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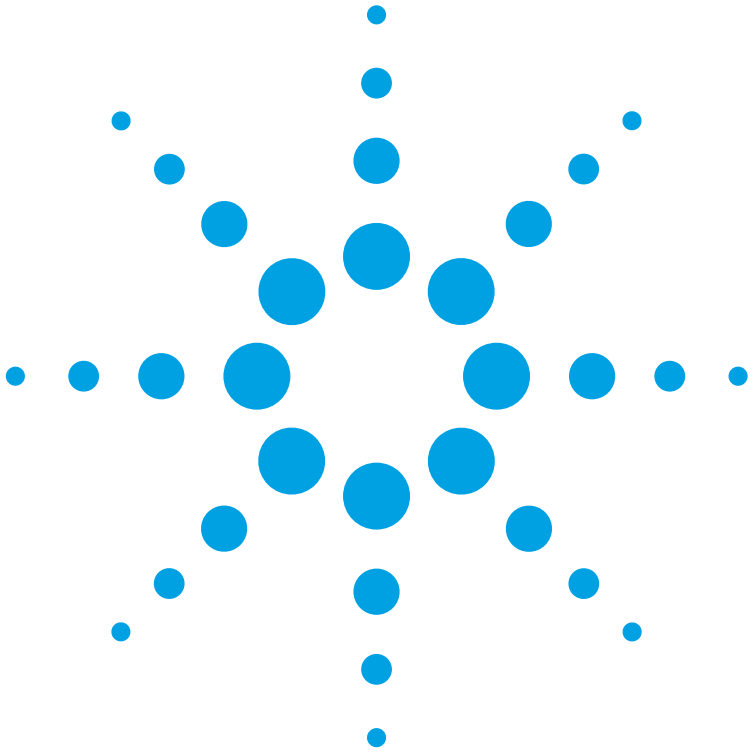
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Agilent 3499A/B/C
Switch/Control System



Service Manual

Agilent Technologies

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Legal and Safety Information

AGILENT TECHNOLOGIES WARRANTY STATEMENT

PRODUCT: Agilent 3499A/B/C Switch/Control System **DURATION OF WARRANTY:** 1 year

1. Agilent Technologies warrants Agilent hardware, accessories and supplies against defects in materials and workmanship for the period specified above. If Agilent receives notice of such defects during the warranty period, Agilent will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.

2. Agilent Technologies warrants that Agilent software will not fail to execute its programming instructions, for the period specified above, due to defects in material and workmanship when properly installed and used. If Agilent receives notice of such defects during the warranty period, Agilent will replace software media which does not execute its programming instructions due to such defects.

3. Agilent Technologies does not warrant that the operation of Agilent products will be interrupted or error free. If Agilent is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product.

4. Agilent Technologies products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.

5. The warranty period begins on the date of delivery or on the date of installation if installed by Agilent. If customer schedules or delays Agilent installation more than 30 days after delivery, warranty begins on the 31st day from delivery.

6. Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by Agilent, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.

7. TO THE EXTENT ALLOWED BY LOCAL LAW, THE ABOVE WARRANTIES ARE EXCLUSIVE AND NO OTHER WARRANTY OR CONDITION, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED AND AGILENT SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, AND FITNESS FOR A PARTICULAR PURPOSE.

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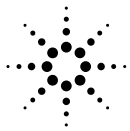
FOR CONSUMER TRANSACTIONS IN AUSTRALIA AND NEW ZEALAND: THE WARRANTY TERMS CONTAINED IN THIS STATEMENT, EXCEPT TO THE EXTENT LAWFULLY PERMITTED, DO NOT EXCLUDE, RESTRICT OR MODIFY AND ARE IN ADDITION TO THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE SALE OF THIS PRODUCT TO YOU.

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Rev. E
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Documentation History

All Editions and Updates of this manual and their creation date are listed below. The first Edition of the manual is Edition 1. The Edition number increments by 1 whenever the manual is revised. Updates, which are issued between Editions, contain replacement pages to correct or add additional information to the current Edition of the manual. Whenever a new Edition is created, it will contain all of the Update information for the previous Edition. Each new Edition or Update also includes a revised copy of this documentation history page.

Rev. A . . . . . January 2000

Rev. B . . . . . December 2000

Rev. C . . . . . April 2002

Rev. D . . . . . March 2003

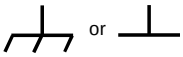
Safety Symbols



Instruction manual symbol affixed to product. Indicates that the user must refer to the manual for specific WARNING or CAUTION information to avoid personal injury or damage to the product.



Indicates the field wiring terminal that must be connected to earth ground before operating the equipment—protects against electrical shock in case of fault.



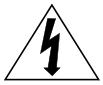
Frame or chassis ground terminal—typically connects to the equipment's metal frame.



Alternating current (AC)



Direct current (DC).



Indicates hazardous voltages.

WARNING Calls attention to a procedure, practice, or condition that could cause bodily injury or death.

CAUTION Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

WARNINGS

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Agilent Technologies Company assumes no liability for the customer's failure to comply with these requirements.

Ground the equipment: For Safety Class 1 equipment (equipment having a protective earth terminal), an uninterruptible safety earth ground must be provided from the mains power source to the product input wiring terminals or supplied power cable.

DO NOT operate the product in an explosive atmosphere or in the presence of flammable gases or fumes.

For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type. DO NOT use repaired fuses or short-circuited fuse holders.

Keep away from live circuits: Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers or shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to an Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

DO NOT service or adjust alone: Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

Operating Location: Sheltered location where air temperature and humidity are controlled within this product's specifications and the product is protected against direct exposure to climatic conditions such as direct sunlight, wind, rain, snow, sleet, and icing, water spray or splash, hoarfrost or dew. Pollution environment for which this product may be operated is IEC 664 Pollution degree 2.

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WARNINGS (Cont.)

The Agilent 3499A/B/C can have modules that are capable of switching voltages up to 250V maximum. Voltage levels above the levels specified for accessible connectors or cable ends could cause bodily injury or death to an operator. Special precautions must be adhered to (discussed below) when applying voltages in excess of 60 Vdc, 30 Vac rms or 42.4 Vac peak.

Module connectors and test signal cables connected to them cannot be operator accessible. Cables and connectors are considered inaccessible if a tool (e.g., screwdriver, wrench, socket, etc.) or a key (equipment in a locked cabinet) is required to gain access to them. Additionally, the operator cannot have access to a conductive surface connected to any cable conductor (High, Low or Guard).

Assure the equipment under test has adequate insulation between the cable connections and any operator-accessible parts (doors, covers, panels, shields, cases, cabinets, etc.). Verify there are multiple and sufficient protective means (rated for the voltages you are applying) to assure the operator will NOT come into contact with any energized conductor even if one of the protective means fails to work as intended. For example, the inner side of a case, cabinet, door, cover or panel can be covered with an insulating material as well as routing the test cables to the module's front panel connectors through non-conductive, flexible conduit such as that used in electrical power distribution.

This ISM device complies with Canadian CES-001
Cet appareil ISM est conforme à la norme NMB-001 du Canada

CLEANING INFORMATION

The instrument should only be cleaned by wiping it with a soft damp cloth.

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Appendix C
Schematics

This chapter contains the schematics for the Agilent 3499A/B/C mainframes and the plug-in modules designed for Agilent 3499A/B/C Switch/Control System. For the schematics of the existing 3488A plug-in modules, you can refer to *Agilent 3488A Switch/Control System Service Manual*.

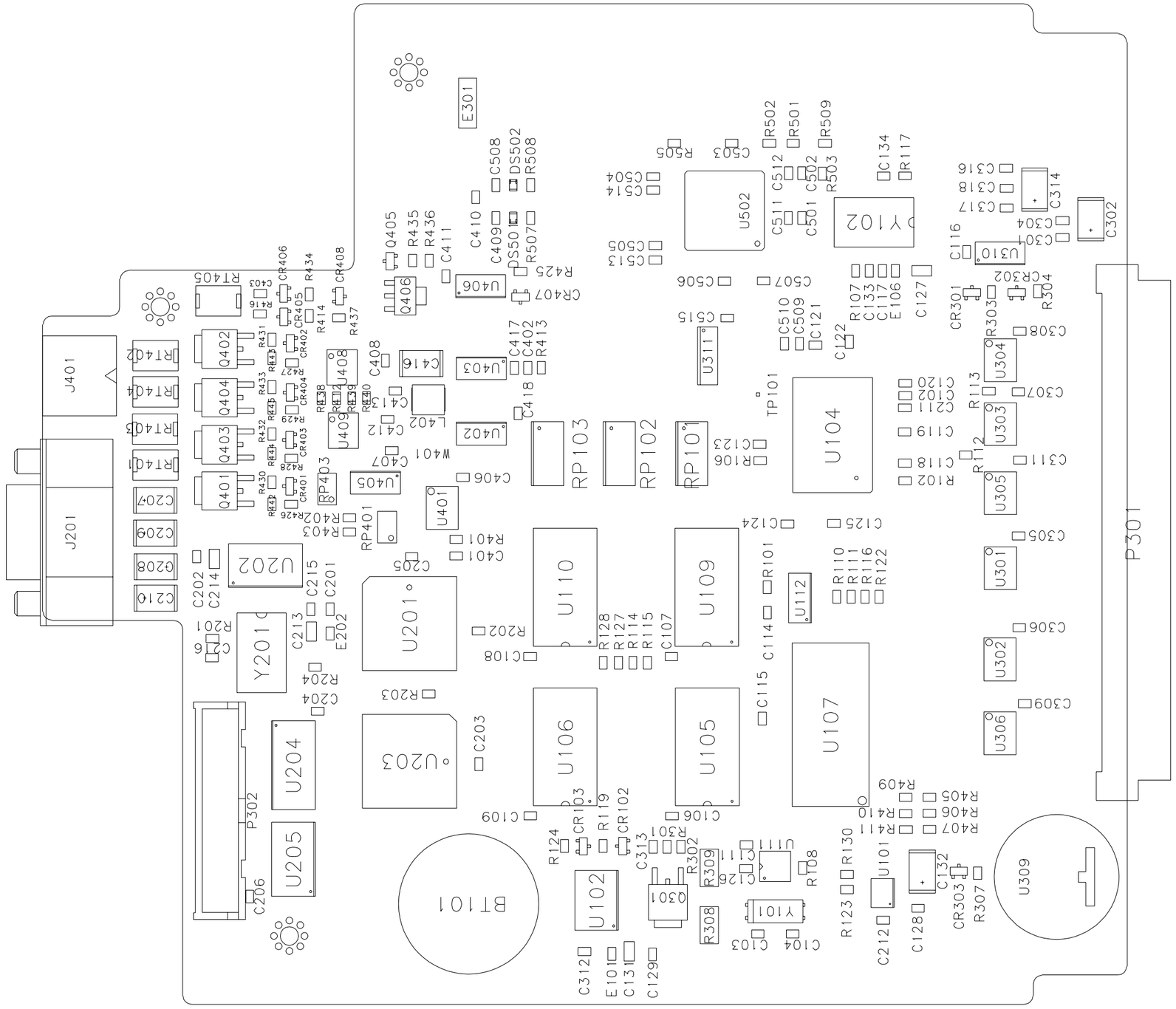
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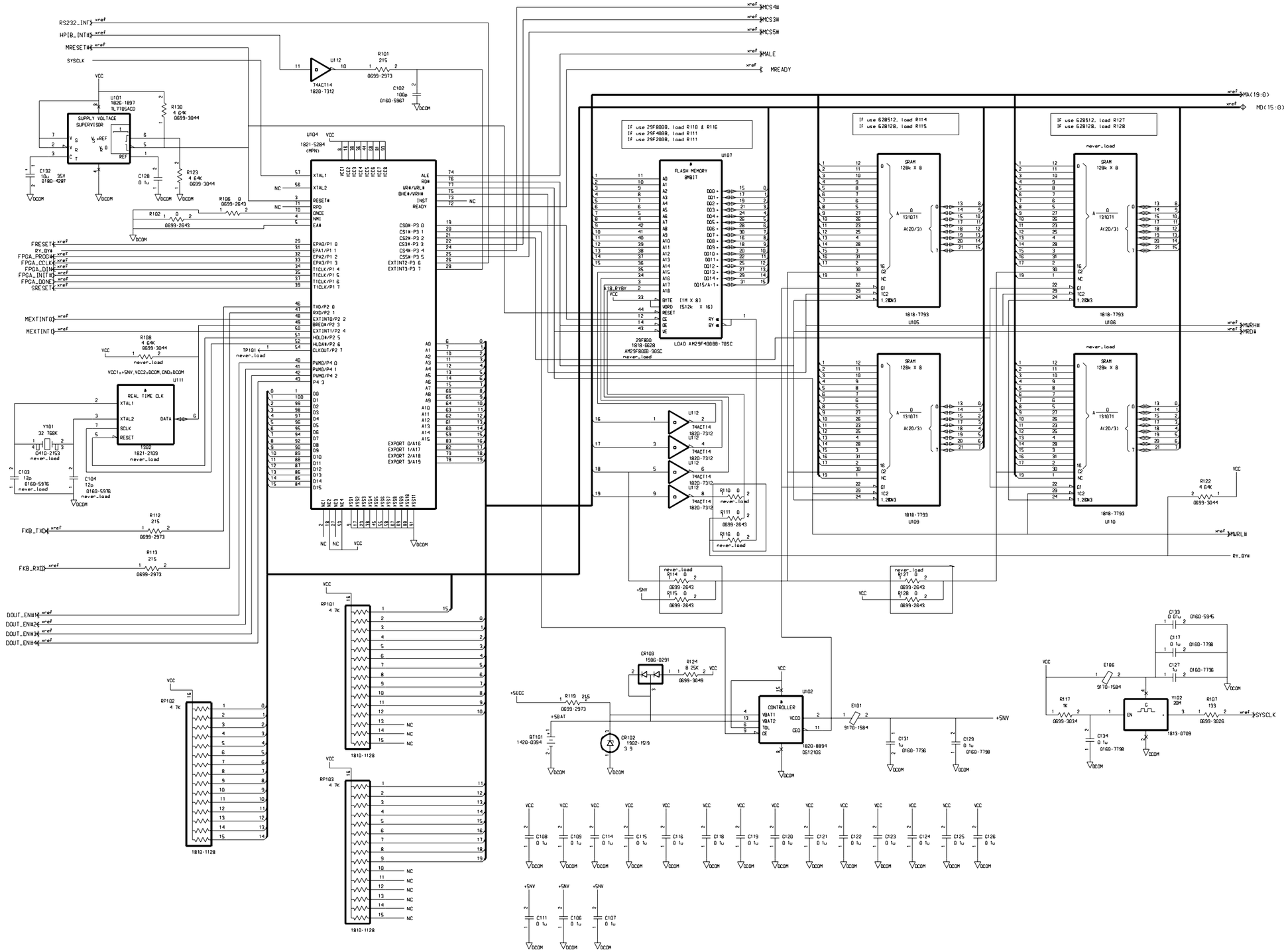
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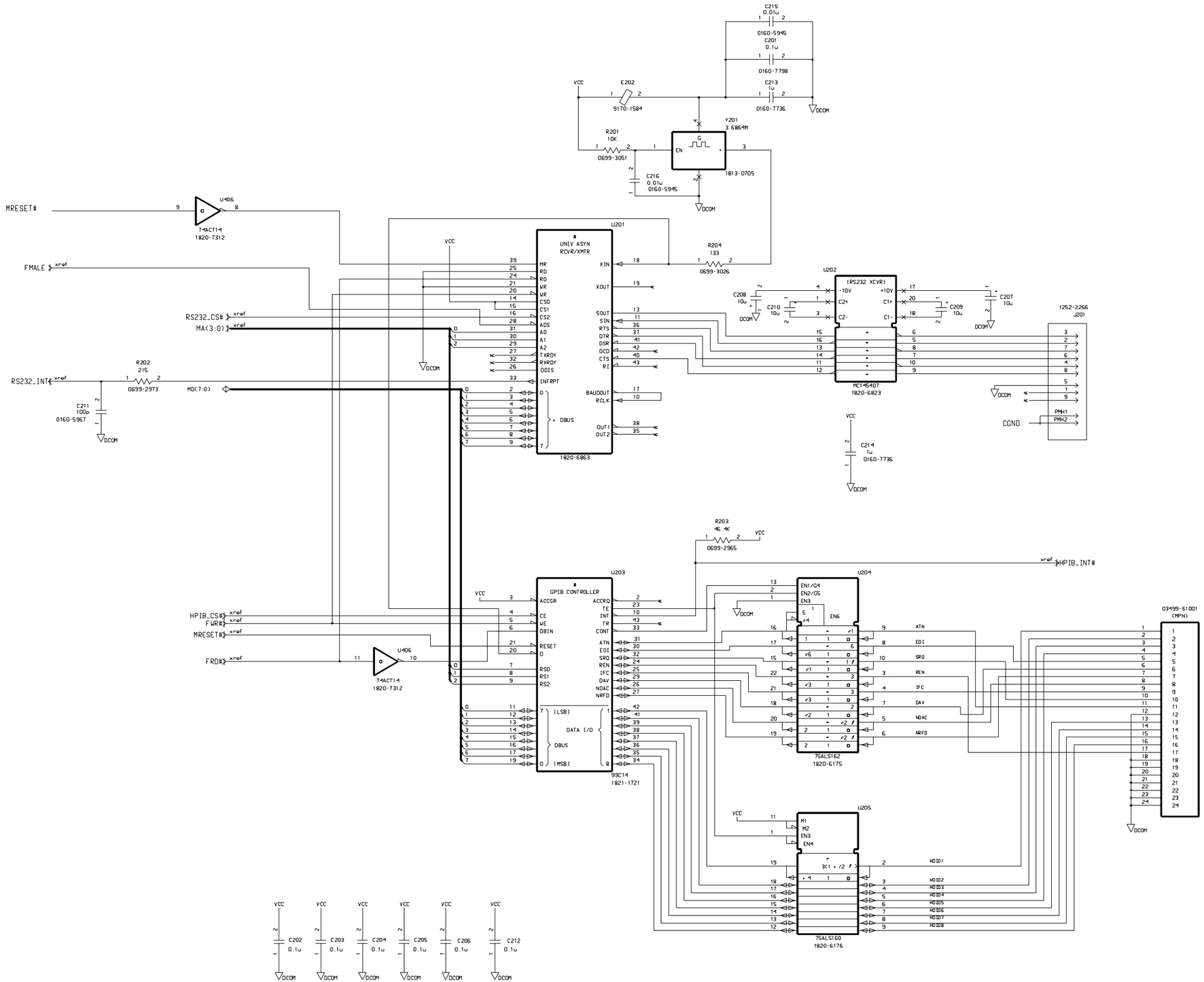
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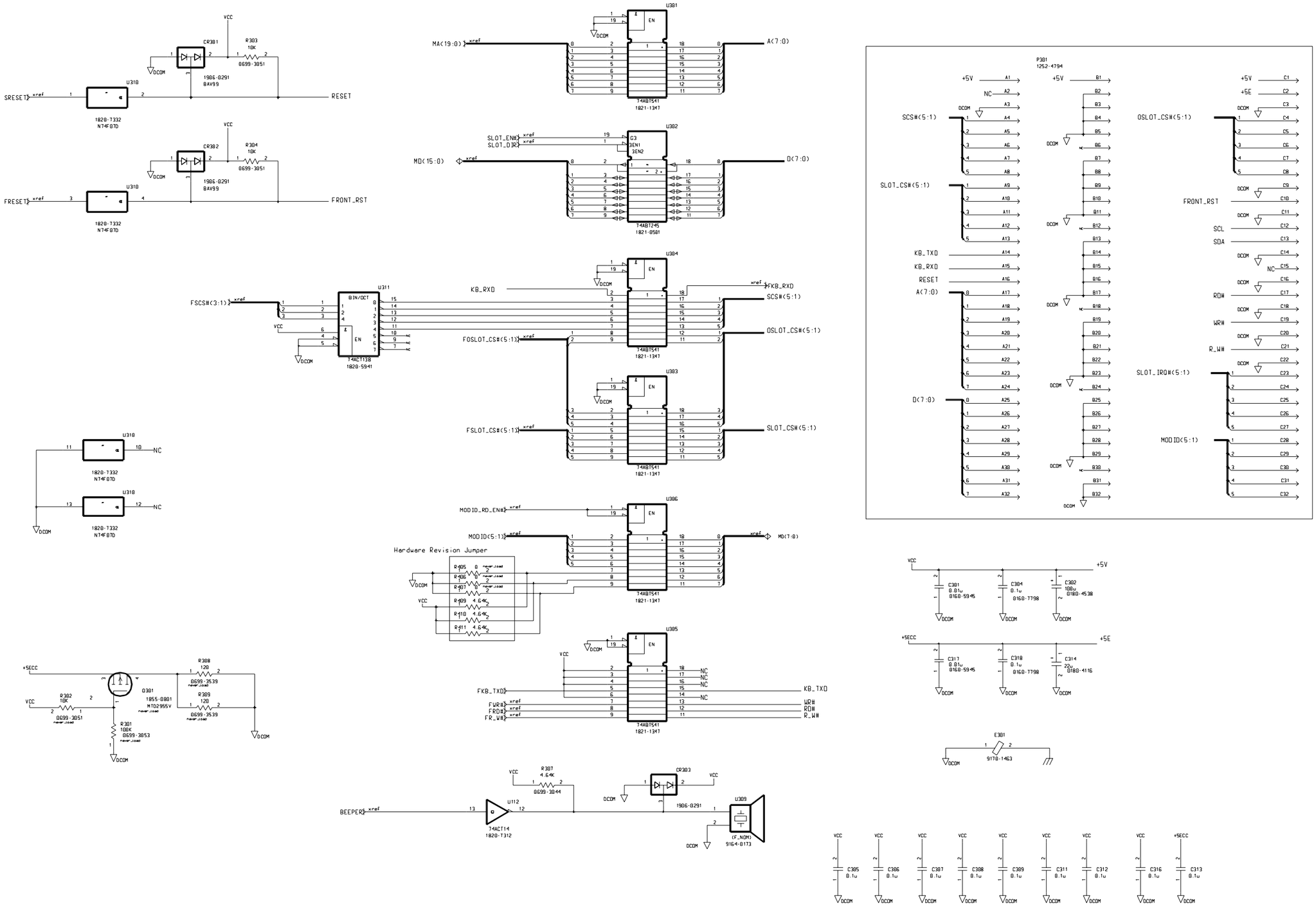
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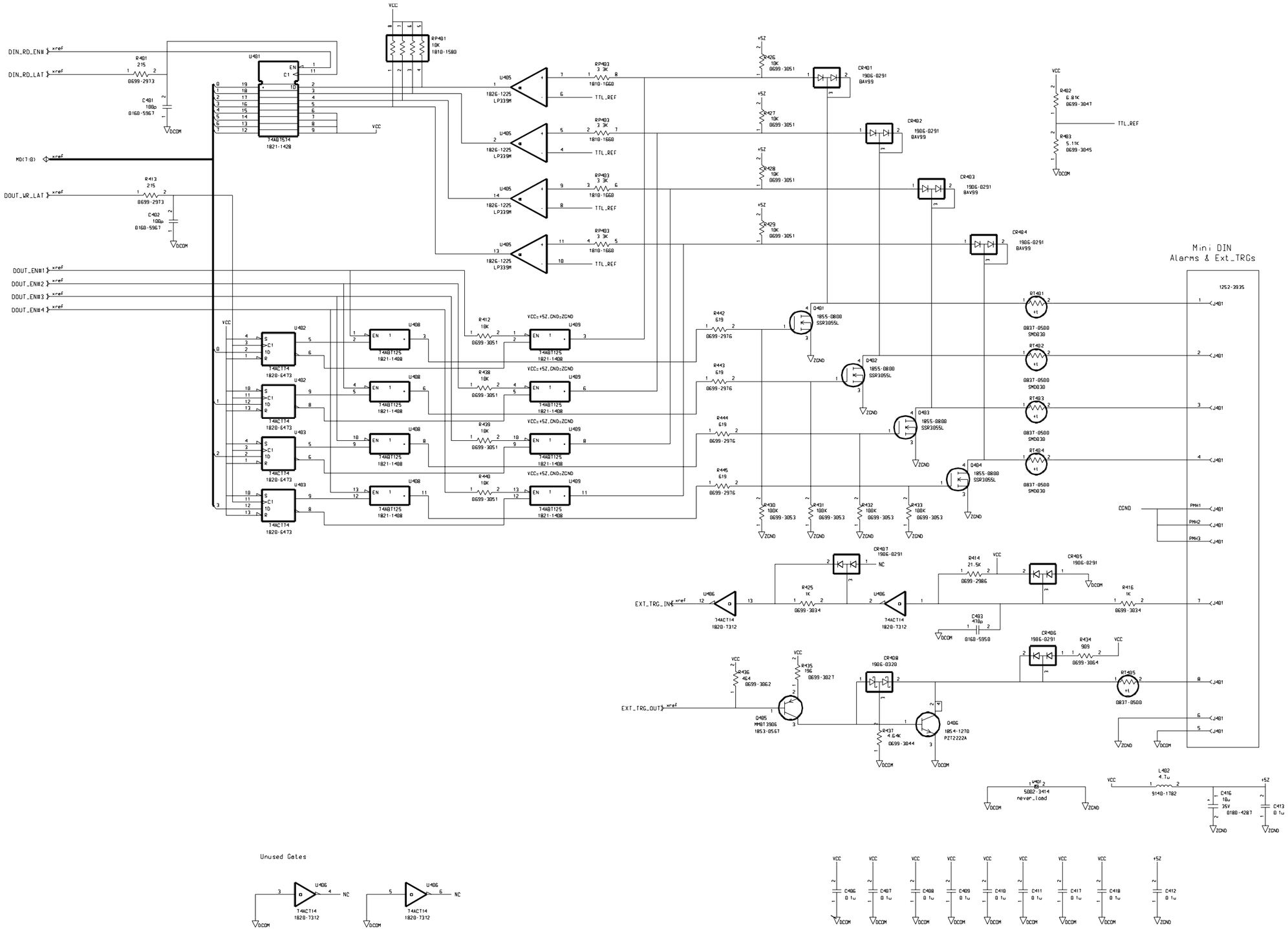
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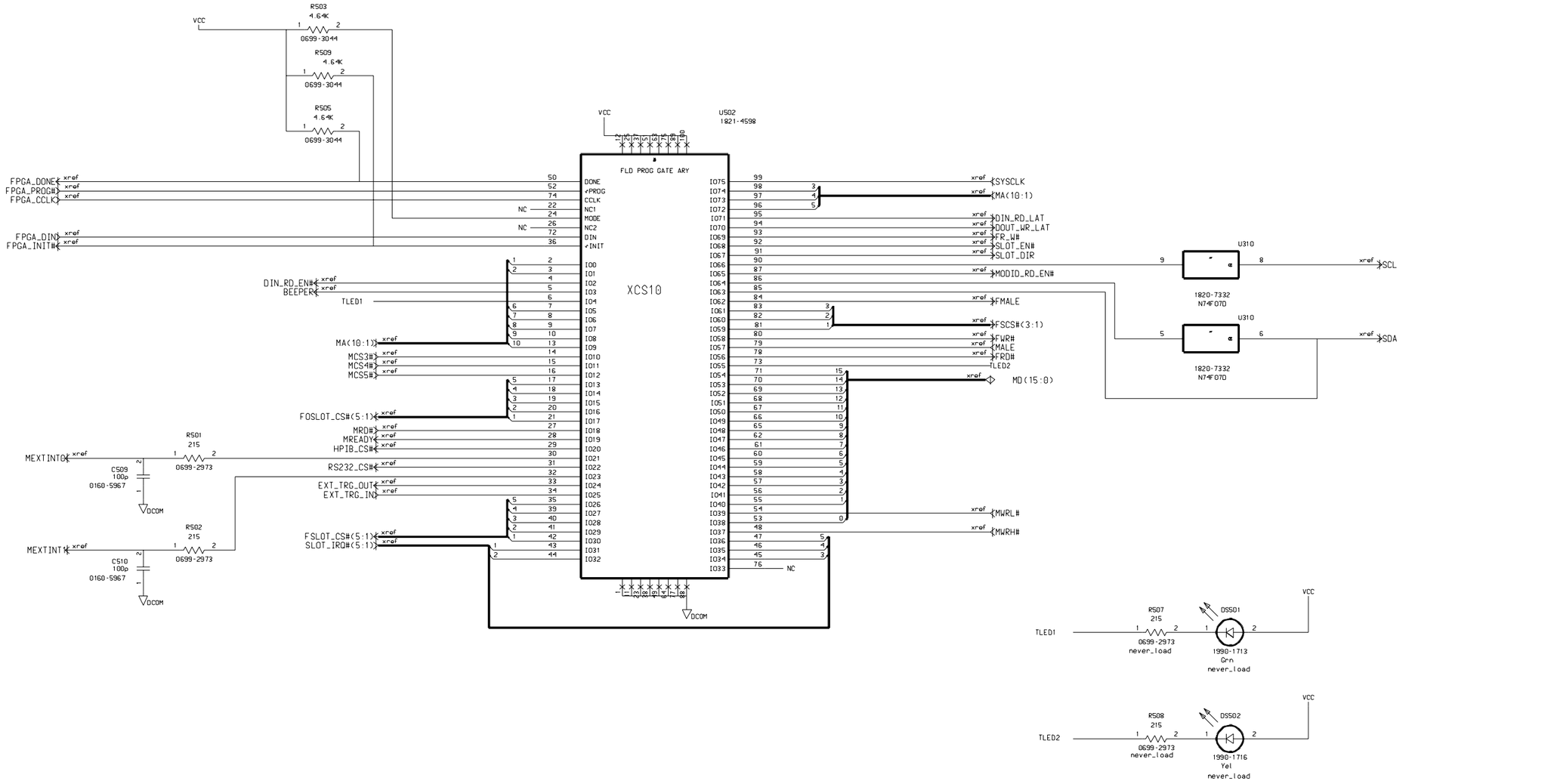


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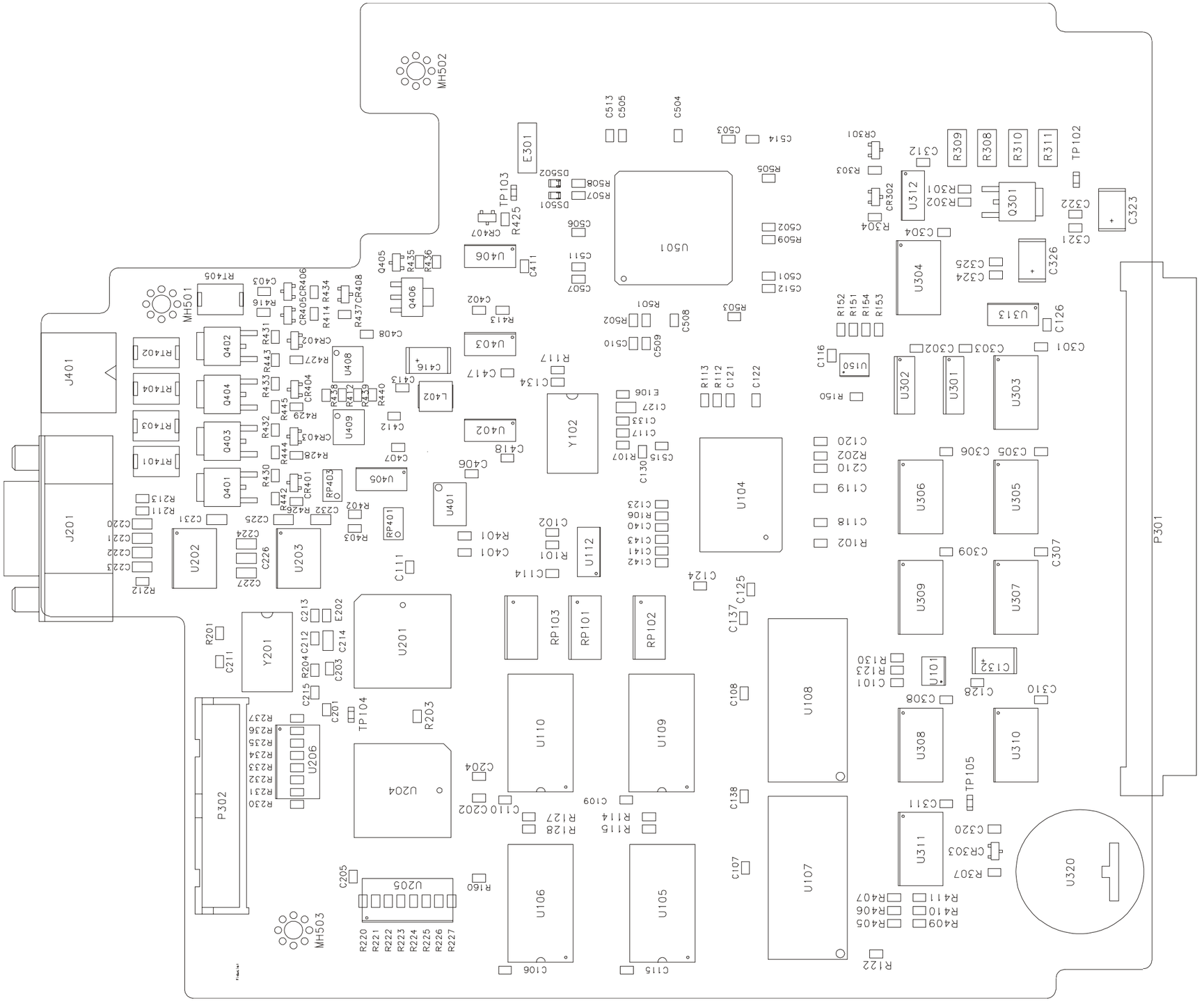


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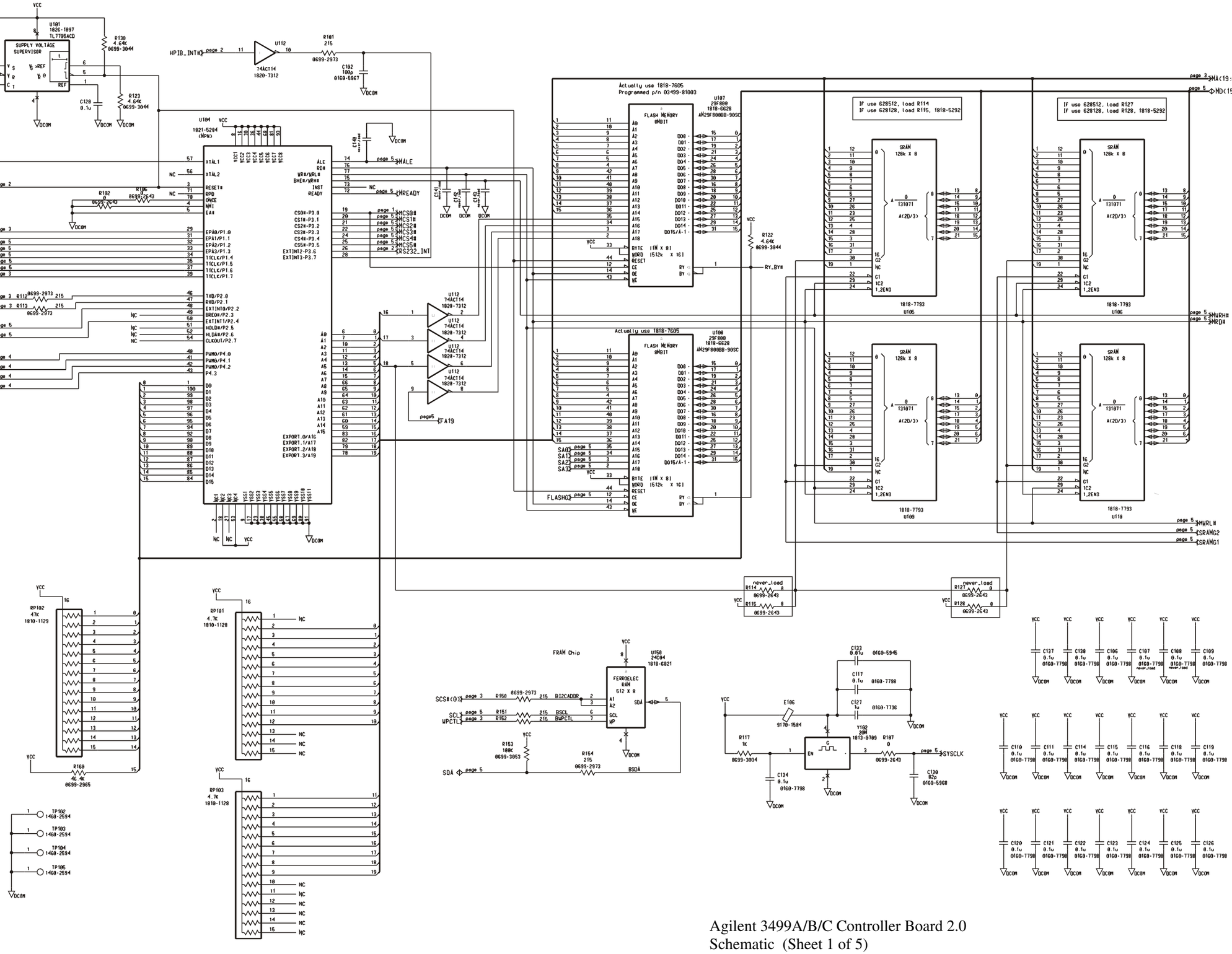
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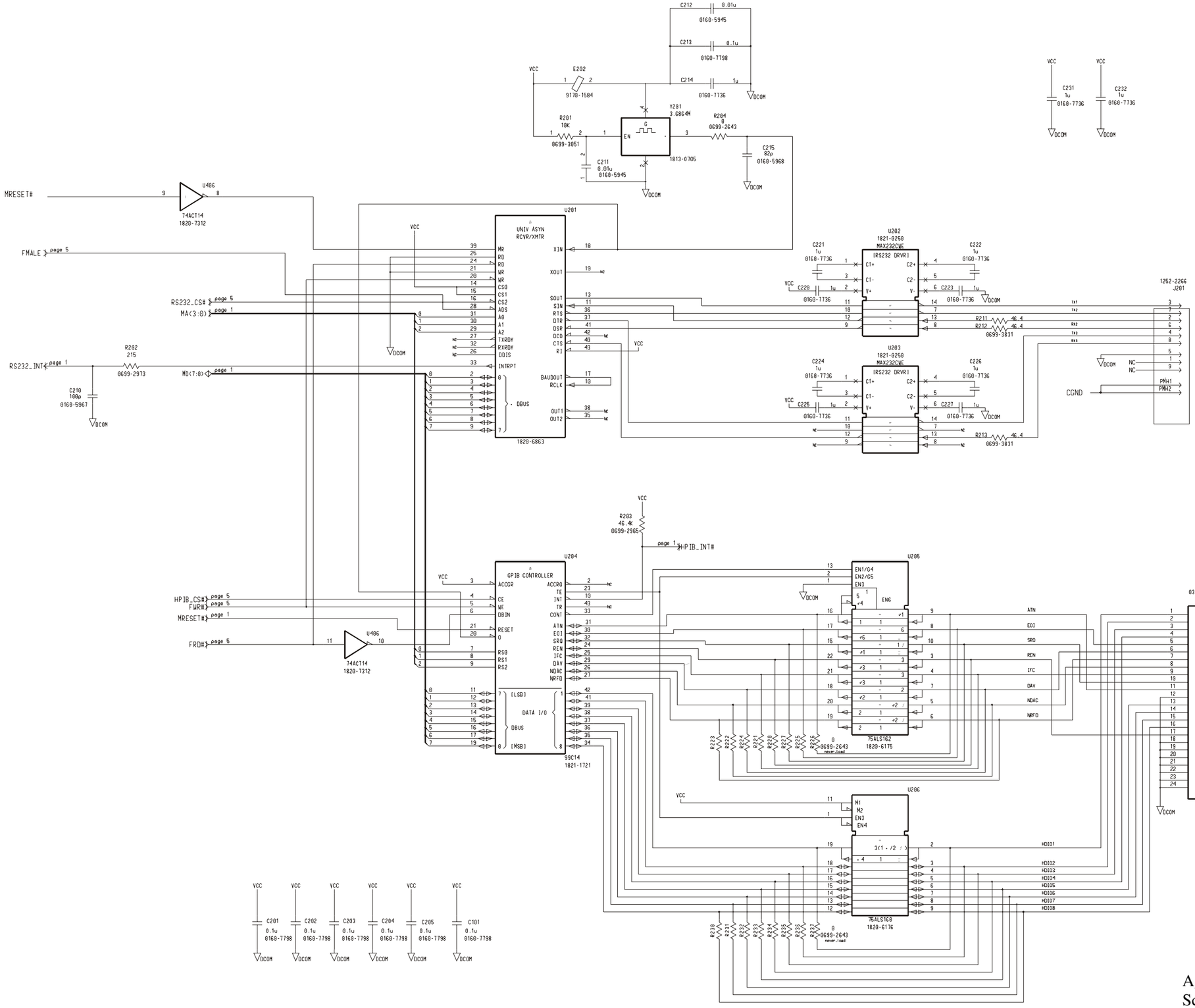
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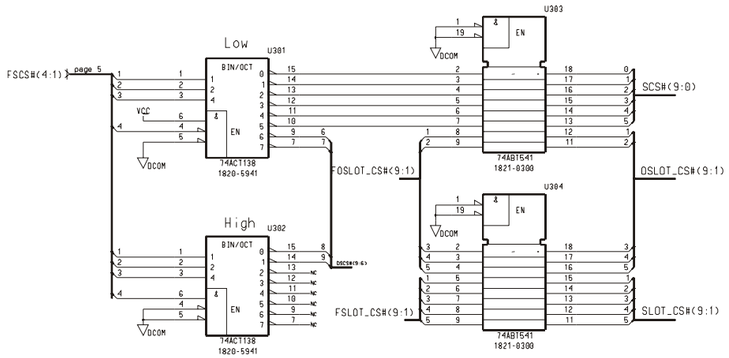
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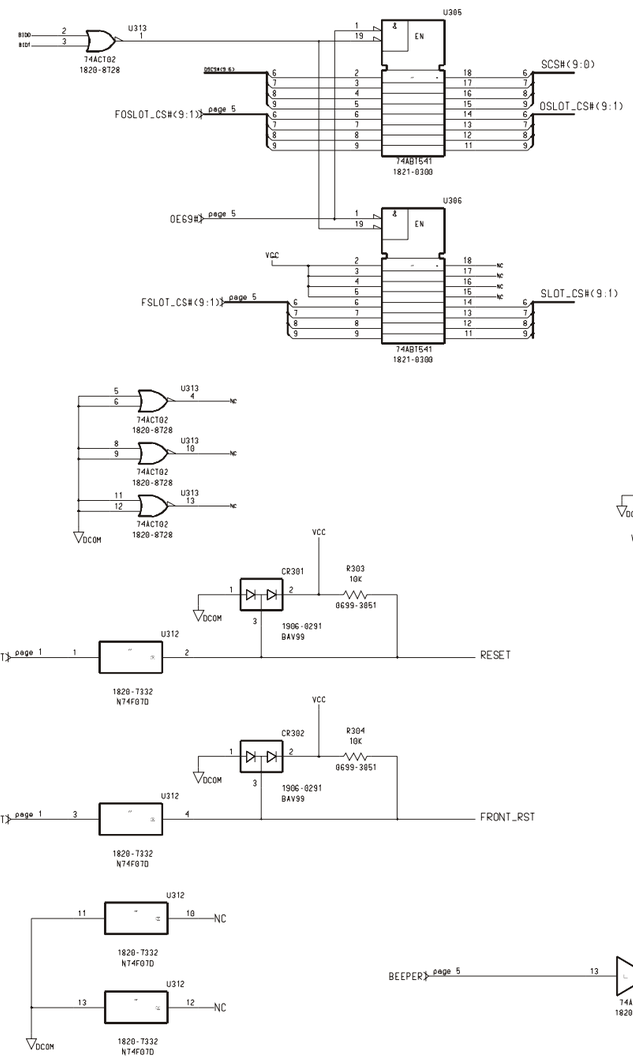
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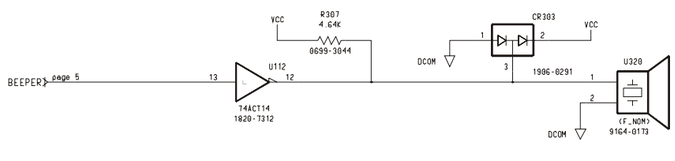


