



GE Energy

Functional Testing Specification

*Parts & Repair Services
Louisville, KY*

LOU-GED-44C372688

Test Procedure for a three-channel comparator card.

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A	Initial release	J. Francis	6/18/2010
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C			

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DATE 6/18/2010	DATE 9/17/2010	DATE	DATE 6/21/2010

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1. SCOPE

1.1 This is a functional testing procedure for a 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 Check board's electronic folder for more information

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 site specific SRA's 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
1		Fluke 87 DMM (or Equivalent)
1	H033890	Rainbow Box
1	H033991	44C Adaptor Box
2		Tenma Dual Adjustable Power Supplies

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6. TESTING PROCESS

6.1 Setup



Note: This card is a 3-channel comparator. We are setting each circuit up identical and looking for any differences. If any test on any step of this test fails, troubleshoot and repair problem, then continue with test.

- 6.1.1 Connect 44C Adaptor Box to top connector on Rainbow Box.
- 6.1.2 Attach card to 44C Adaptor Box, with components facing to the right.
- 6.1.3 Set jumpers J301, J201, and J101 for Auto.
- 6.1.4 Set jumpers J302, J202, and J102 for "A".
- 6.1.5 Set switches 301SW, 201SW, and 101SW down.
- 6.1.6 Set 302SW, 202SW, and 102SW in the up position.
- 6.1.7 Adjust Potentiometers 302P, 202P, and 102P fully clockwise.

6.2 Testing Procedure

- 6.2.1 Connect positive lead of 1st power supply to pin 1 on rainbow box. Connect negative lead of 1st power supply to pin 3 of rainbow box. Adjust power supply for +15 VDC output.
- 6.2.2 Connect positive lead of 2nd power supply to pin 3 on rainbow box. Connect negative lead of 2nd power supply to pin 5 of rainbow box. Adjust power supply for -15 VDC output.
- 6.2.3 Connect positive lead of 1st power supply to pin 1 on rainbow box. Connect negative lead of 1st power supply to pin 3 of rainbow box. Adjust power supply for +15 VDC output.
- 6.2.4 Connect positive lead of 3rd power supply to pin 7 on rainbow box. Connect negative lead of 3rd power supply to pin 9 of rainbow box. Adjust power supply for +24 VDC output.
- 6.2.5 Connect 1st Multimeter positive lead to 301TP, set for DC Volts. Connect 1st Multimeter negative lead to pin 3 of rainbow box.
- 6.2.6 Turn on +/-15 VDC and +24 VDC power supplies. 101LED, 201LED, and 301LED should be off.
- 6.2.7 Make sure that 1st Multimeter reads +5 VDC +/-0.1 VDC. If not, set for +5 VDC, adjust accordingly. 301P will adjust 301TP.
- 6.2.8 Move positive lead of 1st Multimeter from 301TP to 303TP, should read >+14 VDC.
- 6.2.9 Connect positive lead of 2nd Multimeter to pin 23 of rainbow box. Connect negative lead of 2nd Multimeter to pin 8 of rainbow box, should read <-/+0.4 VDC.
- 6.2.10 Move switch 302SW to the down position.

