g GE Energy	**Functional Testing Specification**
Parts & Repair Services ***Louisville, KY***	**LOU-GED-DS200IAXS**

Test Procedure for a DS200IAXS

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REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release – Transferred from GEDS format into current format.	Jill Hardin	8-17-2011
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J. Hardin			Charlie Wade
DATE	**DATE**	**DATE**	**DATE**
8/17/2011			8/18/2011

1. SCOPE

1.1 This is a functional testing procedure for a IGBT AA snubber 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
2		60 VDC power supplies
3		Digital Volt meters
2		1K 2W resistors

6. Modifications/Upgrades

6.1 Check Orange Book for any modifications or upgrades.

7. Testing Process

7.1 Testing Procedure

7.2 Verify that no solder shorts exist between adjacent pins.

7.3 Using the material list, verify that all parts shown on the silk-screen are present, and are assembled per the silk-screen.

7.4 Verify that all leads are properly soldered and connections are filleted and clipped.

7.5 Make sure APL, BPL, and CPL connectors are mounted with the high guard side as shown on silk screen.

7.6 Check to see that only pins 3, 4, 10, and 11 are missing from APL, BPL, and CPL connectors.

7.7 With an Ohmmeter check the following:

7.7.1 Verify the impedance values of R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13 and R14 by using the following table:

From - To	Resistors	Value (ohms)	Groups
APL-1 - APL-2	R6 + R5	1048 - 1075 976 - 1039	G1, G3 G2,G4
APL-1 - Q1-GuN	R6	58.81 - 65 26.03 - 28.77	G1, G3 G2, G4
APL-7 - APL-6	R4 + R3	1048 - 1075 26.03 - 28.77	G1, G3 G2, G4
APL-7 - Q1-GuP	R4	58.81 - 65 26.03 - 28.77	G1, G3 G2, G4
BPL-1 - BPL-2	R9 + R10	1048 - 1075 976 - 1039	G1, G3 G2, G4
BPL-1 - Q1-GvN	R9	58.81 - 65 26.03 - 28.77	G1, G3 G2, G4
BPL-7 - BPL-6	R7 + R8	1048 - 1075 976 - 1039	G1, G3 G2, G4
BPL-7 - Q1-GvP	R7	58.81 - 65 26.03 - 28.77	G1, G3 G2, G4
CPL-1 - CPL-2	R13 + R14	1048 - 1075 976 - 1039	G1, G3 G2, G4
CPL-1 - Q1-GwN	R13	58.81 - 65 26.03 - 28.77	G1, G3 G2, G4
CPL-7 - CPL-6	R11 + R12	1048 - 1075 976 - 1039	G1, G3 G2, G4
CPL-7 - Q1-GwP	R11	58.81 - 65 26.03 - 28.77	G1, G3 G2, G4

7.8 Connect ohmmeter plus lead to C3P and the negative lead to C4N, measure 59 k to 61 k ohms.

7.9 Check for continuity between C3N to C4P to (R15/R16) and C1N to C2P to (R1/R2).

7.10 Check that APL-12, BPL12, CPL12, C1P, DCPL1, and DCPLF1 are all tied together.

7.11 Check that C2N, DCPLF2, and DCPL2 are tied together.

7.12 Check for continuity between Q1-U to APL-5.

7.13 Check for continuity between Q1-V to BPL-5.

7.14 Check for continuity between Q1-W to CPL-5.

7.15 Check diodes across transistors, using DVM with diode testing capability, as follows:

7.16 Plus lead to APL-6 and minus lead to APL-12, measure 0.35 to 0.45 Volts.

7.17 Plus lead to APL-2 and minus lead to APL-5, measure 0.35 to 0.45 Volts.

7.18 Plus lead to BPL-6 and minus lead to BPL-12, measure 0.35 to 0.45 Volts.

7.19 Plus lead to BPL-2 and minus lead to BPL-5, measure 0.35 to 0.45 Volts.

7.20 Plus lead to CPL-6 and minus lead to C3P, measure 0.35 to 0.45 Volts.

7.21 Plus lead to CPL-2 and minus lead to CPL-5, measure 0.35 to 0.45 Volts.

7.22 POWER TEST - ZENERS D1 and D2 TESTS

7.23 Set DC Power Supply #1 to current limit at 100 ma as follows:

7.24 With Supply off connect a jumper across + and - terminals.

7.25 Turn the I limit and voltage knob fully counterclockwise.

7.26 Turn the Supply on and adjust I limit to 100 ma, if it doesn't adjust turn the voltage knob up slightly.

7.27 Turn Supply off and remove jumper from the + and - terminals.

7.28 Connect DC Power Supply #1 with a 1K 2W resistor (104X123BH 031) in series with the plus lead to APL-7 and the minus lead to APL-6.