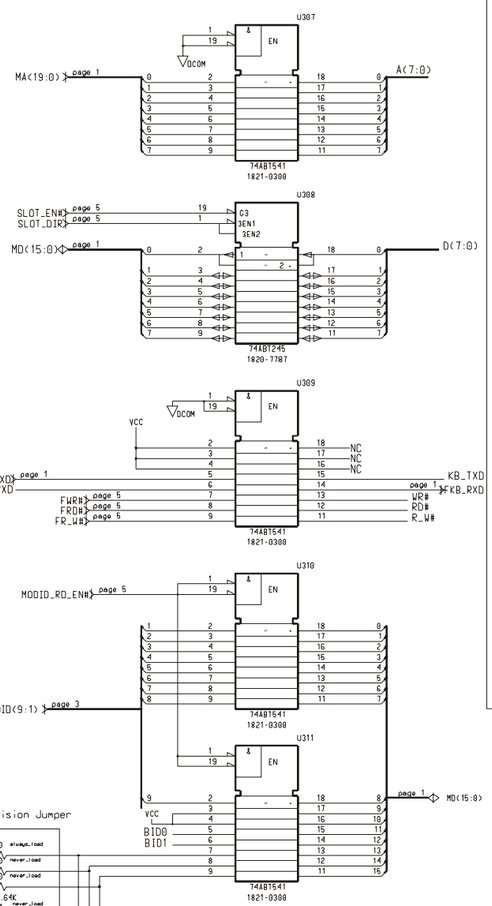
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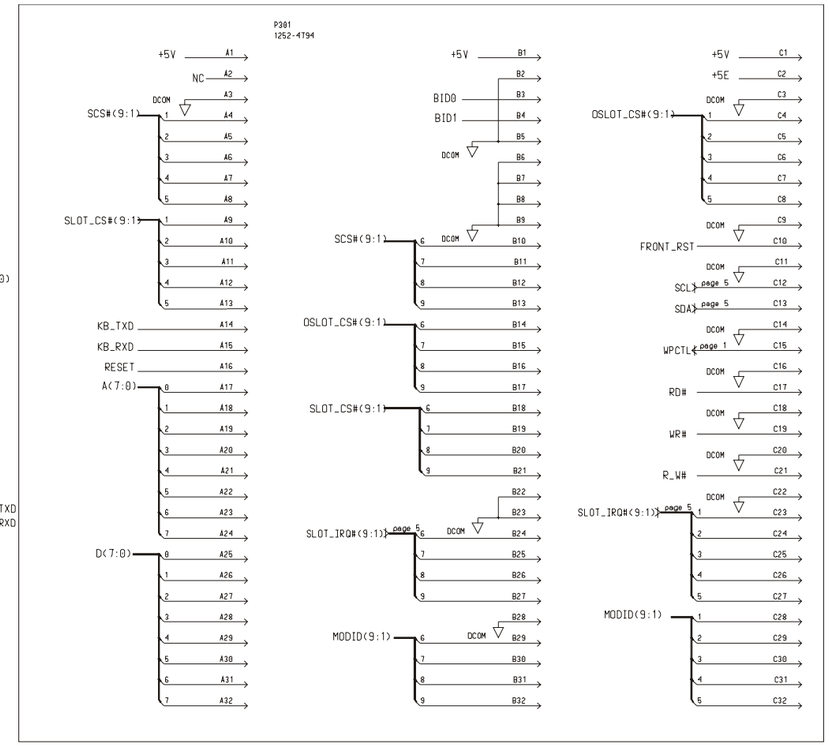
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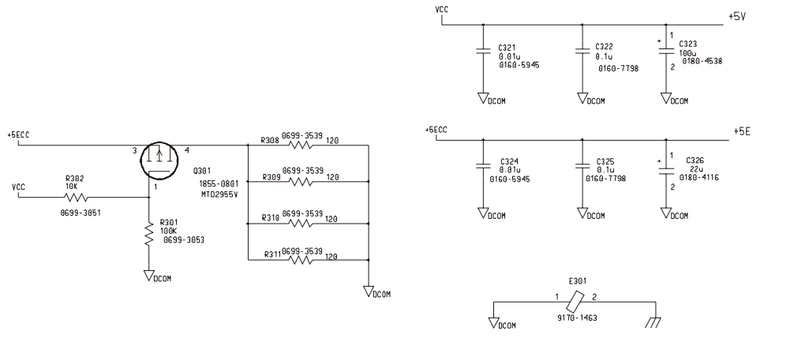


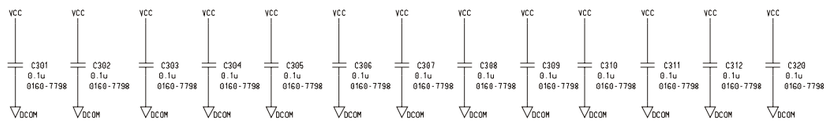






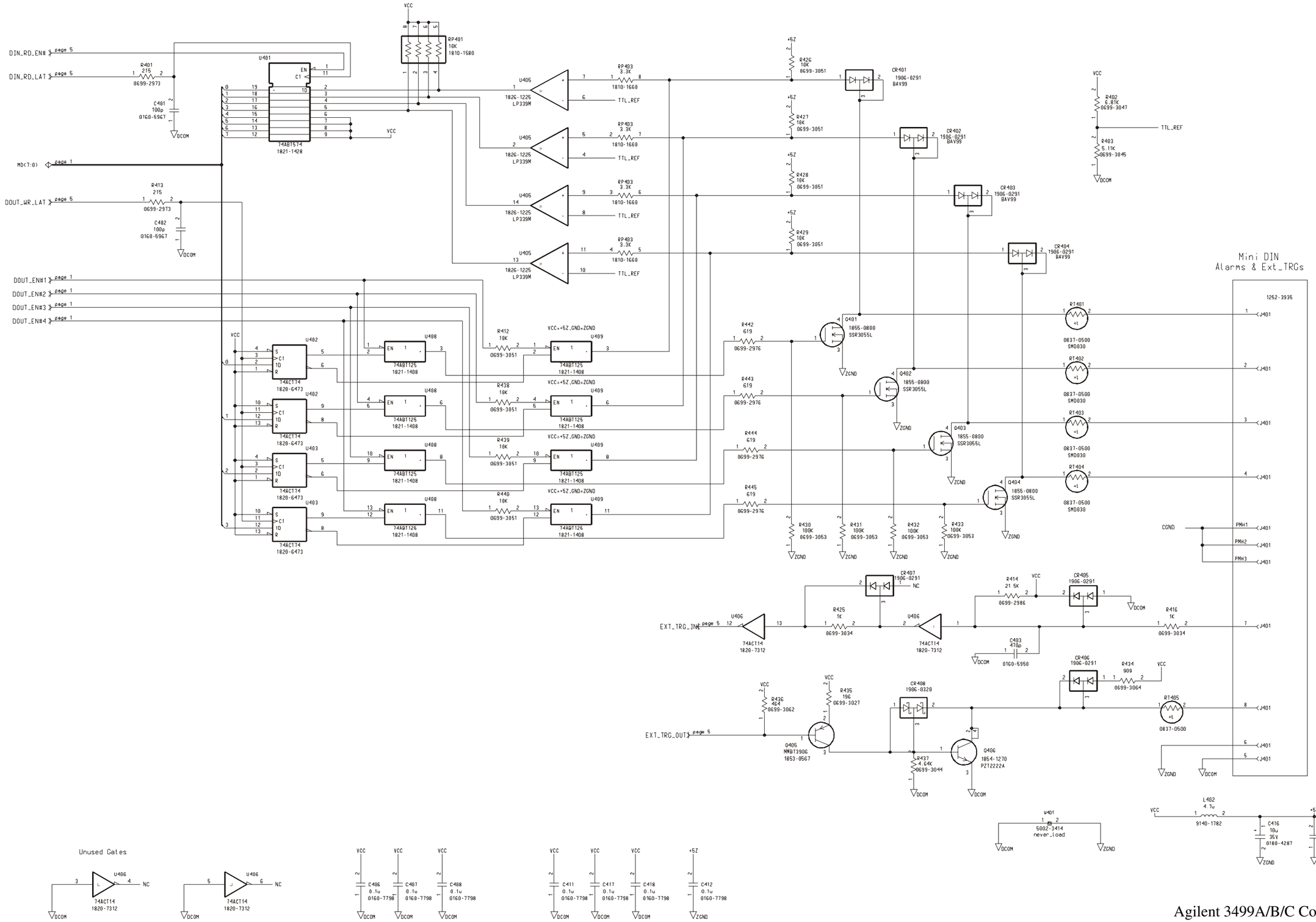




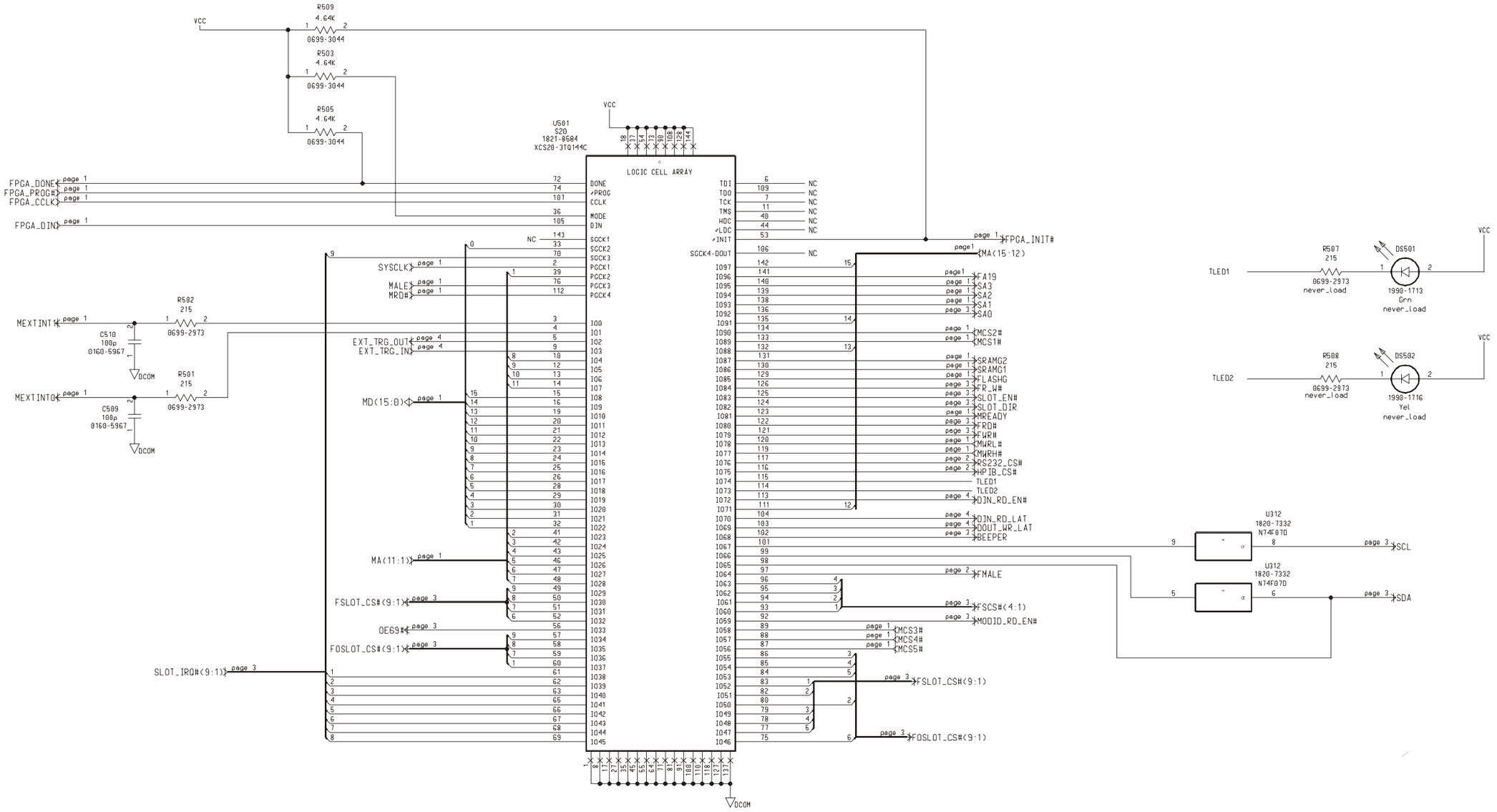


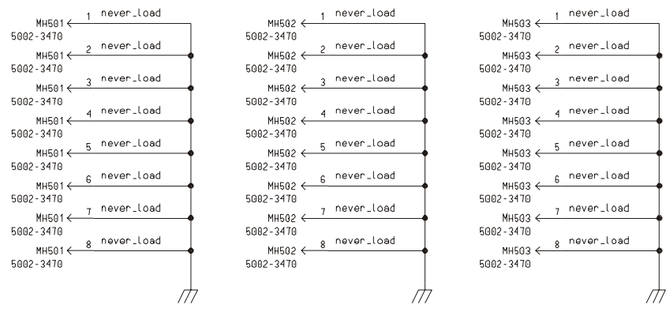
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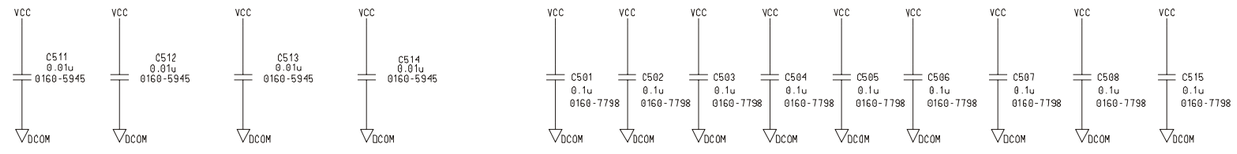
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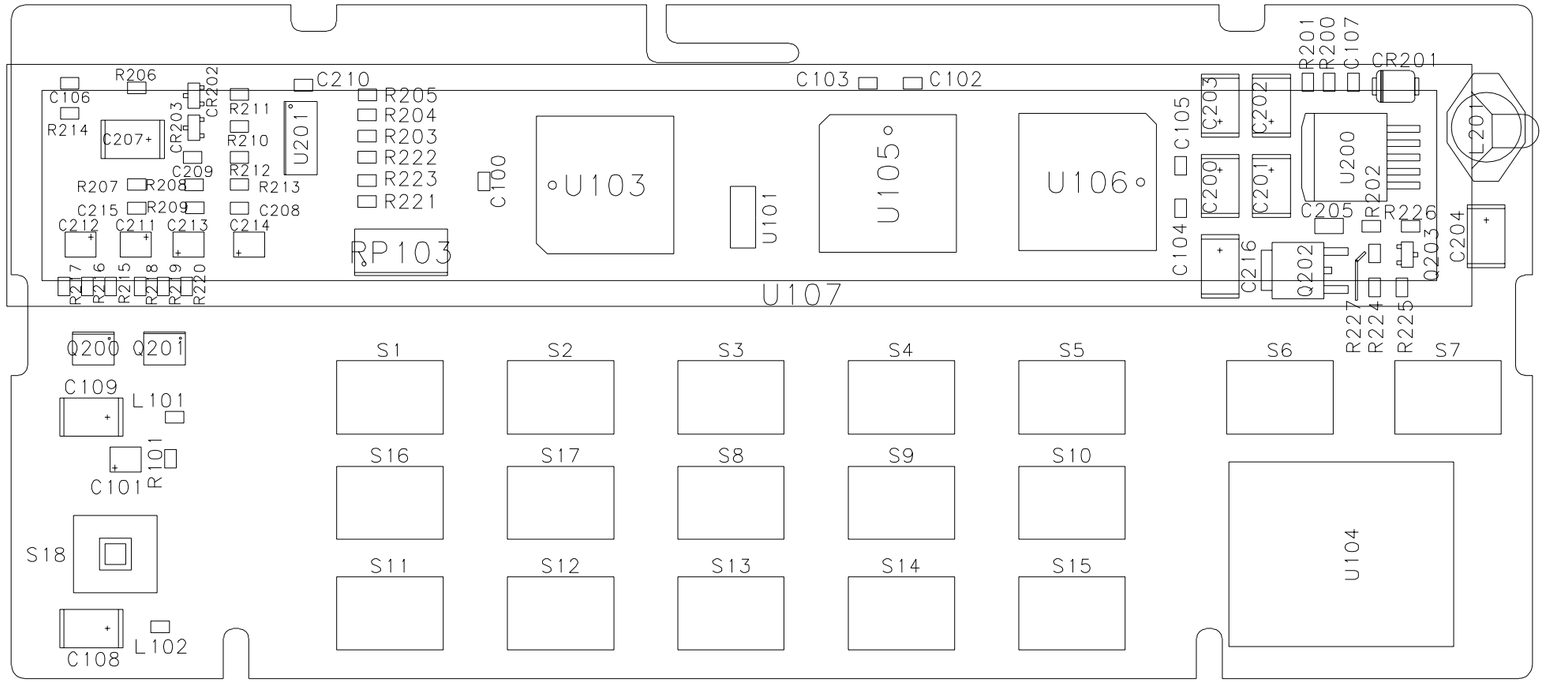




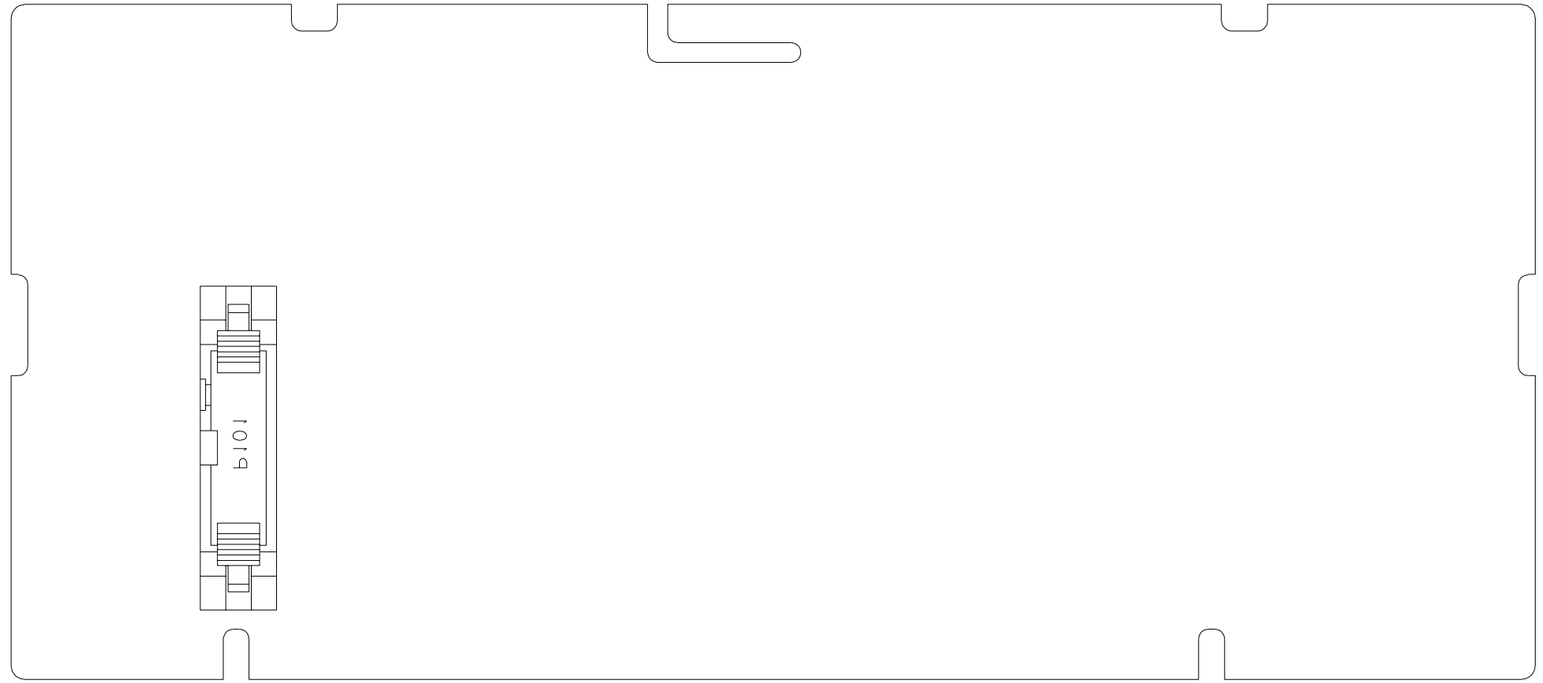
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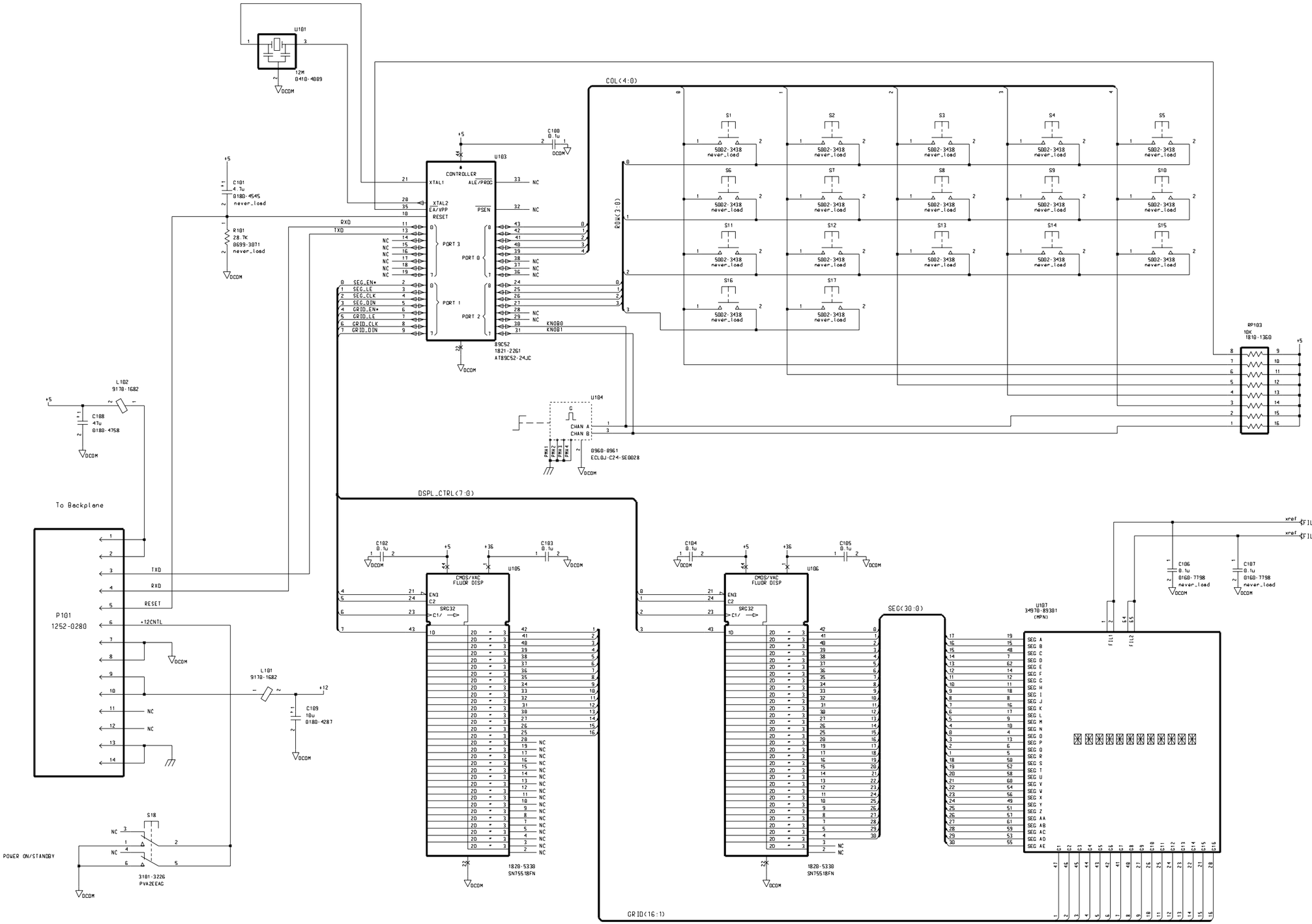
Top Locator



Bottom Locator



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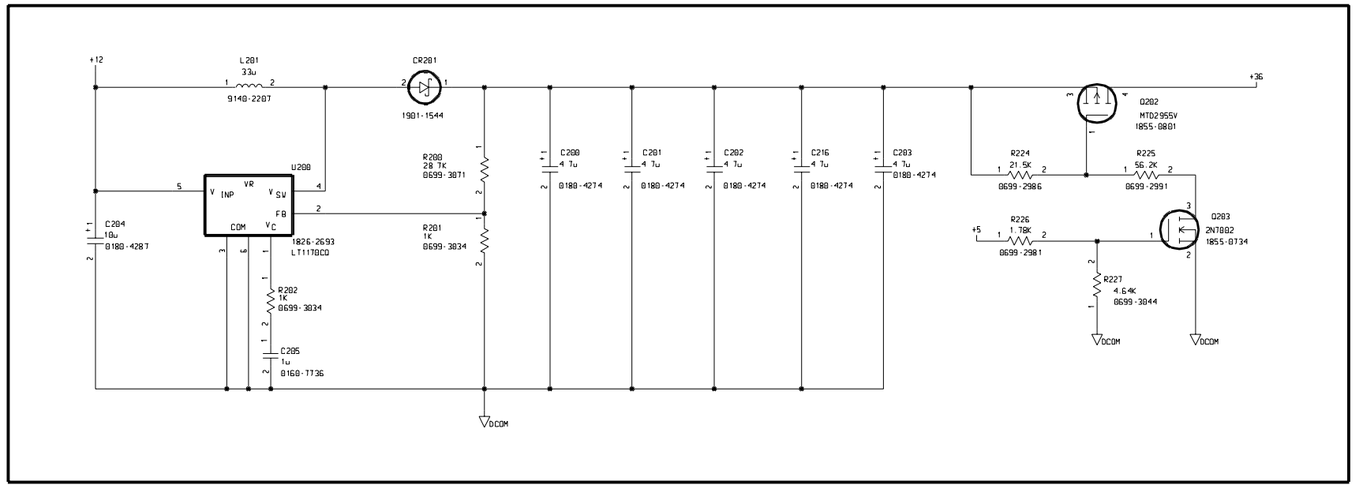


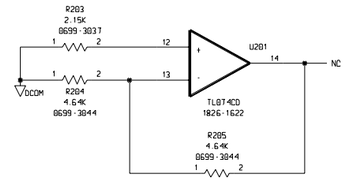
Agilent 3499A/B/C Keyboard and Display
Schematic (Sheet 1 of 2)
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DC(12v) to DC (36v) Converter

Vo=(1+(R200/R201))*1.24

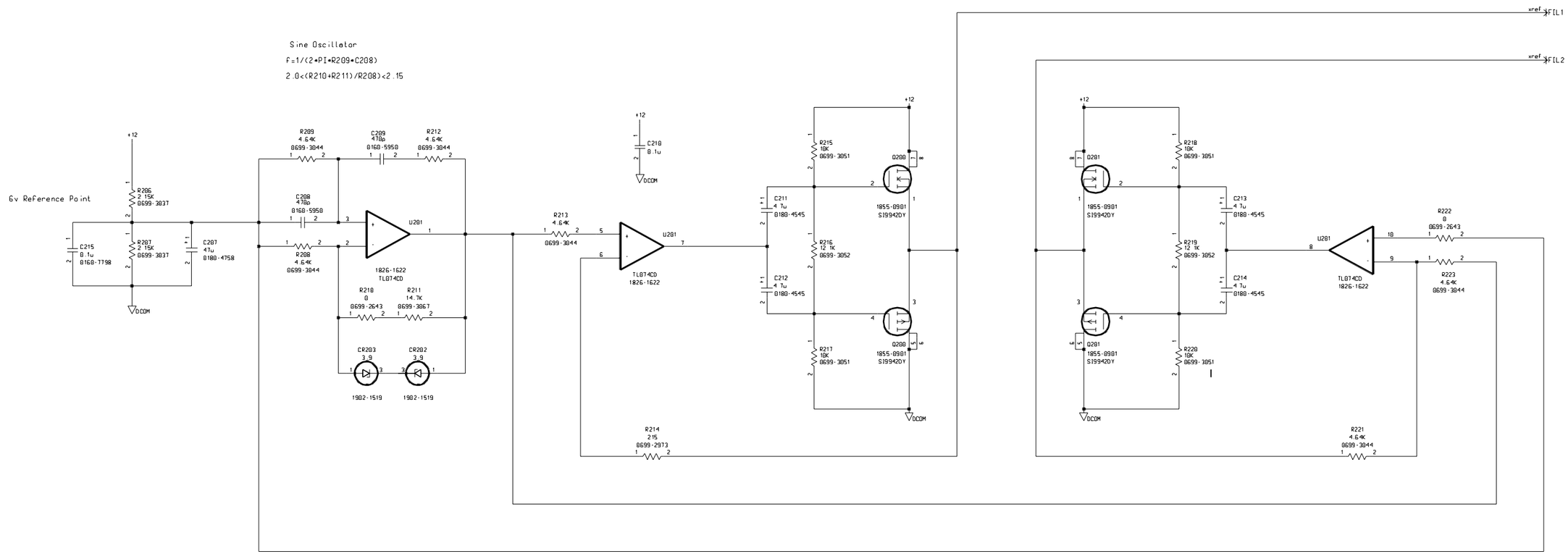




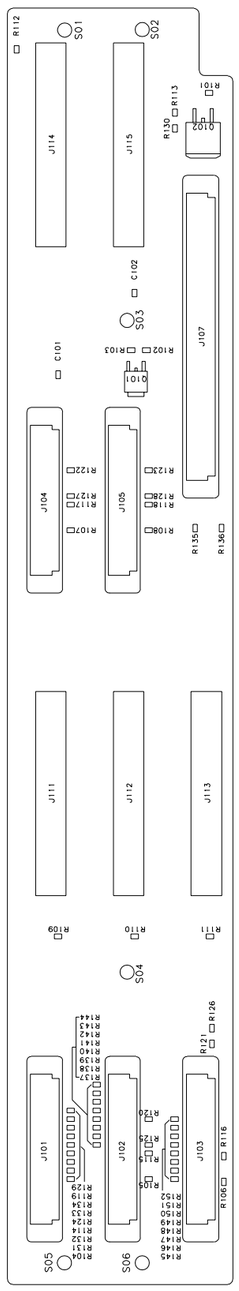
Sine Oscillator

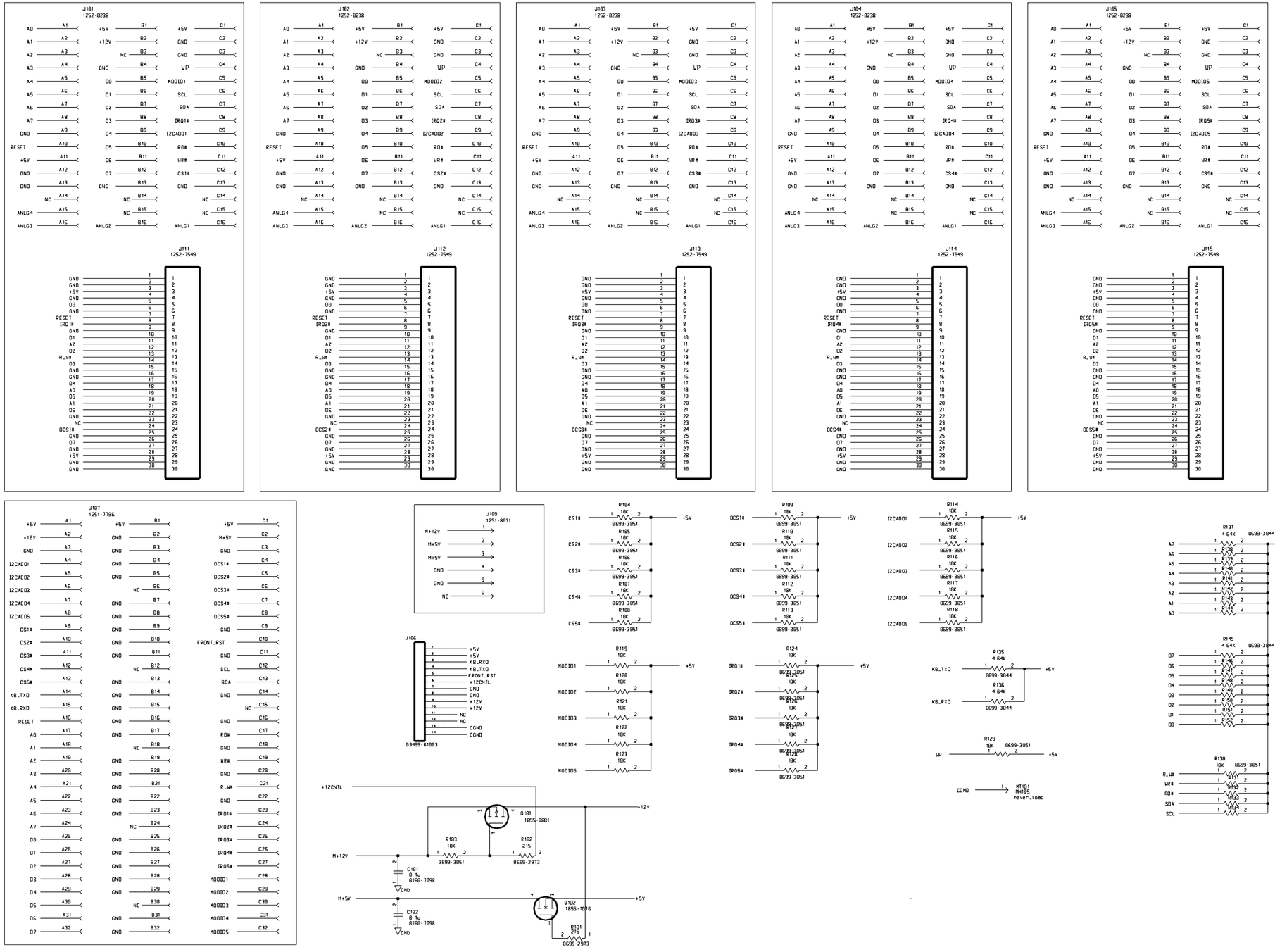
F=1/(2*PI*R209*C208)

2.0<(R210+R211)/R208)<2.15



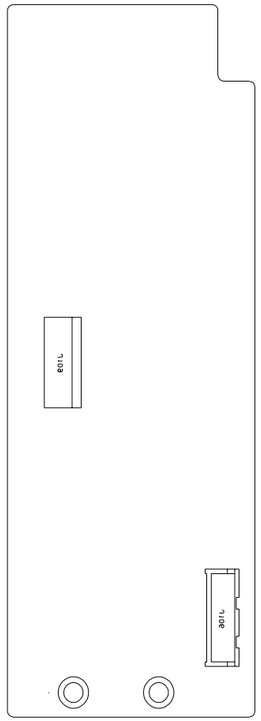
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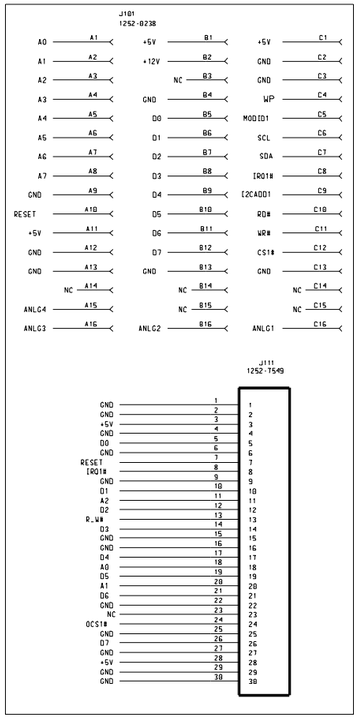


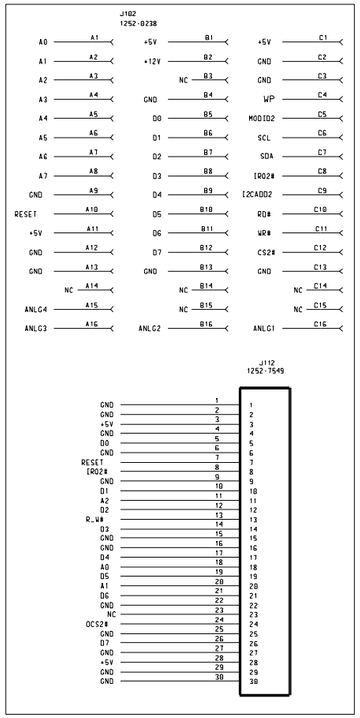


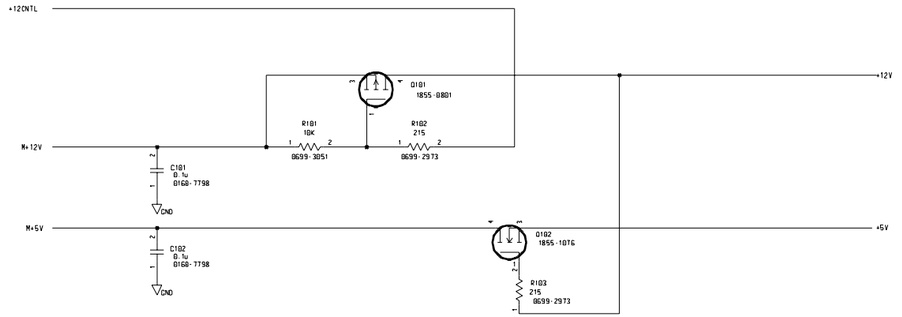
Agilent 3499A Backplane Component Locator and Schematics
Page 146

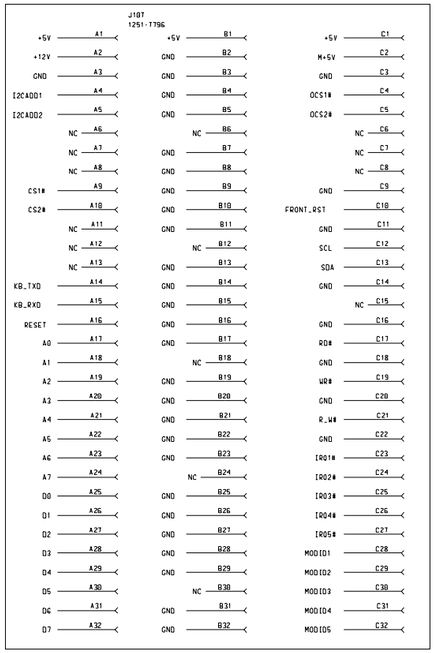
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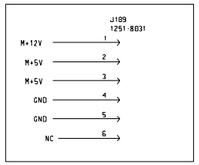


