering Labs Inc.			
Address: 50 McIntosh Drive, Suite 120				Address: 3000 Bristol Circle			
City: Markham, ONT	State:	Zip: L6H 6G4	Country: CAN	City: Oakville, ONT	State:	Zip: L6H 6G4	Country: CAN
Submitter's Name: David Mandelstam				Submitter's Name: Mike Tom			
Phone Number: 905-474-1990				Phone Number: 1-877-765-4173			
Email Address: dm@sangoma.com				Email Address: mike@ultratech-labs.com			
1b. TCB Identification Number (if applicable) Not Applicable							
1c. Declaration of Conformity Included? Yes							
2. Terminal Approval Date September 13, 2002							
3. Product Identifier S518							

4. Responsible Party

5. U.S. Agent for Service

Company Name: Sangoma Technologies Corp.				Company Name: JBM Electronics Co.			
Address: 50 McIntosh Drive, Suite 120				Individual or Department: 4645 LaGuardia			
City: Markham, ONT	State:	Zip: L6H 6G4	Country: CAN	Address: 4645 LaGuardia			
Responsible Party Point of Contact: David Mandelstam				City: St. Louis	State: MO	Zip: 63134-9906	
Phone Number: 905-474-1990				Phone: 1-314-426-7781			
Email Address: dm@sangoma.com				URL: www.jbmelectronics.com			

6. Equipment Description	6a. Country Of Origin
ADSL Modem PCI Card	Canada

7. Responsible Party Code (RPC)	8. Manufacturer's Code (if available)
SAN	

9. Current Authorization Number (only if Modification, Notice, Re-certification, and/or re-declaration filing)	10. Equipment Code
	DL

11a. List of Brand or Trade Name(s) Including New and Existing Names
S518 ADSL PCI Card
11b. List of New and Existing Model Number(s) for Each Brand or Trade Name
S518

12. Network address signaling code
N

13a. AC Ringer Equivalence Number (REN) 0.2B	13b. Hearing Aid Compatibility (YES/NO/NA) N/A
13c. USOC Jack(s) RJ-11	13d. Repetitive Dialing to a Single Number (YES/NO) NO

14. Filing Status
ORIGINAL

15. Facility Interface Code(s)	16. Manufacturer Port ID
02LS2	N/A

17. Service Order Code(s) (SOC)	18. Answer Supervision Code(s)
9.0Y	N/A

19. Ancillary Equipment

	Certification Status	Trade Name	Model Number	List of Ancillary Equipment by Type	Manufacturer's Identifier
1.	N/A				
2.					
3.					
4.					

If you are submitting an original filing or re-certification please fill out the following information. This will give you your ACTA Product-Labeling Number.

ACTA PRODUCT LABEL				
US:	SAN	DL	02B	S518
	#7	#10	#13a (leave out the decimal point)	#3

- #7. Responsible Party Code (RPC)
- #10. Equipment Code
- #13a AC Ringer Equivalence Number (REN)
- #3. Product Identifier

Completed Product Label: US: SANDL02BS518

SUPPLIER'S DECLARATION OF CONFORMITY

REFERENCE NUMBER: SNG17_ACTA

DATE OF ISSUE: September 13, 2002

COUNTRY OF MANUFACTURE: Canada

We, the Responsible Party, *Sangoma Technologies Corp.* located at:

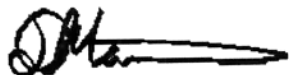
ADDRESS: 50 McIntosh Drive, Suite 120
Markham, Ontario
Canada, L3R 9T3

hereby declare that the following product:

TRADE NAME/MODEL NUMBER (S): S518 ADSL PCI Card, Model: S518
LABEL IDENTIFICATION NUMBER: US: SANDL02BS518

Is in conformity with the Federal Communications Commission's (FCC) Rules and Regulations 47 CFR Part 68, the Administrative Council on Terminal Attachments (ACTA) – adopted technical criteria, TIA/EIA IS-968 – Technical Requirements For Connection Of Terminal Equipment To The Telephone Network, July 2001, and TIA/EIA IS-883 – Supplemental Technical Requirements for Connection of Sutter Dial Tone Detection Devices and ADSL Modems to the Telephone Network.

Responsible Party Legal Representative:



Signature

President and CEO

Position

David R. Mandelstam

Full Name

September 13, 2002

Date



50 McIntosh Drive, Suite 120, Markham, Ontario, CANADA L3R 9T3

INDEMNIFICATION AND LIABILITY STATEMENT

September 13, 2002

ACTA Secretariat
c/o ATIS
1200 G Street, NW
Suite 500
Washington, DC 20005

RE: Statement of Indemnification, Liability, and addition information about the *S518 ADSL PCI Card*, model: *S518*, Label Identifier: US: SANDL02BS518 (the "Product")

ACTA Secretariat:

Sangoma Technologies hereby indemnifies and holds harmless the Administrative Council for Terminal Attachment ("ACTA"), its members, affiliates, Secretariat, and Sponsors, and each of their officers, directors, employees, participants, agents and representatives (the "ACTA Parties"), of and from any and all liabilities, losses, costs, damages, claims, suits or expenses (including reasonable attorneys' fees and costs) of any kind whatsoever, arising from or relating to the Telephone Terminal Equipment ("TTE") or *Sangoma Technologies*, Supplier's Declaration of Conformity ("SDoC") submitted to ACTA in connection therewith.

Sangoma Technologies, hereby acknowledges and agrees that ACTA, and the ACTA Parties shall not, and do not, assume, and expressly disclaim, any and all liability, responsibility and obligation in connection with any loss, damage or claim arising from or relating to, in any way, ACTA's publication, distribution or other use of any information relating to or concerning the Product, including without limitation in connection with any claims or liabilities sounding in contract, tort (including negligence or strict liability), or otherwise, and in no circumstances shall ACTA or the ACTA Parties be liable for any loss of profits, loss of use, loss of production, loss of goodwill, or incidental, direct, indirect or consequential damages of any kind.

Pursuant to Part 68.218 and Part 68.348 of the FCC rules and Regulations, no changes will be made to the above referenced Product or its protective circuitry that would result in any change in the information contained in the corresponding SDoC or TCB Grant of Certification *SNG17_ACTA* without filing of a new SDoC or TCB Grant of Certification.

As specified in Part 68.324(e)(3), a copy of the SDoC is freely available to the general public, and accessible to the disabled community, on the company website at www.sangoma.com.

Name of Company Officer: David Mandelstam

Function of Officer: President and CEO

A handwritten signature in black ink, appearing to read 'DM', followed by a horizontal line.

Signature: _____