g GE Energy	**Functional Testing Specification**
Parts & Repair Services ***Louisville, KY***	**LOU- GED-DS200SIOCG1A**

Test Procedure for a DS200SIOCG1A Card

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1. SCOPE

1.1 This is a functional testing procedure for the DS200SIOCG1A card.

2. STANDARDS OF QUALITY

2.1 Refer to the current revision of the IPC-A-610 standard for workmanship standards.

3. APPLICABLE DOCUMENTS

3.1 The following document(s) shall form part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue shall apply.

3.1.1 Salem Test - 200SIOC.TXT

4. ENGINEERING REQUIREMENTS

4.1 Equipment Cleaning

4.1.1 Equipment should be clean and free of debris prior to applying power unless performing an initial check. Refer to the local documented procedures for cleaning guidelines.

4.2 Equipment Inspection

4.2.1 Equipment should be visually inspected for any defects prior to applying power. This inspection should include the following as a minimum:

4.2.1.1 Wires - broken, cracked, or loosely connected
4.2.1.2 Terminal strips / connectors - broken or cracked
4.2.1.3 Components - visually damaged
4.2.1.4 Capacitors - bloated or leaking
4.2.1.5 Solder joints - damaged or cold
4.2.1.6 Circuit board - burned or de-laminated
4.2.1.7 Printed wire runs / Traces - burned or damaged

5. EQUIPMENT REQUIRED

5.1 The following equipment is required to perform the process requirements. Equipment may be substituted provided that all accuracy's and test ratios are equivalent or better.

Qty	Reference #	Description
2		Fluke 85 or equivalent
1		120VAC Variable
1		Fluke 715 mV source or equivalent

6. TESTING PROCESS

6.1 Setup

6.1.1 Verify that all berg jumpers JP1, JP2, JP3, and JP4 are in the 1-2 position.

6.1.2 Verify that fuse FU1 is a .25A fuse and is installed.

6.1.3 Verify that DS1 is a 4 red LED package and DS2 is a single green LED.

6.1.4 Verify that all test rings and test points are correct, unbent, and are there.

6.1.5 Attach power cord to male connector at TB1.2 and TB1.3.

6.1.6 Plug power cord in the AC power Supply

6.2 Testing Procedure (Power Supplies)

6.2.1 Verify 115 VAC between TB1.2 and TB1.3 terminals

6.2.2 Verify the following voltages on the card.

VOLTAGE	TEST POINT	HIGH	LOW
P24V	TP10	27.0V	23.0V
P15V	TP12	15.6V	14.4V
N15V	TP13	-14.4V	-15.6V
N24V	TP11	-23.0V	-27.0V
COM	TP1	TP1	REFERENCE

6.3 Testing Procedure (Offsets)

6.3.1 Turn pots R2, R4, R6, & R8 to the Full “CCW” Position.

6.3.2 Connect a shorting jumper from 1PL.1 to 1PL.2.

6.3.3 Connect positive lead of digital voltmeter (DVM) to “FB1” (TP3).

6.3.4 Connect negative lead of digital voltmeter (DVM) to “COM” (TP1).

6.3.5 Set DVM to a range to measure millivolts.

6.3.6 Adjust pot R9 until DVM reads 0.000V +/- 5mV.

6.3.7 Remove the shorting jumper from 1PL.1 and 1PL.2 and reconnect between 2PL.1 and 2PL.2.

6.3.8 Connect positive lead of DVM to “FB2” (TP5).

6.3.9 Adjust pot R10 until DVM reads 0.000V +/- 5mV.

6.3.10 Remove the shorting jumper from 2PL.1 and 2PL.2 and reconnect between 3PL.1 and 3PL.2.

6.3.11 Connect positive lead of DVM to “FB3” (TP7).

6.3.12 Adjust pot R11 until DVM reads 0.000V +/- 5mV.

6.3.13 Remove the shorting jumper from 3PL.1 and 3PL.2 and reconnect between 4PL.1 and 4PL.2.

6.3.14 Connect positive lead of DVM to "FB4" (TP9).

6.3.15 Adjust pot R12 until DVM reads 0.000V +/- 5mV.

6.3.16 Remove the shorting jumper from 4PL.1 and 4PL.2.

6.4 Testing Procedure (Voltage Gains)

6.4.1 Set precision voltage source (PVS) for 100mV +/- 2mV.

6.4.2 Connect positive lead of PSV to 1PL.1 (R).

6.4.3 Connect negative lead of PSV to 1PL.2 (W).

6.4.4 Connect positive lead of DVM to "FB1" (TP3) and adjust pot R2 to verify that DVM reads 1.000V (+100mV/-20mV), HI=1.1V and LO=0.980V.