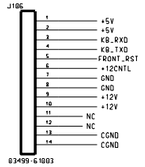


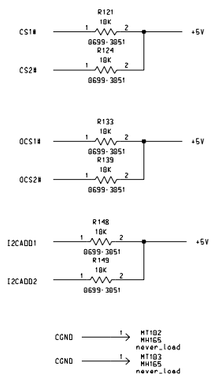


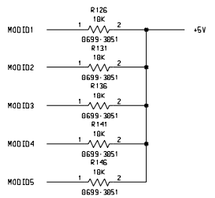


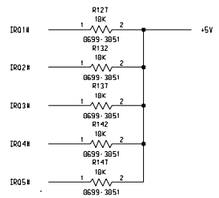


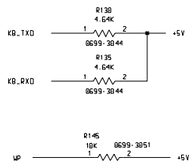


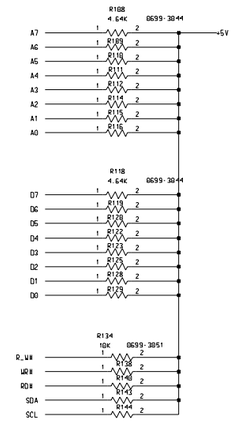




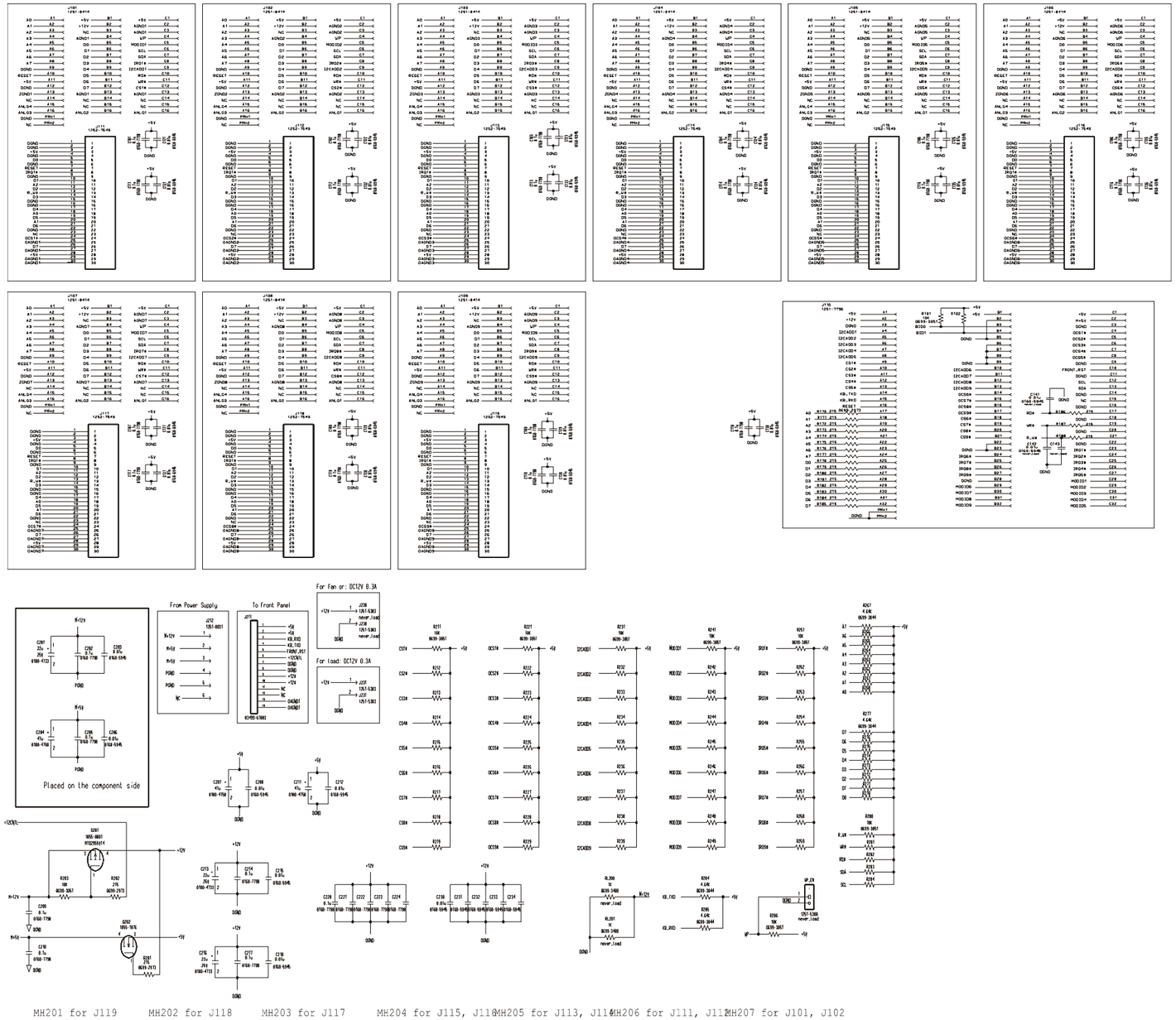


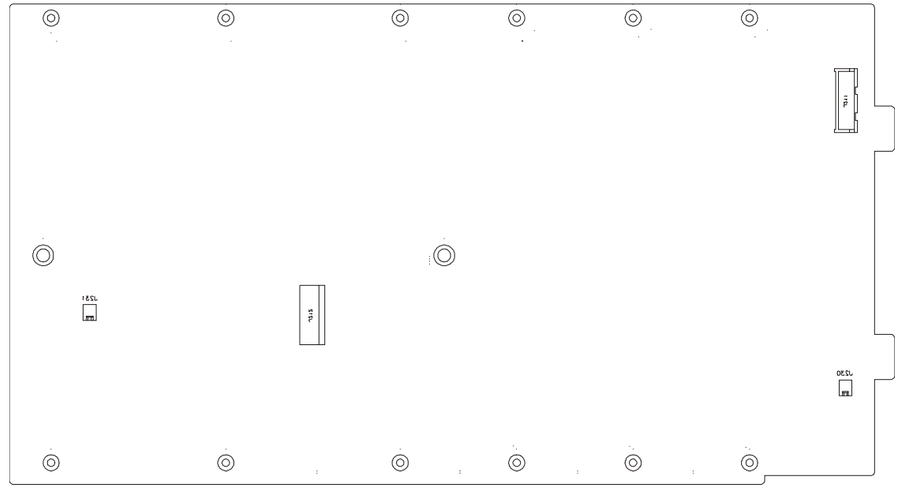






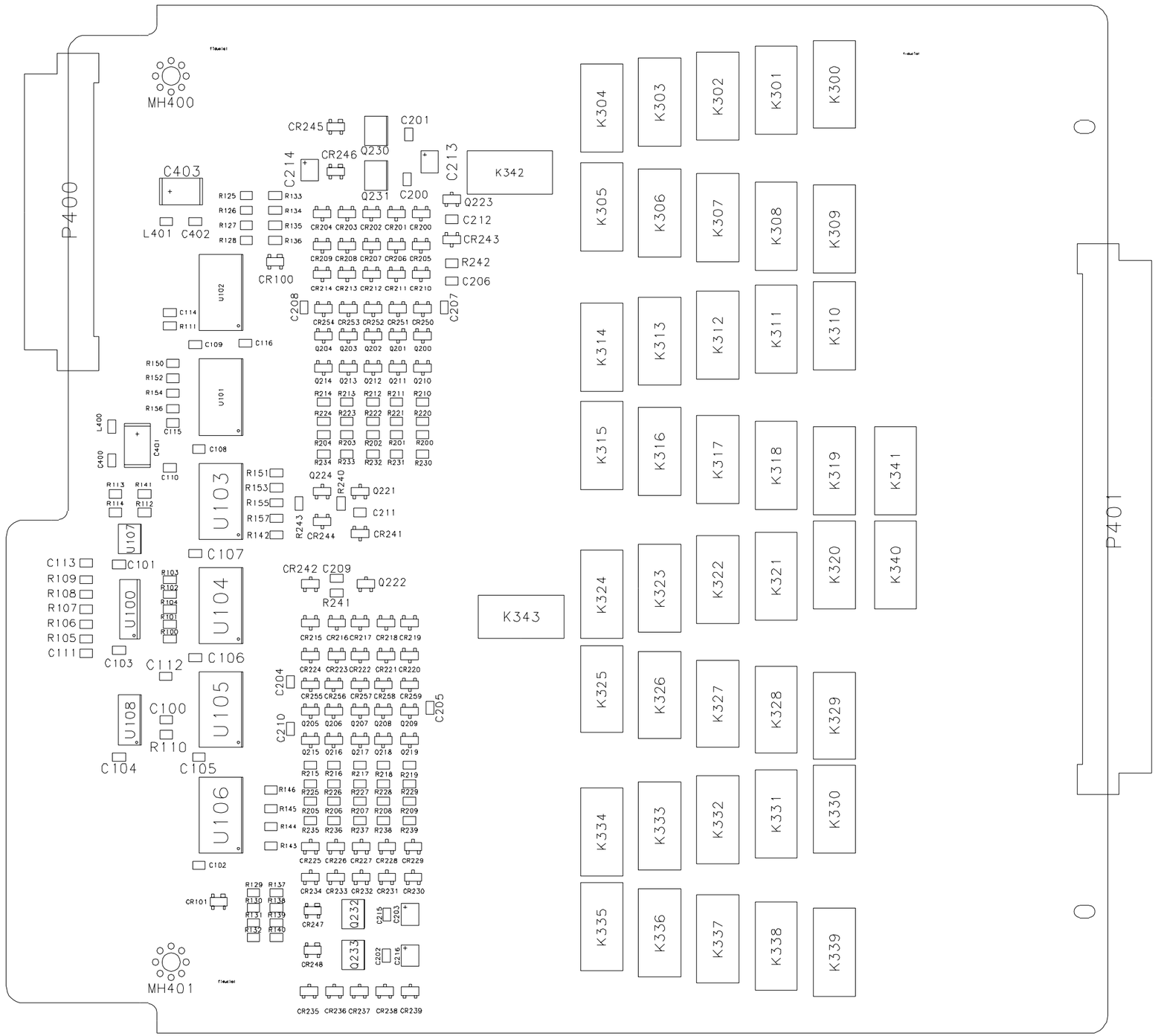
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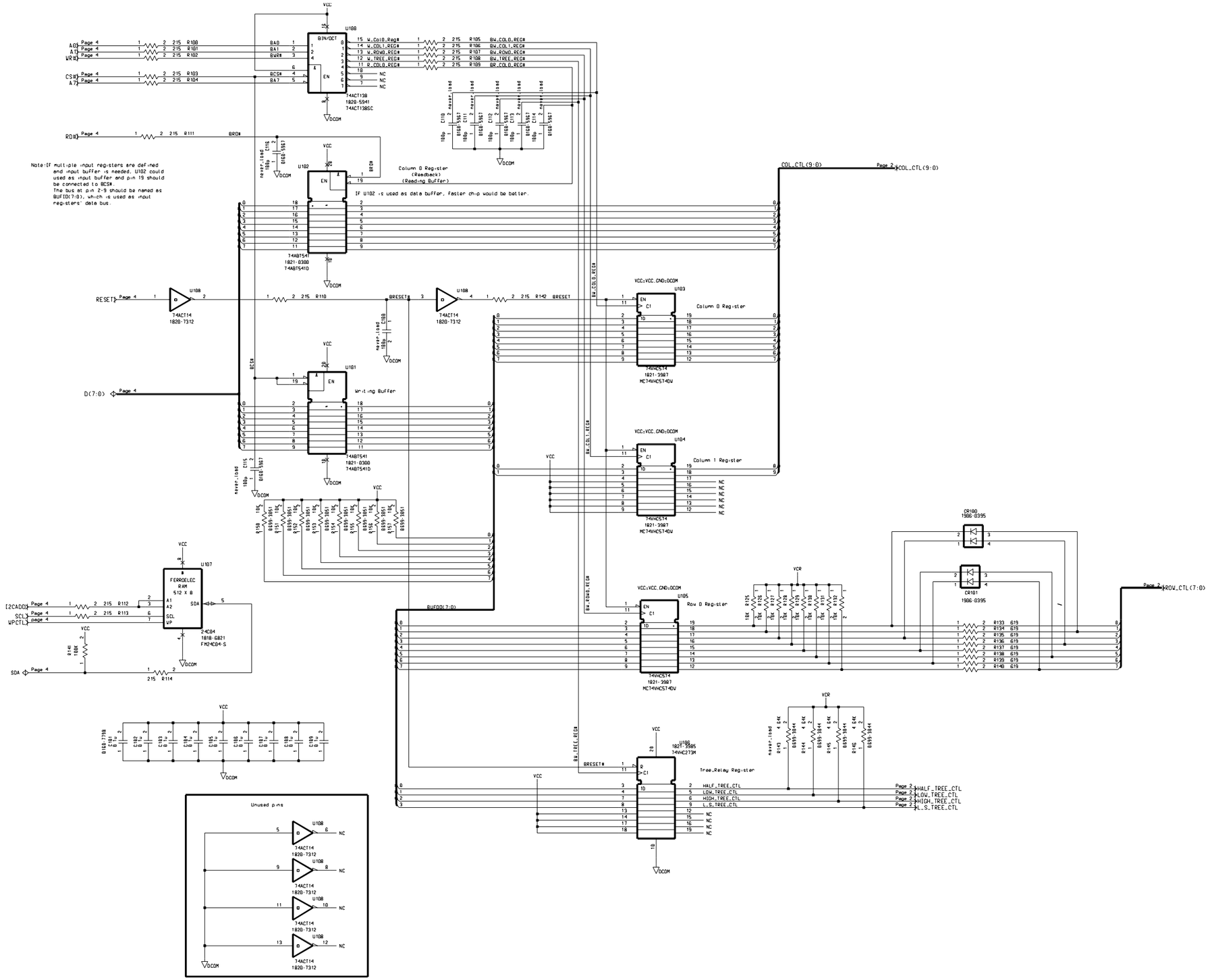


Agilent 3499C Backplane Component Locators
and Schematics
Page 148

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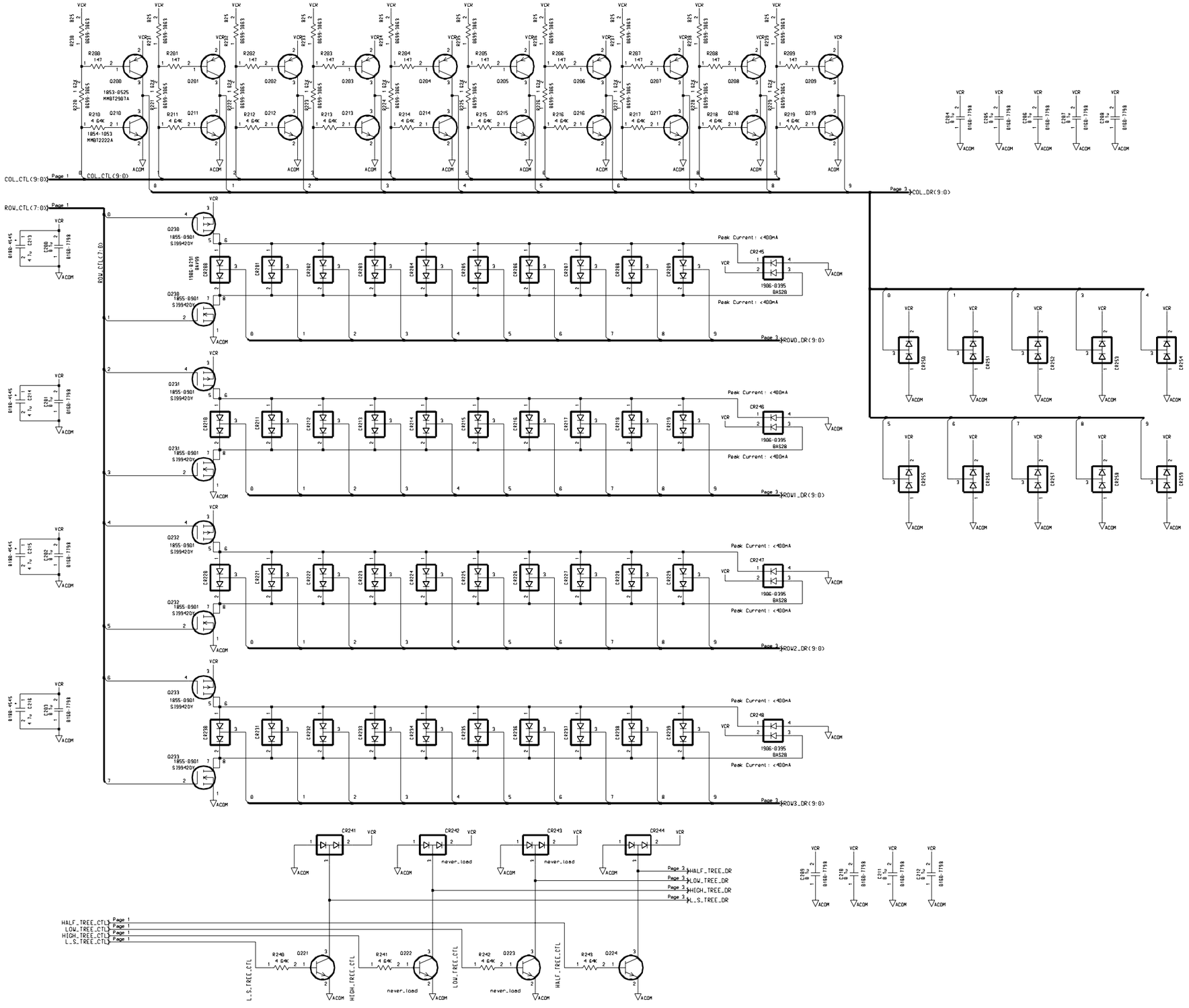


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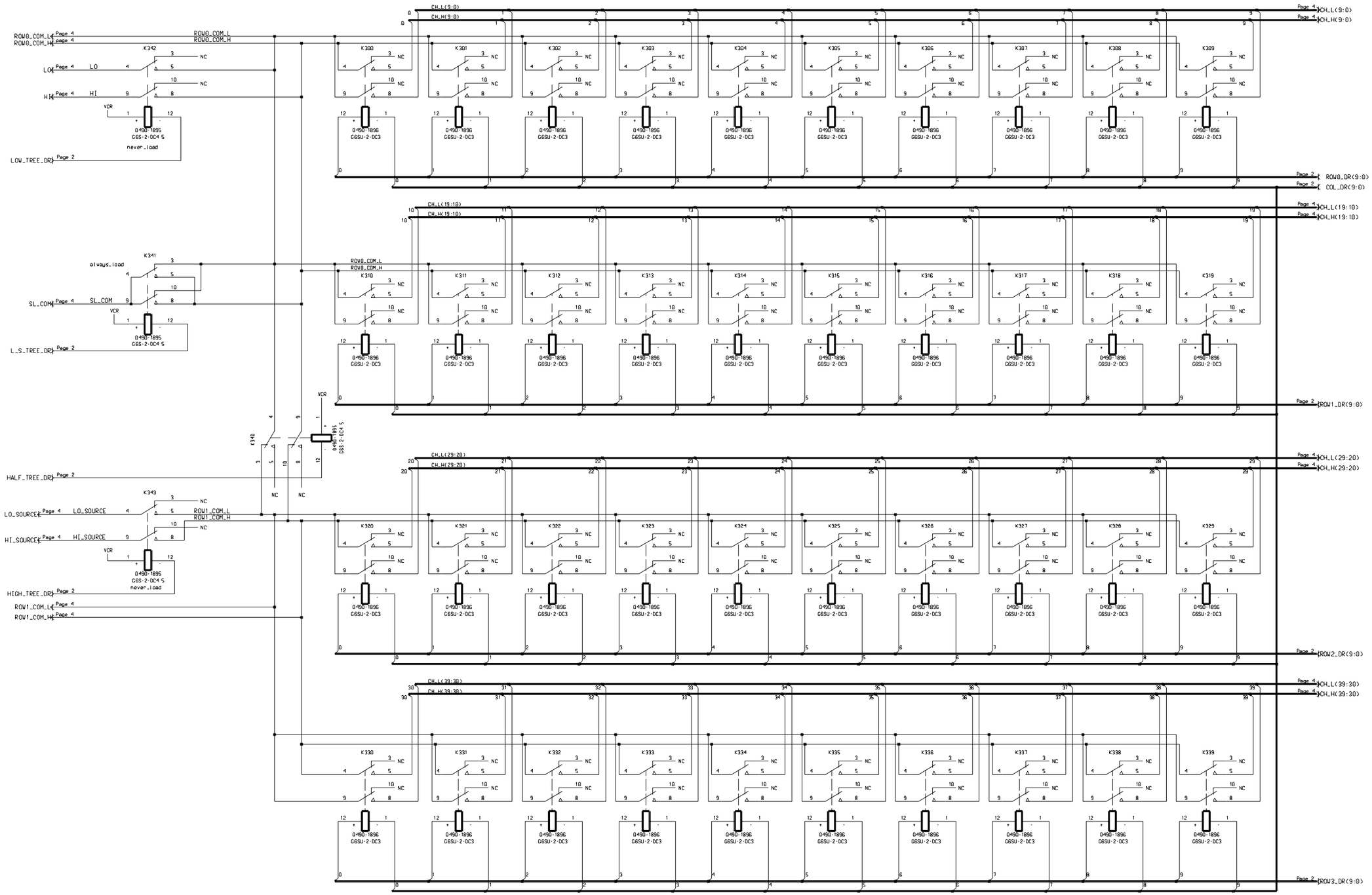


Agilent N2260A 40-Channel MUX Module
Schematic (Sheet 1 of 4)
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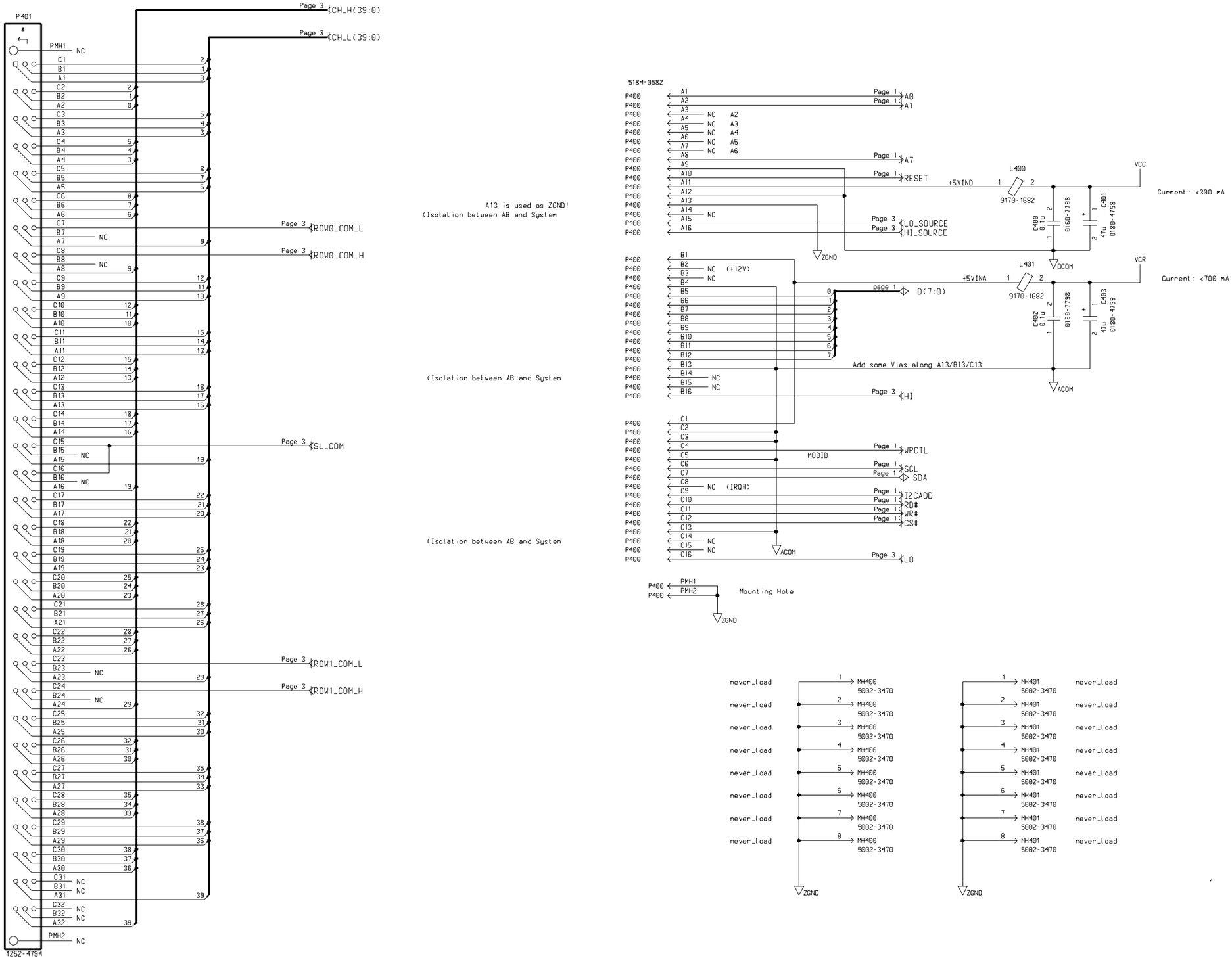
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Relay Specification : 1A/200V

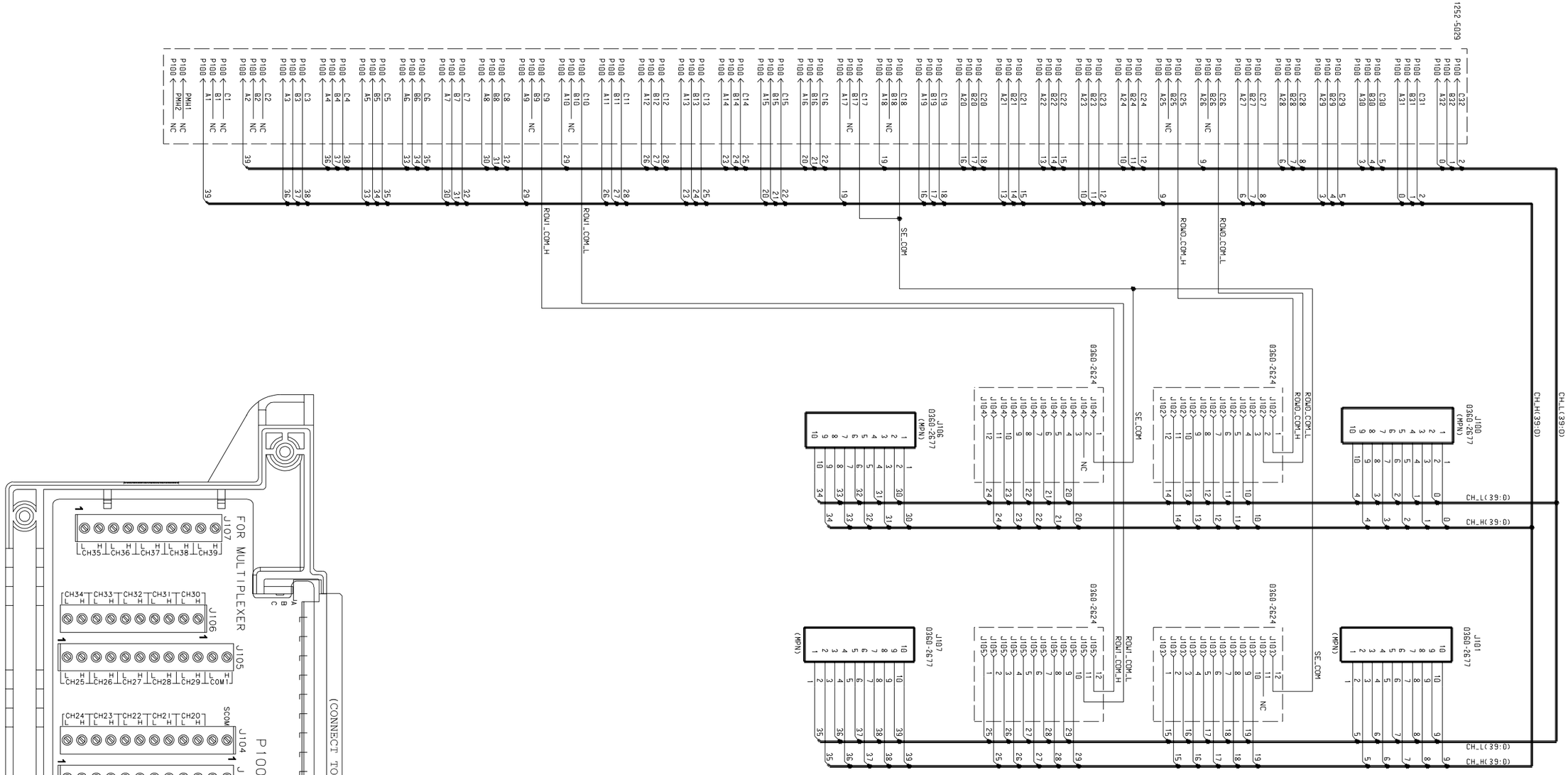
Agilent N2260A 40-Channel MUX Module
Schematic (Sheet 3 of 4)
Page 152

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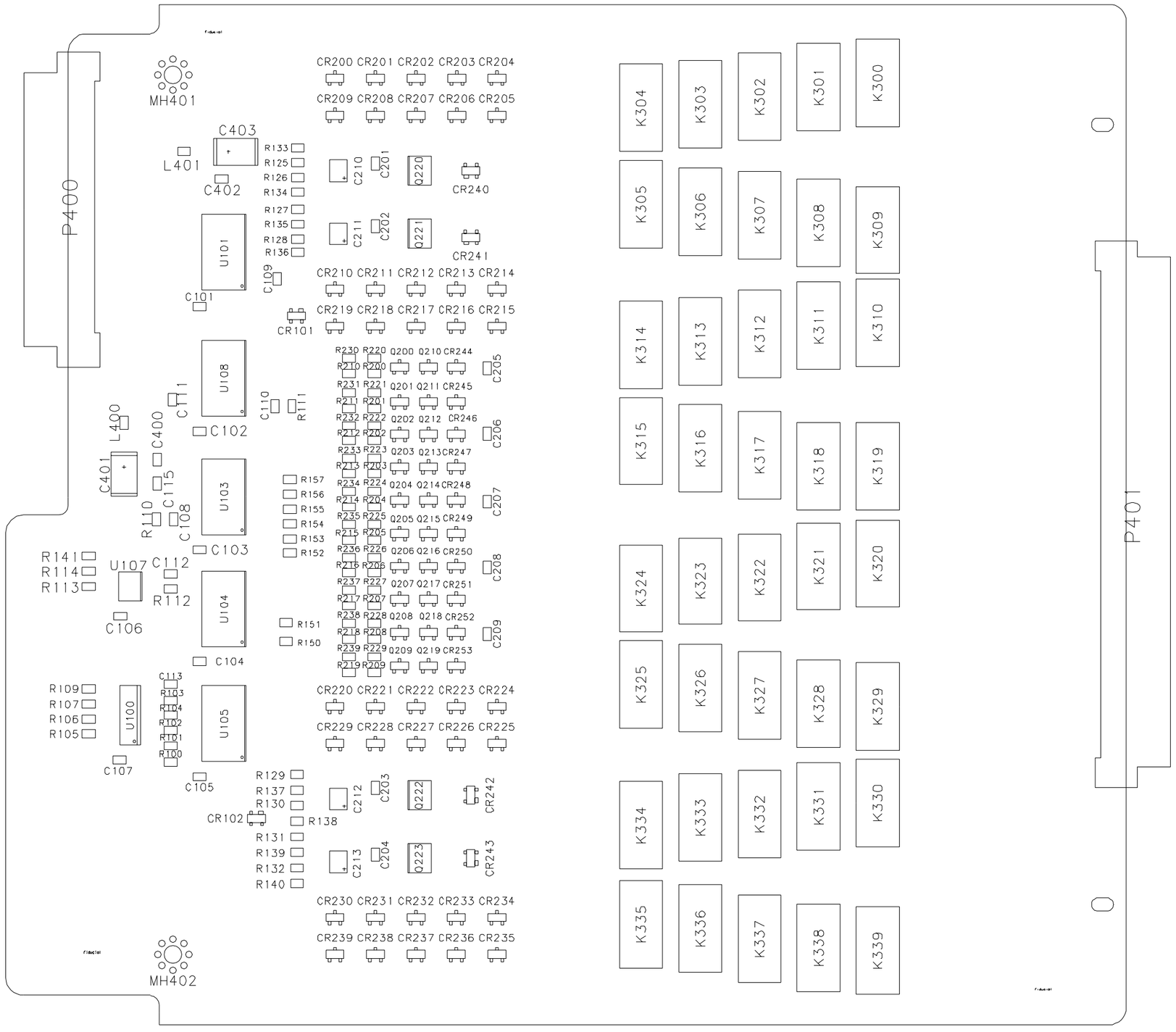
Agilent N2260A 40-Channel MUX Module
Schematic (Sheet 4 of 4)
Page 153

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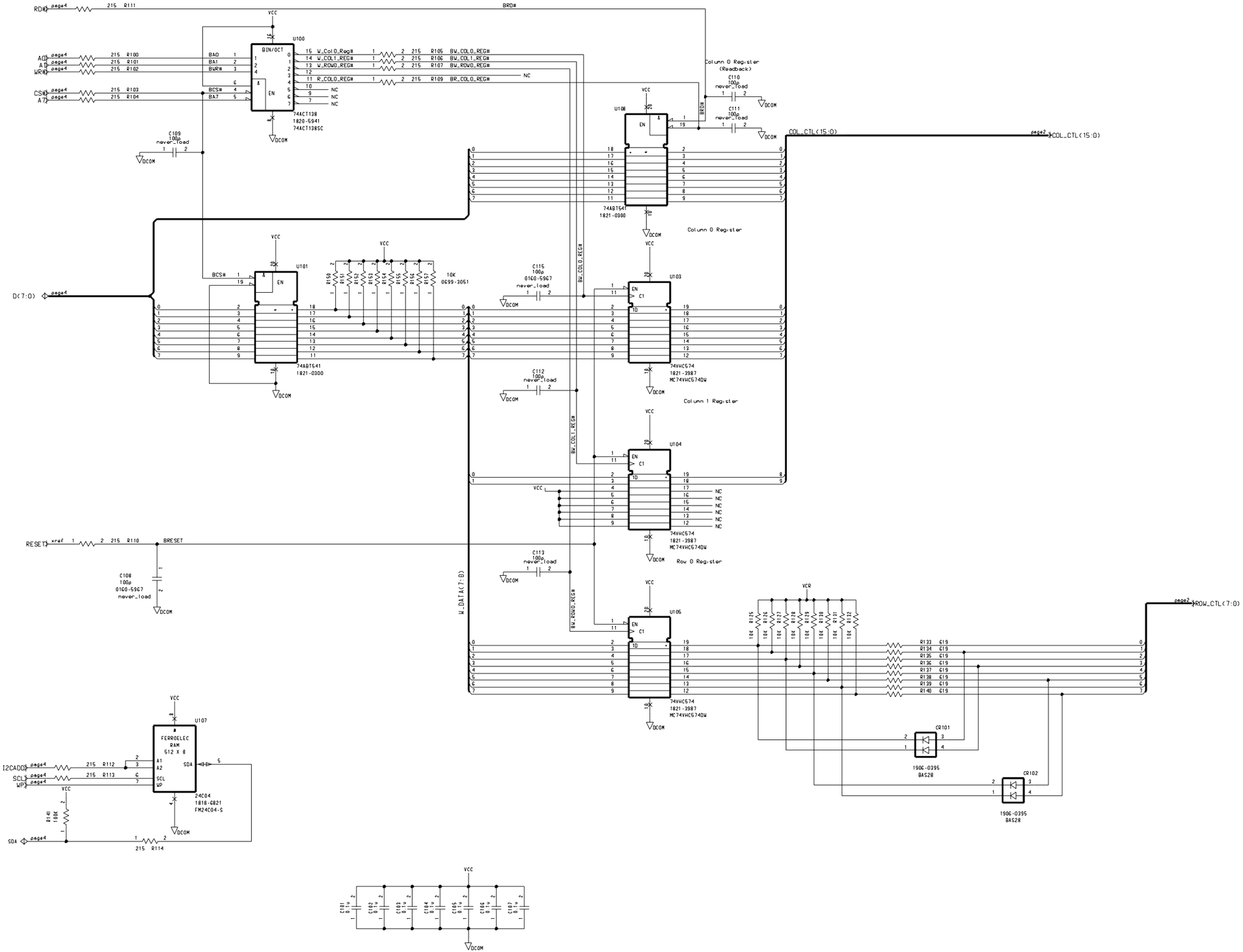
Agilent N2290A Screw Terminal Block Component Locator and Schematic
Page 154

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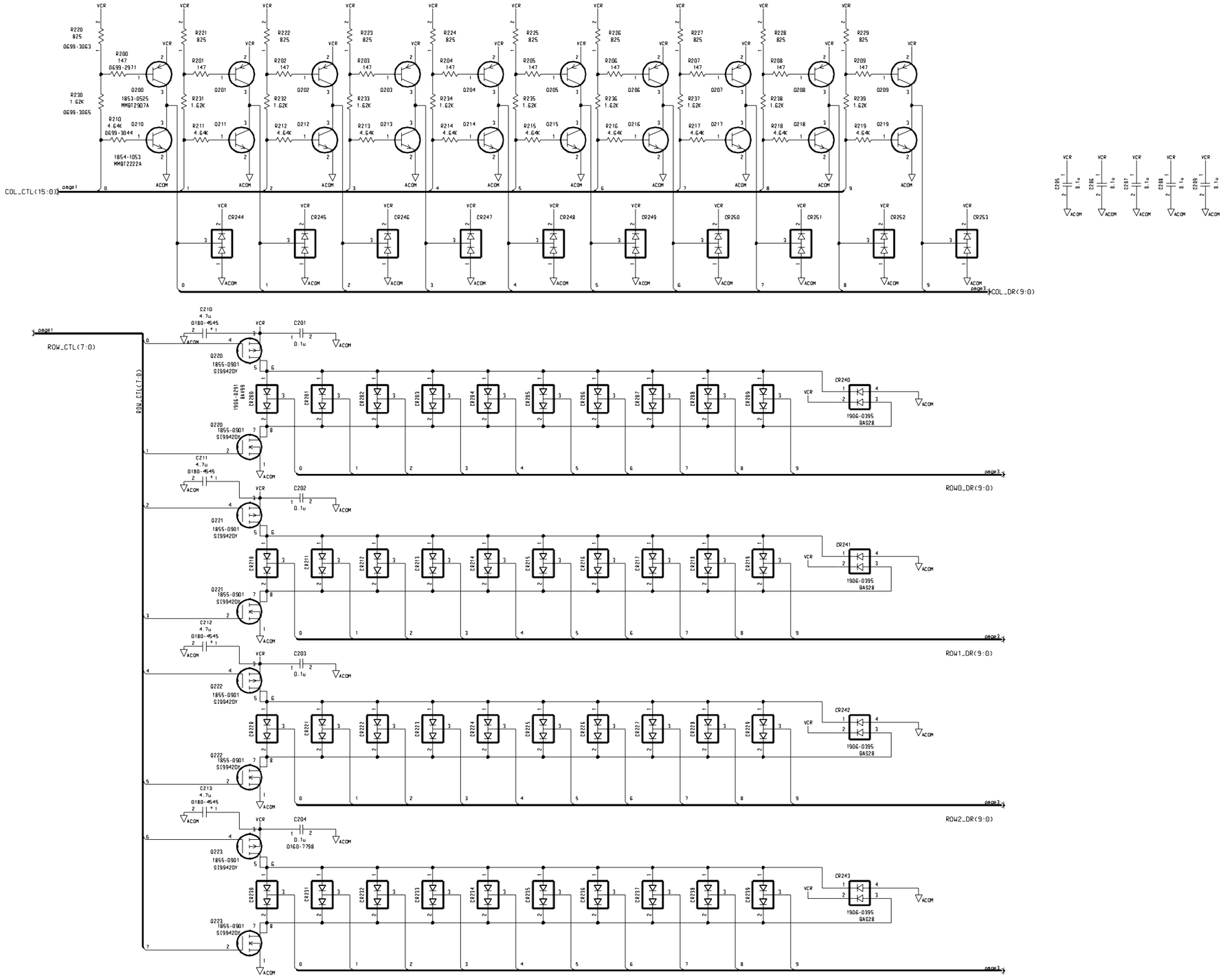
Agilent N2261A GP Relay Module
Component Locator
Page 155

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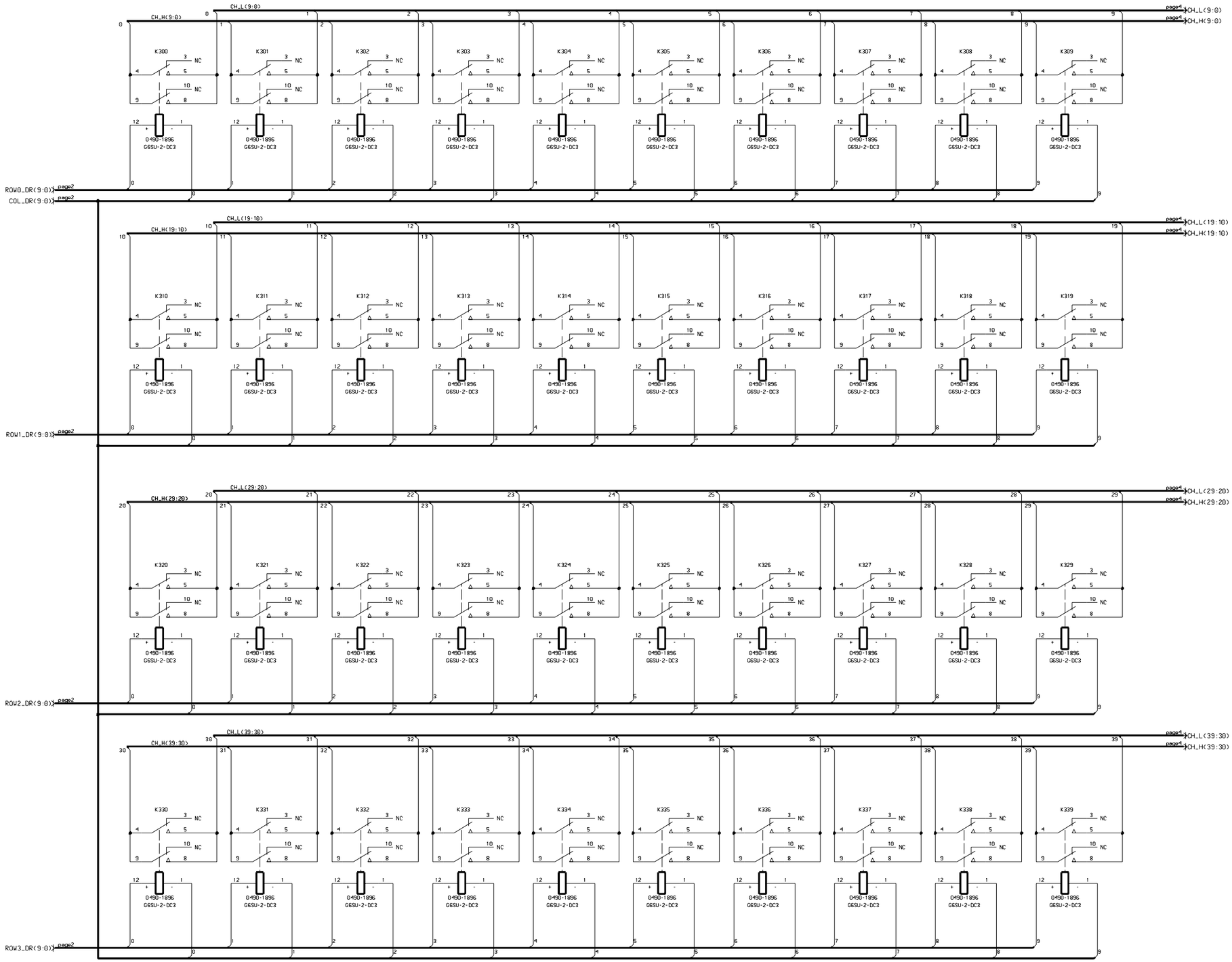


Agilent N2261A GP Relay Module
Schematic (Sheet 1 of 4)
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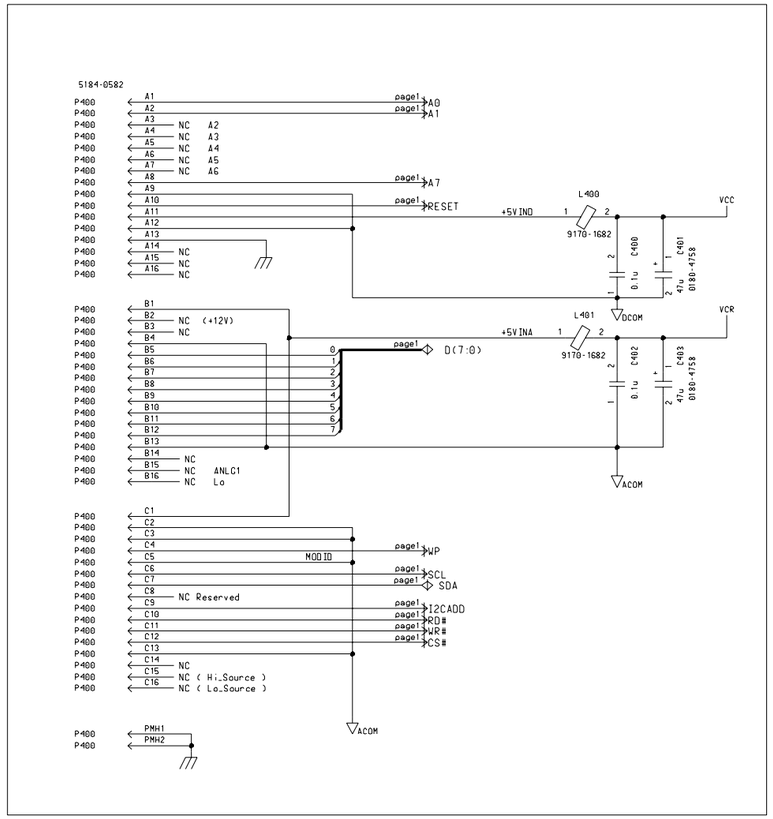
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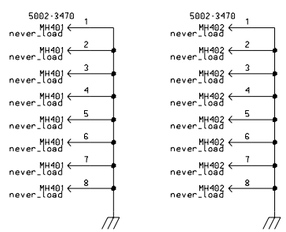
Agilent N2261A GP Relay Module
Schematic (Sheet 3 of 4)
Page 158