7.29 Connect Digital Voltmeter A across DC Power Supply #1 before the 1K 2W resistor, connect the plus lead to Supply plus and the minus lead to Supply minus.

7.30 Connect Digital Voltmeter B across R3 plus to right side and minus to left side of the resistor.

7.31 Warning Do Not Exceed 20 VDC on Digital Voltmeter B as damage will result to the transistor.

7.32 Adjust the DC Power Supply #1 to 40 VDC, while watching the Voltage on Digital Voltmeter B it should read 17.8 to 19.7 VDC.

7.33 Turn the DC Power Supply #1 voltage to zero and connect the plus lead (after the 1K resistor) to APL-6 and minus to APL-7.

7.34 Adjust the DC Power Supply #1 to 40 VDC, while watching the voltage on the Digital Voltmeter B it should read - 17.8 to -19.7 VDC.

7.35 ZENER D3 and D4 TESTS

7.36 Connect DC Power Supply #1 with 1K 2W resistor in series with the plus lead to APL-1 and the minus lead to APL-2.

7.37 Connect Digital Voltmeter A across DC Power Supply #1 before the 1K 2W resistor,

7.38 Connect the plus lead to Supply plus and the minus to Supply minus.

7.39 Connect Digital Voltmeter B across R5 plus to right side and minus to left side of the resistor.

7.40 Warning Do Not Exceed 20 VDC on Digital Voltmeter B as damage will result to the transistor.

7.41 Adjust the DC Power Supply #1 to 40 VDC, while watching the Voltage on Digital Voltmeter B it should read 17.8 to 19.7 VDC.

7.42 Turn the DC Power Supply #1 voltage to zero and connect the plus lead (after the 1K resistor) to PL-2 and minus to PL-1. Adjust the DC Power Supply #1 to 40 VDC, while watching the voltage on the Digital Voltmeter B it should read - 17.8 to -19.7 VDC.

7.43 ZENER D5 and D6 TESTS

7.44 Connect DC Power Supply #1 with 1K 2W resistor in series with the plus lead to BPL-7 and the minus lead to BPL-6.

7.45 Connect Digital Voltmeter A across DC Power Supply #1 before the 1K 2W resistor, connect the plus lead to Supply plus and the minus to Supply minus.

7.46 Connect Digital Voltmeter B across R8 plus to right side and minus to left side of the resistor.

7.47 Warning Do Not Exceed 20 VDC on Digital Voltmeter B as damage will result to the transistor.

7.48 Adjust the DC Power Supply #1 to 40 VDC, while watching the Voltage on Digital Voltmeter B it should read 17.8 to 19.7 VDC.

7.49 Turn the DC Power Supply #1 voltage to zero and connect the plus lead (after the 1K resistor) to PL-2 and minus to PL-1.

7.50 Adjust the DC Power Supply #1 to 40 VDC, while watching the voltage on the Digital Voltmeter it should read - 17.8 to -19.7 VDC.

7.51 ZENER D7 and D8 TESTS

7.52 Connect DC Power Supply #1 with 1K 2W resistor in series with the plus lead to BPL-1 and the minus lead to BPL-2.

7.53 Connect Digital Voltmeter A across DC Power Supply #1 before the 1K 2W resistor, connect the plus lead to Supply plus and the minus to Supply minus.

7.54 Connect Digital Voltmeter B across R10 plus to right side and minus to left side of the resistor.

7.55 Warning Do Not Exceed 20 VDC on Digital Voltmeter B as damage will result to the transistor.

7.56 Adjust the DC Power Supply #1 to 40 VDC, while watching the Voltage on Digital Voltmeter B it should read 17.8 to 19.7 VDC.

7.57 Turn the DC Power Supply #1 voltage to zero and connect the plus lead (after the 1K resistor) to PL-2 and minus to PL-1.

7.58 ZENER D9 and D10 TESTS

7.59 Connect DC Power Supply #1 with 1K 2W resistor in series with the plus lead to CPL-7 and the minus lead to CPL-6.

7.60 Connect Digital Voltmeter A across DC Power Supply #1 before the 1K 2W resistor, connect the plus lead to Supply plus and the minus to Supply minus.