6.4.5 Adjust pot R2 in the "CW" direction until DVM reads 10.00V +/- 20mV, HI=10.020V and LO=9.980V.

6.4.6 Adjust pot R2 in the "CCW" Direction until DVM reads 1.000V (+100mV/-20mV), HI=1.100V and LO=0.980V.

6.4.7 Disconnect positive lead of PVS from 1PL.1 and reconnect to 2PL.1 (R).

6.4.8 Disconnect negative lead of PVS from 1PL.2 and reconnect to 2PL.2 (W).

6.4.9 Connect positive lead of DVM to "FB2" (TP5) and adjust pot R4 to verify that DVM reads 1.000V (+100mV/-20mV), HI=1.100V and LO=0.980V.

6.4.10 Adjust pot R4 in the "CW" direction until DVM reads 10.00V +/- 20mV, HI=10.020V and LO=9.980V.

6.4.11 Adjust pot R4 in the "CCW" direction until DVM reads 1.000V (+100mV/-20mV), HI=1.100V and LO=0.980mV.

6.4.12 Disconnect positive lead of PVS from 2PL.1 and reconnect to 3PL.1. (R).

6.4.13 Disconnect negative lead of PVS from 2PL.2 and reconnect to 3PL.2. (W).

6.4.14 Connect positive lead of DVM to "FB3" (TP7) and adjust pot R6 to verify that DVM reads 1.000V (+100mV/-20mV), HI=1.100V and LO=0.980V.

6.4.15 Adjust pot R6 in the "CW" direction until DVM reads 10.00V +/- 20mV, HI=10.020V and LO=9.980V.

6.4.16 Adjust pot R6 in the "CCW" direction until meter reads 1.000V (+100mV/-20mV), HI=1.100V and LO=0.980V.

6.4.17 Disconnect positive lead of PVS from 3PL.1 and reconnect to 4PL.1. (R).

6.4.18 Disconnect negative lead of PVS from 3PL.2 and reconnect to 4PL.2. (W).

6.4.19 Connect positive lead of DVM to “FB4” (TP9) and adjust pot R8 to verify that DVM reads 1.000V (+100mV/-20mV), HI=1.100V and LO=0.980V.

6.4.20 Adjust pot R8 in the “CW” direction until DVM reads 10.00V +/- 20mV, HI=10.020V and LO=9.980V.

6.4.21 Adjust pot R8 in the “CCW” Direction until DVM reads 1.000V (+100mV/-20mV), HI=1.100V and LO=0.980V.

6.4.22 Turn PVS to stand-by position.

6.4.23 Disconnect positive lead of PVS from 4PL.1.

6.4.24 Disconnect negative lead of PVS from 4PL.2.

6.4.25 Turn off PVS and disconnect DVM leads.

6.5 Testing Procedure (Trip Set)

6.5.1 Connect positive lead of DVM to “TRIP_1” (TP2).

6.5.2 Connect negative lead of DVM to “COM” (TP1).

6.5.3 Adjust pot R1 in the “CCW” direction and verify DVM reads 1.0V +/- 125mV, HI=1.125V and LO=0.875V.

6.5.4 Adjust pot R1 in the “CW” direction and verify DVM reads 5.5V (+300mV/-500mV), HI=5.800V and LO=5.000V.

6.5.5 Connect positive lead of DVM to “TRIP_2” (TP4).

6.5.6 Adjust pot R3 in the “CCW” direction and verify DVM reads 1.0V +/- 125mV, HI=1.125V and LO=0.875V.

6.5.7 Adjust pot R3 in the “CW” direction and verify DVM reads 5.5V (+300mV/-500mV), HI=5.800V and LO=5.000V.

6.5.8 Connect positive lead of DVM to “TRIP_3” (TP6).

6.5.9 Adjust pot R5 in the “CCW” direction and verify DVM reads 1.0V +/- 125mV, HI=1.125V and LO=0.875V.

6.5.10 Adjust pot R5 in the “CW” direction and verify DVM reads 5.5V (+300mV/-500mV), HI=5.800V and LO=5.000V.

6.5.11 Connect positive lead of DVM to “TRIP_4” (TP8).

6.5.12 Adjust pot R7 in the “CCW” direction and verify DVM reads 1.0V +/- 125mV, HI=1.125V and LO=0.875V.

6.5.13 Adjust pot R7 in the “CW” direction and verify DVM reads 5.5V +/- 100mV, HI=5.600V and LO=5.400V.

6.6 Testing Procedure (Verifying 4 CFB Channels Trip))

6.6.1 Connect positive lead of DVM #1 to “FB1” (TP3).

6.6.2 Connect negative lead of DVM #1 to “COM” (TP1).

6.6.3 Connect positive lead of DVM #2 to “TRIP_1” (TP2).

6.6.4 Connect negative lead of DVM #2 to “COM” (TP1).

6.6.5 Turn on PVS and set to 100mV +/- 2mV, HI=0.102V and LO=0.098V

6.6.6 Connect PSV positive lead to 1PL.1. (R).

6.6.7 Connect PSV negative lead to 1PL.2. (W).

6.6.8 Adjust pot R1 “CCW” until DVM #2 reads 4.00V +/- 5mV, HI=4.005V and LO=3.995V.

6.6.9 Increase PSV voltage upward to 400mV and verify that LED “OC1” turns on when PSV reaches 400mV +/- 30mV and “FB1” reaches 4.00V, HI=0.430V and LO=0.370V

Note: (OC1-4 are the 4 red LED’s that are a part of DS1, but marked on silk-screen as OC1 thru OC4).