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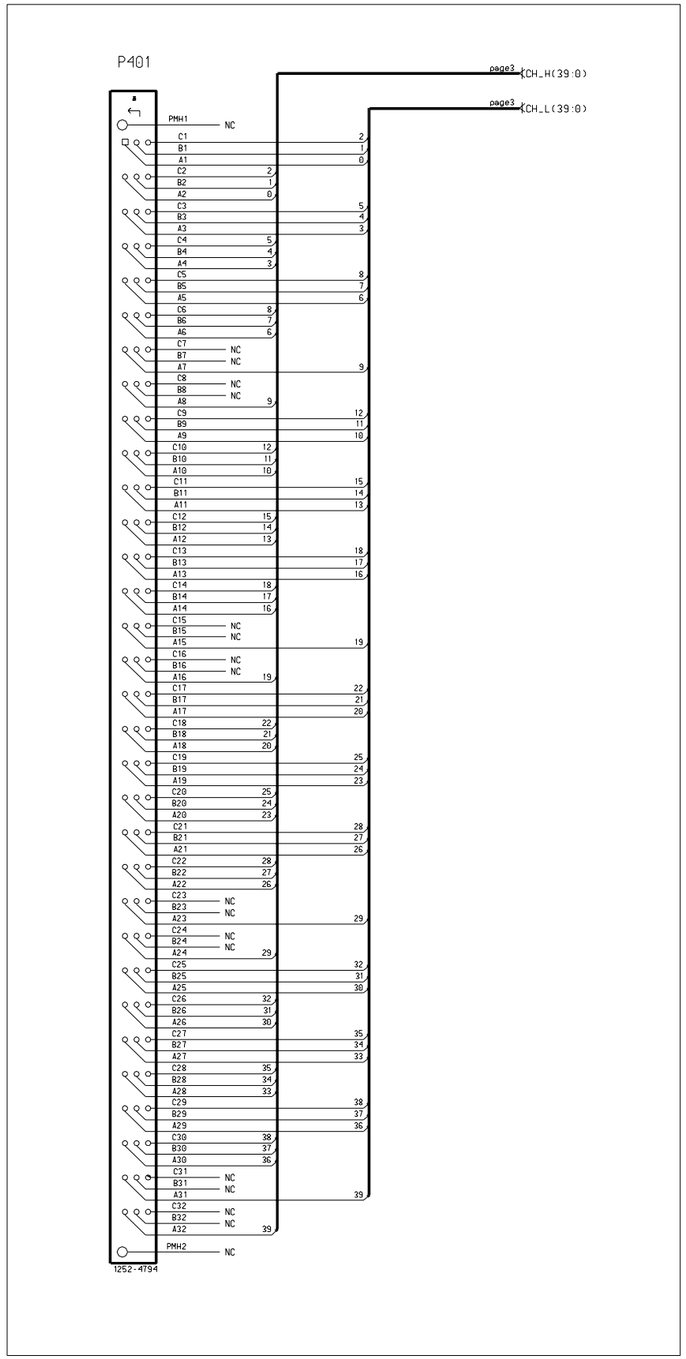
Backplane Connector



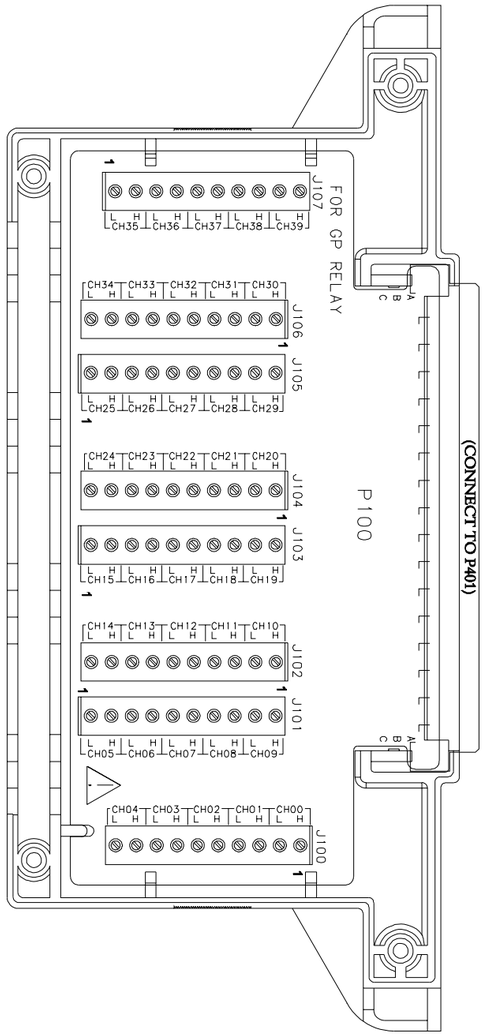
Two Mounting Holes

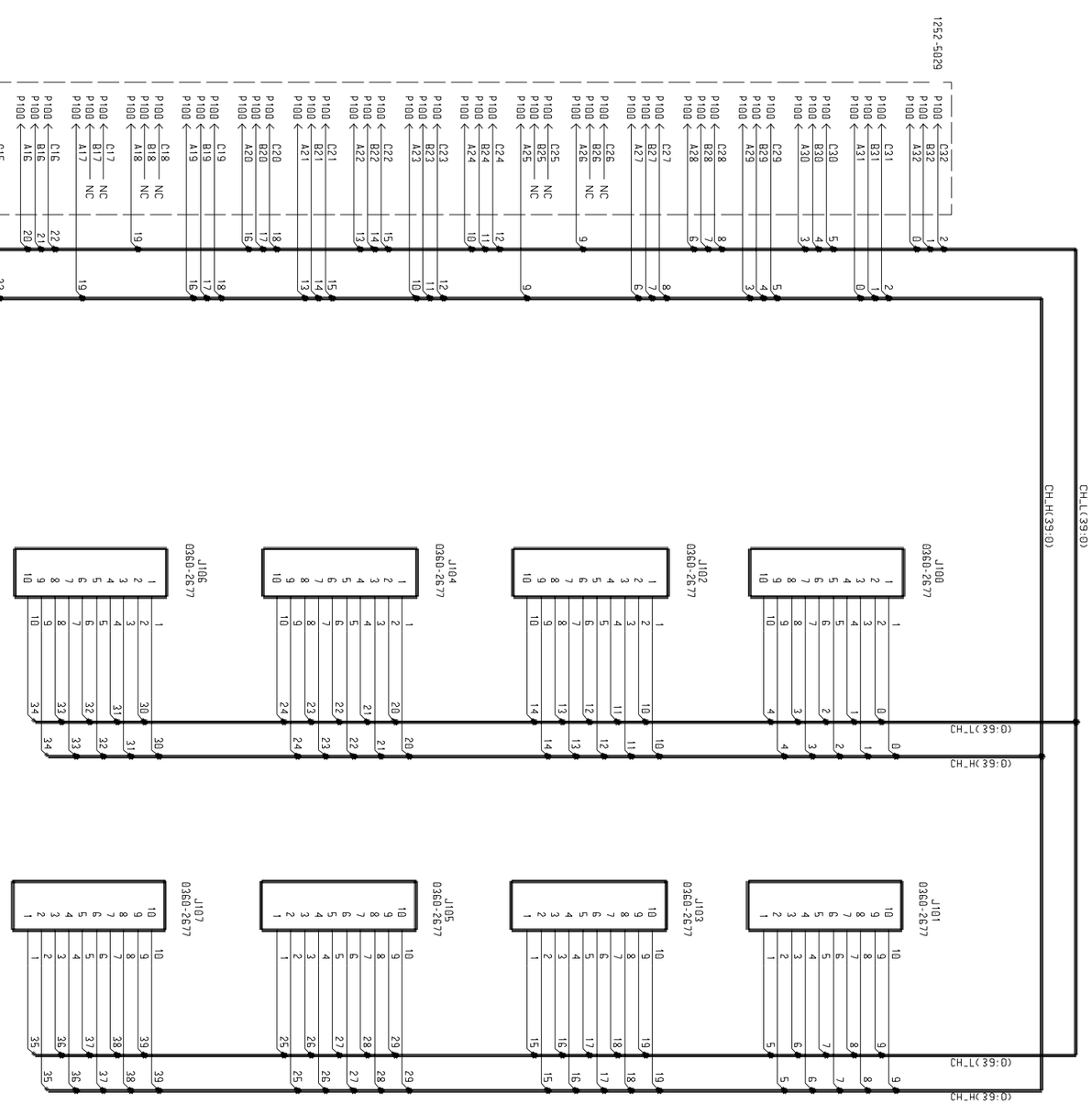


Front Connector



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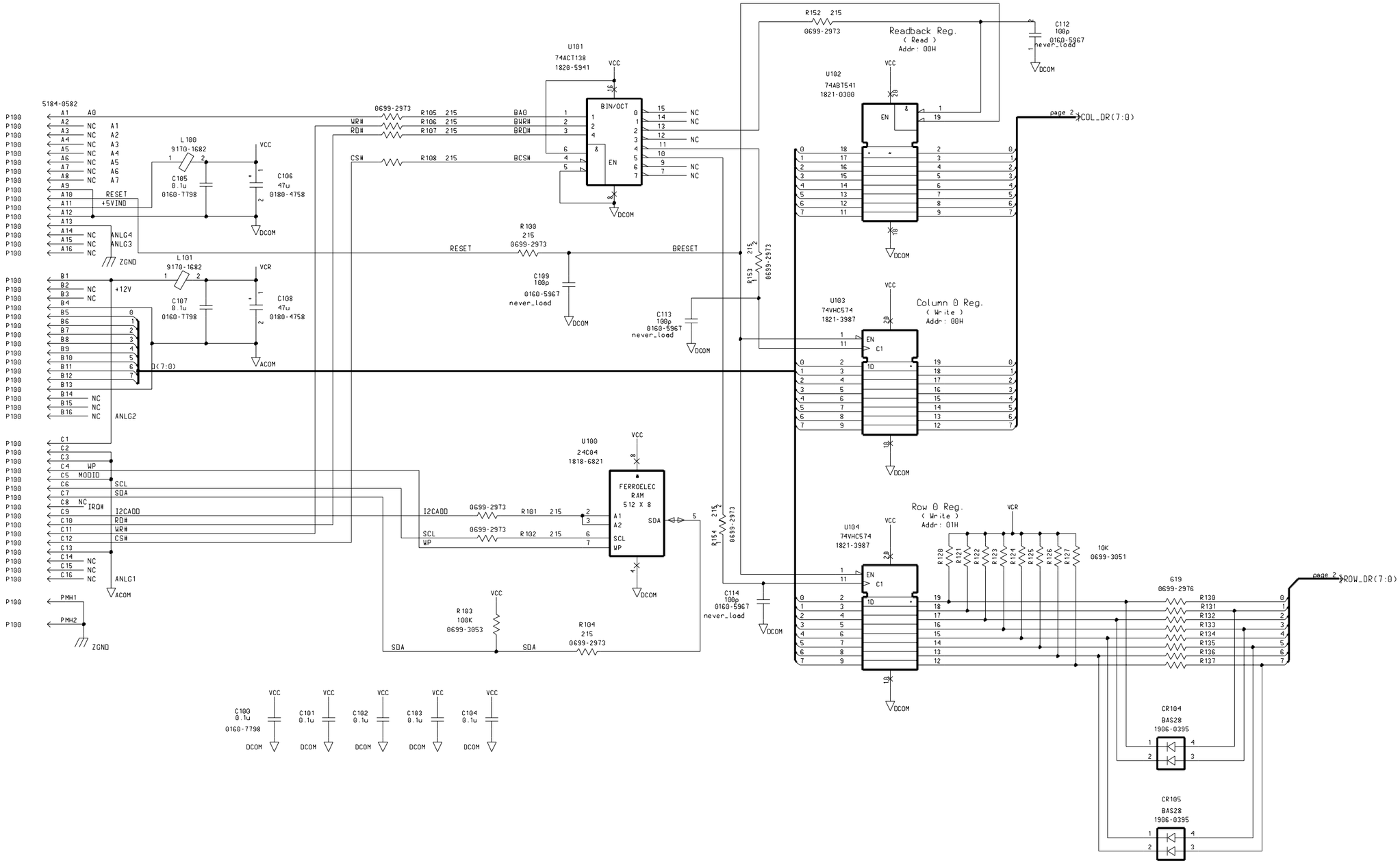


Agilent N2291A Screw Terminal Block Component Locator and Schematic
Page 160

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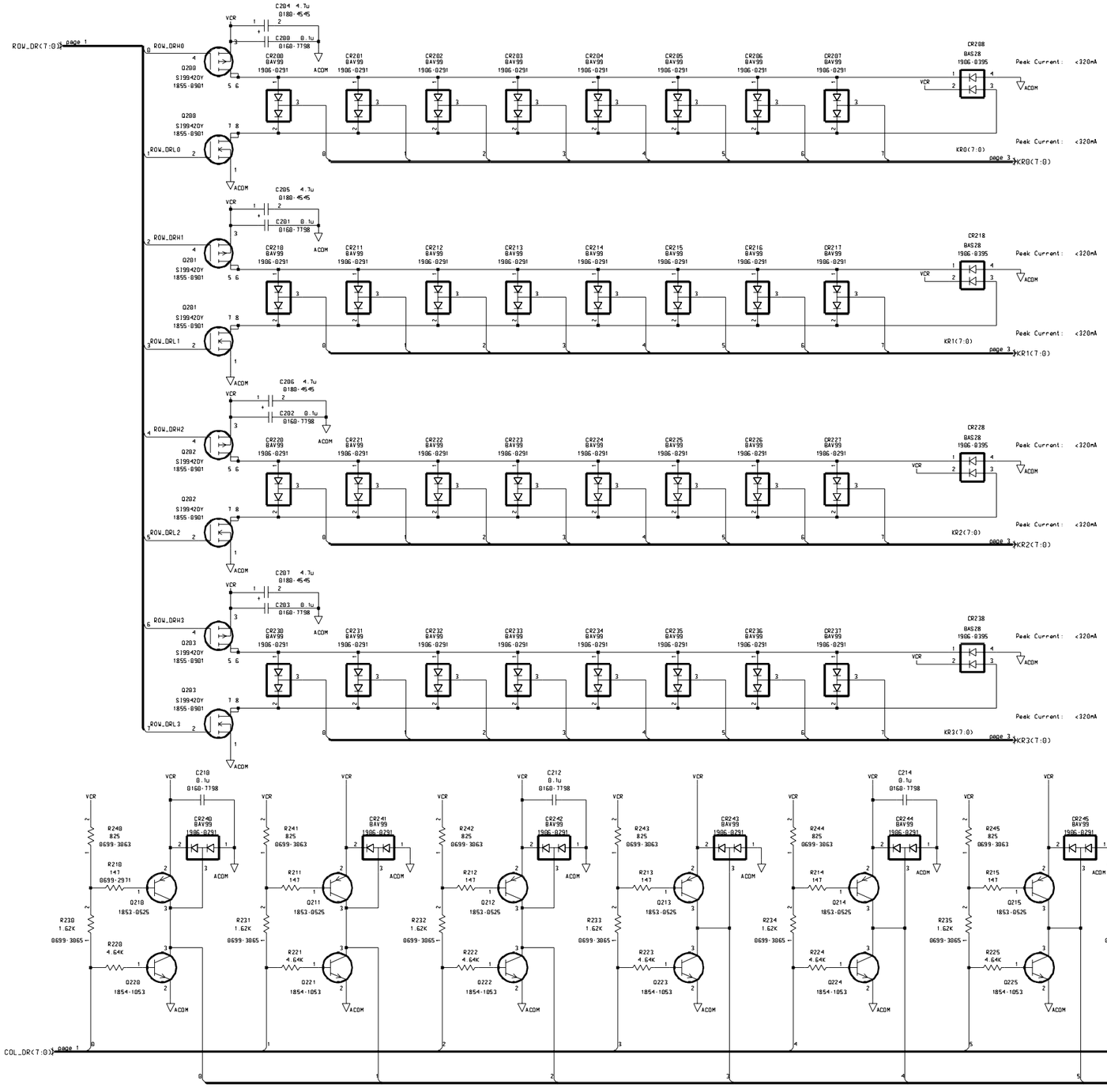
Agilent N2262A 4 x 8 Matrix Module
Component Locator
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Agilent N2262A 4 x 8 Matrix Module
Schematic (Sheet 1 of 3)
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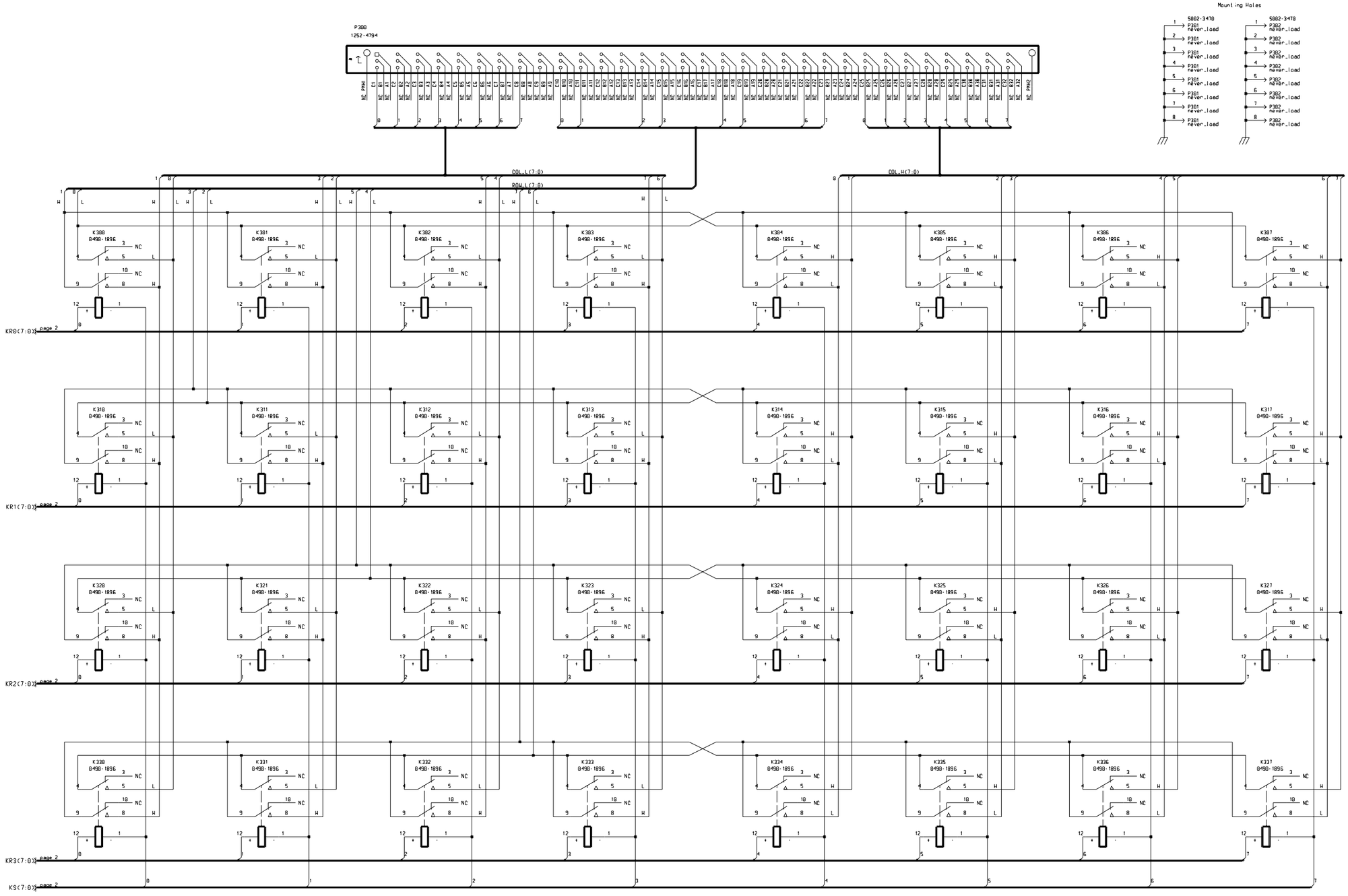
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Note:

Digital signals should be as far away as possible from RELAY TRACES

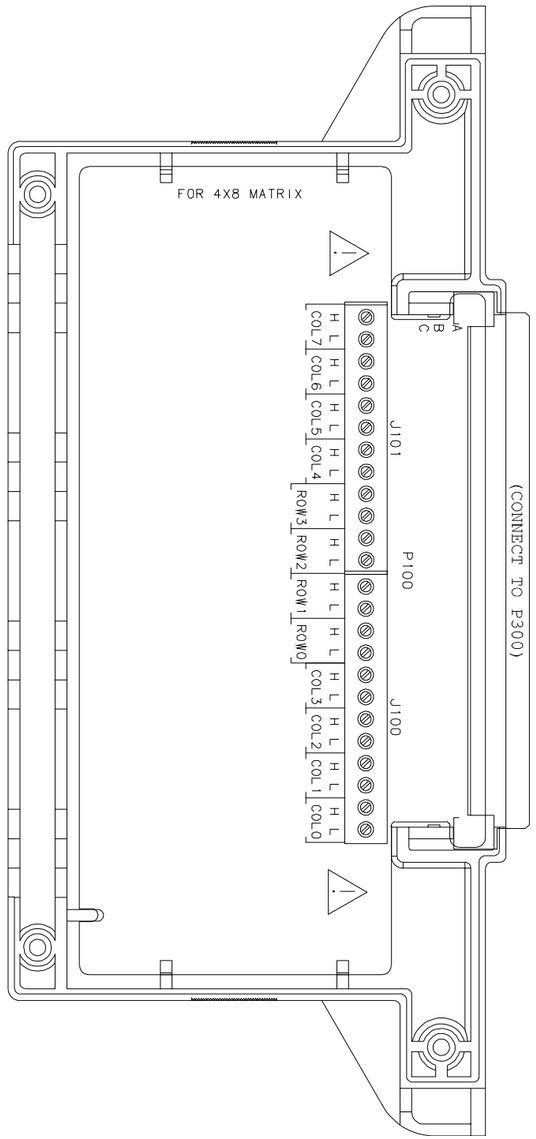
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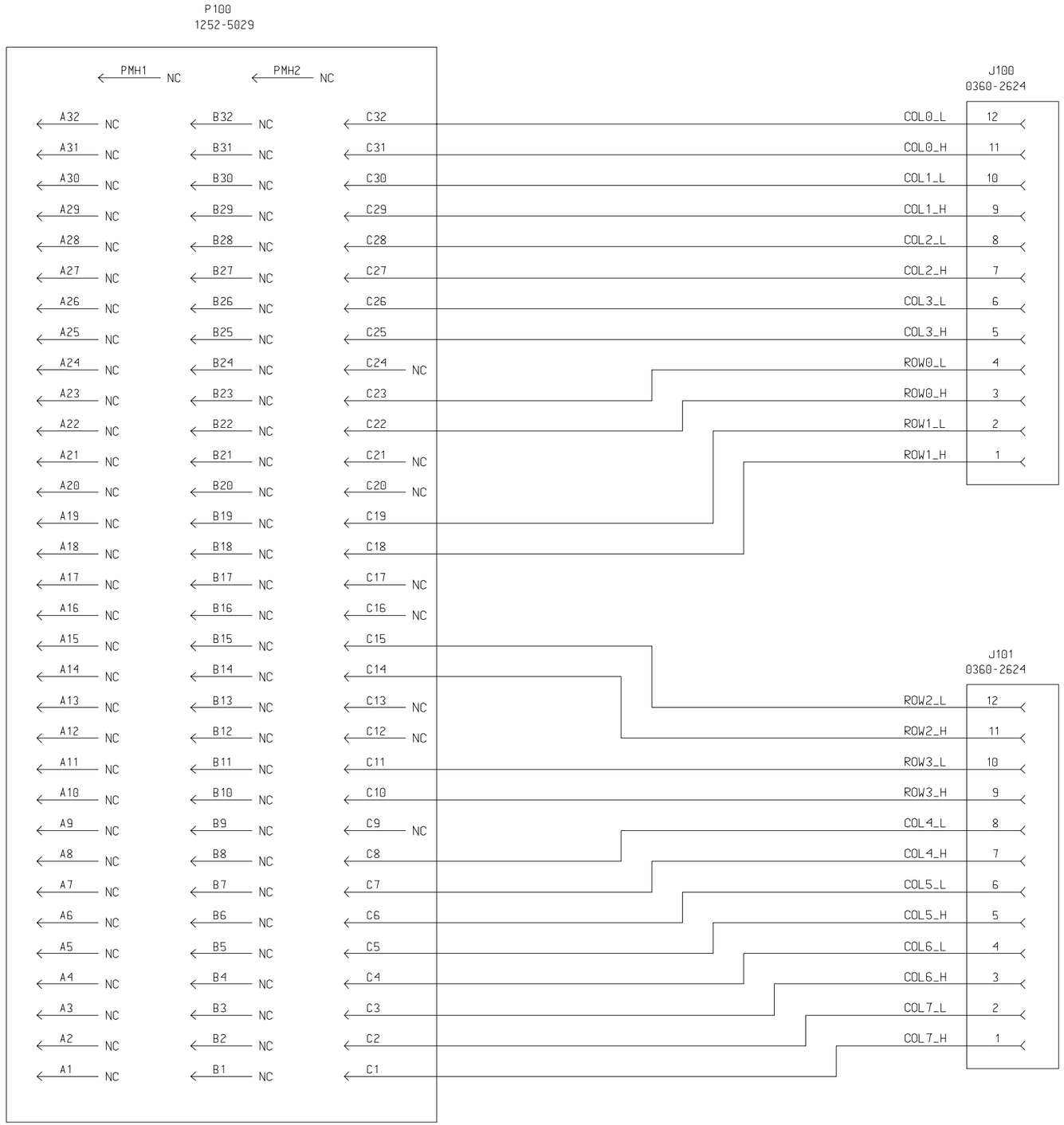


Relay Specification : 1A/200V

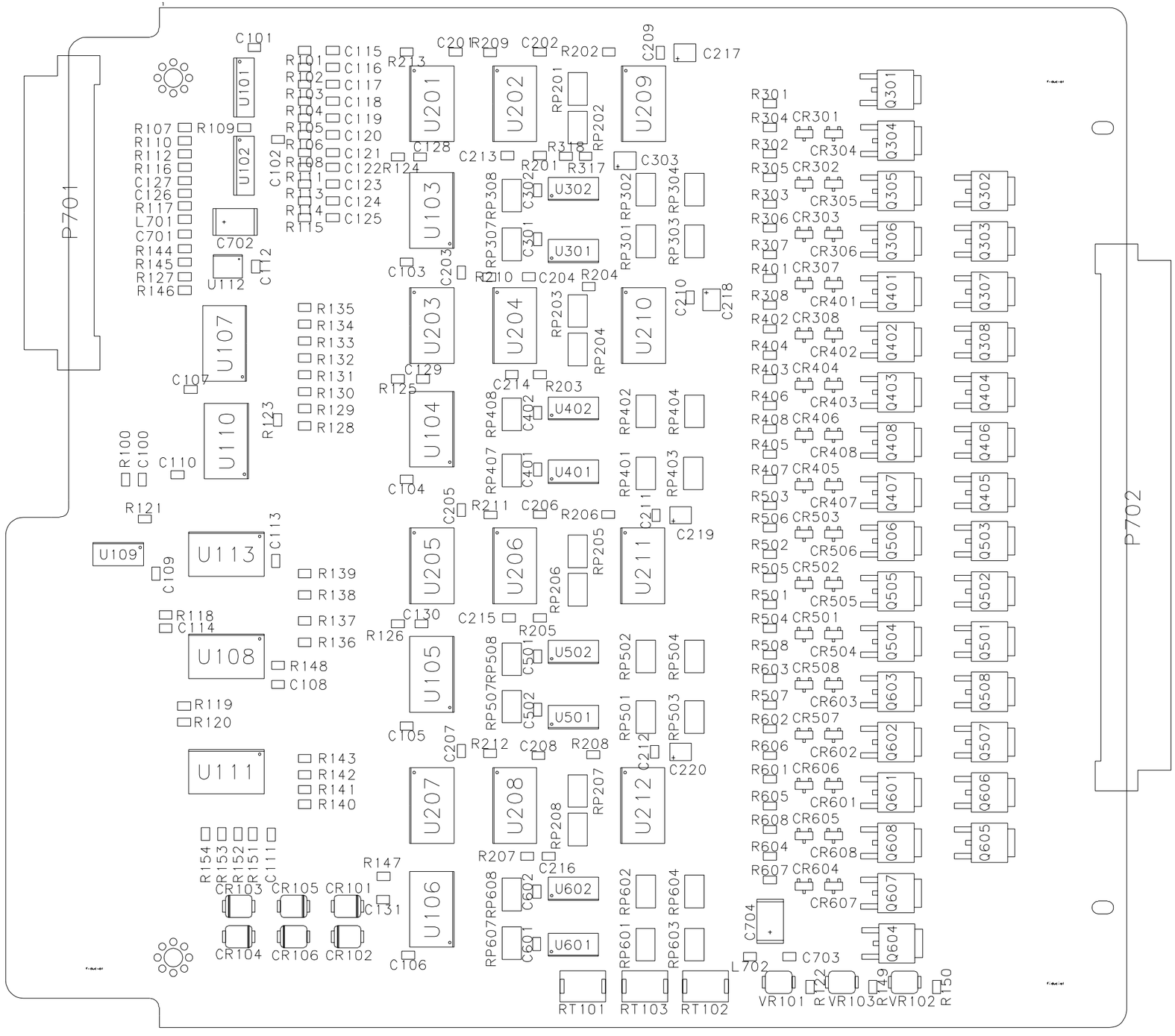
Agilent N2262A 4 x 8 Matrix Module
Schematic (Sheet 3 of 3)
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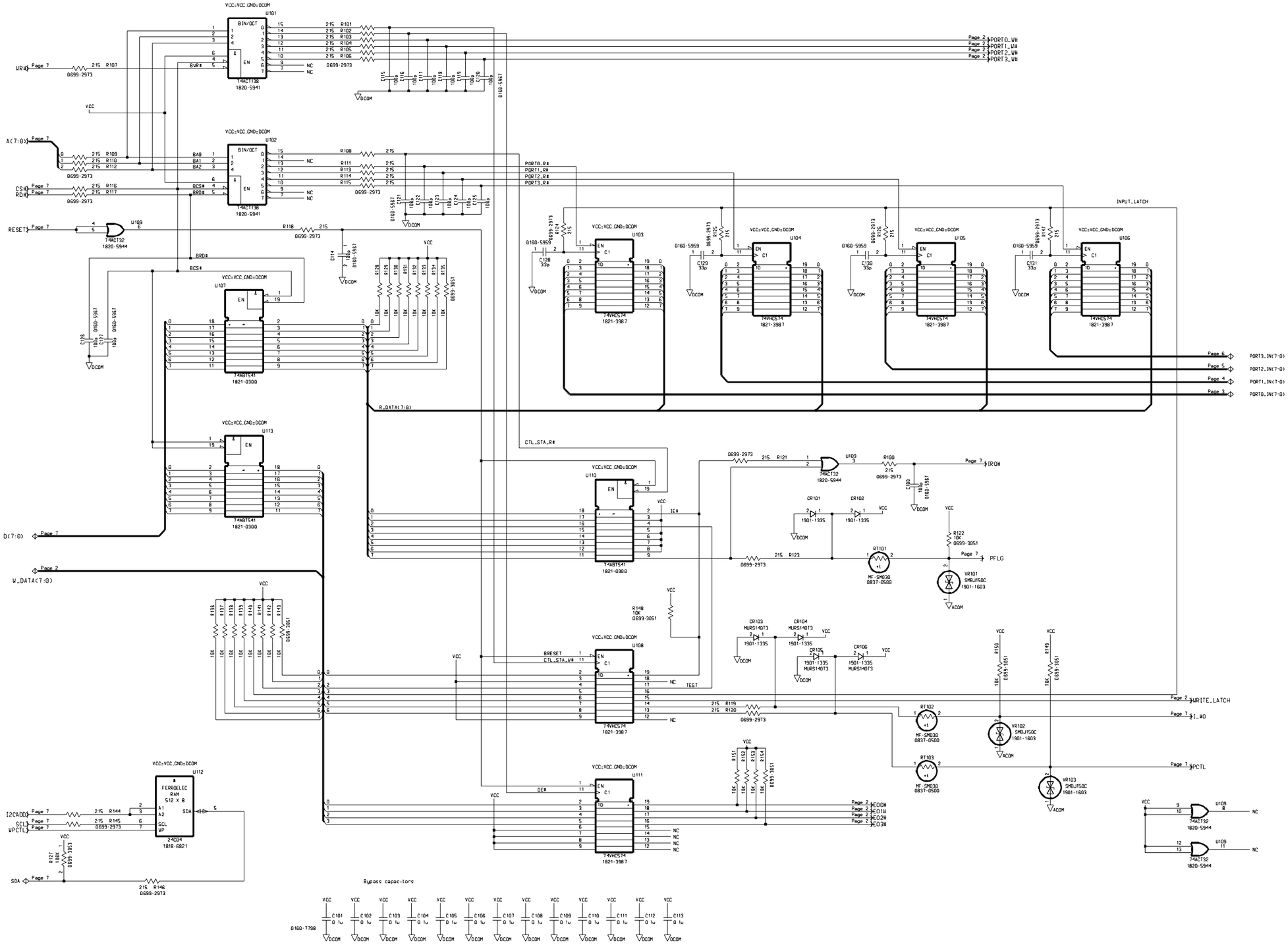




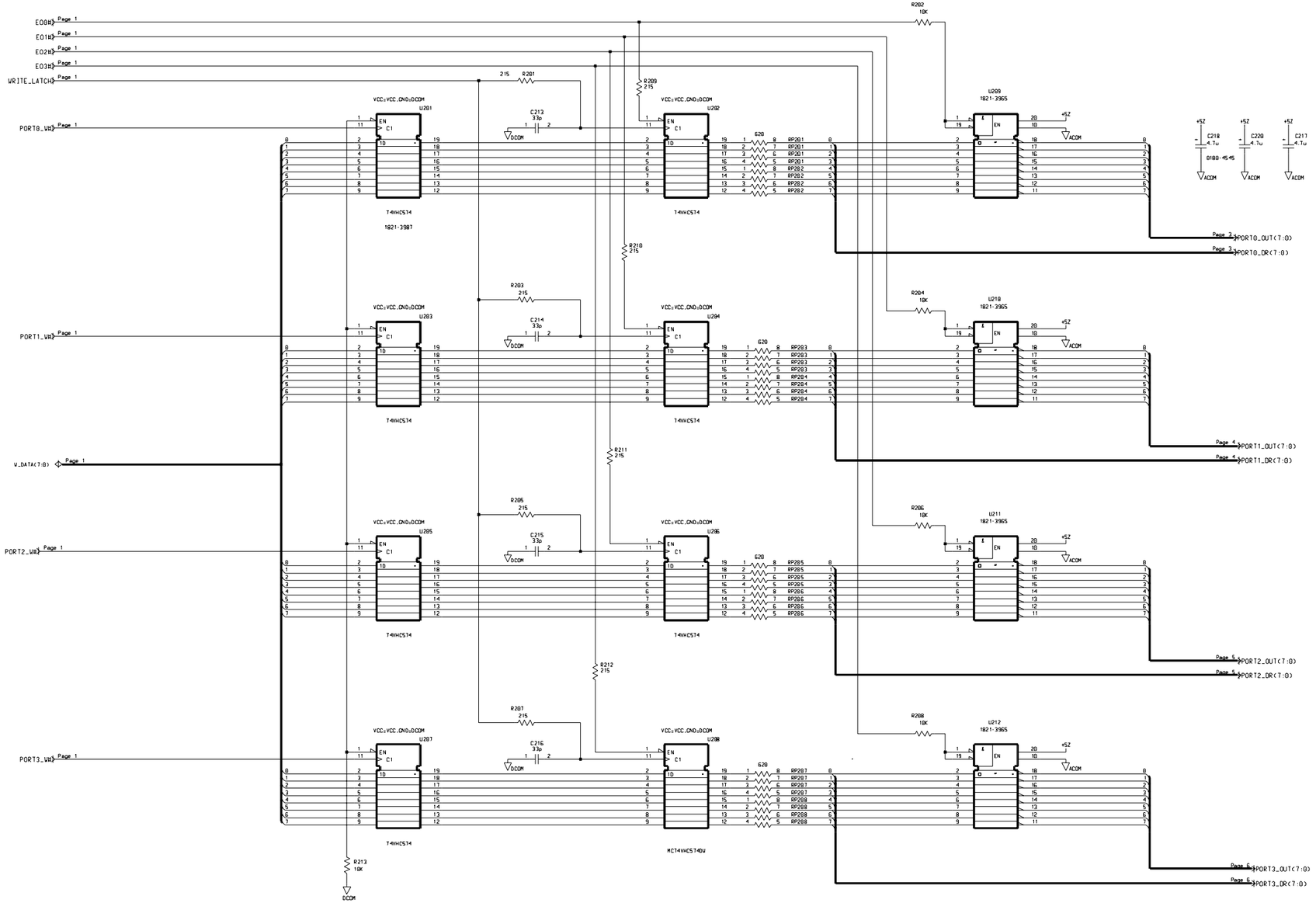
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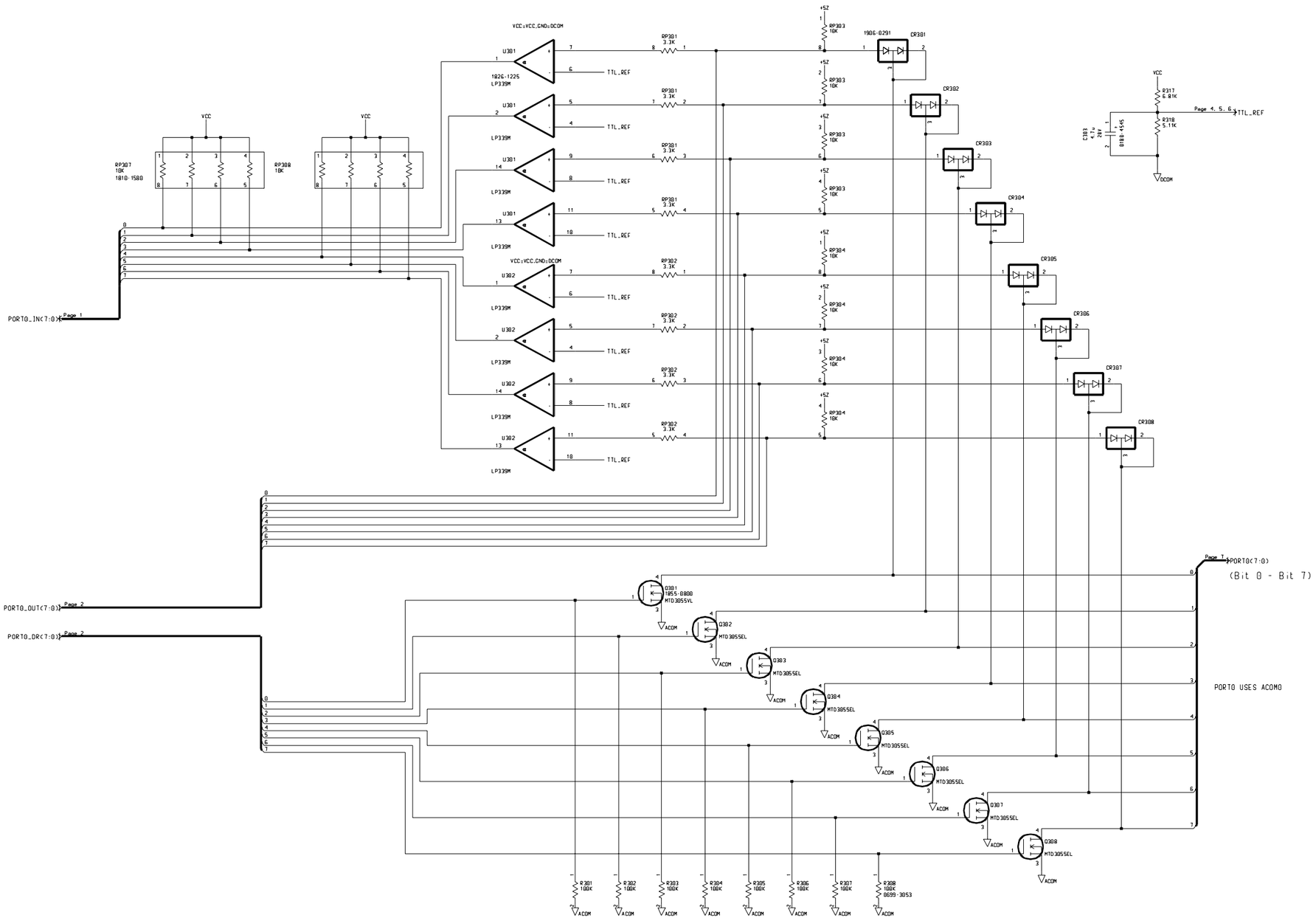


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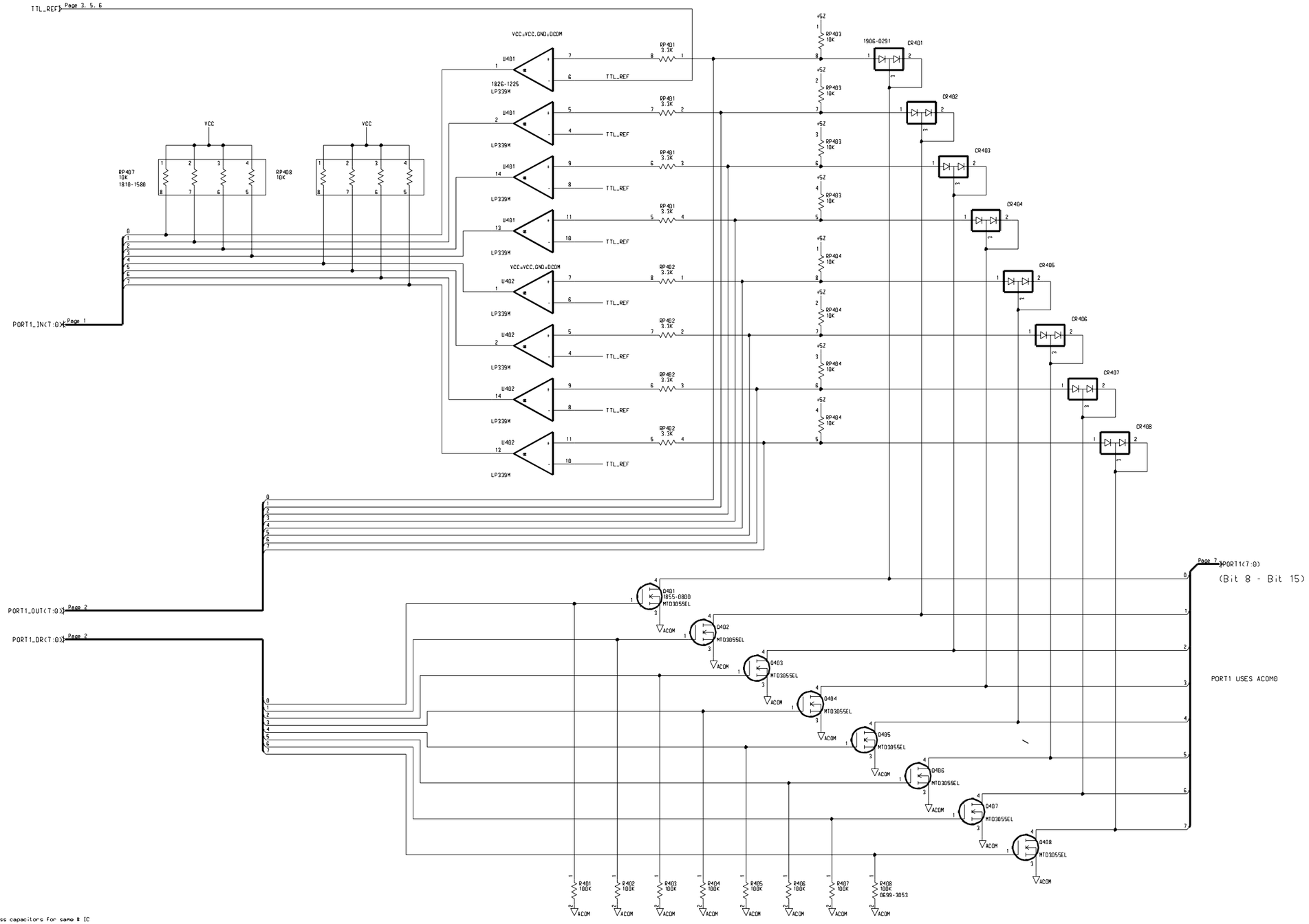
Agilent N2263A 32-Bit Digital I/O Module
Schematic (Sheet 2 of 7)
Page 168