7.61 Connect Digital Voltmeter B across R12 plus to right side and minus to left side of the resistor.

7.62 Warning Do Not Exceed 20 VDC on Digital Voltmeter B as damage will result to the transistor.

7.63 Adjust the DC Power Supply #1 to 40 VDC, while watching the Voltage on Digital Voltmeter B it should read 17.8 to 19.7 VDC.

7.64 Turn the DC Power Supply #1 voltage to zero and connect the plus lead (after the 1K resistor) to PL-2 and minus to PL-1.

7.65 Adjust the DC Power Supply #1 to 40 VDC, while watching the voltage on the Digital Voltmeter B it should read - 17.8 to -19.7 VDC.

7.66 ZENER D11 and D12 TESTS

7.67 Connect DC Power Supply #1 with 1K 2W resistor in series with the plus lead to CPL-1 and the minus lead to CPL-2.

7.68 Connect Digital Voltmeter A across DC Power Supply #1 before the 1K 2W resistor, connect the plus lead to Supply plus and the minus to Supply minus.

7.69 Connect Digital Voltmeter B across R14 plus to right side and minus to left side of the resistor.

7.70 Warning Do Not Exceed 20 VDC on Digital Voltmeter B as damage will result to the transistor.

7.71 Adjust the DC Power Supply #1 to 40 VDC, while watching the Voltage on Digital Voltmeter B it should read 17.8 to 19.7 VDC.

7.72 Turn the DC Power Supply #1 voltage to zero and connect the plus lead (after the 1K resistor) to PL-2 and minus to PL-1.

7.73 Adjust the DC Power Supply #1 to 40 VDC, while watching the voltage on the Digital Voltmeter B it should read - 17.8 to -19.7 VDC.

7.74 TRANSISTOR #1 TEST

7.75 Connect DC Power Supply #1 with a 1K 2W resistor in series with the plus lead to APL-7 and the minus lead to APL-6.

7.76 Connect DC Power Supply #2 with a 1K 10W resistor (104X123AG 008) in series with the plus lead to APL-12 and the minus lead to APL-6.

7.77 Connect Digital Voltmeter a plus lead to APL-7 and the minus lead to APL-6.

7.78 Connect Digital Voltmeter B plus to APL-12 and minus to APL-6

7.79 Adjust DC Power Supply #2 for 10 VDC.

7.80 Verify that Digital Voltmeter A reads zero volts (no current flow).

7.81 Next slowly adjust DC Power Supply #1 until a voltage drop appears on Digital Voltmeter B continues to adjust DC Power Supply #1 until meter reads 4.5 to 7.5 VDC.

7.82 The voltage drop displayed on Digital Voltmeter shows that the transistor is turned on. Adjust Supply #1 back to 0V, Voltmeter A reads 10V and the transistor is turned off.

7.83 TRANSISTOR #2 TESTS

7.84 Connect DC Power Supply #1 with a 1K 2W resistor in series with the plus lead to APL-1 and the minus lead to APL-2.

7.85 Connect DC Power Supply #2 with a 1K 10W resistor (104X123AG 008) in series with the plus lead to APL-5 and the minus lead to APL-2.

7.86 Connect Digital Voltmeter a plus APL-1 and the minus lead to APL-2.

7.87 Connect Digital Voltmeter B plus to APL-5 and minus to APL-2

7.88 Adjust DC Power Supply #2 for 10 VDC.

7.89 Verify that Digital Voltmeter A reads zero volts (no current flow).

7.90 Next slowly adjust DC Power Supply #1 until a voltage drop appears on Digital Voltmeter B continues to adjust DC Power Supply #1 until meter reads 4.5 to 7.5 VDC.

7.91 The voltage drop displayed on Digital Voltmeter shows that the transistor is turned on. Adjust Supply #1 back to 0V, Voltmeter A reads 10V and the transistor is turned off.

7.92 TRANSISTOR #3 TESTS

7.93 Connect DC Power Supply #1 with a 1K 2W resistor in series with the plus lead to BPL-7 and the minus lead to BPL-6.

7.94 Connect DC Power Supply #2 with a 1K 10W resistor (104X123AG 008) in series with the plus lead to APL-12 and the minus lead to BPL-6.

7.95 Connect Digital Voltmeter a plus BPL-7 and the minus lead to BPL-6.

7.96 Connect Digital Voltmeter B plus to APL-12 and minus to BPL-6

7.97 Adjust DC Power Supply #2 for 10 VDC.

7.98 Verify that Digital Voltmeter A reads zero volts (no current flow).

7.99 Next slowly adjust DC Power Supply #1 until a voltage drop appears on Digital Voltmeter B continues to adjust DC Power Supply #1 until meter reads 4.5 to 7.5 VDC.