6.6.10 Connect positive lead of DVM #1 to “FB2” (TP5).

6.6.11 Connect positive lead of DVM #2 to “TRIP_2” (TP4).

6.6.12 Set PVS to 100mV +/- 2mV. HI=0.102V LO=0.098V

6.6.13 Connect PSV positive lead to 2PL.1. (R)

6.6.14 Connect PSV negative lead to 2PL.2. (W)

6.6.15 Adjust pot R3 “CCW” until DVM #2 reads 4.00V +/- 5mV, HI=4.005V and LO=3.995V.

6.6.16 Increase PSV voltage upward to 400mV and verify that LED “OC2” turns on when PSV reaches 400mV +/- 30mVand “FB2” reaches 4.00V, HI=0.430V and LO=0.370V.

6.6.17 Connect positive lead of DVM #1 to “FB3” (TP7).

6.6.18 Connect positive lead of DVM #2 to “TRIP_3” (TP6).

6.6.19 Set PVS to 100mV +/- 2mV, HI=0.102V and LO=0.998V.

6.6.20 Connect PSV positive lead to 3PL.1. (R).

6.6.21 Connect PSV negative lead to 3PL.2. (W).

6.6.22 Adjust pot R5 “CCW” until DVM #2 reads 4.00V +/- 5mV, HI=4.005V and LO=3.995V.

6.6.23 Increase PSV voltage upward to 400mV and verify that LED “OC3” turns on when PSV reaches 400mV +/- 30mVand “FB3” reaches 4.00V, HI=0.430V and LO=0.370V.

6.6.24 Connect positive lead of DVM #1 to “FB4” (TP9).

6.6.25 Connect positive lead of DVM #2 to “TRIP_4” (TP8).

6.6.26 Set PVS to 100mV +/- 2mV, HI=0.102V and LO=0.098V

6.6.27 Connect PSV positive lead to 4PL.1. (R).

6.6.28 Connect PSV negative lead to 4PL.2. (W).

6.6.29 Adjust pot R7 "CCW" until DVM #2 reads 4.00V +/- 5mV, HI=4.005V and LO=3.995V.

6.6.30 Increase PSV voltage upward to 400mV and verify that LED "OC4" turns on when PSV reaches 400mV +/- 20mVand "FB4" reaches 4.00V, HI=0.430V and LO=0.370V.

6.6.31 Turn power to all power supplies off.

6.6.32 Disconnect all jumpers, power cables, test instrument leads, etc. if card passes.

6.6.33 If card passes seal offset adj. pots R9, R10, R11, and R12 only. Do Not Seal pots R1, R2, R3, R4, R5, R6, R7, and R8.

6.7 ***TEST COMPLETE ***

7. NOTES

7.1 Scope of Test

7.1.1 Power Supplies: Connects and verifies that the proper voltages are applied to the card.

7.1.2 OFFSETS: Trims offset adjustments to minimum value on all 4 isolation amplifiers.

7.1.3 VOLTAGE GAINS: Verifies voltage gain adjustment for all 4 isolated power shunt inputs to isolation amplifiers.

7.1.4 TRIP SET: Verifies the trip levels of the four channels and verifies that the trip pot is adjustable from 1.0V to 5.5VDC. This is just a general check for component error.

7.1.5 VERIFYING TRIP: Sets and verifies that all 4 CFB channels trip at 4.0 volts. Verifies that OC1-OC4 LED's turn on in the event of a trip.

7.1.6 SEALS POTS: Asks the test operator seal offset adjustment pots, if card passes all of the test steps.

7.2 References

7.2.1 Card is set with CFB trip level set for 4.0 volts

7.2.2 Card is set with GAIN pots set for a gain = 1.

7.2.3 Part Number 104X171CA034 (ULN2001A) location QN9 must be changed

7.3 Operation Notes

7.3.1 Each isolation amplifier (U1, U2, U3, and U4) has a internal X10 GAIN.

7.3.2 Gain adjustment pots (R2, R4, R6, and R8) gain values are as follows:

7.3.2.1 Adjust in the "CCW" direction for approx. 1.0 GAIN. [Full CCW = Gain= 1.0]

7.3.2.2 Adjust in the "CW" direction for approx. 10.0 GAIN. [Full CW = Gain = 10.0]

7.3.3 With jumpers JP1, JP2, JP3, and JP4 in 1-2 (LATCH) position and if the shunt input voltages are greater then the TRIPSET voltage (set by tripset pots) the DS1 LEDs will latch on and remain on until a reset is given or power is removed from the card. (To reset w/o removing power, just remove the appropriate jumper for that channel and re-install; If the shunt input voltage is below the trip-set value the DS1 led will turn off. It will re-latch again if the input shunt voltage is equal or greater than the trip-set voltage point.)

8. ATTACHMENTS

8.1 None at this time