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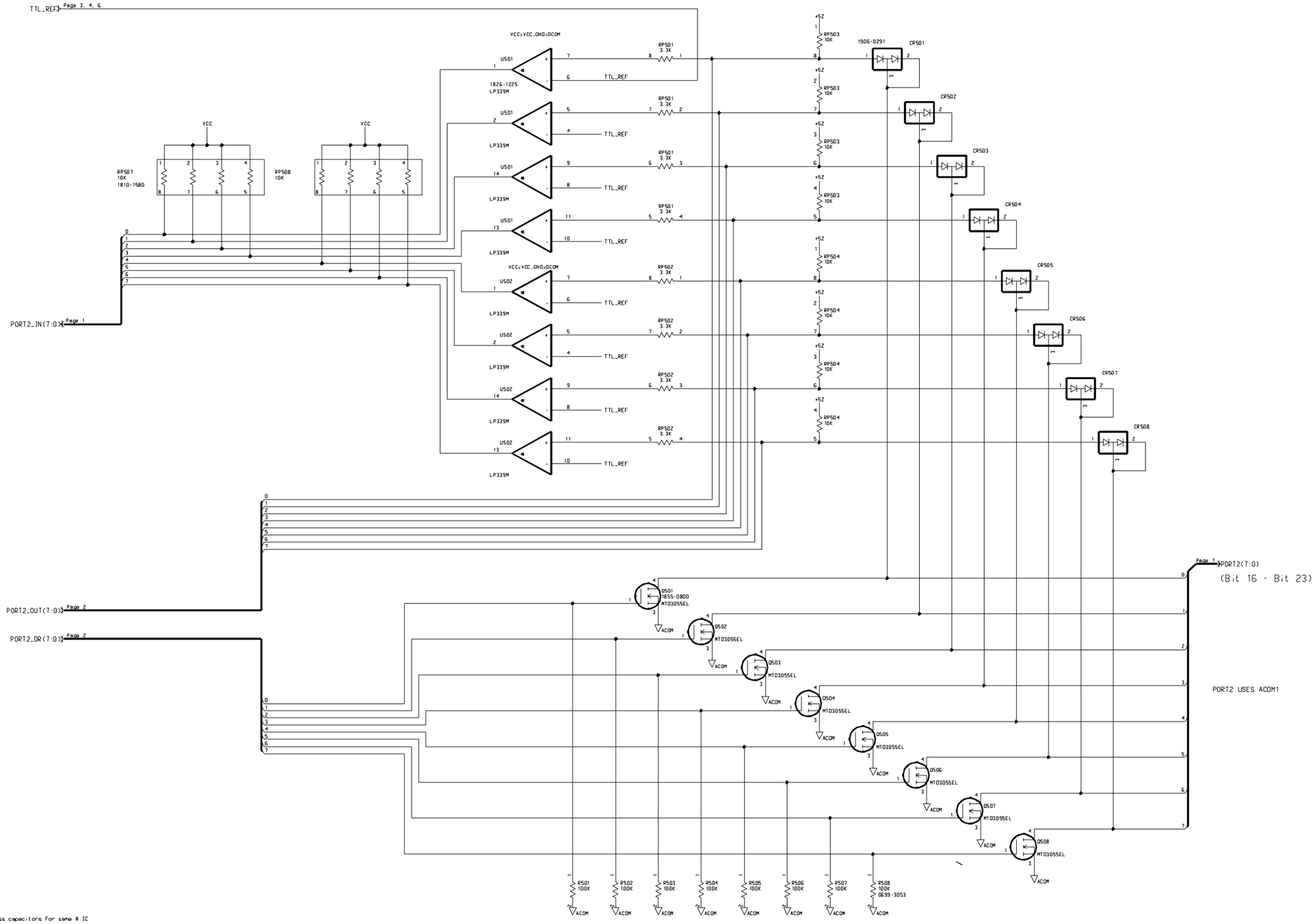
Agilent N2263A 32-Bit Digital I/O Module
Schematic (Sheet 3 of 7)
Page 169

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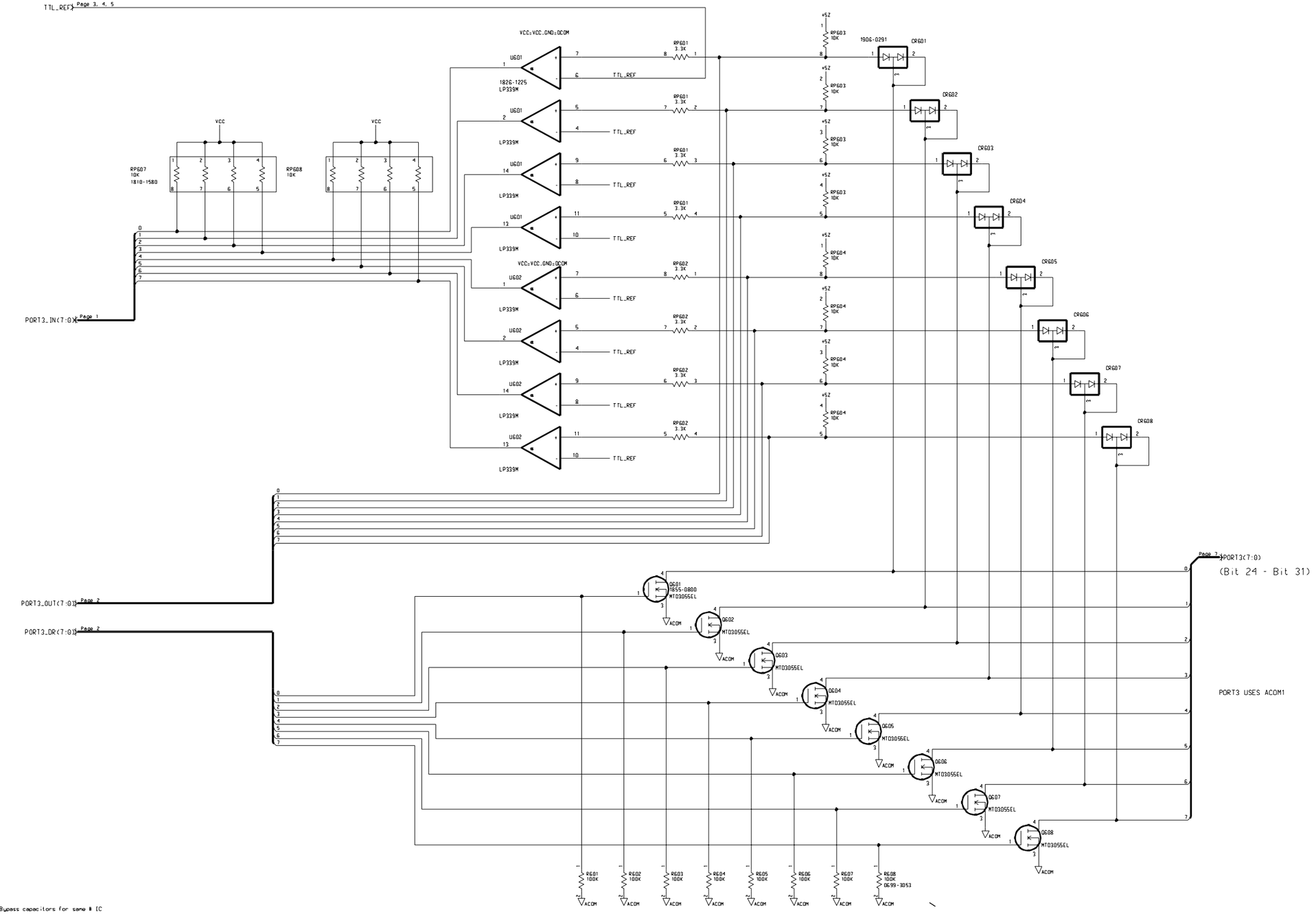
Agilent N2263A 32-Bit Digital I/O Module
Schematic (Sheet 4 of 7)
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Agilent N2263A 32-Bit Digital I/O Module
Schematic (Sheet 5 of 7)
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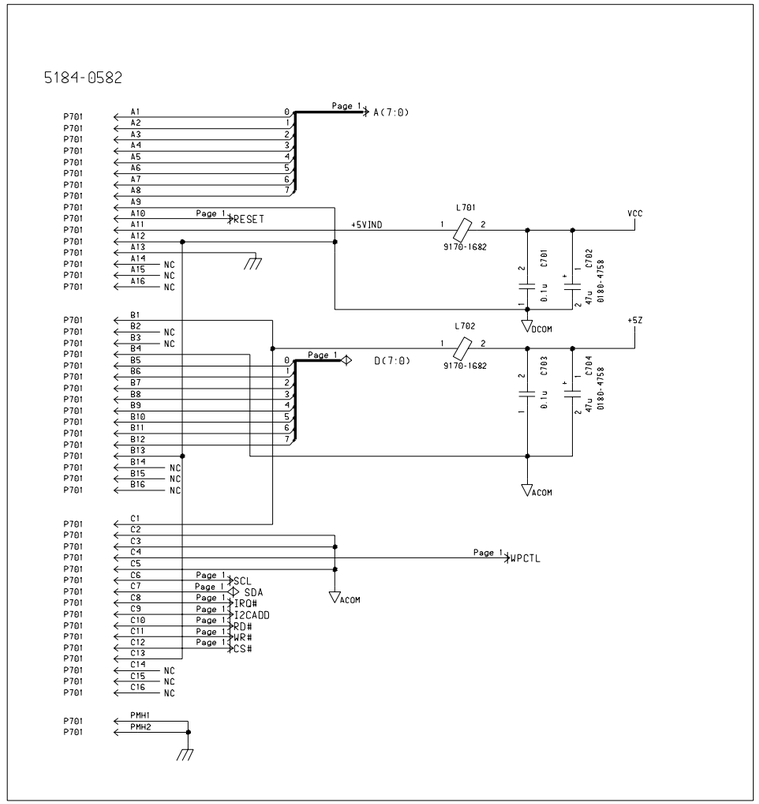
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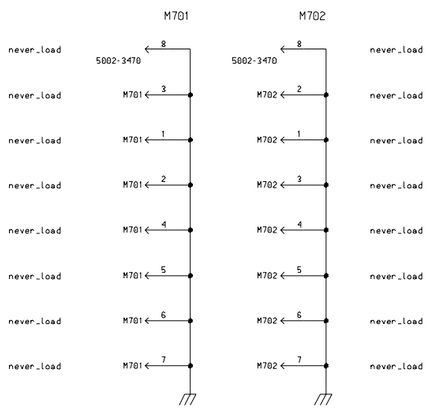
Agilent N2263A 32-Bit Digital I/O Module
Schematic (Sheet 6 of 7)
Page 172

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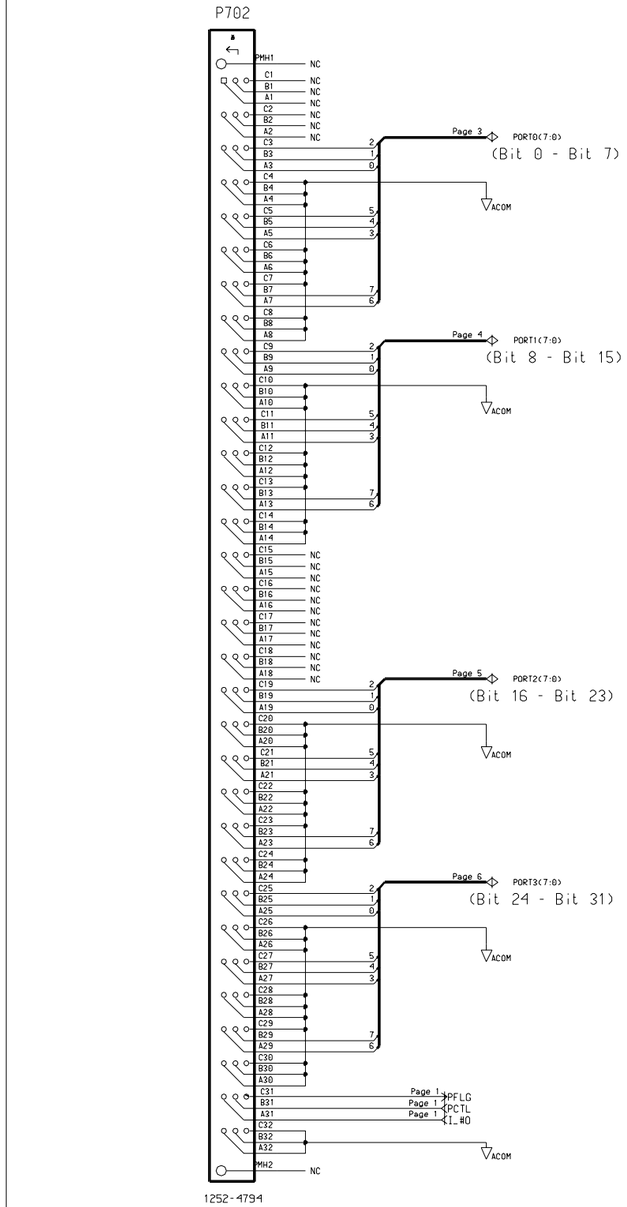
Backplane Connector



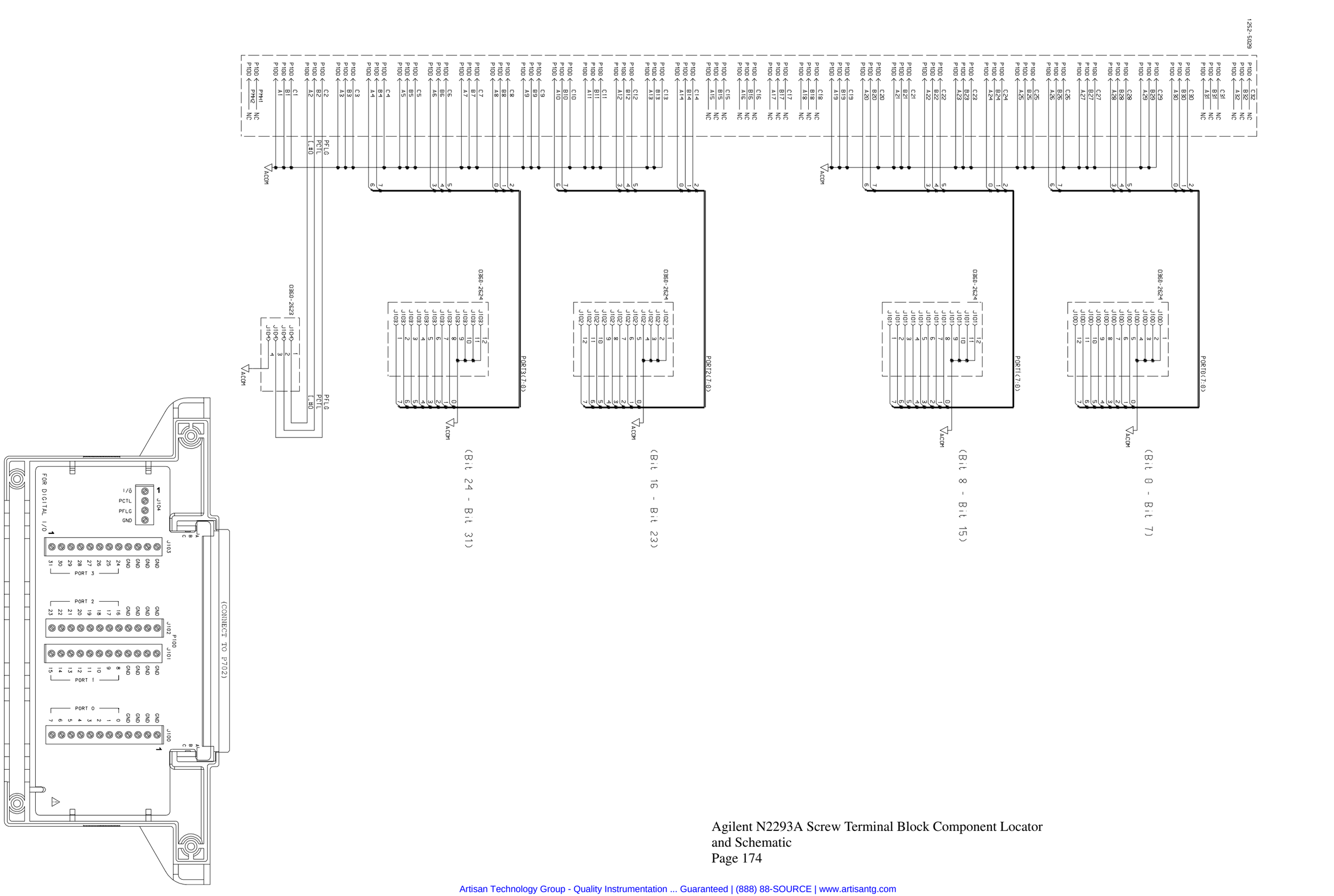
Two Mounting Holes with Soldermask



Front Connector

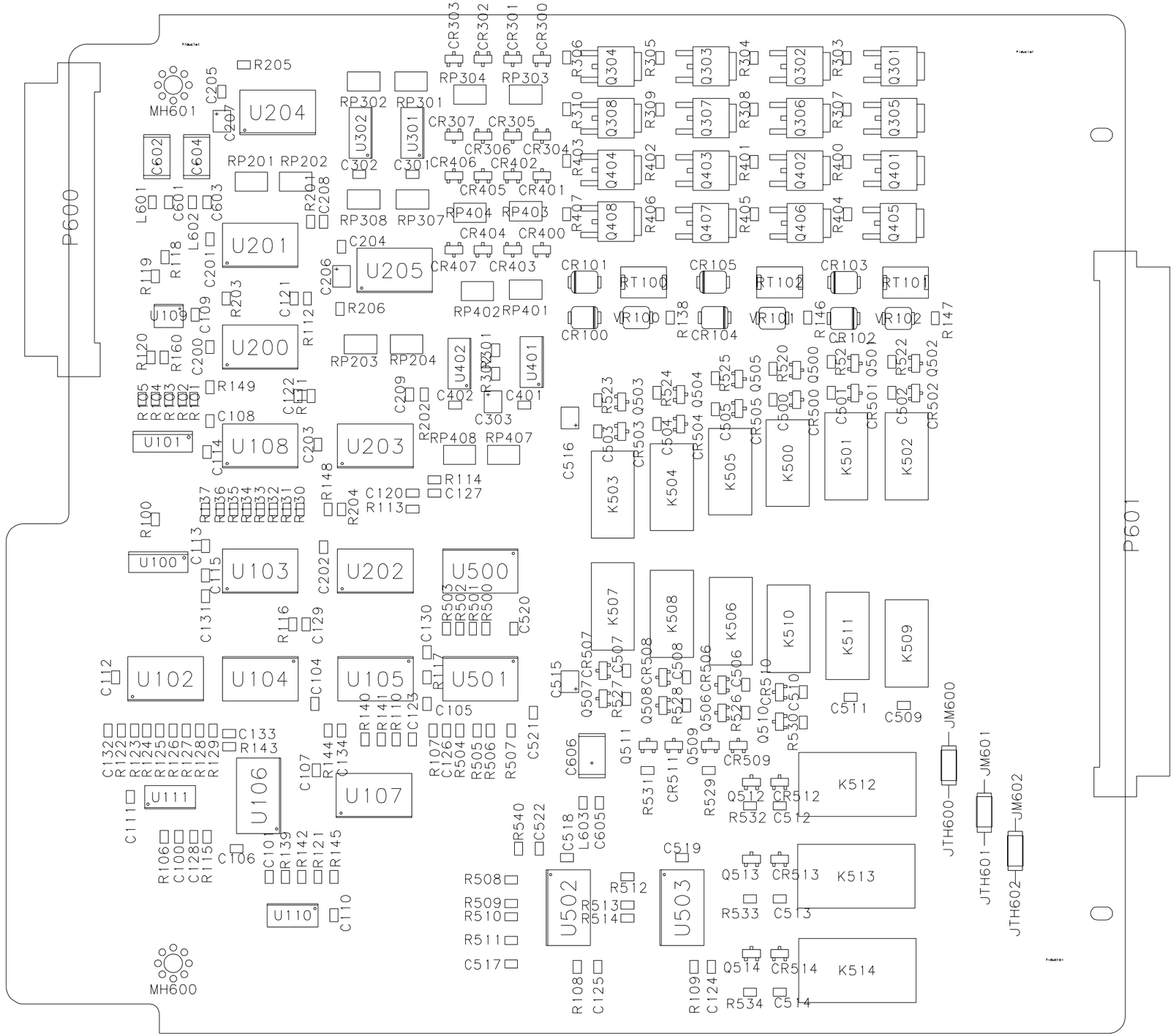


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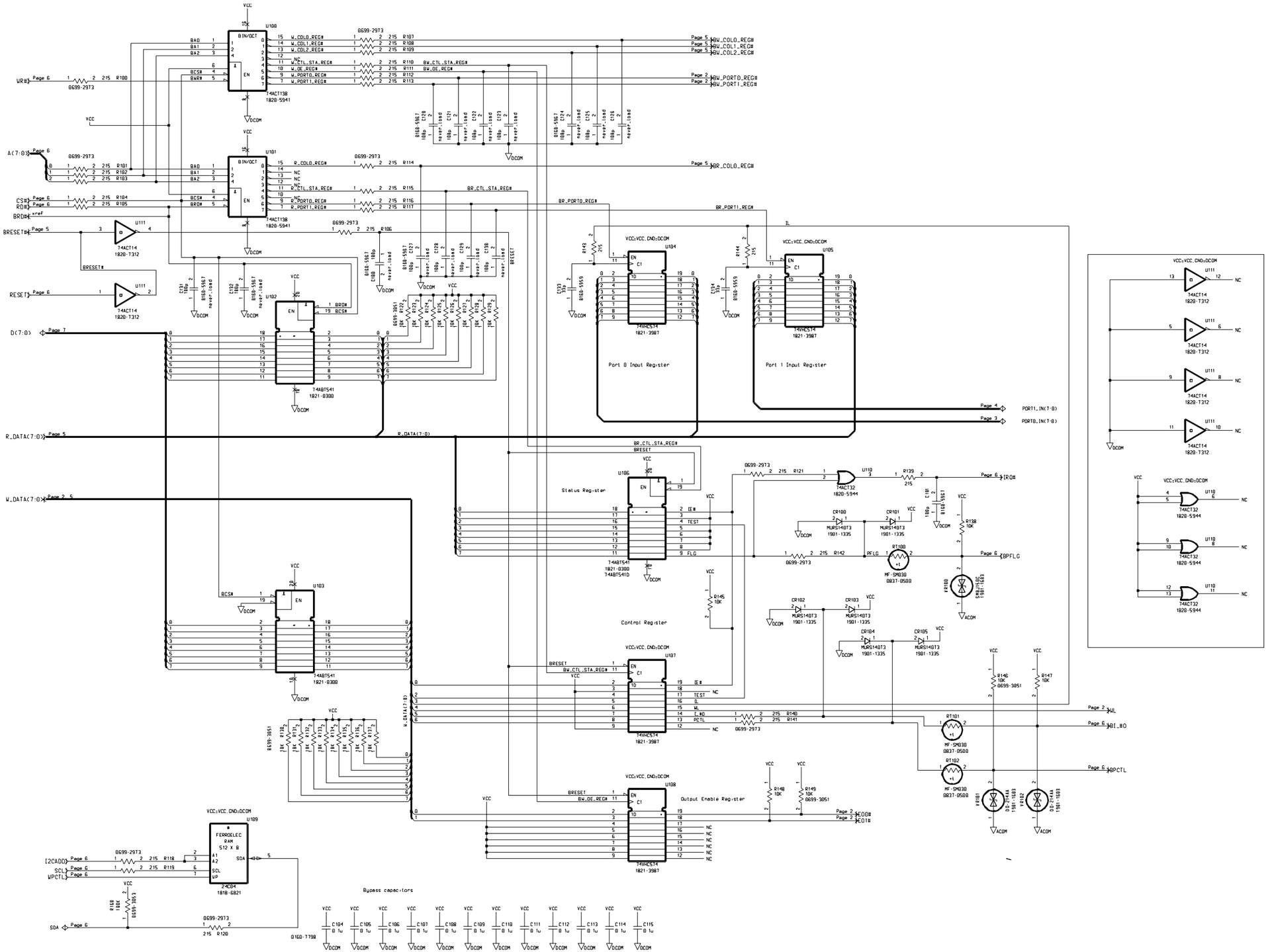
Agilent N2293A Screw Terminal Block Component Locator and Schematic
Page 174

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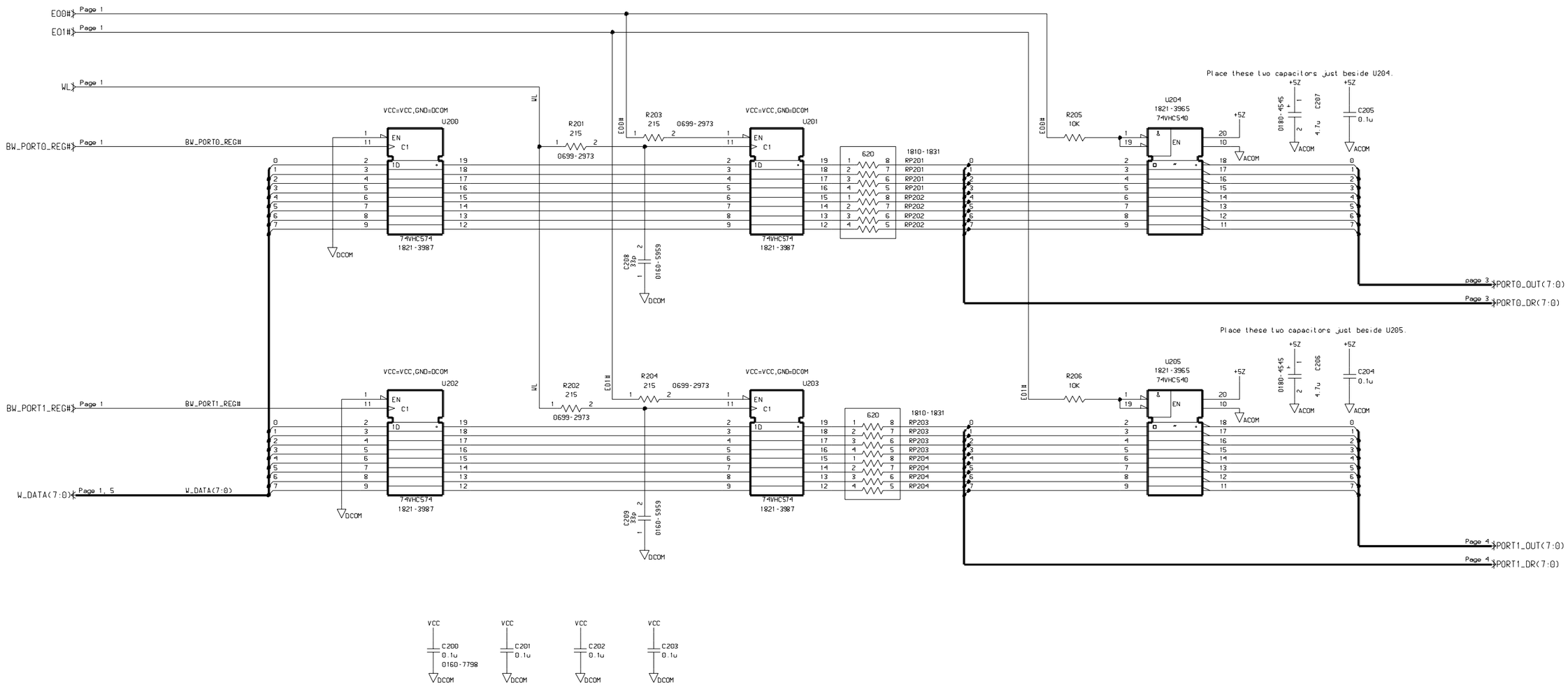
Agilent N2264A Multifunction Module
Component Locator
Page 175

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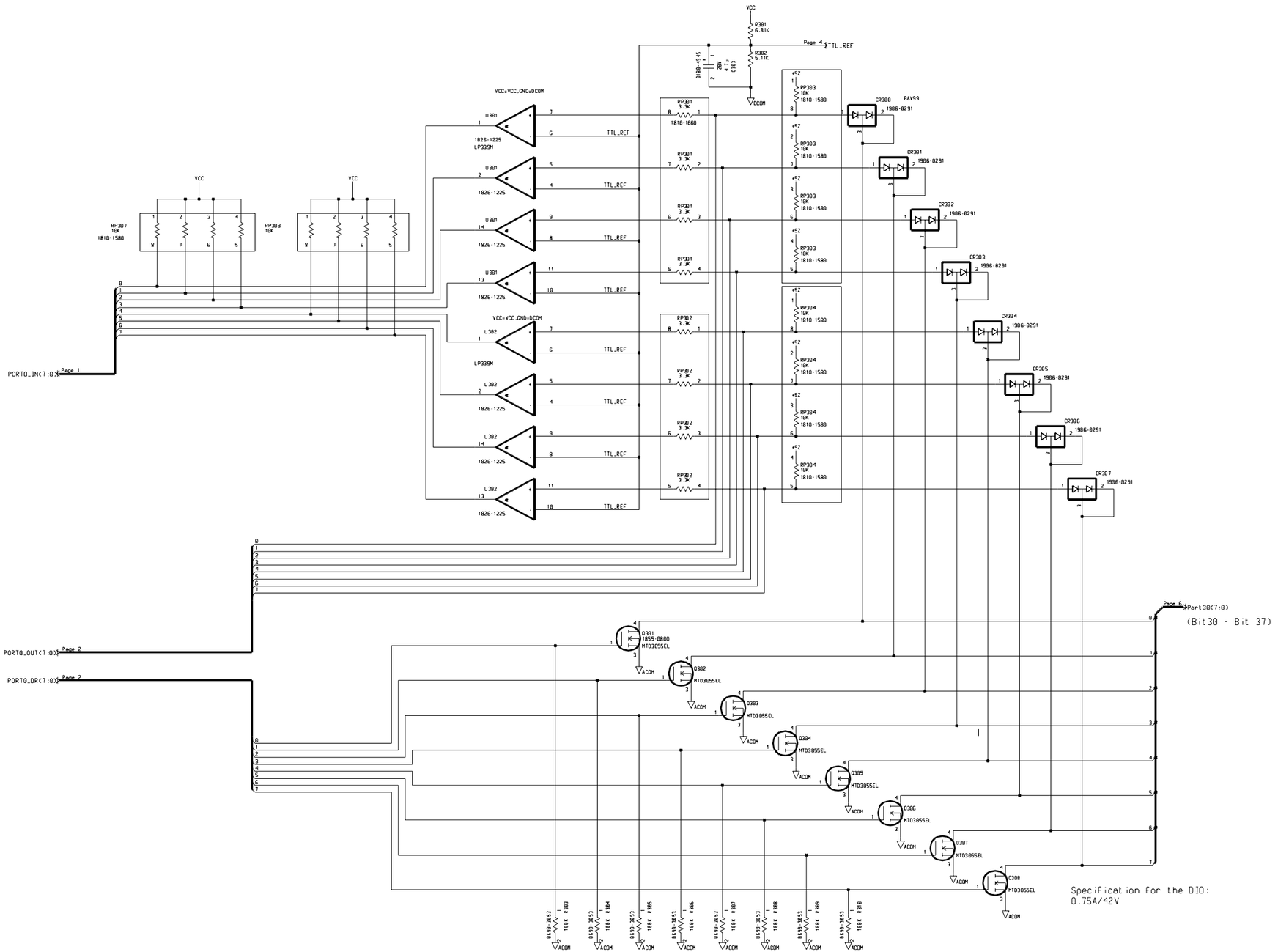


Agilent N2264A Multifunction Module
Schematic (Sheet 1 of 6)
Page 176

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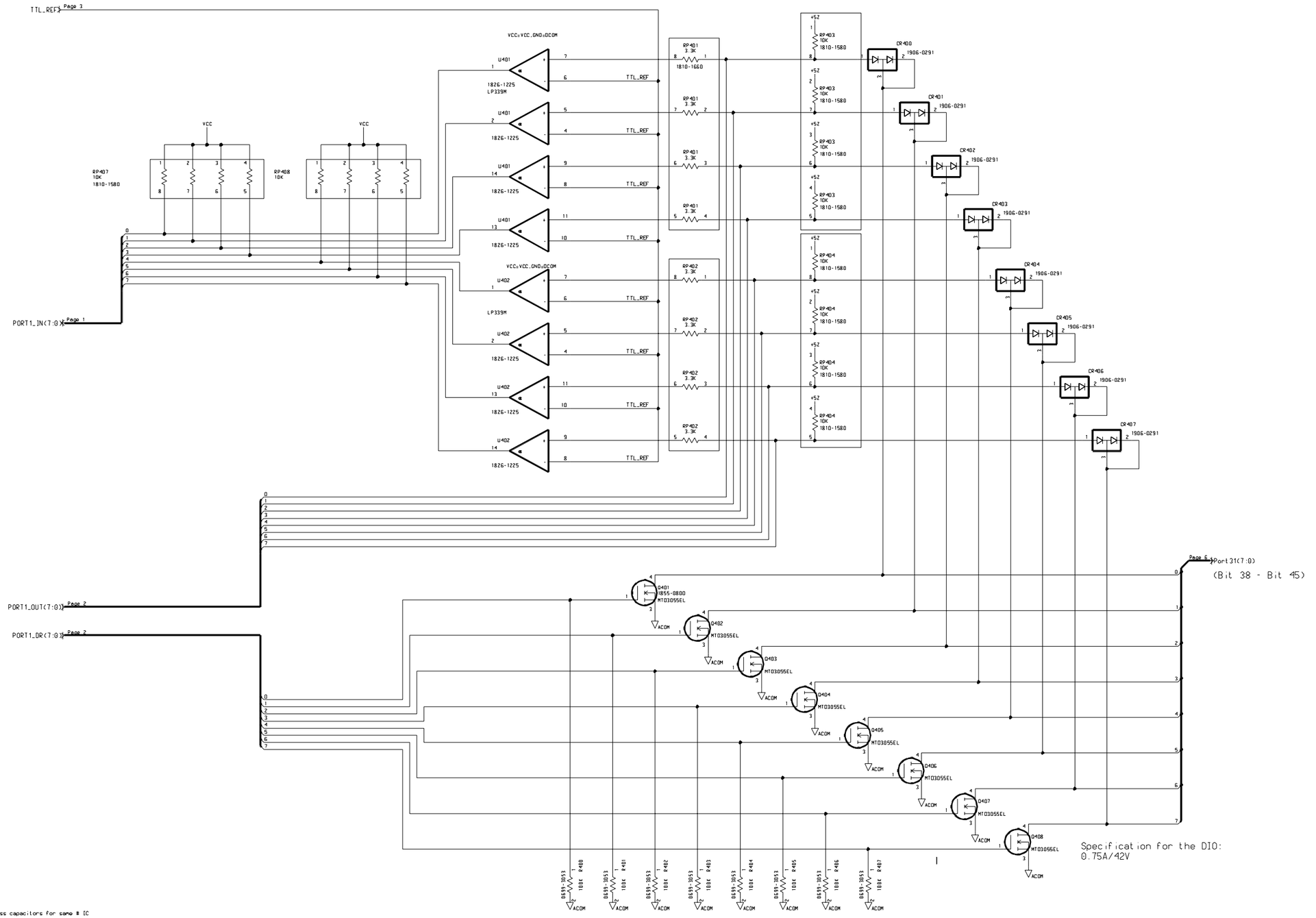


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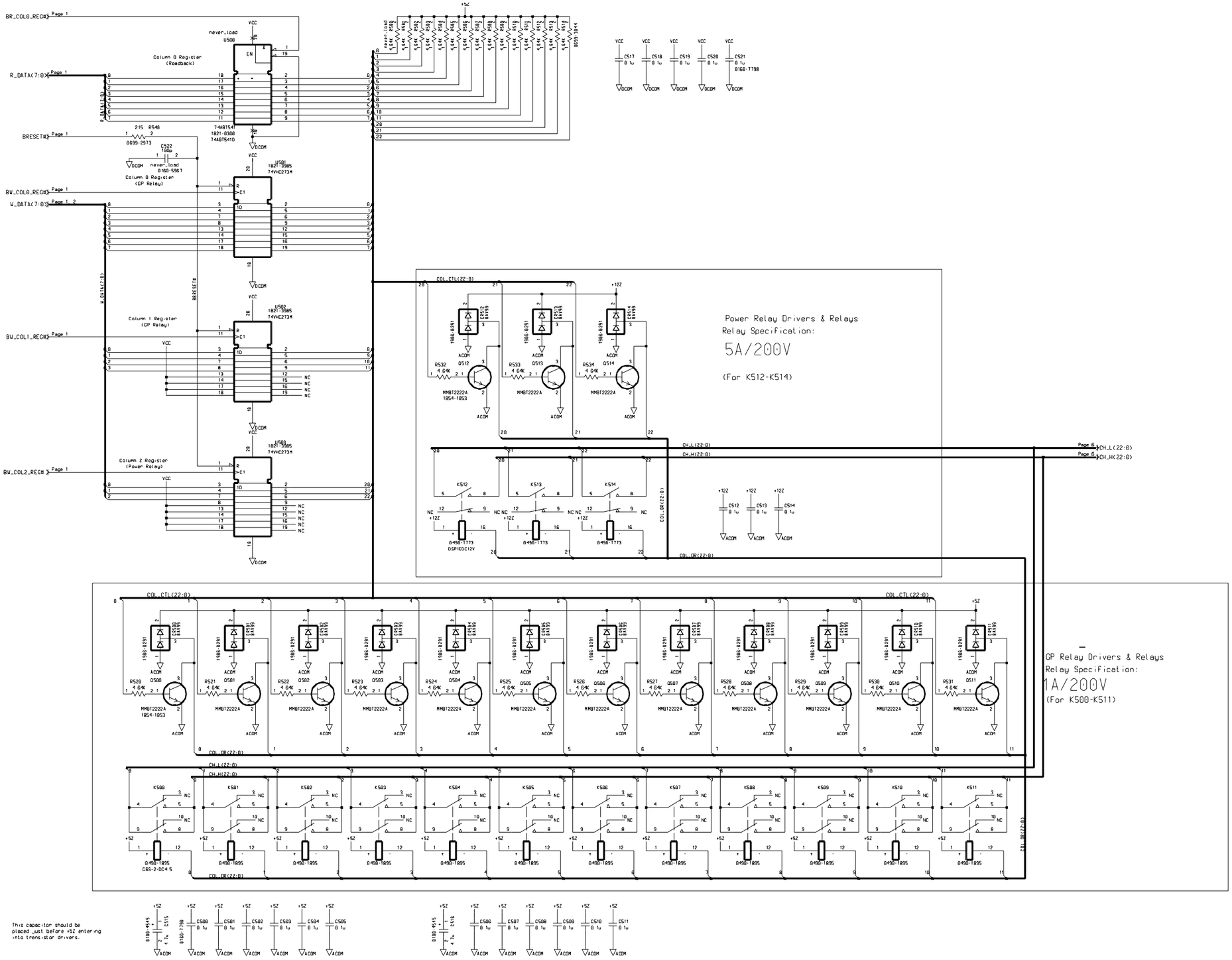


Agilent N2264A Multifunction Module
Schematic (Sheet 3 of 6)
Page 178

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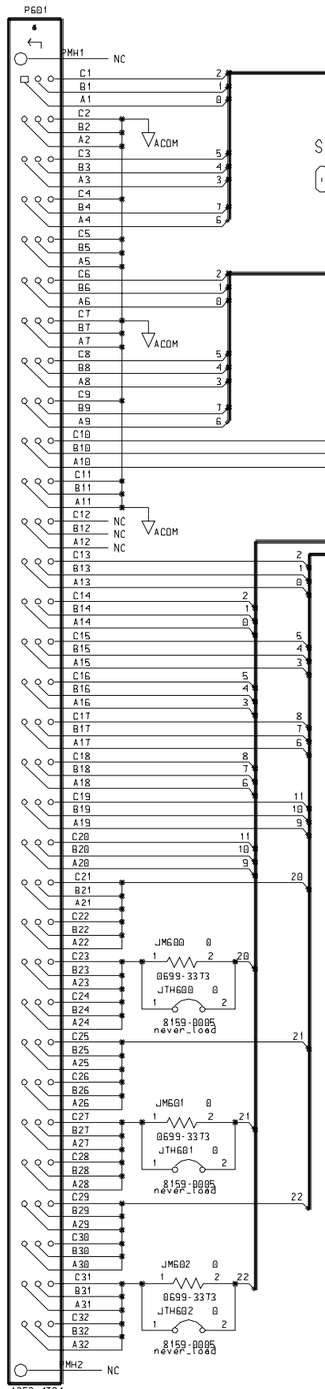
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This capacitor should be placed just before +5Z entering into transistor drivers.