7.100 The voltage drop displayed on Digital Voltmeter shows that the transistor is turned on. Adjust Supply #1 back to 0V, Voltmeter A reads 10V and the transistor is turned off.

7.101 TRANSISTOR #4 TESTS

7.102 Connect DC Power Supply #1 with a 1K 2W resistor in series with the plus lead to BPL-1 and the minus lead to BPL-2.

7.103 Connect DC Power Supply #2 with a 1K 10W resistor (104X123AG 008) in series with the plus lead to BPL-5 and the minus lead to BPL-2.

7.104 Connect Digital Voltmeter a plus BPL-1 and the minus lead to BPL-2.

7.105 Connect Digital Voltmeter B plus to BPL-5 and minus to BPL-2.

7.106 Adjust DC Power Supply #2 for 10 VDC.

7.107 Next slowly adjust DC Power Supply #1 until a voltage drop appears on Digital Voltmeter B continues to adjust DC Power Supply #1 until meter reads 4.5 to 7.5 VDC.

7.108 The voltage drop displayed on Digital Voltmeter shows that the transistor is turned on. Adjust Supply #1 back to 0V, Voltmeter A reads 10V and the transistor is turned off.

7.109 TRANSISTOR #5 TESTS

7.110 Connect DC Power Supply #1 with a 1K 2W resistor in series with the plus lead to CPL-7 and the minus lead to CPL-6.

7.111 Connect DC Power Supply #2 with a 1K 10W resistor (104X123AG 008) in series with the plus lead to APL-12 and the minus lead to CPL-6.

7.112 Connect Digital Voltmeter a plus CPL-7 and the minus lead to CPL-6.

7.113 Connect Digital Voltmeter B plus to APL-12 and minus to CPL-6.

7.114 Adjust DC Power Supply #2 for 10 VDC.

7.115 Verify that Digital Voltmeter A reads zero volts (no current flow).

7.116 Next slowly adjust DC Power Supply #1 until a voltage drop appears on Digital Voltmeter B continues to adjust DC Power Supply #1 until meter reads 4.5 to 7.5 VDC.

7.117 The voltage drop displayed on Digital Voltmeter shows that the transistor is turned on. Adjust Supply #1 back to 0V, Voltmeter A reads 10V and the transistor is turned off.

7.118 TRANSISTOR #6 TESTS

7.119 Connect DC Power Supply #1 with a 1K 2W resistor in series with the plus lead to CPL-1 and the minus lead to CPL-2.

7.120 Connect DC Power Supply #2 with a 1K 10W resistor (104X123AG 008) in series with the plus lead to CPL-5 and the minus lead to CPL-2.

7.121 Connect Digital Voltmeter a plus CPL-1 and the minus lead to CPL-2.

7.122 Connect Digital Voltmeter B plus to CPL-5 and minus to CPL-2.

7.123 Adjust DC Power Supply #2 for 10 VDC.

7.124 Verify that Digital Voltmeter A reads zero volts (no current flow).

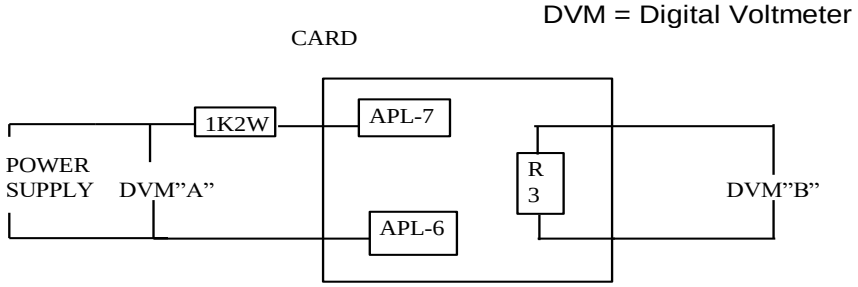
7.125 Next slowly adjust DC Power Supply #1 until a voltage drop appears on Digital Voltmeter B continues to adjust DC Power Supply #1 until meter reads 4.5 to 7.5 VDC.

7.126 The voltage drop displayed on Digital Voltmeter shows that the transistor is turned on. Adjust Supply #1 back to 0V, Voltmeter A reads 10V and the transistor is turned off.