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- 6.2.11** Connect positive lead of 3rd Multimeter to pin 24 of rainbow box. Connect negative lead of 3rd Multimeter to pin 9 of rainbow box. Multimeter should read >+20 VDC.
- 6.2.12** Connect positive lead of an adjustable power supply, making sure output is adjusted to 0 VDC output, to pin 13 of rainbow box. Connect negative lead of same power supply to pin 3 of rainbow box.
- 6.2.13** Adjust output to +5.5 VDC (pin 13 of rainbow box). 1st Multimeter should read <-12 VDC.
- 6.2.14** Wait approximately 5 seconds then 301LED should turn on, 2nd Multimeter should read -24 VDC, and 3rd Multimeter should read <+0.8 VDC.
- 6.2.15** Adjust output to 0 VDC (pin 13 of rainbow box). 1st Multimeter should read >+14 VDC.
- 6.2.16** Wait approximately 3 seconds then 301LED should turn off, 2nd Multimeter should read <-/+0.4 VDC, and 3rd Multimeter should read >+20 VDC.
- 6.2.17** Move jumper J301 to MAN position.
- 6.2.18** Move 301SW to up position and push reset. 301LED should come on, 2nd Multimeter should read -24 VDC, and 3rd Multimeter should read <+0.8 VDC.
- 6.2.19** Adjust 302P fully counter clockwise.
- 6.2.20** Adjust output of adjustable power supply to +5.5 VDC (pin 13 of rainbow box). 1st Multimeter should read <-12 VDC.
- 6.2.21** Wait approximately 1 seconds then 301LED should turn off, 2nd Multimeter should read <-/+0.4 VDC, and 3rd Multimeter should read <+20 VDC.
- 6.2.22** Adjust output to 0 VDC (pin 13 of rainbow box). 1st Multimeter should read >+14 VDC. 301LED should stay off, 2nd Multimeter should still read <-/+0.4 VDC, and 3rd Multimeter should still read >+20 VDC.
- 6.2.23** Press 301PB (channel 3 reset button).
- 6.2.24** 301LED should go "ON", 2nd Multimeter should read -24 VDC, and 3rd Multimeter should read <+0.8 VDC.
- 6.2.25** Move jumper J301 back to AUTO position.
- 6.2.26** Move switch 302SW into down position, 2nd Multimeter should read <+0.8 VDC, and 3rd Multimeter should read >+20 VDC.
- 6.2.27** Move 302SW back to up position.
- 6.2.28** **Channel 3 testing complete.**
- 6.2.29** Connect 1st Multimeter positive lead to 201TP, set for DC Volts. Connect 1st Multimeter negative lead to pin 3 of rainbow box.

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- 6.2.30** Turn on -/+15 VDC and +24 VDC power supplies. 101LED, 201LED, and 301LED should be off.
- 6.2.31** Connect positive lead of 1st Multimeter to 201TP, should read +5 VDC +/-0.1 VDC. If not, set for +5 VDC, adjust accordingly. 201P will adjust 201TP.
- 6.2.32** Move positive lead of 1st Multimeter from 201TP to 203TP, should read >+14 VDC.
- 6.2.33** Connect positive lead of 2nd Multimeter to pin 22 of rainbow box. Connect negative lead of 2nd Multimeter to pin 8 of rainbow box, should read <-/+0.4 VDC.
- 6.2.34** Move switch 202SW to the down position.
- 6.2.35** Connect positive lead of 3rd Multimeter to pin 24 of rainbow box. Connect negative lead of 3rd Multimeter to pin 9 of rainbow box. Multimeter should read >+20 VDC.
- 6.2.36** Connect positive lead of an adjustable power supply, making sure output is adjusted to 0 VDC output, to pin 12 of rainbow box. Connect negative lead of same power supply to pin 3 of rainbow box.
- 6.2.37** Adjust output to +5.5 VDC (pin 12 of rainbow box). 1st Multimeter should read <-12 VDC.
- 6.2.38** Wait approximately 5 seconds then 201LED should turn on, 2nd Multimeter should read -24 VDC, and 3rd Multimeter should read <+0.8 VDC.
- 6.2.39** Adjust output to 0 VDC (pin 12 of rainbow box). 1st Multimeter should read >+14 VDC.
- 6.2.40** Wait approximately 1 seconds then 201LED should turn off, 2nd Multimeter should read <-/+0.4 VDC, and 3rd Multimeter should read >+20 VDC.
- 6.2.41** Move jumper J201 to MAN position.
- 6.2.42** Move 201SW to up position and push reset. 201LED should come on, 2nd Multimeter should read -24 VDC, and 3rd Multimeter should read <+0.8 VDC.
- 6.2.43** Adjust 202P fully counter clockwise.
- 6.2.44** Adjust output of adjustable power supply to +5.5 VDC (pin 12 of rainbow box). 1st Multimeter should read <-12 VDC.
- 6.2.45** Wait approximately 1 seconds then 201LED should turn off, 2nd Multimeter should read <-/+0.4 VDC, and 3rd Multimeter should read <+20 VDC.
- 6.2.46** Adjust output to 0 VDC (pin 12 of rainbow box). 1st Multimeter should read >+14 VDC. 201LED should stay off, 2nd Multimeter should still read <-/+0.4 VDC, and 3rd Multimeter should still read >+20 VDC.
- 6.2.47** Press 201PB (channel 2 reset button).
- 6.2.48** 201LED should go "ON", 2nd Multimeter should read -24 VDC, and 3rd Multimeter should read <+0.8 VDC.