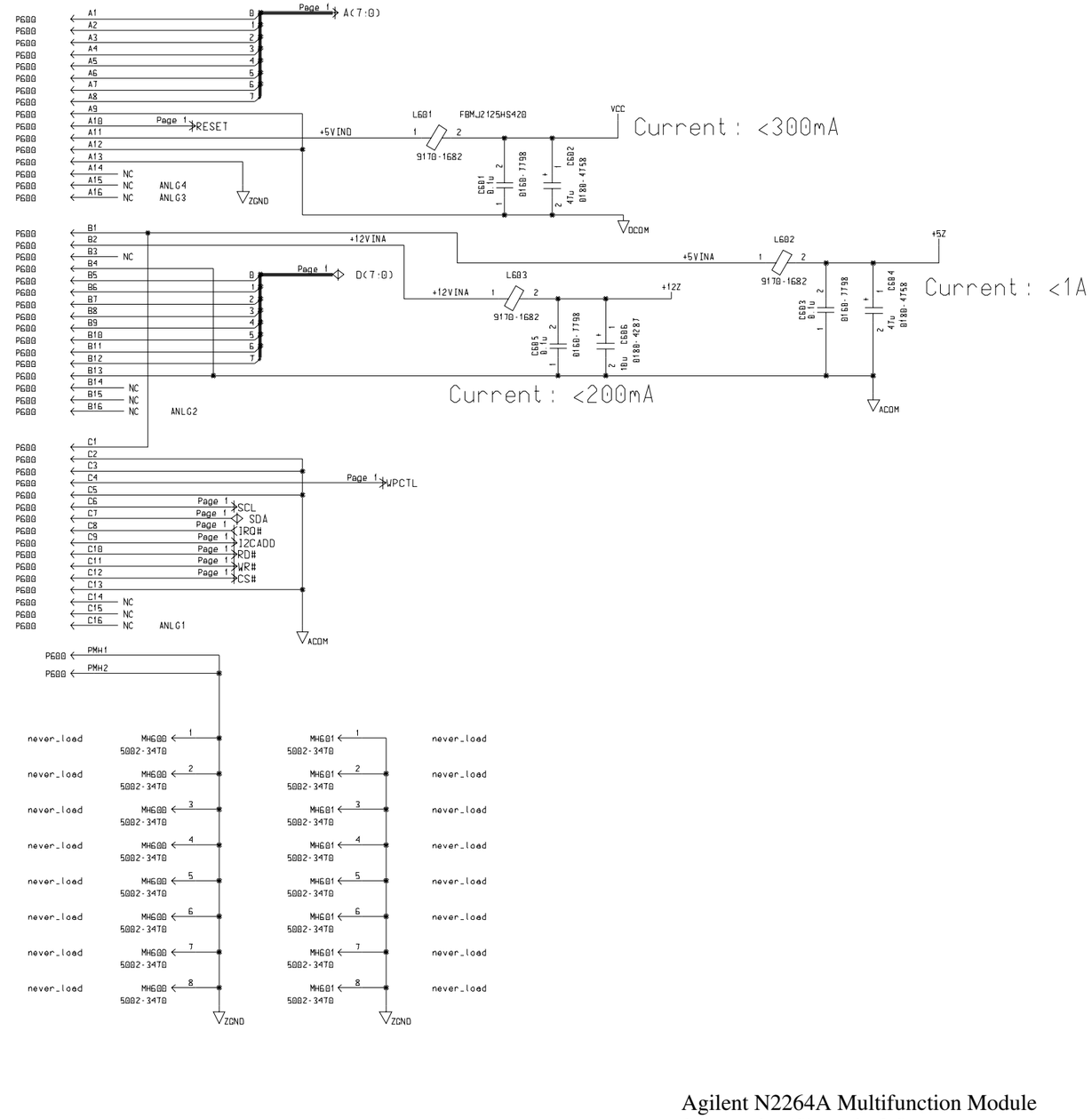
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Customer Connector

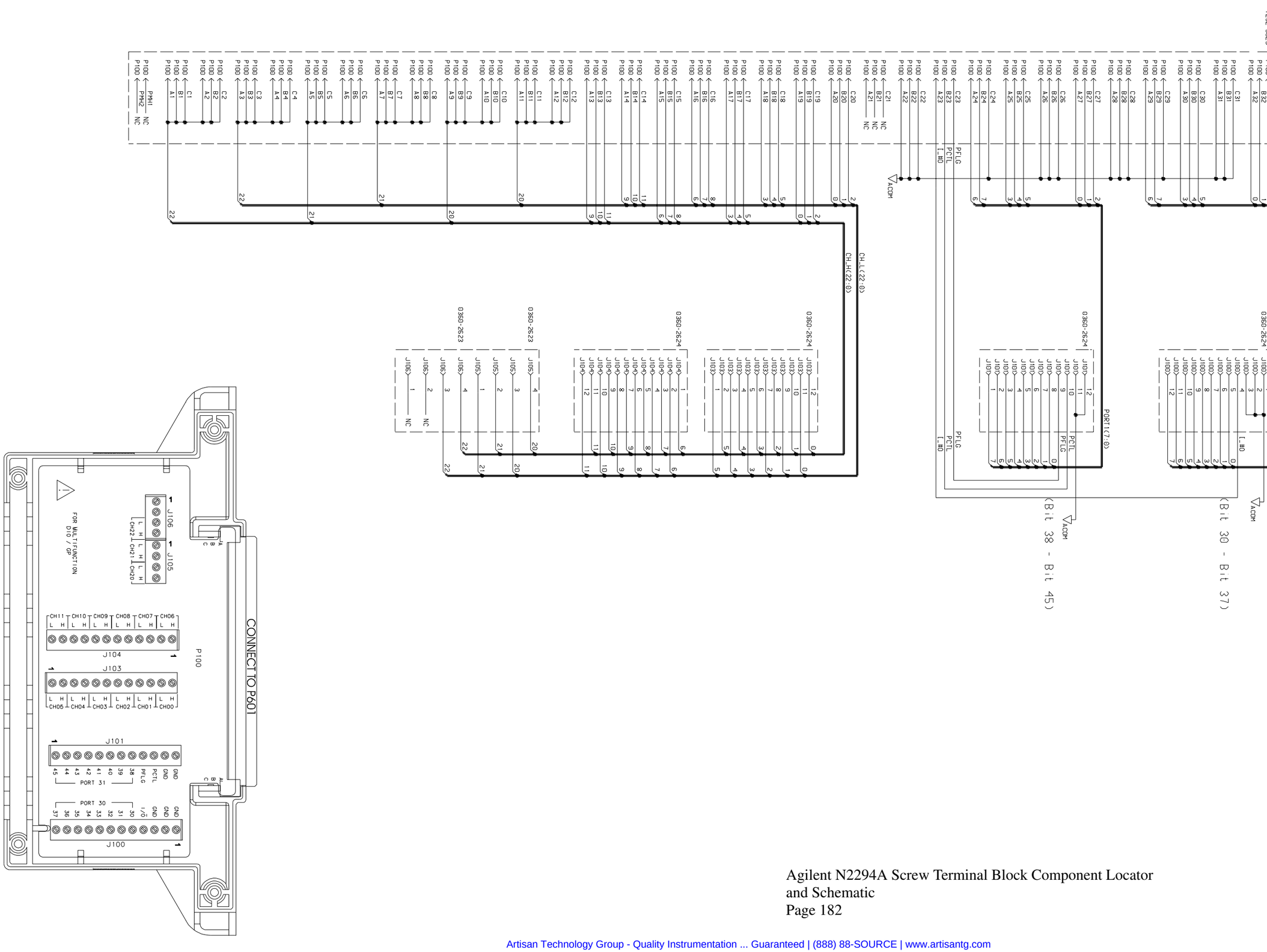


Backplane Connector

5184-0582

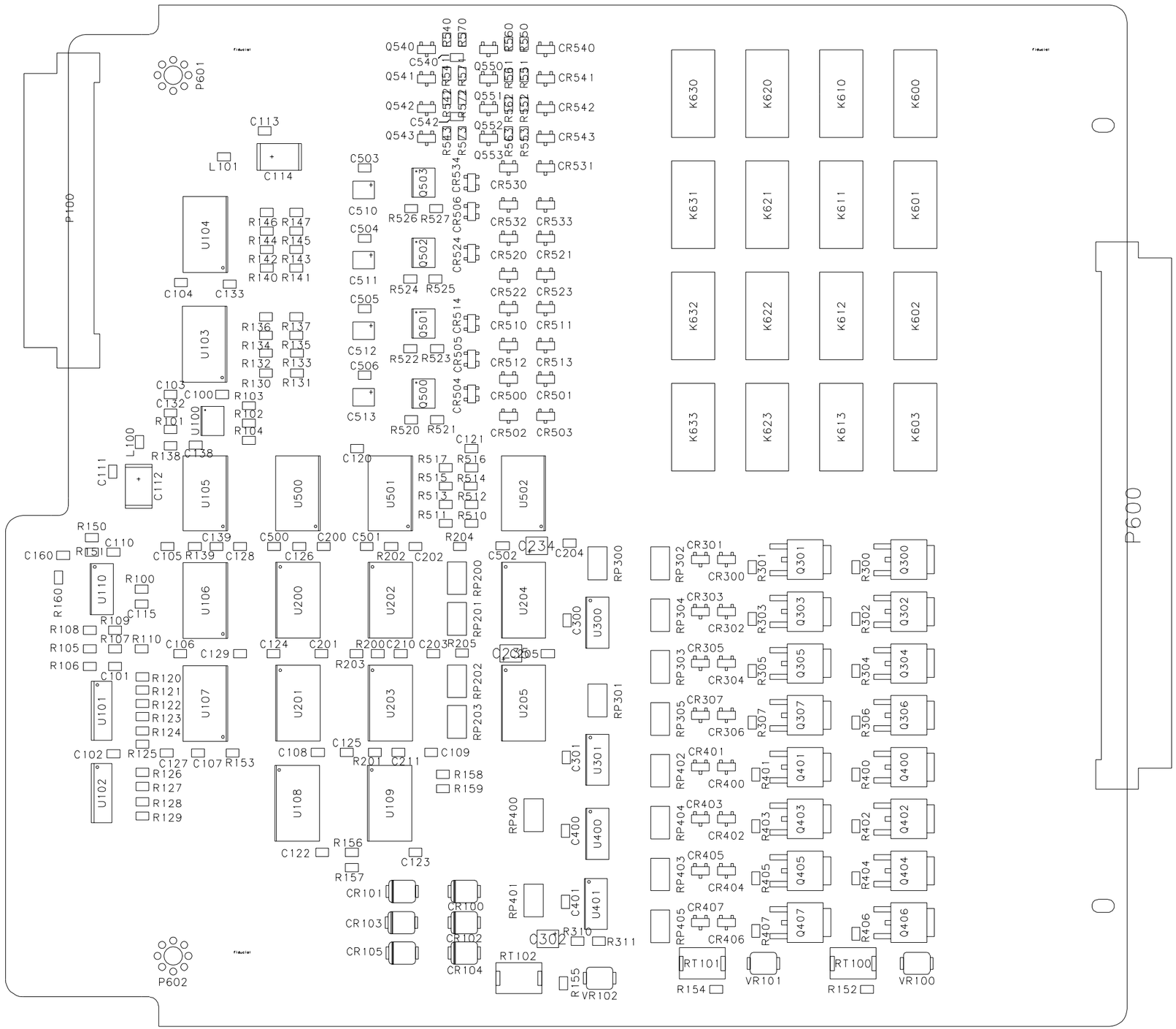


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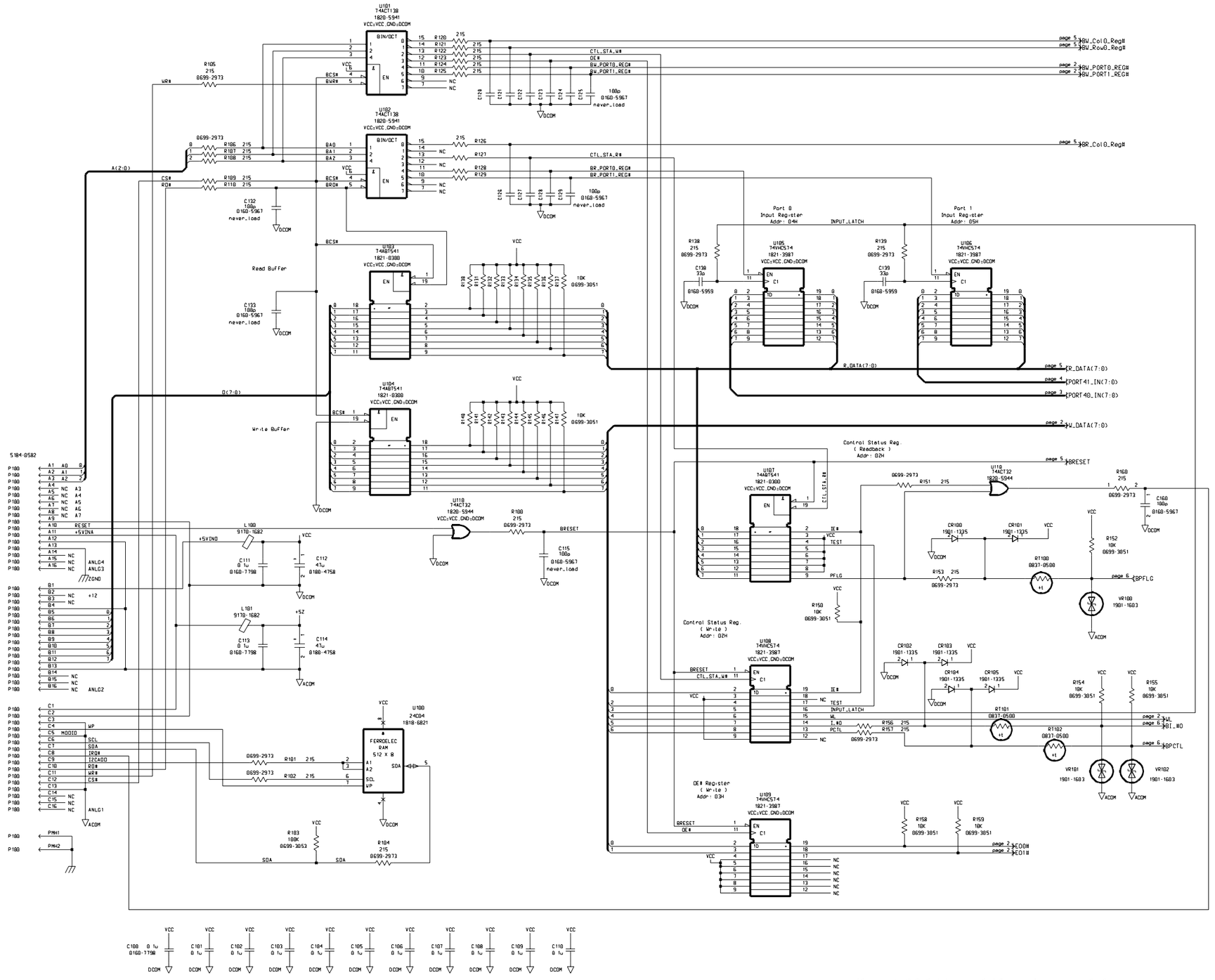
Agilent N2294A Screw Terminal Block Component Locator and Schematic
Page 182

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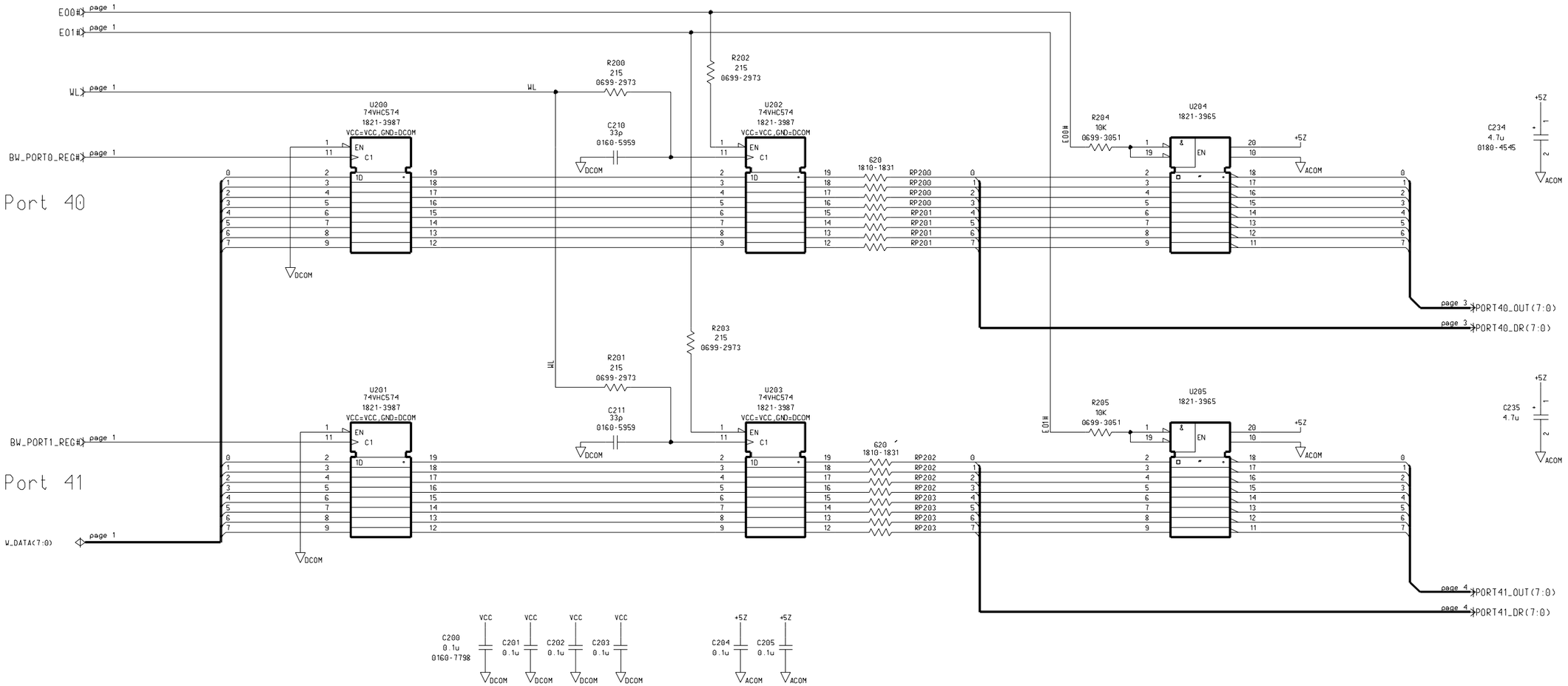
Agilent N2265A Multifunction Module
Component Locator
Page 183

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



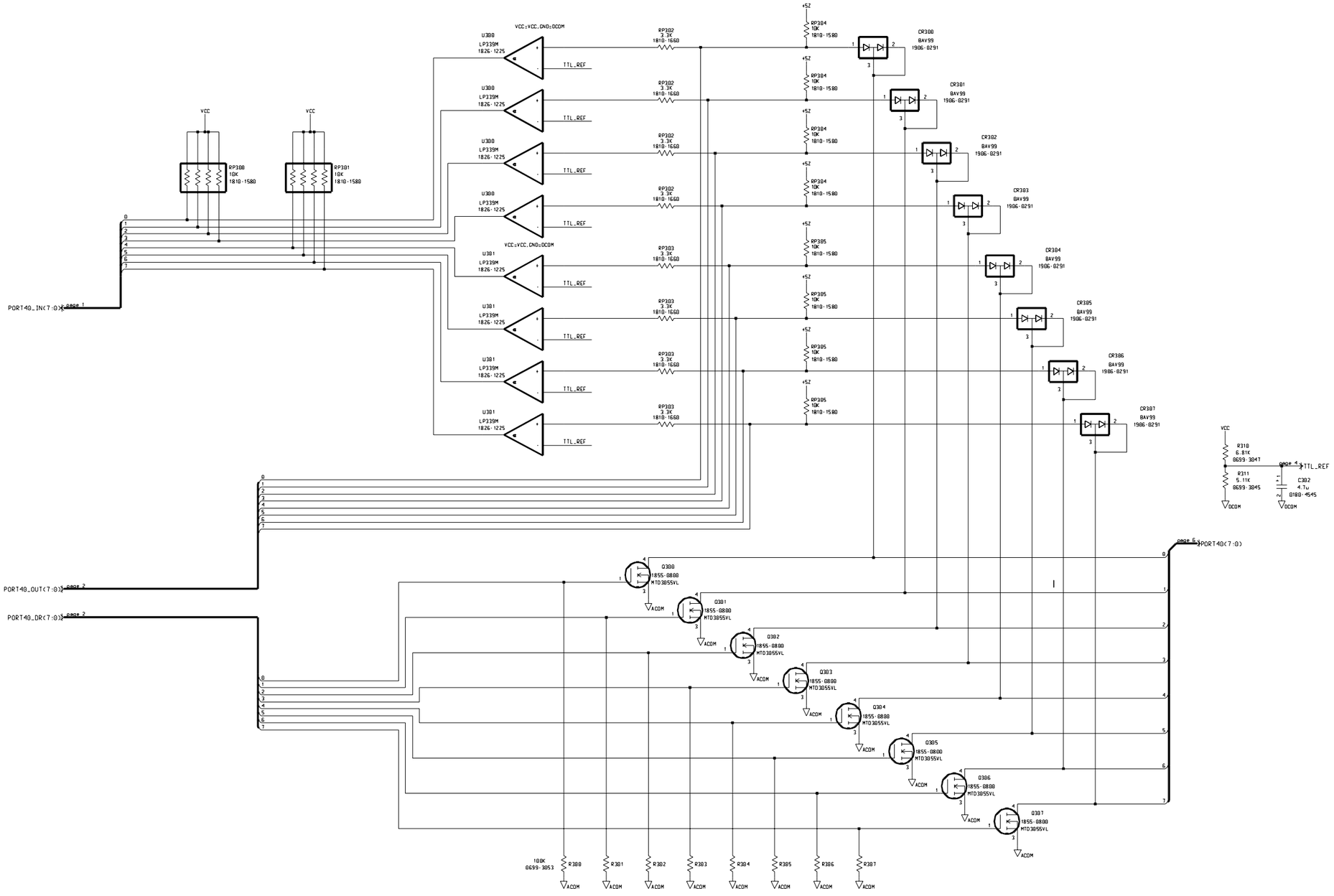
Agilent N2265A Multifunction Module
Schematic (Sheet 1 of 6)
Page 184

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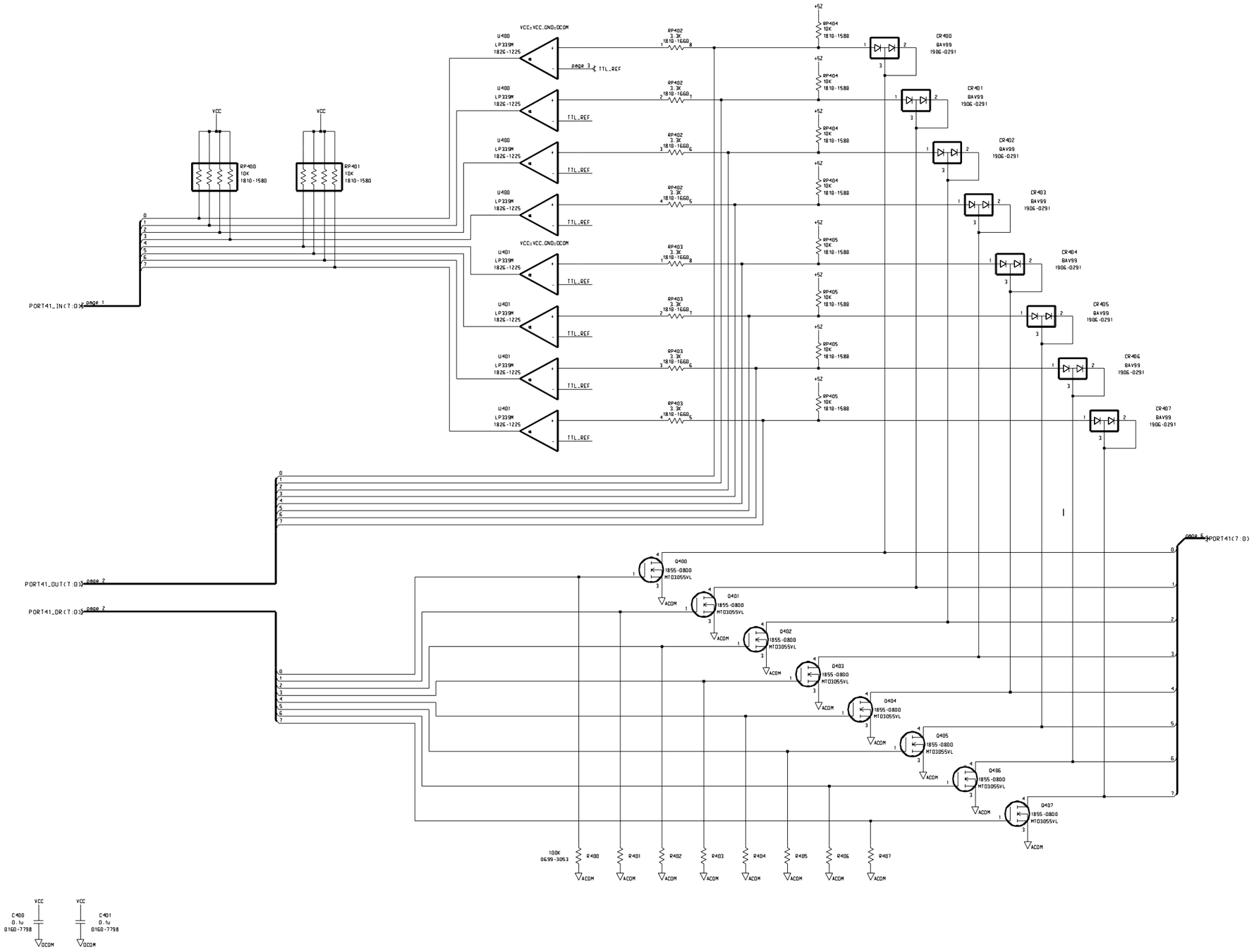
Agilent N2265A Multifunction Module
Schematic (Sheet 2 of 6)
Page 185

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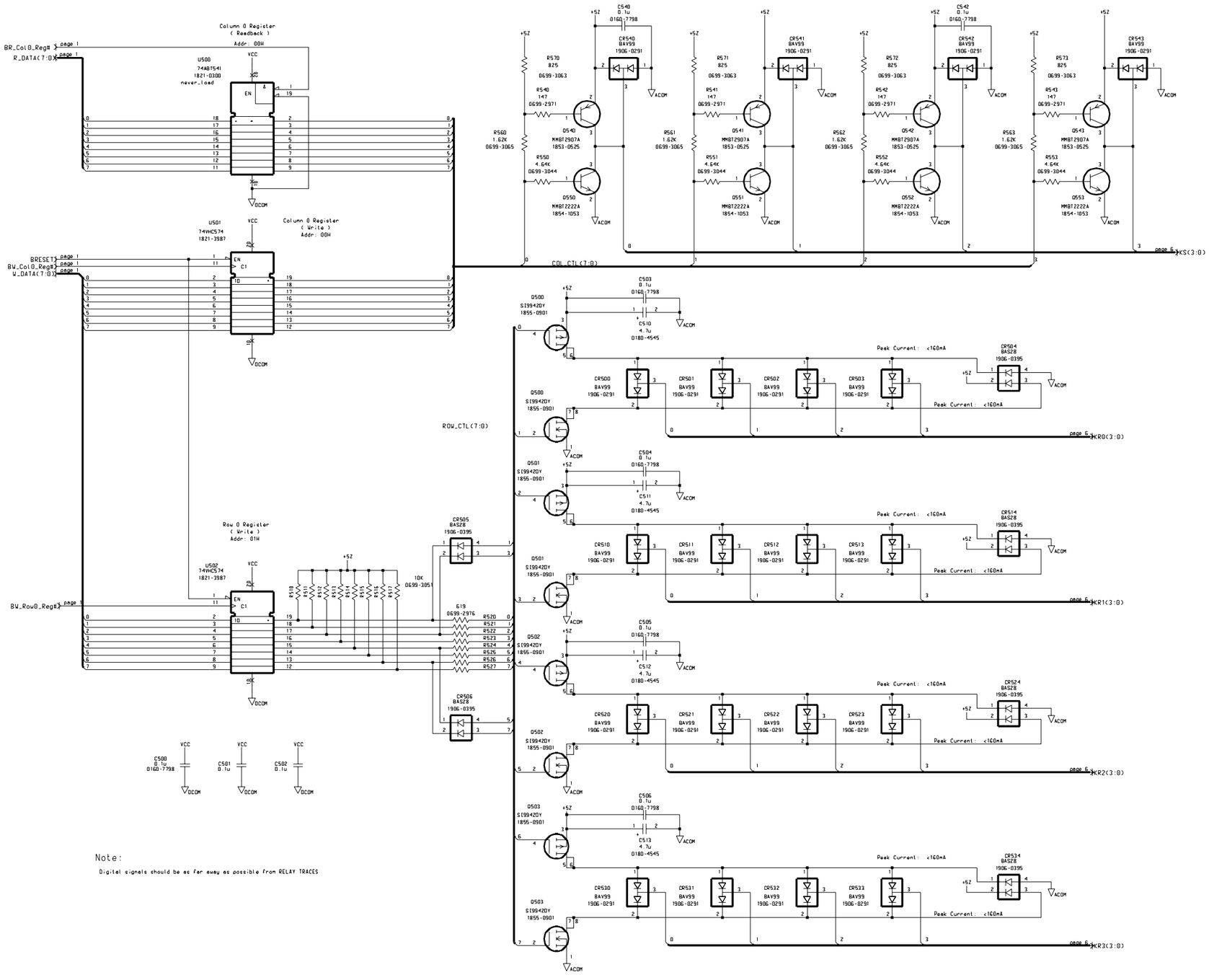


Agilent N2265A Multifunction Module
Schematic (Sheet 3 of 6)
Page 186

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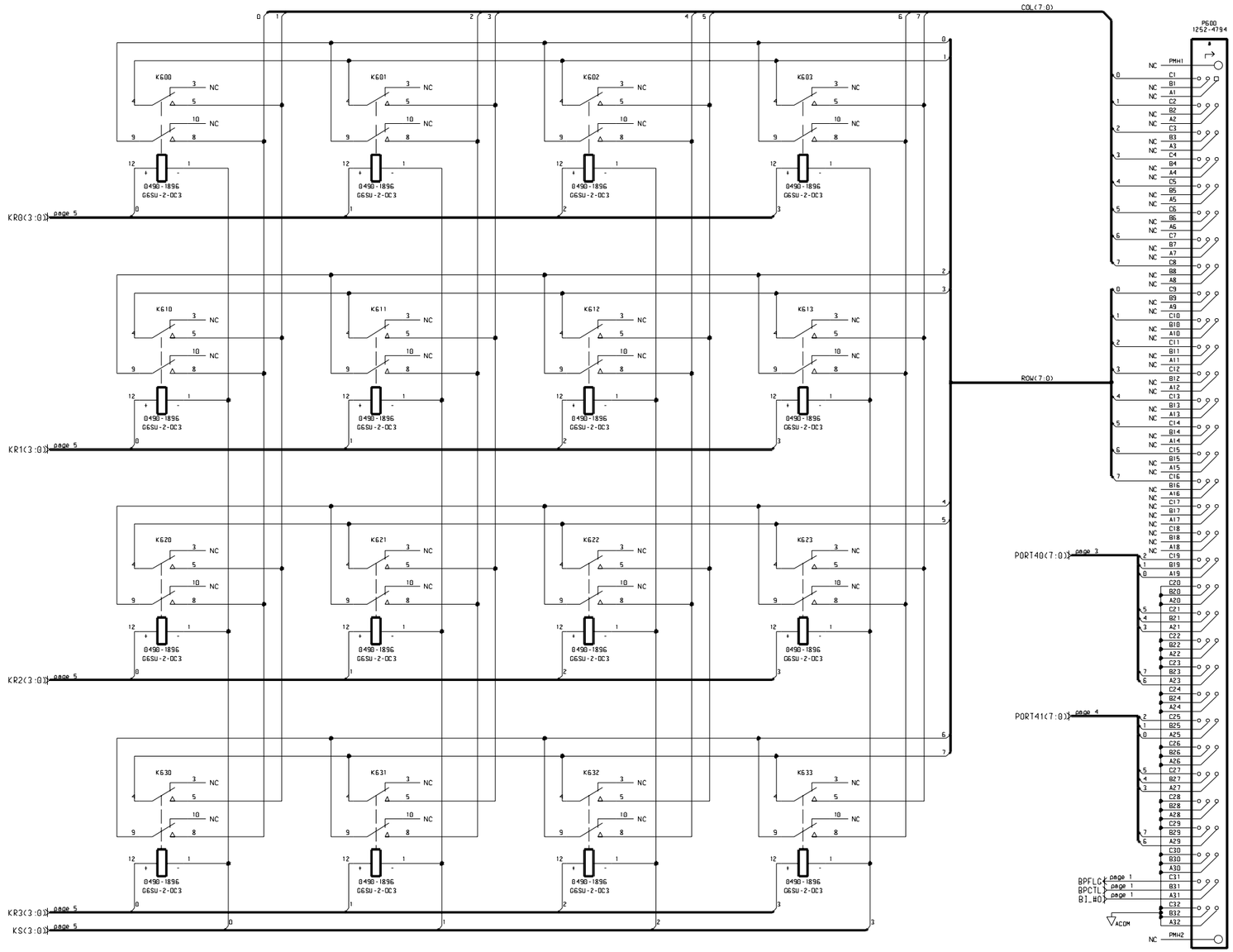


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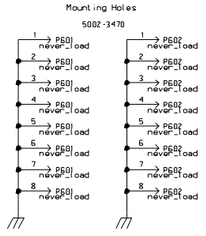
Agilent N2265A Multifunction Module
Schematic (Sheet 5 of 6)
Page 188

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Mounting Holes

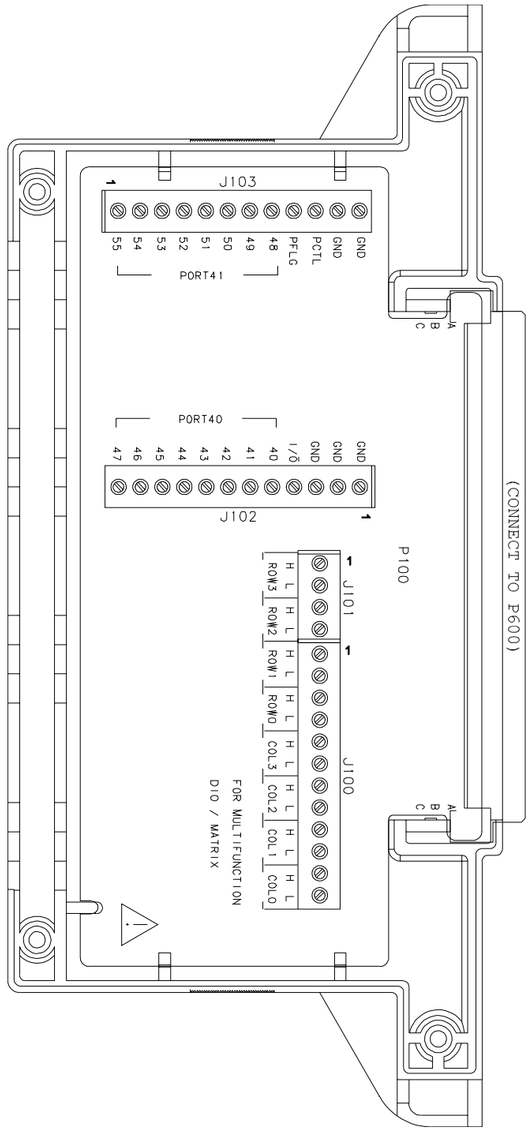
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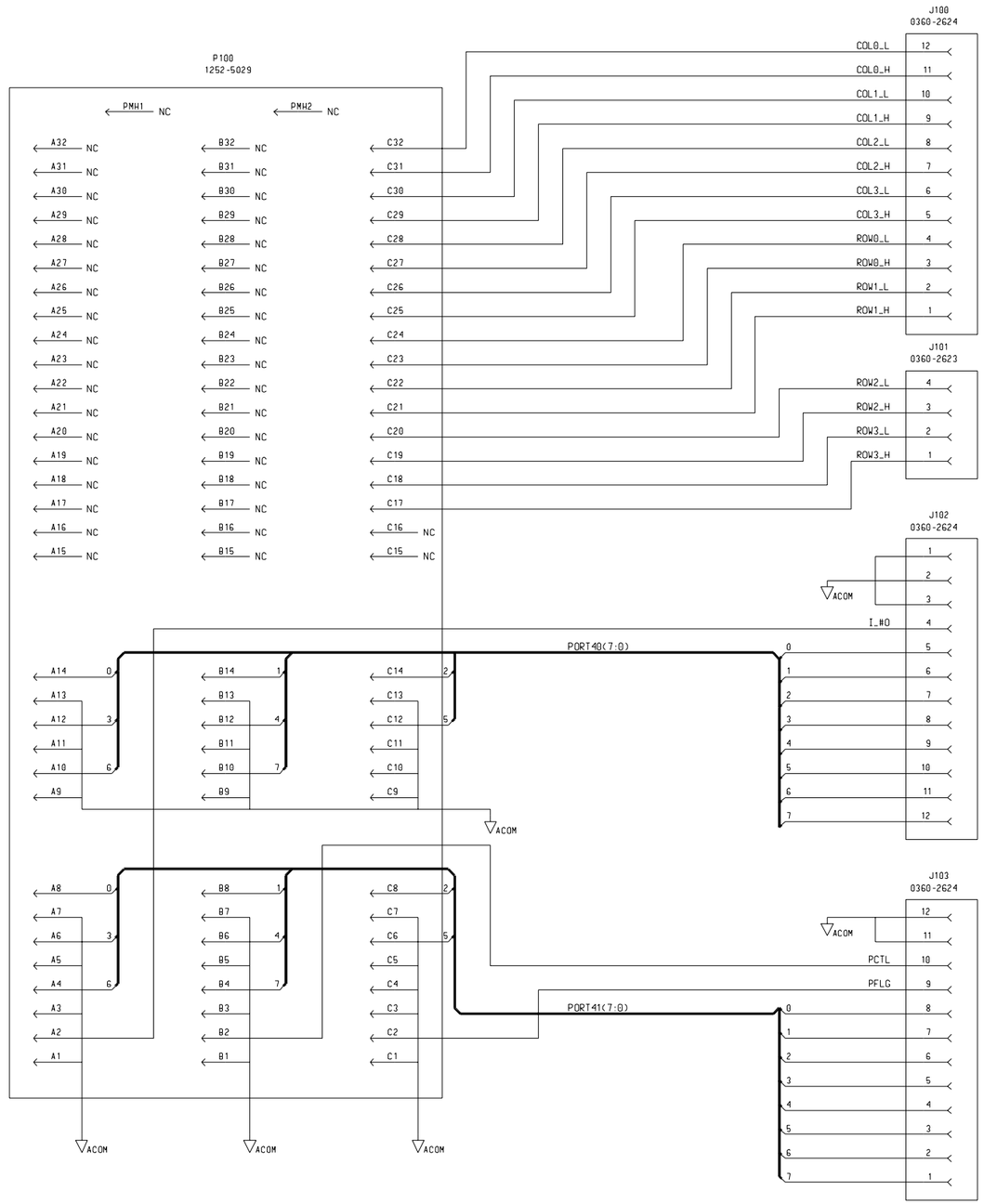


Relay Specification : 1A/200V

Agilent N2265A Multifunction Module
Schematic (Sheet 6 of 6)
Page 189

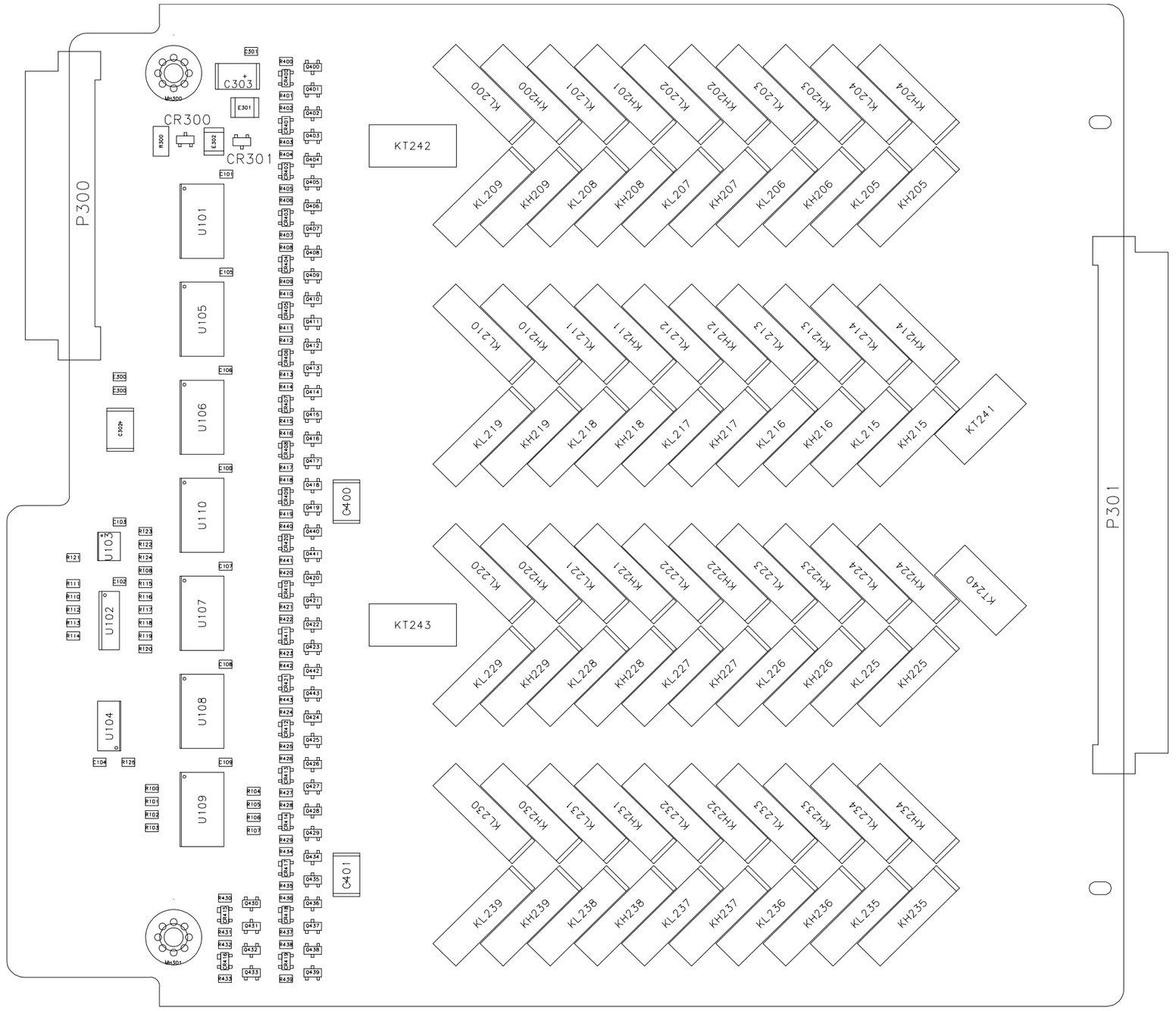
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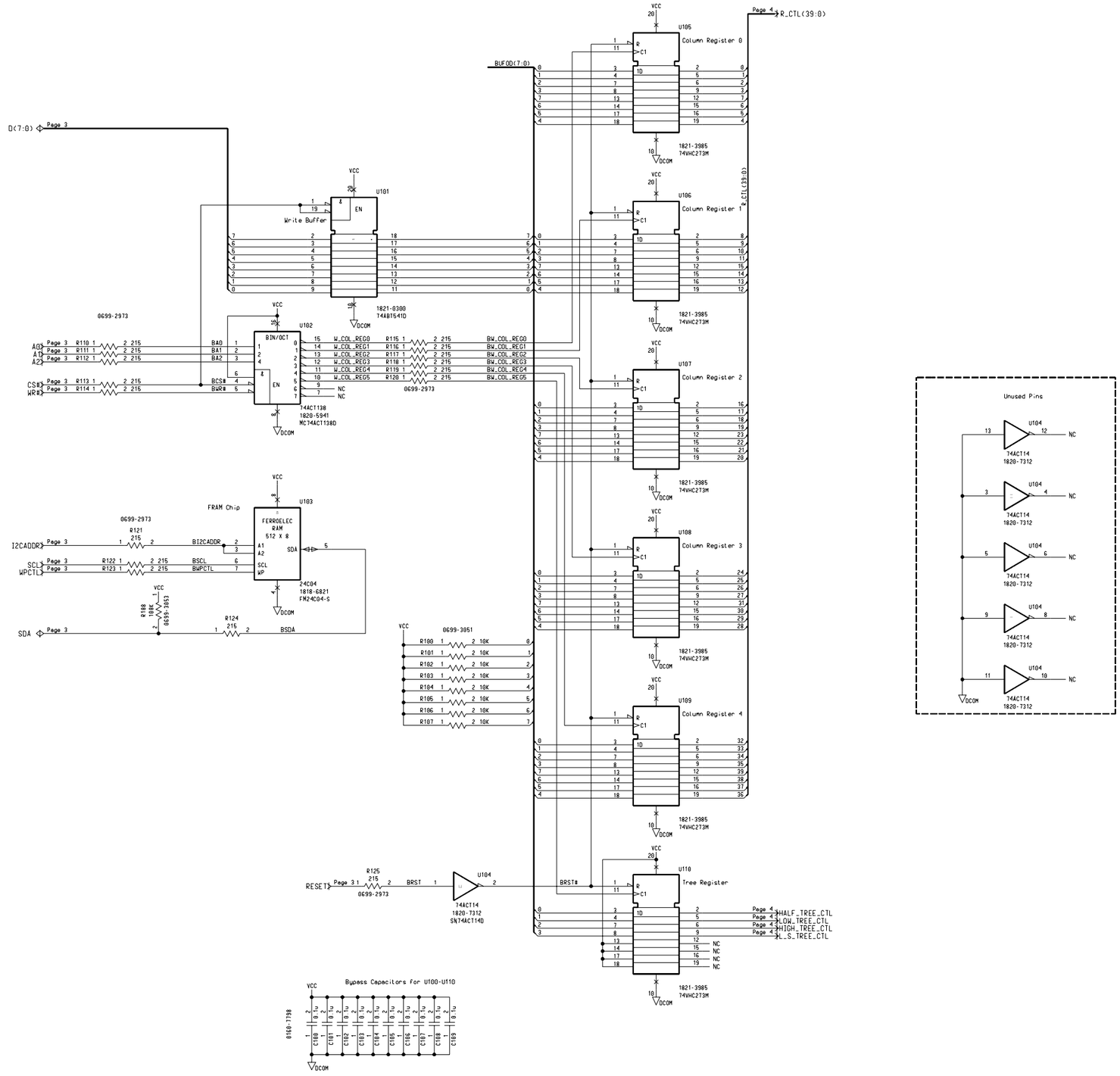