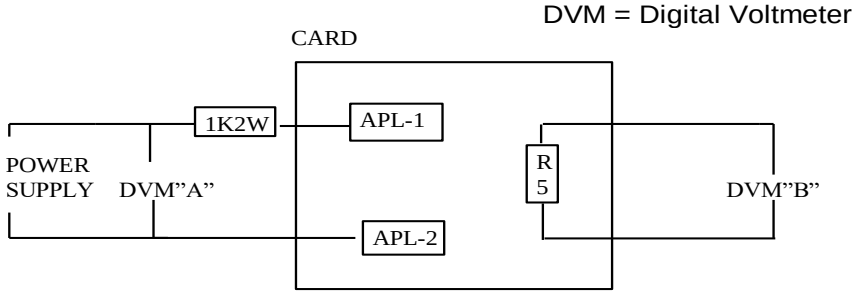
7.127 ******TEST COMPLETE ******

8. CONNECTION DIAGRAMS:

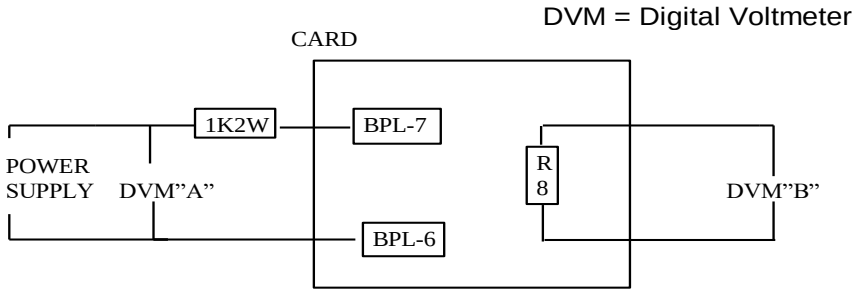
D1 & D2 CIRCUIT



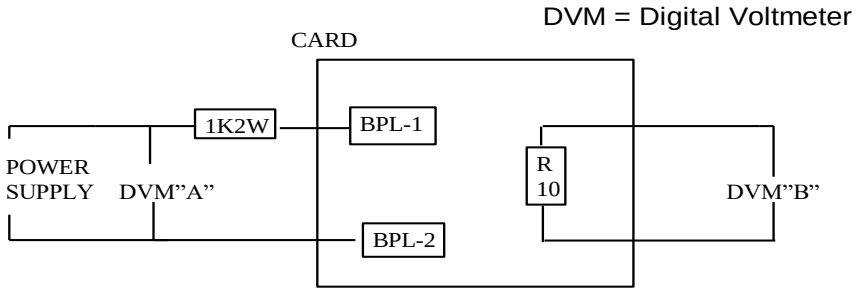
D3 & D4 CIRCUIT



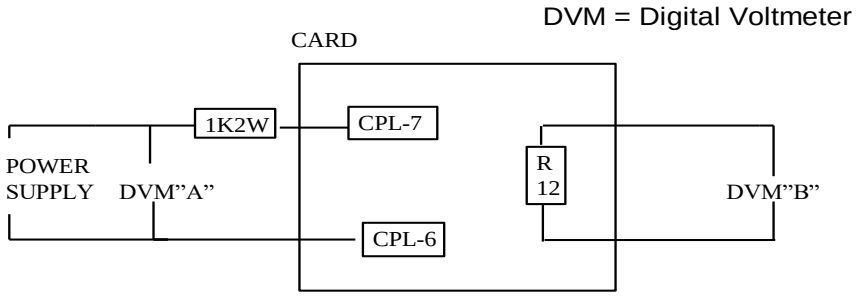
D5 & D6 CIRCUIT



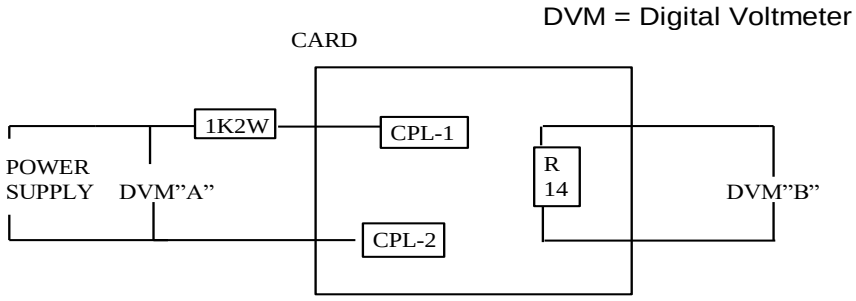
D7 & D8 CIRCUIT



D9 & D10 CIRCUIT

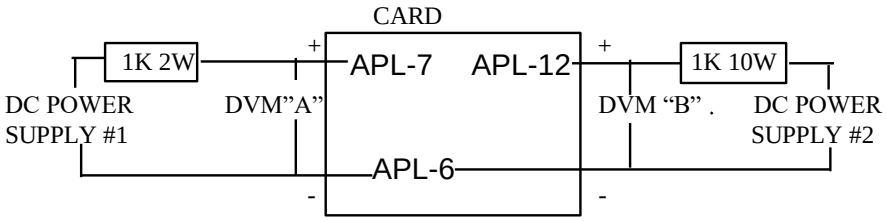


D11& D12 CIRCUIT



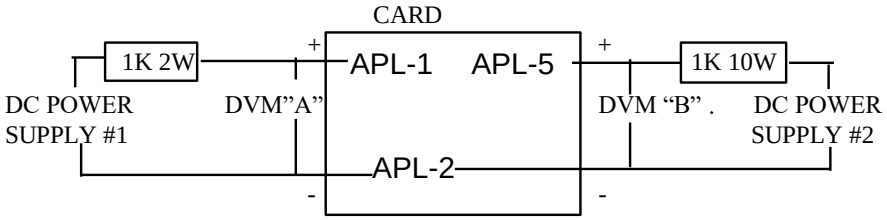
TRANSISTOR CIRCUIT #1