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- 6.2.49** Move jumper J201 back to AUTO position.
- 6.2.50** Move switch 202SW into down position, 2nd Multimeter should read <+0.8 VDC, and 3rd Multimeter should read >+20 VDC.
- 6.2.51** Move 202SW back to up position.
- 6.2.52** **Channel 2 testing complete.**
- 6.2.53** Turn on -/+15 VDC and +24 VDC power supplies. 101LED, 201LED, and 301LED should be off.
- 6.2.54** Connect positive lead of 1st Multimeter to 101TP, should read +5 VDC +/-0.1 VDC. If not, set for +5 VDC, adjust accordingly. 101P will adjust 101TP.
- 6.2.55** Move positive lead of 1st Multimeter from 101TP to 103TP, should read >+14 VDC.
- 6.2.56** Connect positive lead of 2nd Multimeter to pin 21 of rainbow box. Connect negative lead of 2nd Multimeter to pin 8 of rainbow box, should read <-/+0.4 VDC.
- 6.2.57** Move switch 102SW to the down position.
- 6.2.58** Connect positive lead of 3rd Multimeter to pin 22 of rainbow box. Connect negative lead of 3rd Multimeter to pin 9 of rainbow box. Multimeter should read >+20 VDC.
- 6.2.59** Connect positive lead of an adjustable power supply, making sure output is adjusted to 0 VDC output, to pin 11 of rainbow box. Connect negative lead of same power supply to pin 3 of rainbow box.
- 6.2.60** Adjust output to +5.5 VDC (pin 11 of rainbow box). 1st Multimeter should read <-12 VDC.
- 6.2.61** Wait approximately 5 seconds then 101LED should turn on, 2nd Multimeter should read -24 VDC, and 3rd Multimeter should read <+0.8 VDC.
- 6.2.62** Adjust output to 0 VDC (pin 11 of rainbow box). 1st Multimeter should read >+14 VDC.
- 6.2.63** Wait approximately 3 seconds then 101LED should turn off, 2nd Multimeter should read <-/+0.4 VDC, and 3rd Multimeter should read >+20 VDC.
- 6.2.64** Move jumper J101 to MAN position.
- 6.2.65** Move 101SW to up position and push reset. 101LED should come on, 2nd Multimeter should read -24 VDC, and 3rd Multimeter should read <+0.8 VDC.
- 6.2.66** Adjust 102P fully counter clockwise.
- 6.2.67** Adjust output of adjustable power supply to +5.5 VDC (pin 11 of rainbow box). 1st Multimeter should read <-12 VDC.
- 6.2.68** Wait approximately 1 seconds then 101LED should turn off, 2nd Multimeter should read <-/+0.4 VDC, and 3rd Multimeter should read <+20 VDC.

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6.2.69 Adjust output to 0 VDC (pin 11 of rainbow box). 1st Multimeter should read >+14 VDC. 101LED should stay off, 2nd Multimeter should still read <-/+0.4 VDC, and 3rd Multimeter should still read >+20 VDC.

6.2.70 Press 101PB (channel 1 reset button).

6.2.71 101LED should go "ON", 2nd Multimeter should read –24 VDC, and 3rd Multimeter should read <+0.8 VDC.

6.2.72 Move jumper J101 back to AUTO position.

6.2.73 Move switch 102SW into down position, 2nd Multimeter should read <+0.8 VDC, and 3rd Multimeter should read >+20 VDC.

6.2.74 Move 102SW back to up position.

6.2.75 Channel 1 testing complete.

6.2.76 Turn off all power supplies.

6.3 *TEST COMPLETE *****

7. NOTES

7.1 None at this time.

8. ATTACHMENTS

8.1 None at this time.