Agilent N2295A Screw Terminal Block Component Locator and Schematic
Page 190

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Agilent N2266A 40-Channel MUX Module
Schematic (Sheet 1 of 4)
Page 192

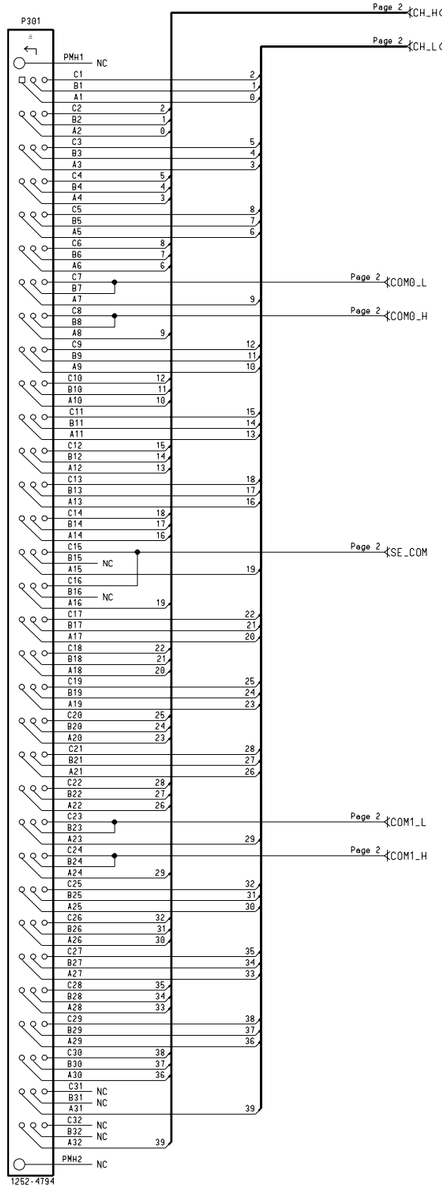
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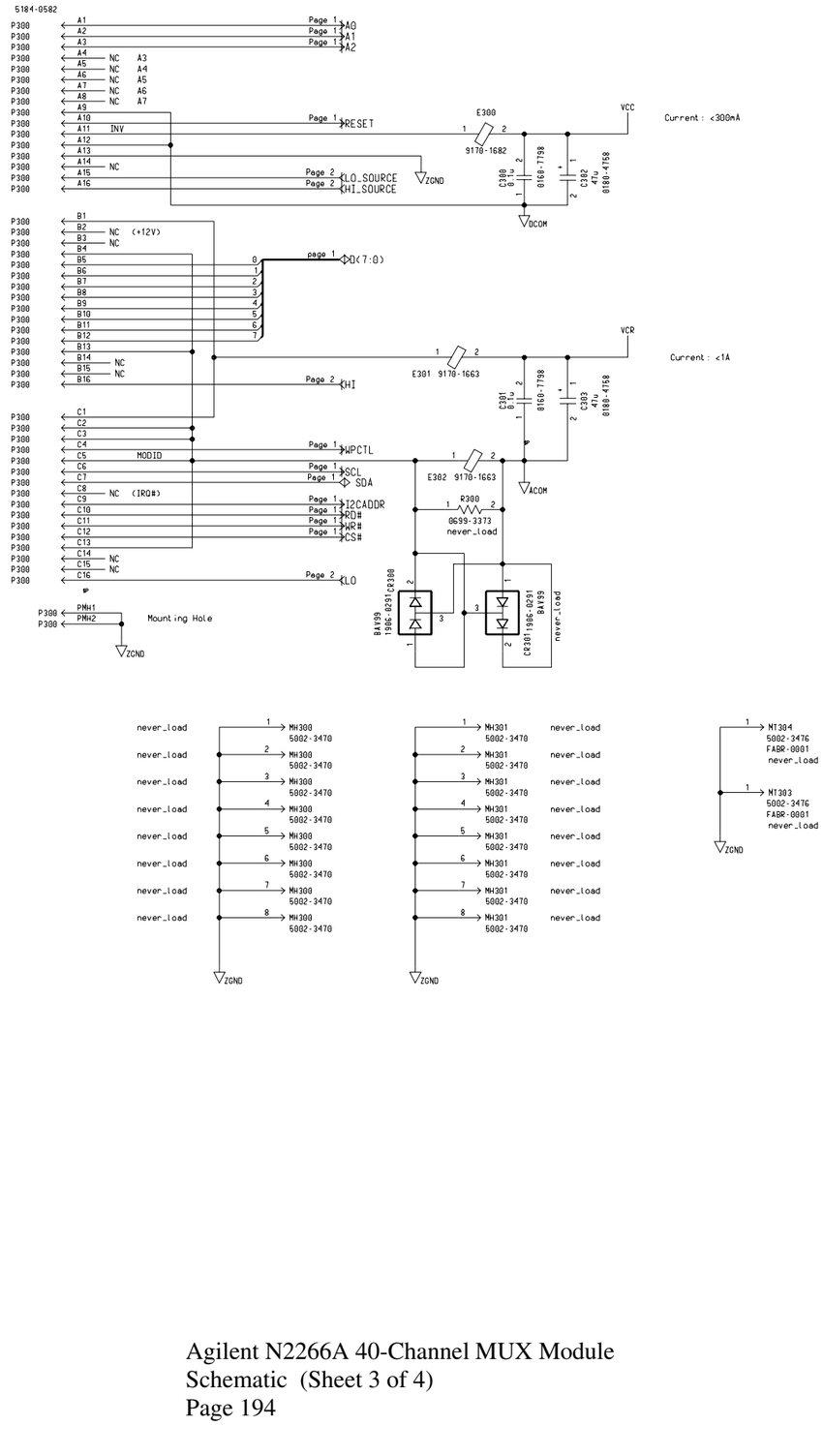
Layout Notes:

1. If spece allowed, enlarge the trace wiidth of relay control lines.
2. Relay specification: 0.5A/200V

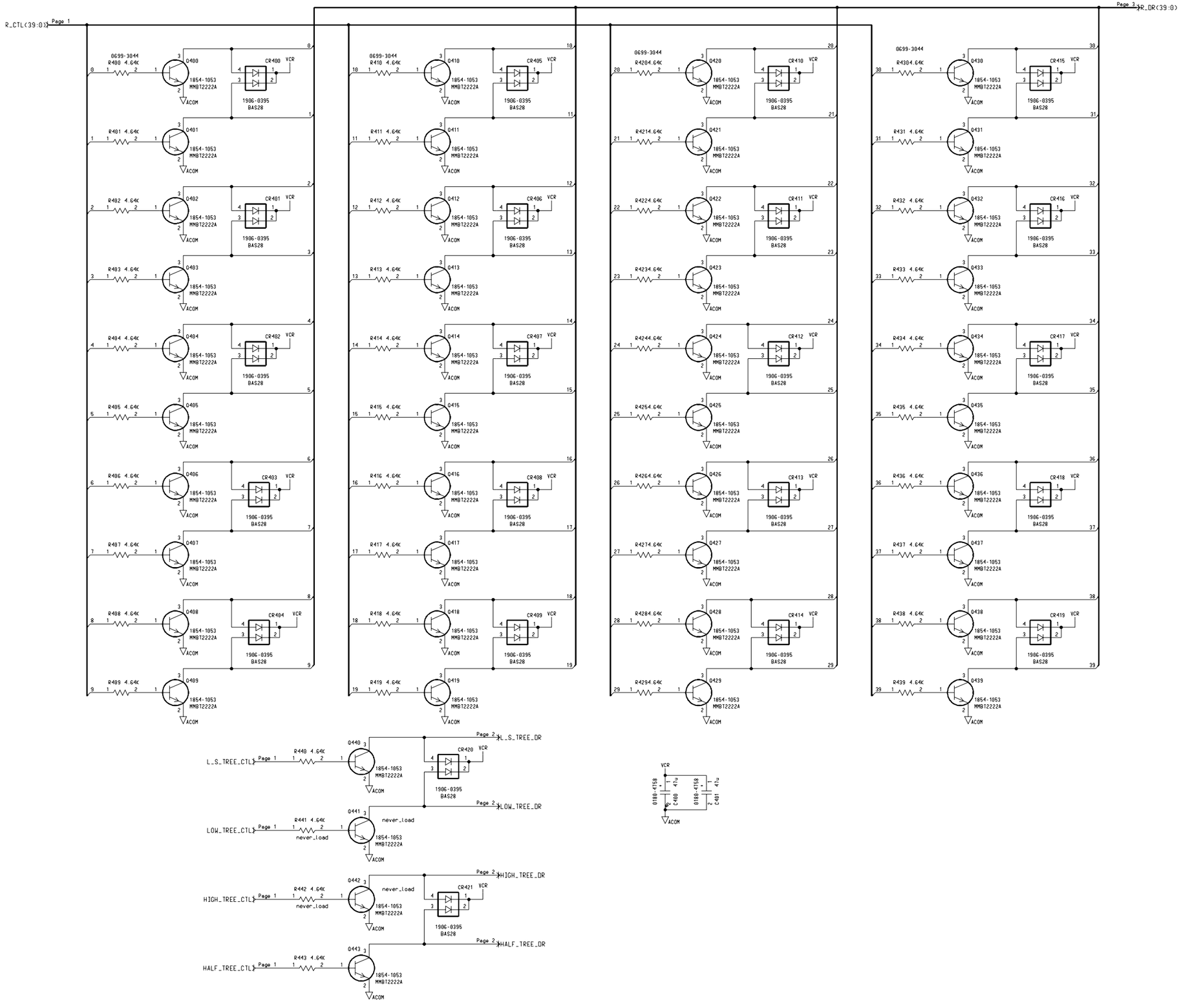
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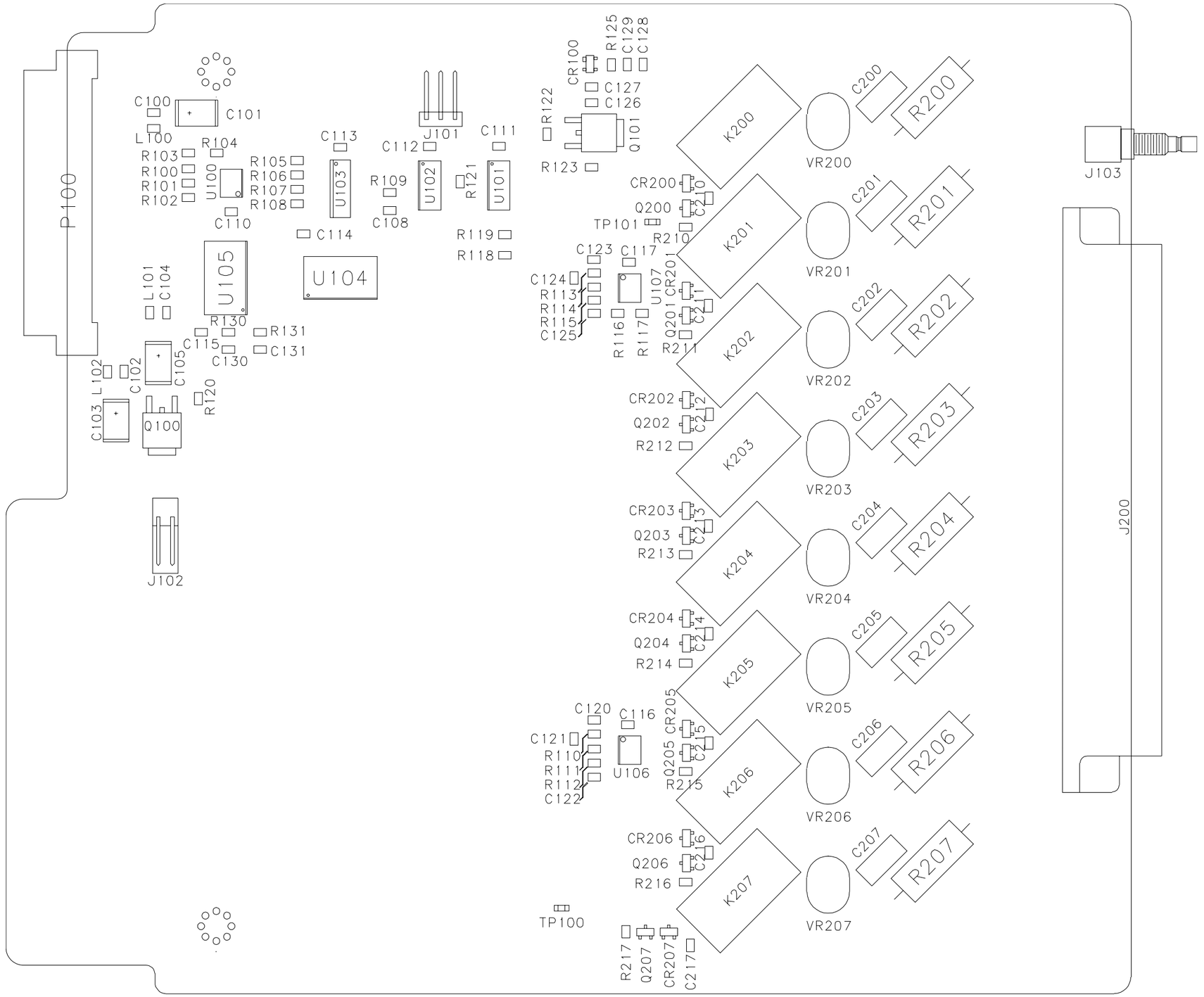
A13 is used as ZGND!
(Isolation between AB and System



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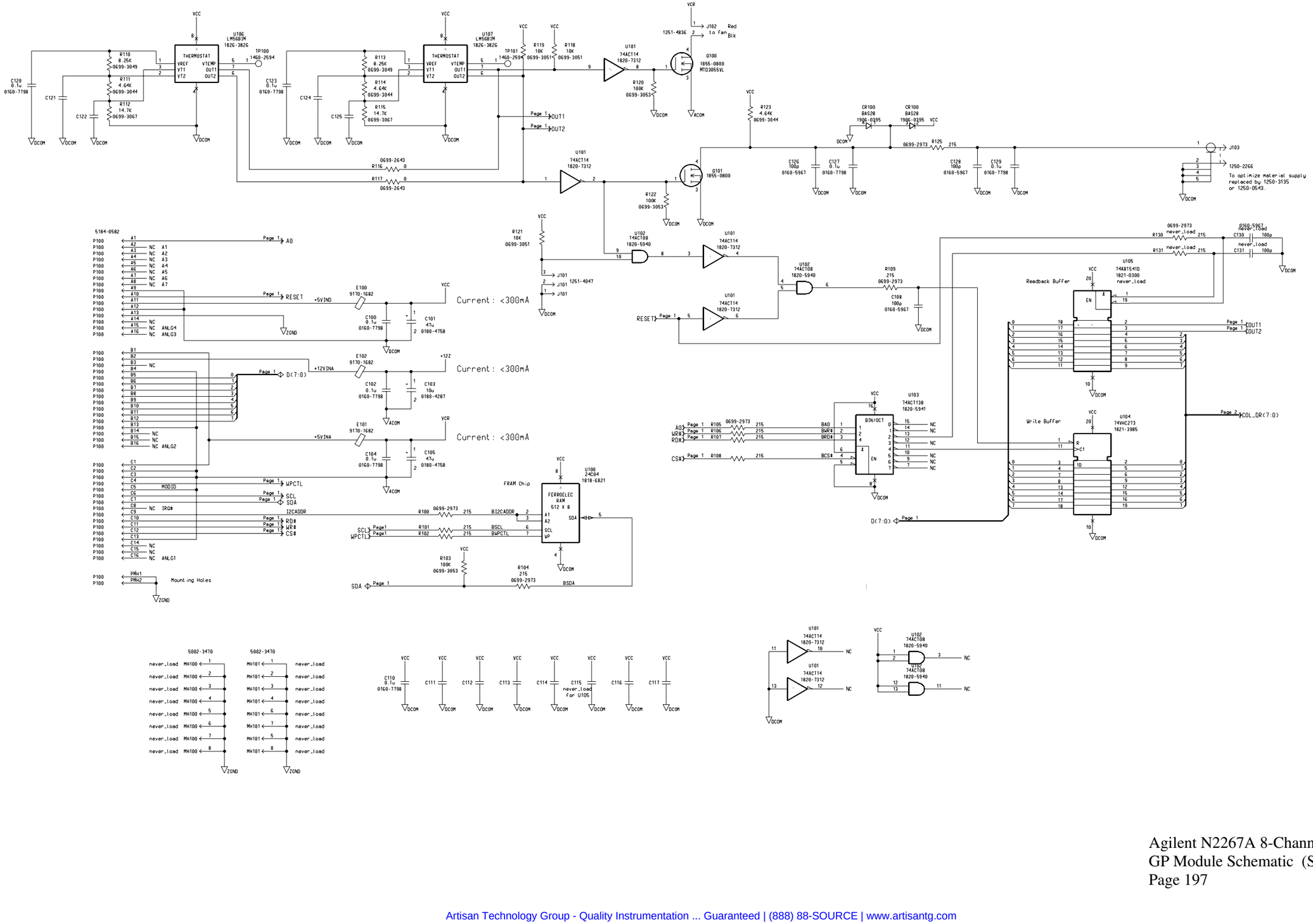


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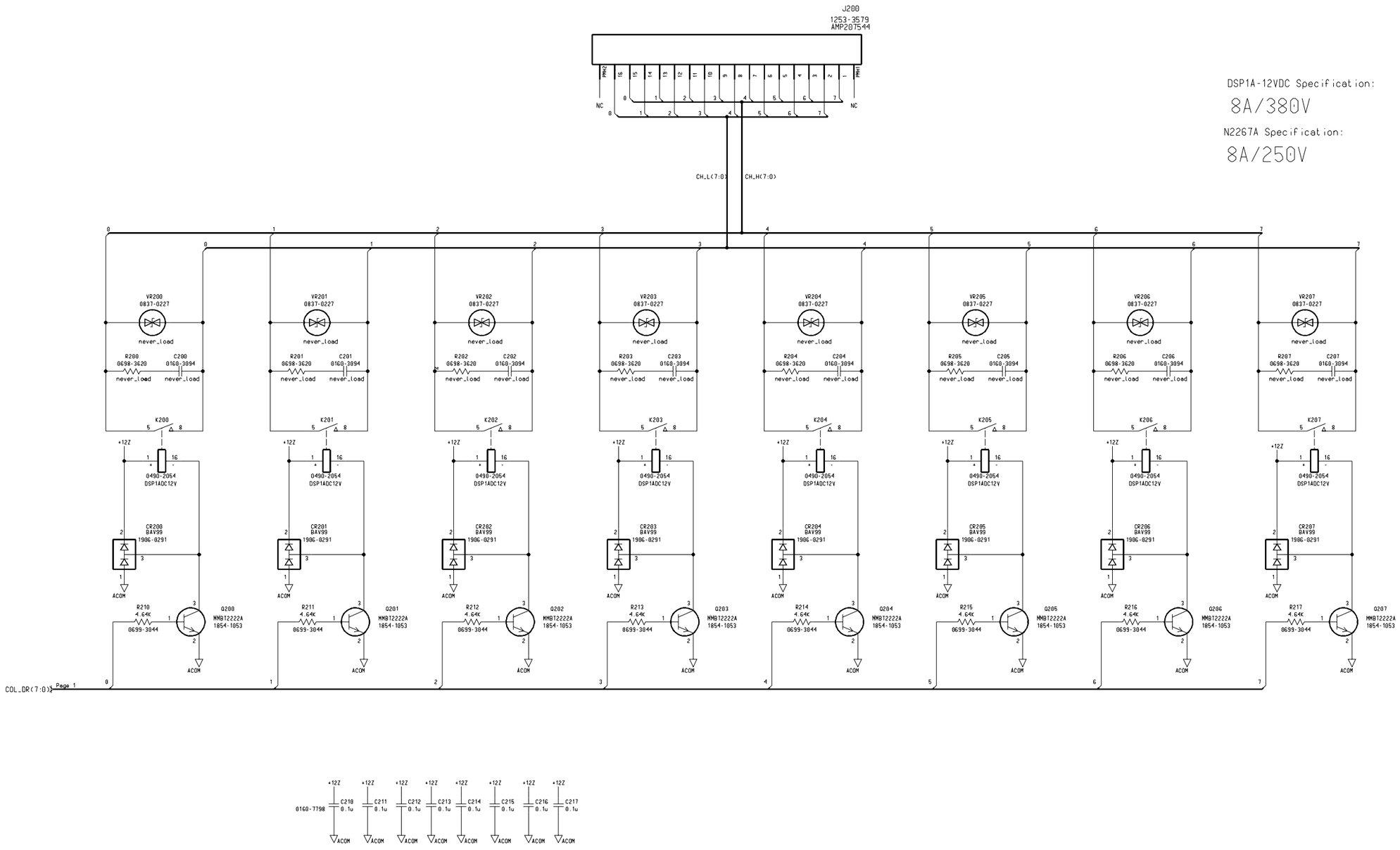


Agilent N2267A 8-Channel High Current GP Module
Component Locator
Page 196

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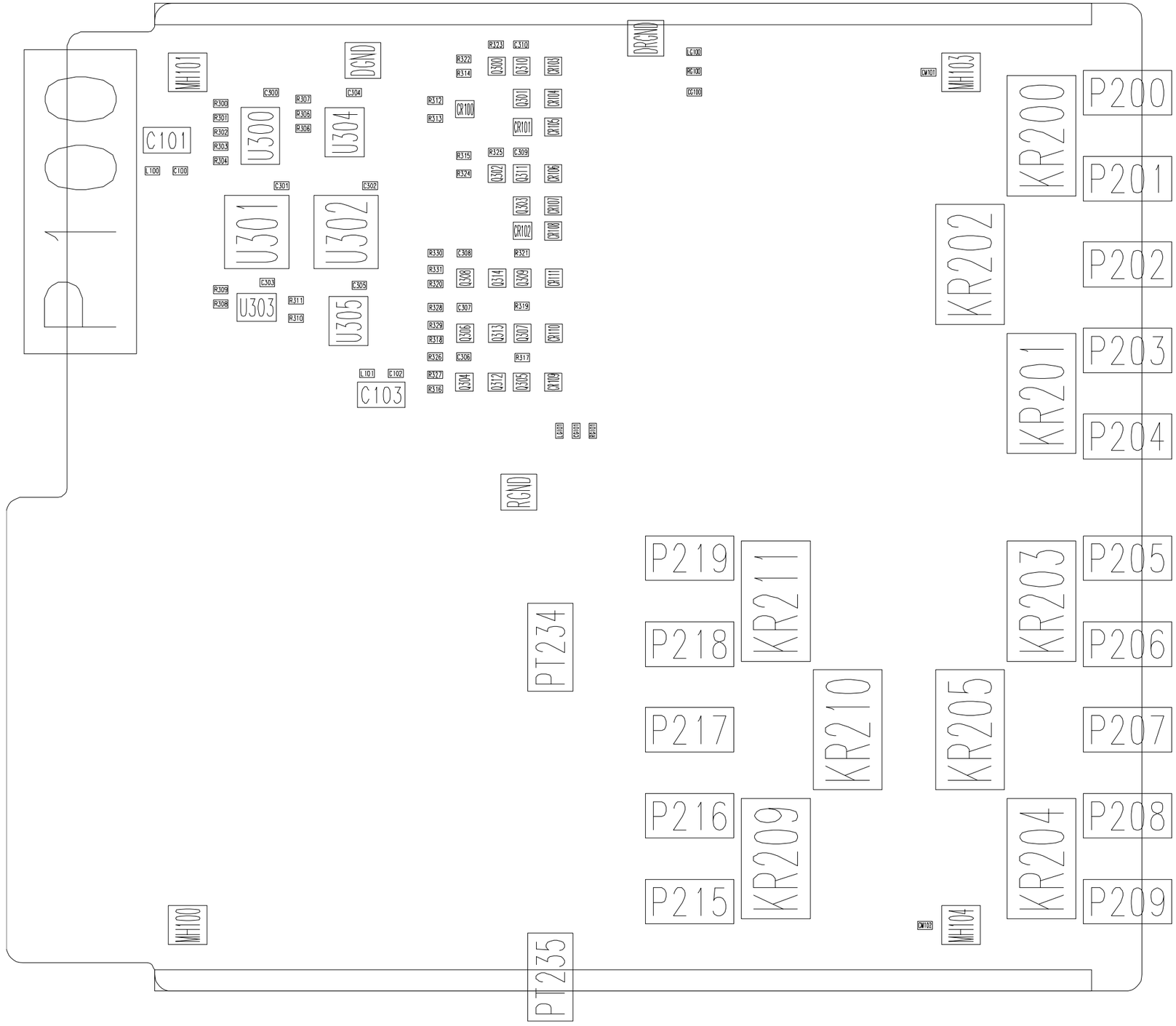


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Agilent N2267A 8-Channel High Current
GP Module Schematic (Sheet 2 of 2)
Page 198

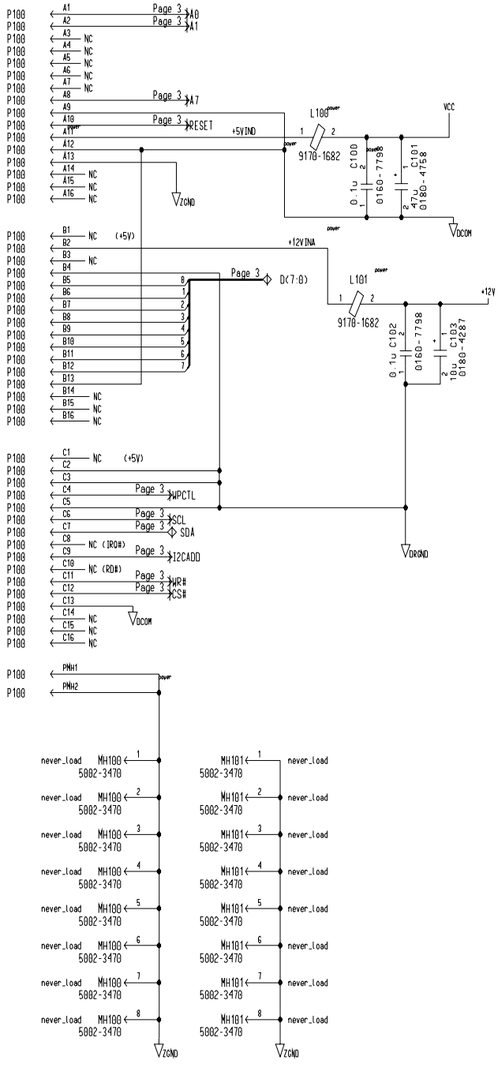
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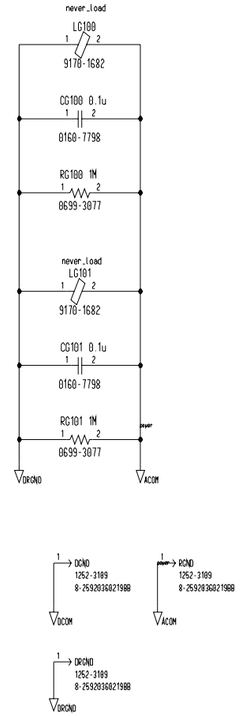
Backplane Connector

5184-0582



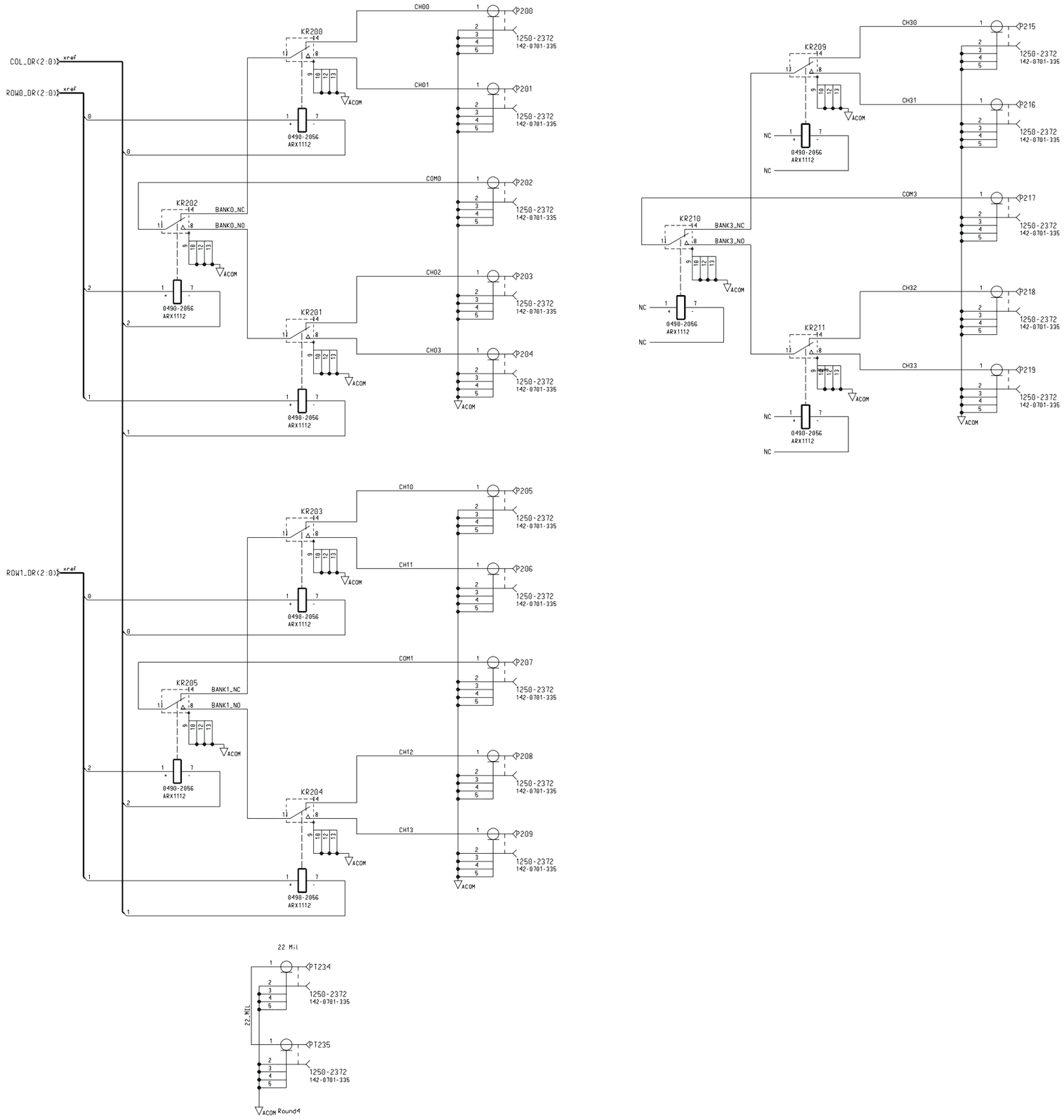
Current: <300mA

Current: <200mA

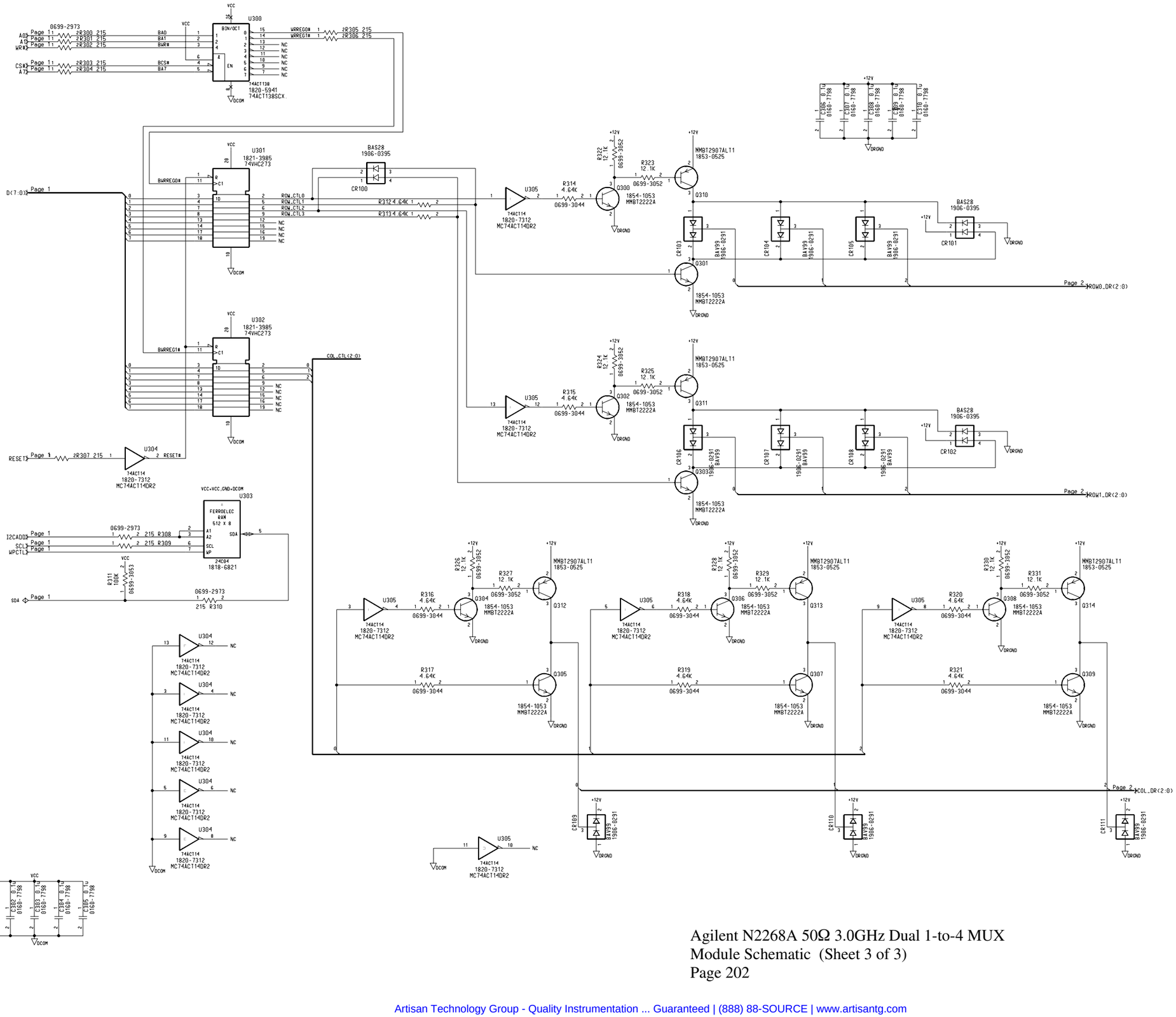


Agilent N2268A 50Ω 3.0GHz Dual 1-to-4 MUX
Module Schematic (Sheet 1 of 3)
Page 200

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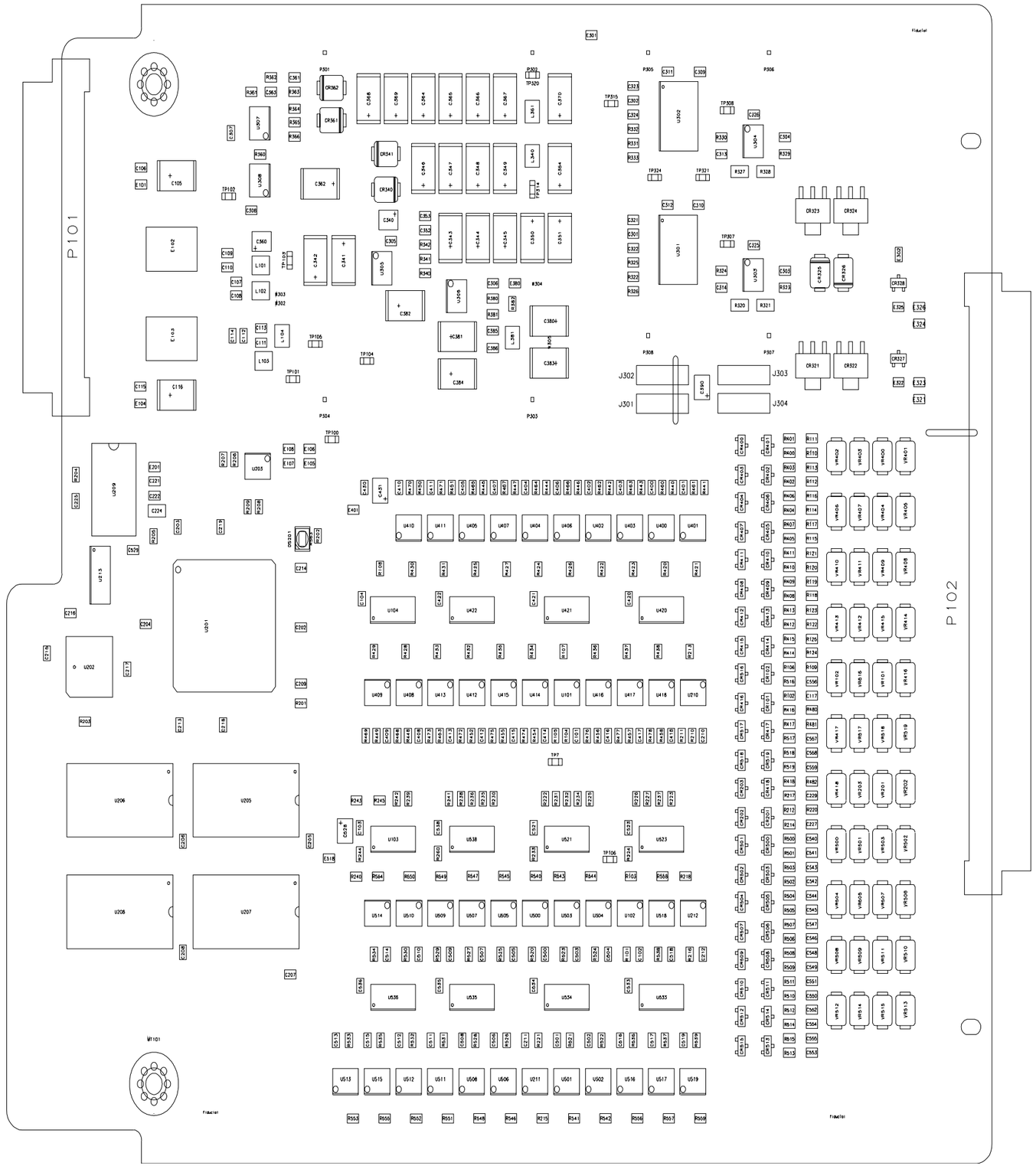


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Agilent N2268A 50Ω 3.0GHz Dual 1-to-4 MUX
Module Schematic (Sheet 3 of 3)
Page 202