DVM = Digital Voltmeter



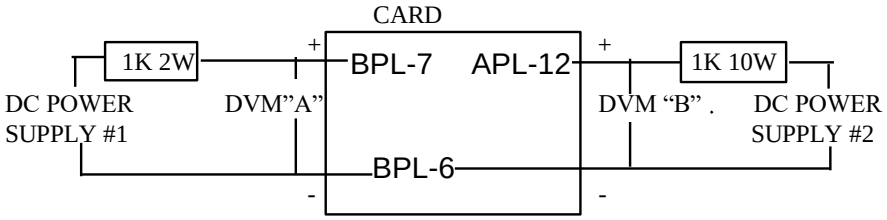
TRANSISTOR CIRCUIT #2

DVM = Digital Voltmeter



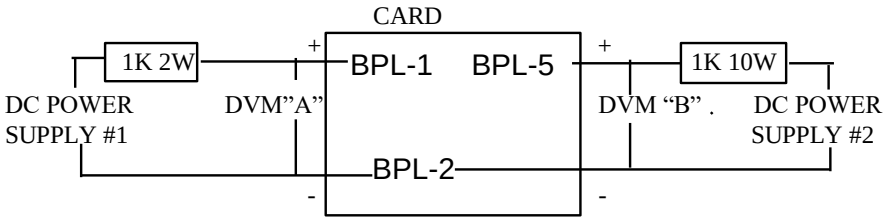
TRANSISTOR CIRCUIT #3

DVM = Digital Voltmeter



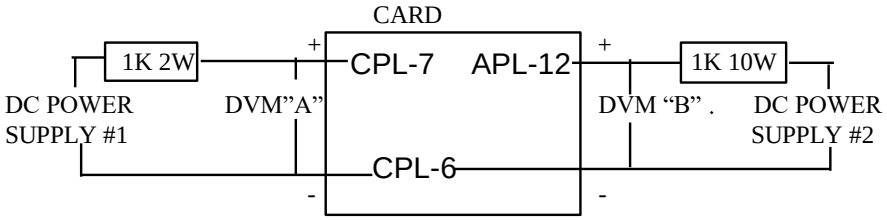
TRANSISTOR CIRCUIT #4

DVM = Digital Voltmeter



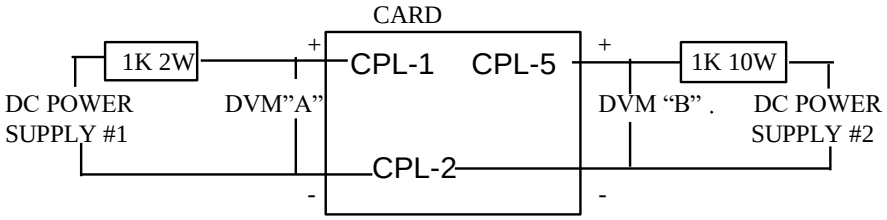
TRANSISTOR CIRCUIT #5

DVM = Digital Voltmeter



TRANSISTOR CIRCUIT #6

DVM = Digital Voltmeter



9. Notes

9.1 None at this time.