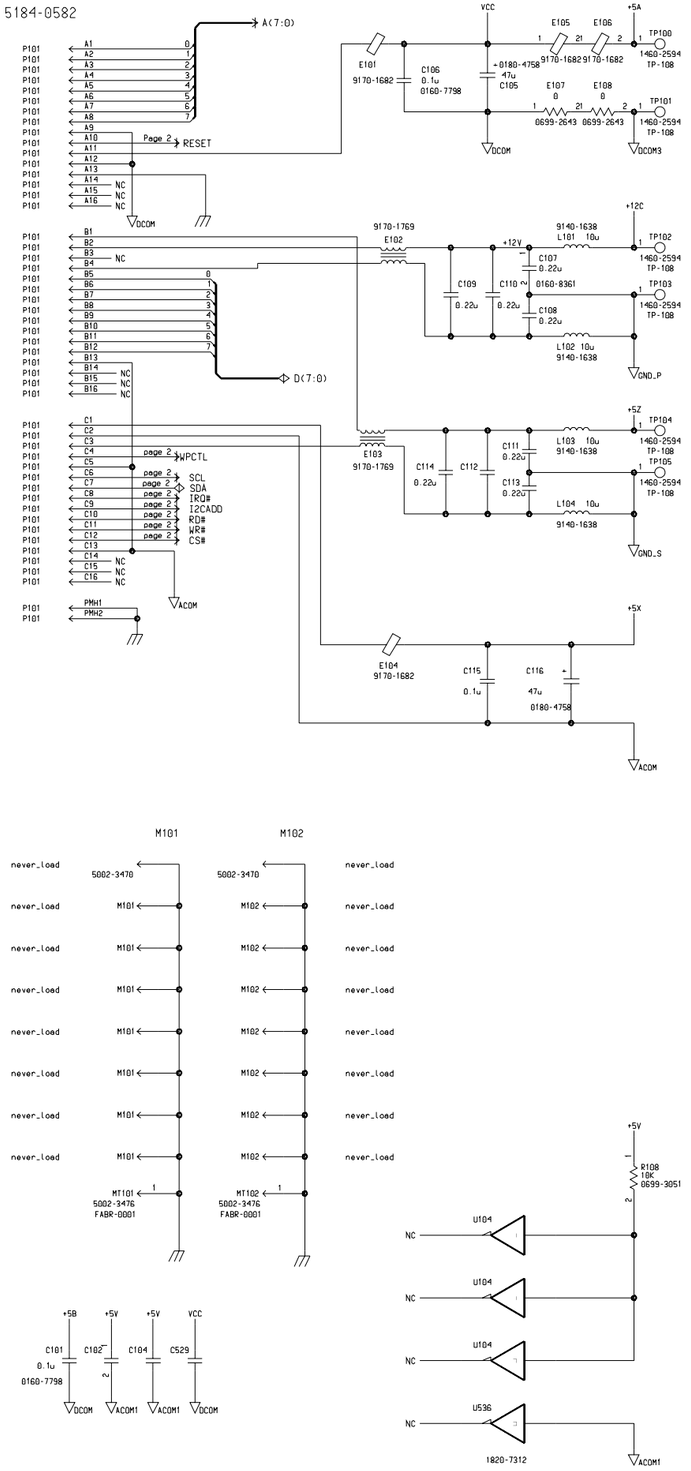
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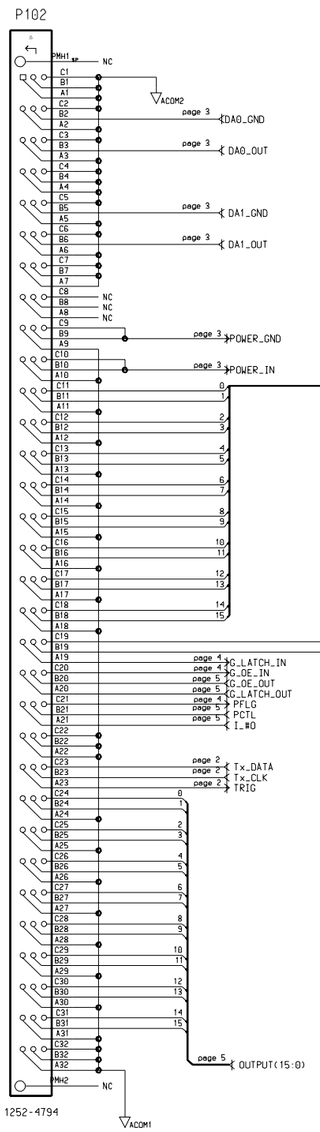


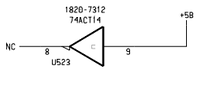
Agilent N2269A Multifunction Module
Component Locator
Page 203

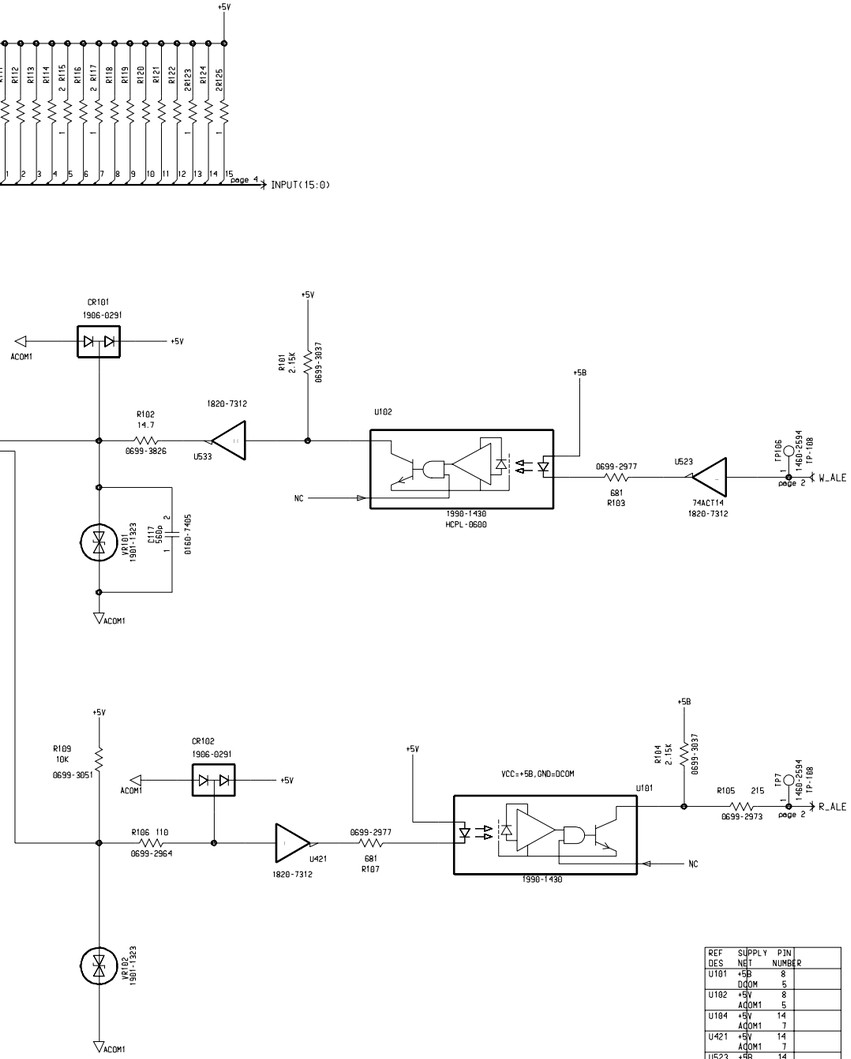
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5184-0582



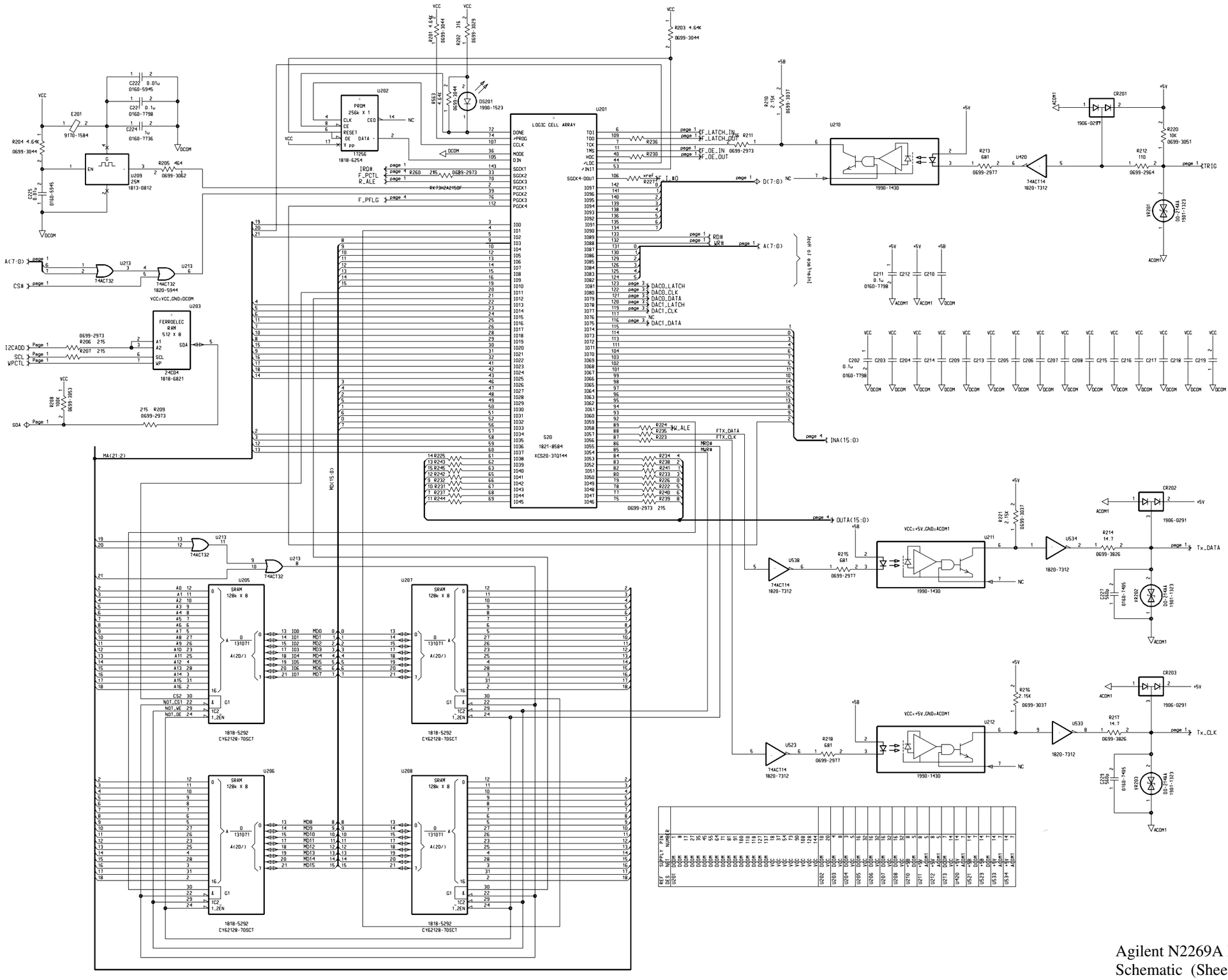






REF DES	SUPPLY NET	PIN NUMBER	
U101	+5B	8	
	DCOM	5	
U102	+5V	8	
	ACOM1	5	
U104	+5V	14	
	ACOM1	7	
U421	+5V	14	
	ACOM1	7	
U523	+5B	14	
	DCOM	7	
U533	+5V	14	
	ACOM1	7	
U536	+5V	14	
	ACOM1	7	

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Agilent N2269A Multifunction Module
Schematic (Sheet 2 of 5)
Page 205

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#32 & #33

2 DAC

REF DES	SUPPLY NET	PIN NUMBER
U301	+5A	3
	+5C	16
	-5C	1
	AGND1	12
	DCOM3	2
U302	+5A	3
	+5C	16
	-5C	1
	AGND0	12
	DCOM3	2
U303	+15C	7
	-15C	4
U304	+15C	7
	-15C	4
U306	+5Z	8
	GND_S	6
U307	+12C	7
	GND_P	4

#30 & #31

Holes for shield over power area

Holes for shield over DA area

All this grounds should be connected after layout done.

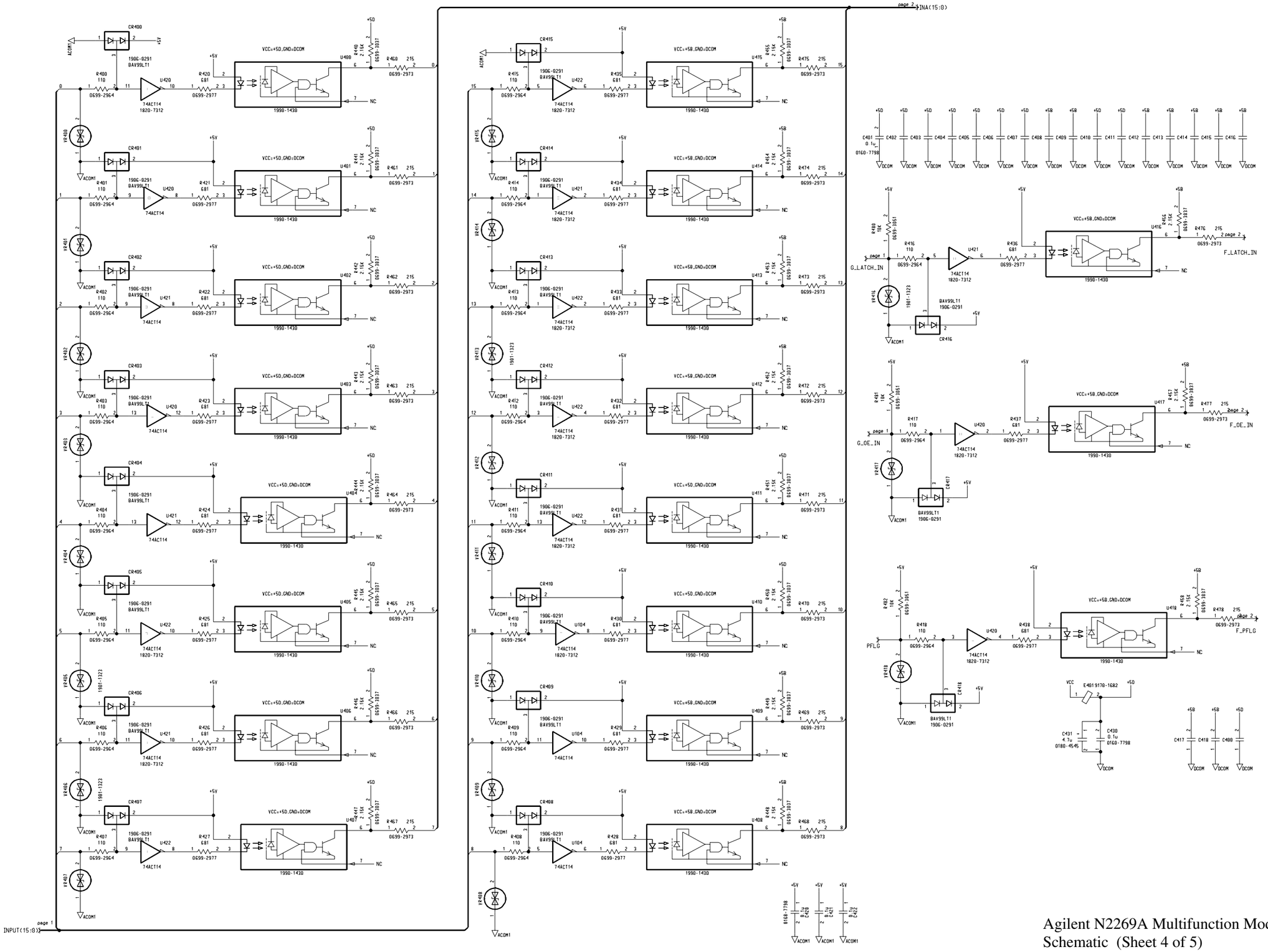
#34 & #35

#36 & #37

#38

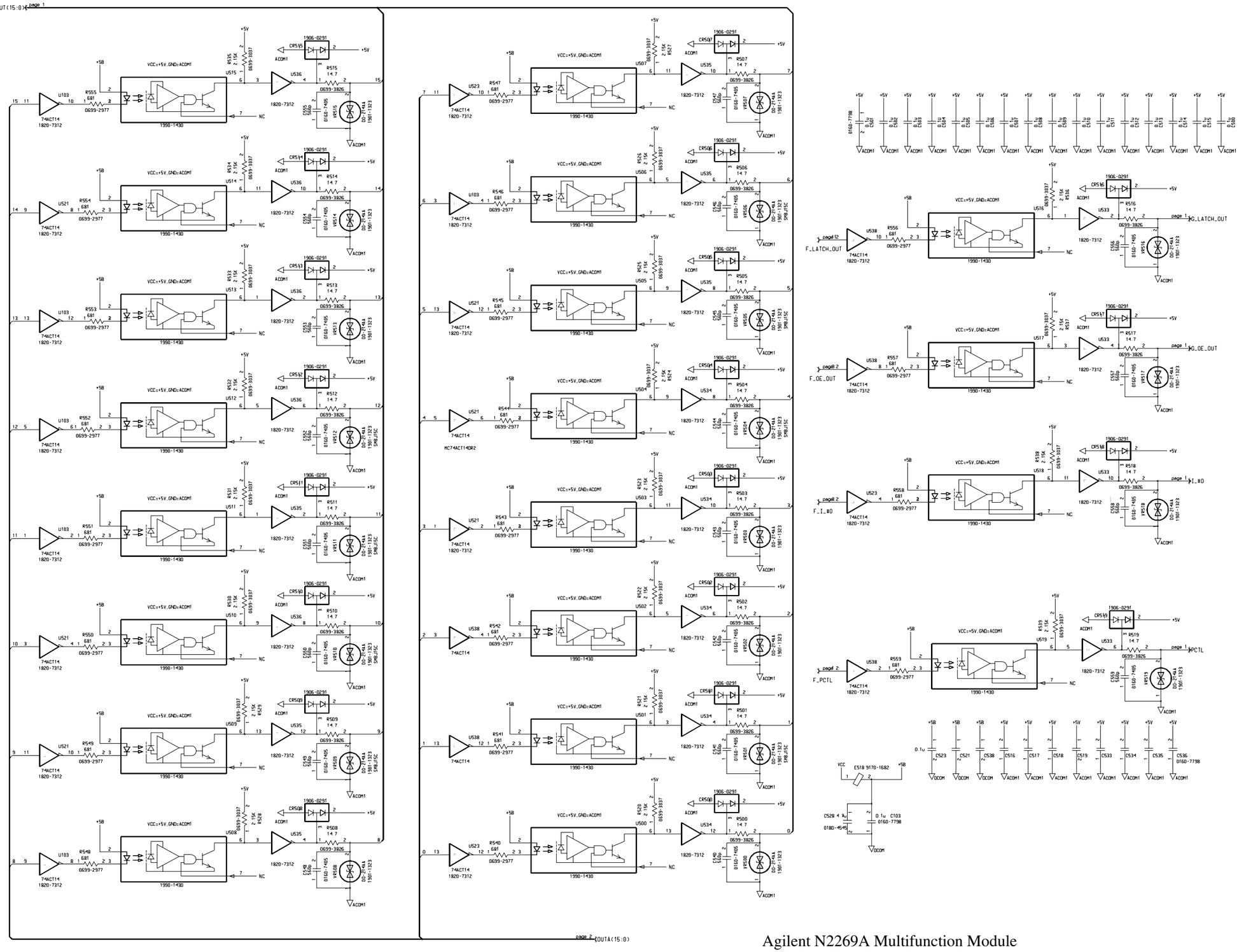
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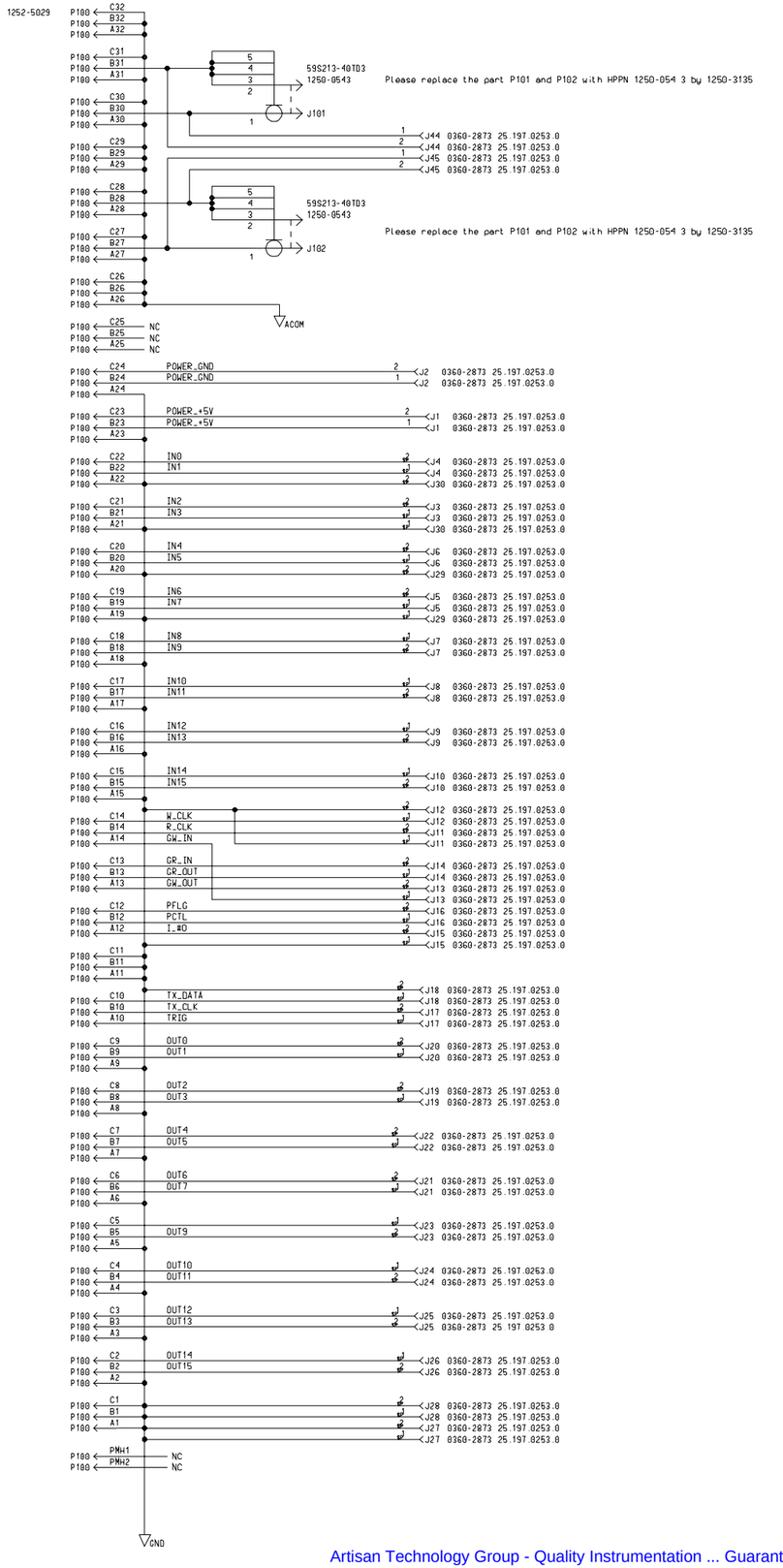


Agilent N2269A Multifunction Module
Schematic (Sheet 4 of 5)
Page 207

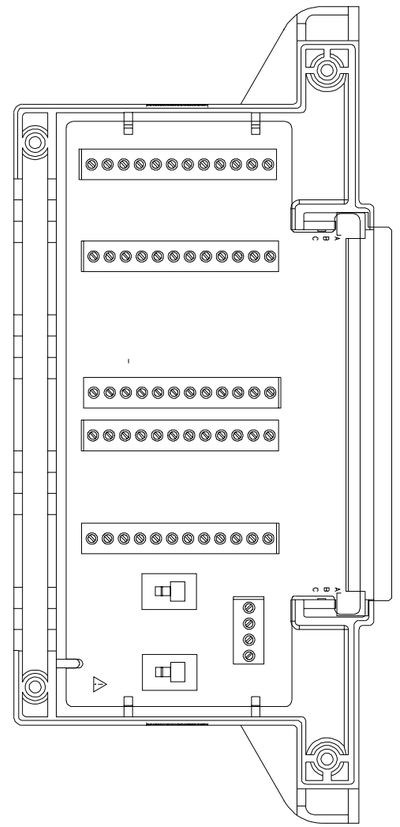
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Agilent N2269A Multifunction Module
Schematic (Sheet 5 of 5)
Page 208

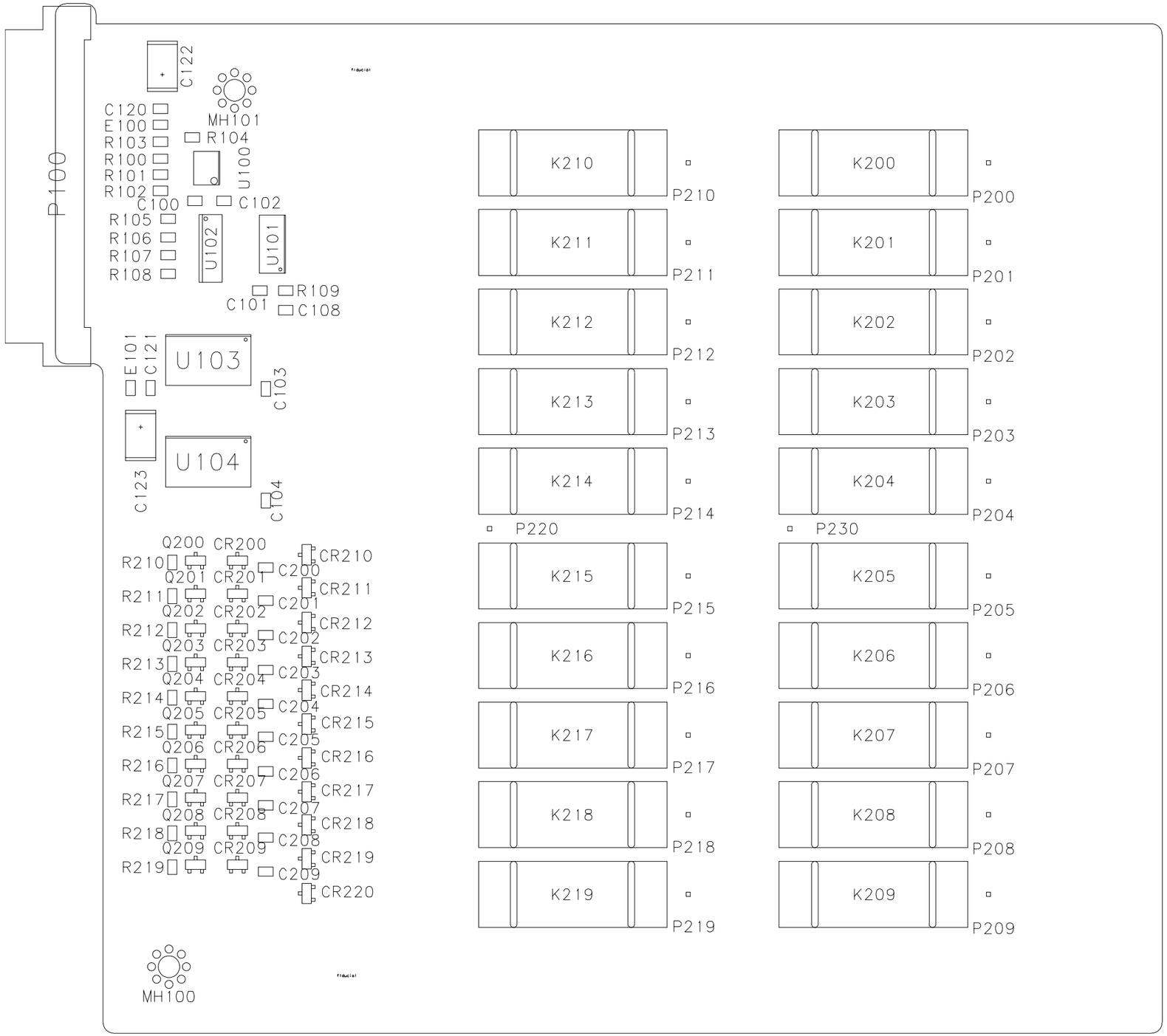
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



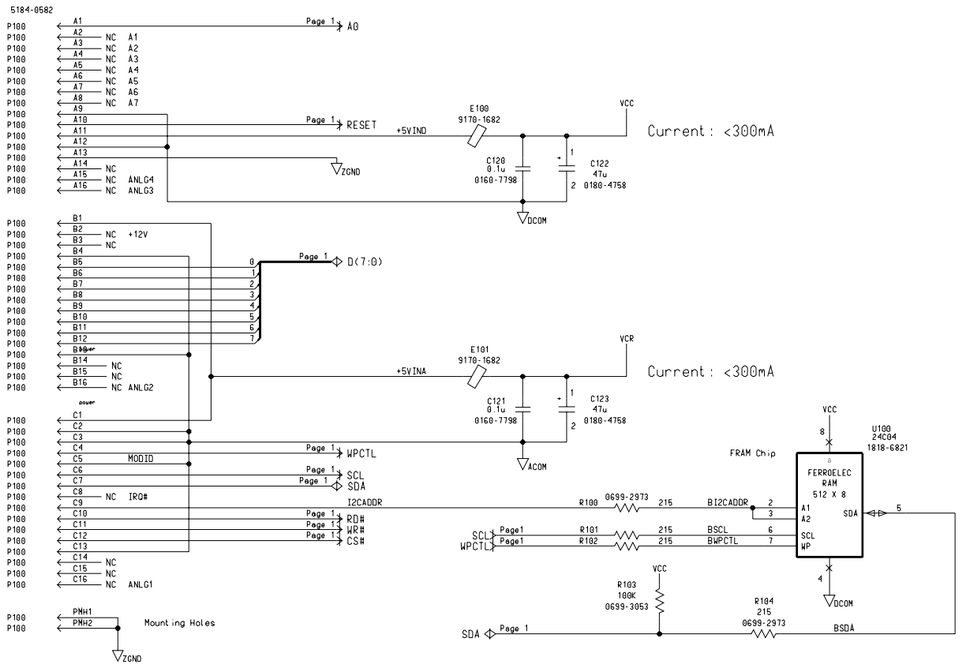


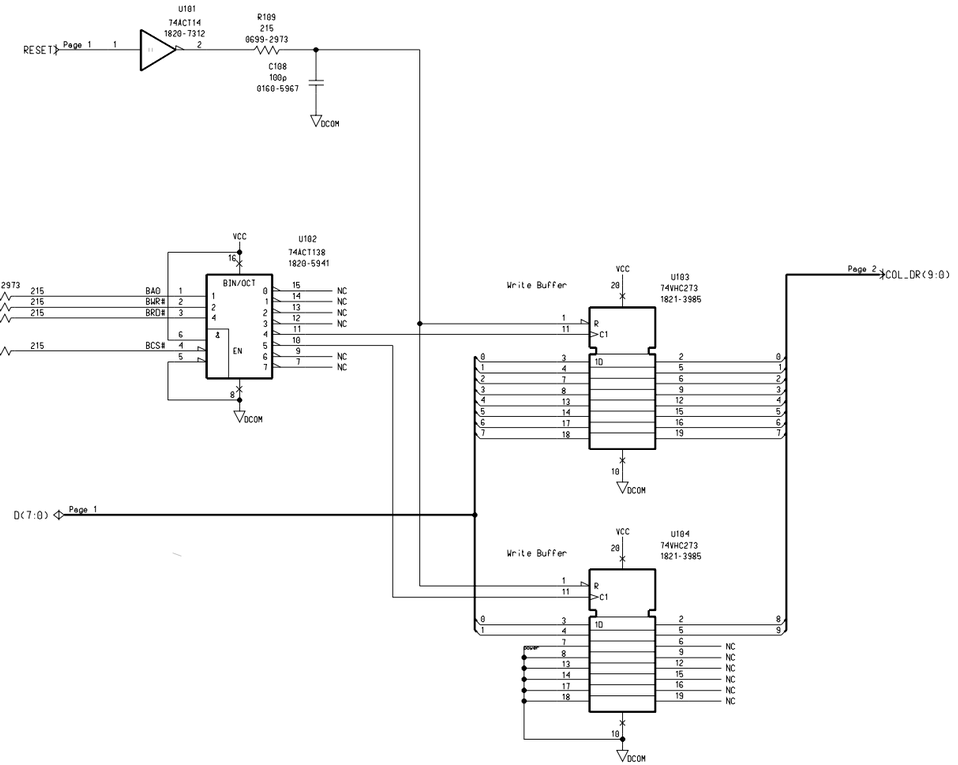
Agilent N2329A Screw Terminal Block
Component Locator and Schematic
Page 209

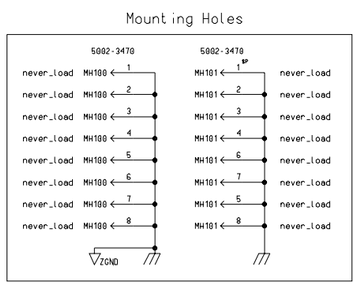
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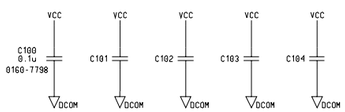


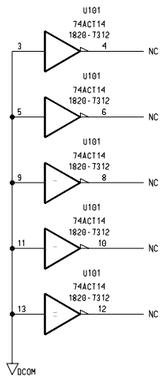
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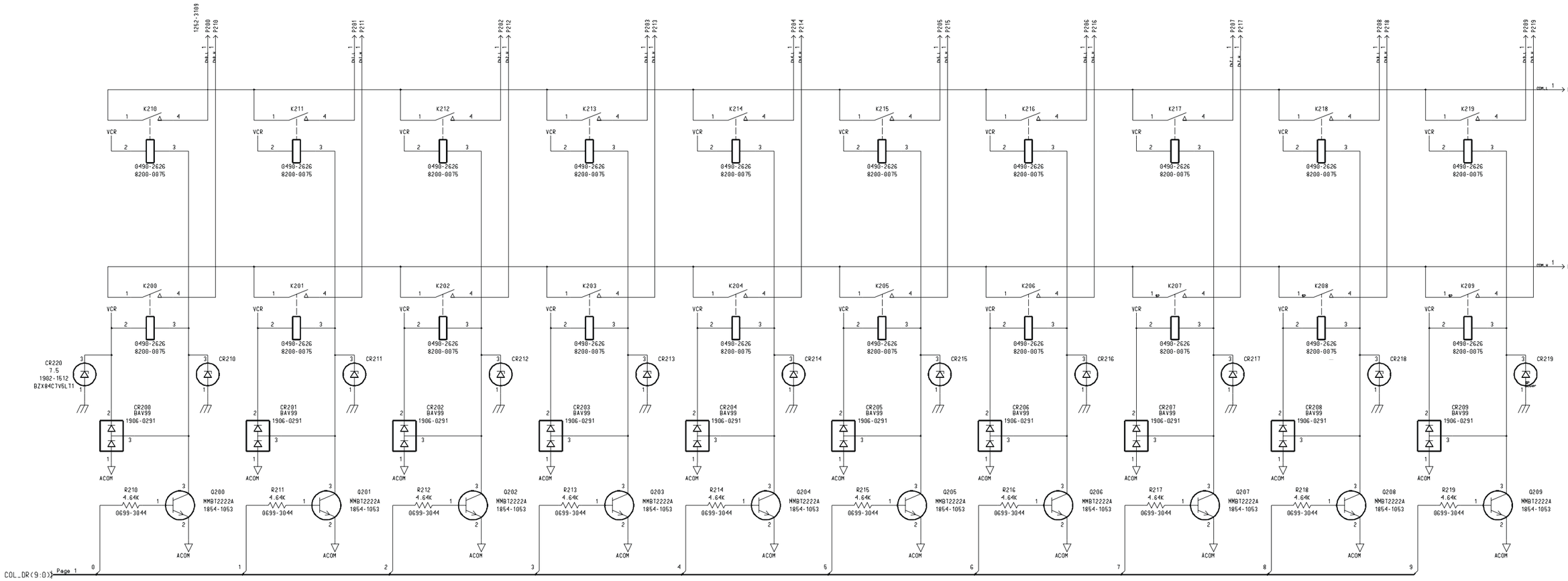






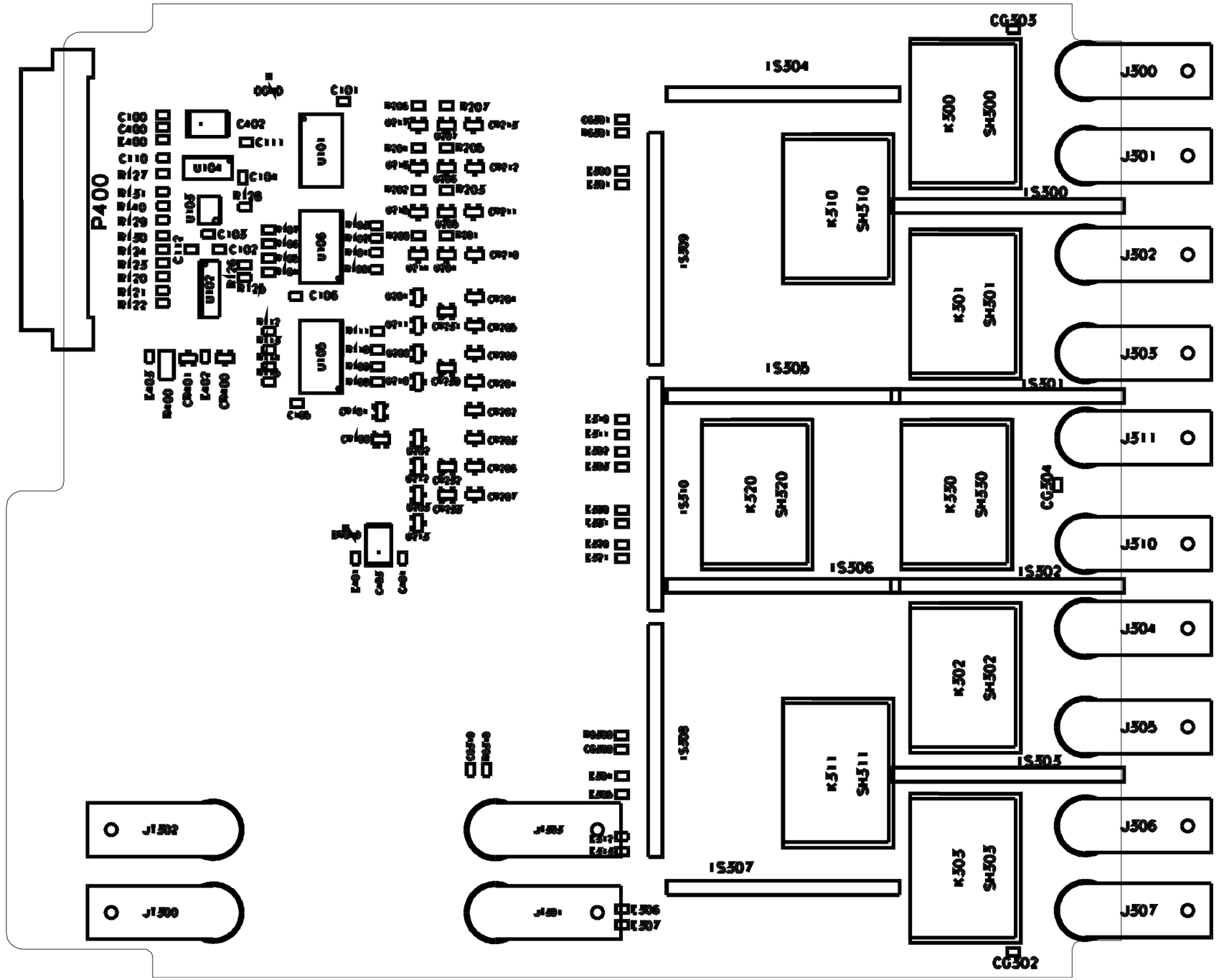
Agilent N2270A 10-Channel High Voltage MUX
Module Schematic (Sheet 1 of 2)
Page 211

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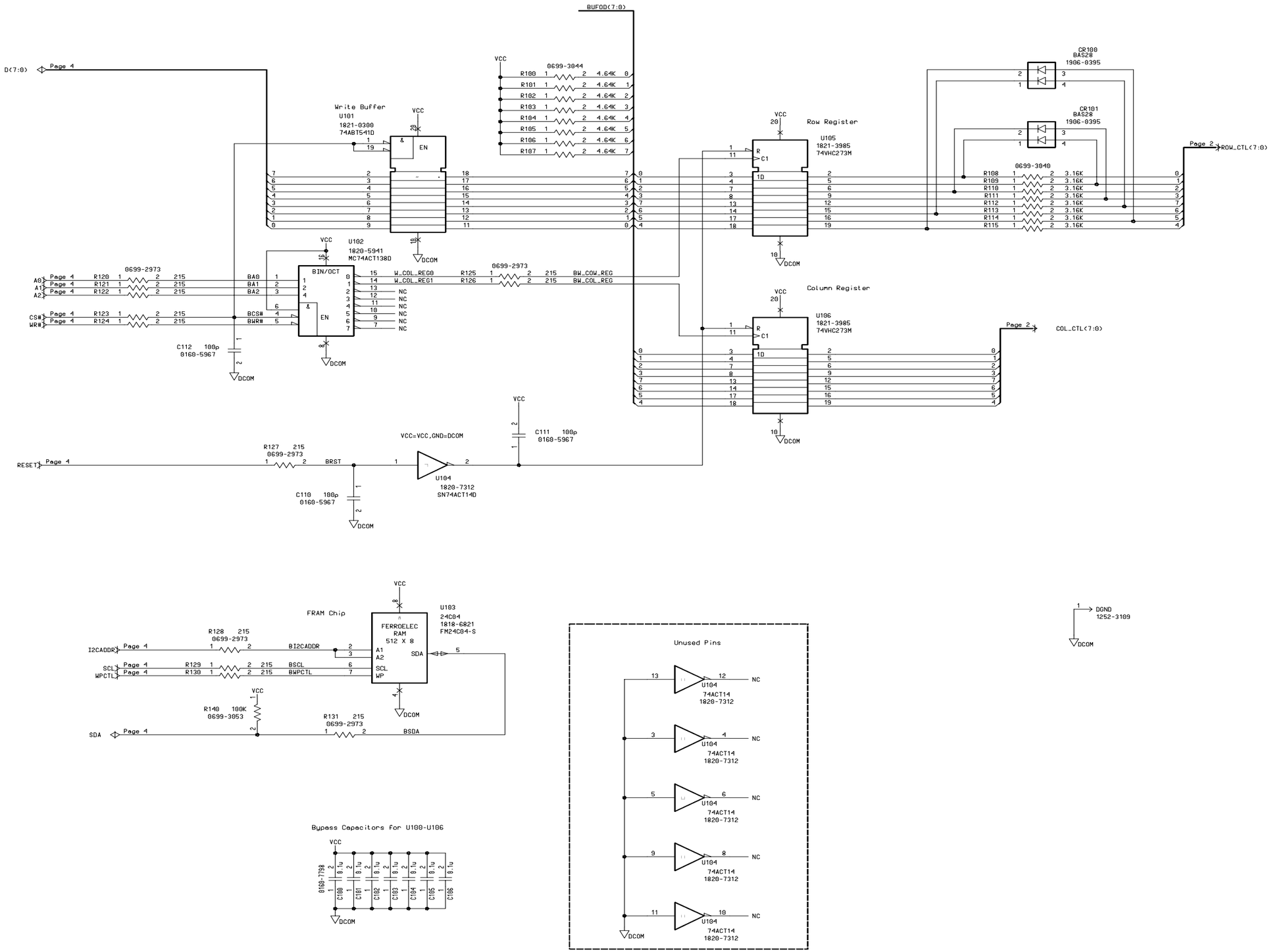


Agilent N2270A 10-Channel High Voltage MUX
Module Schematic (Sheet 2 of 2)
Page 212

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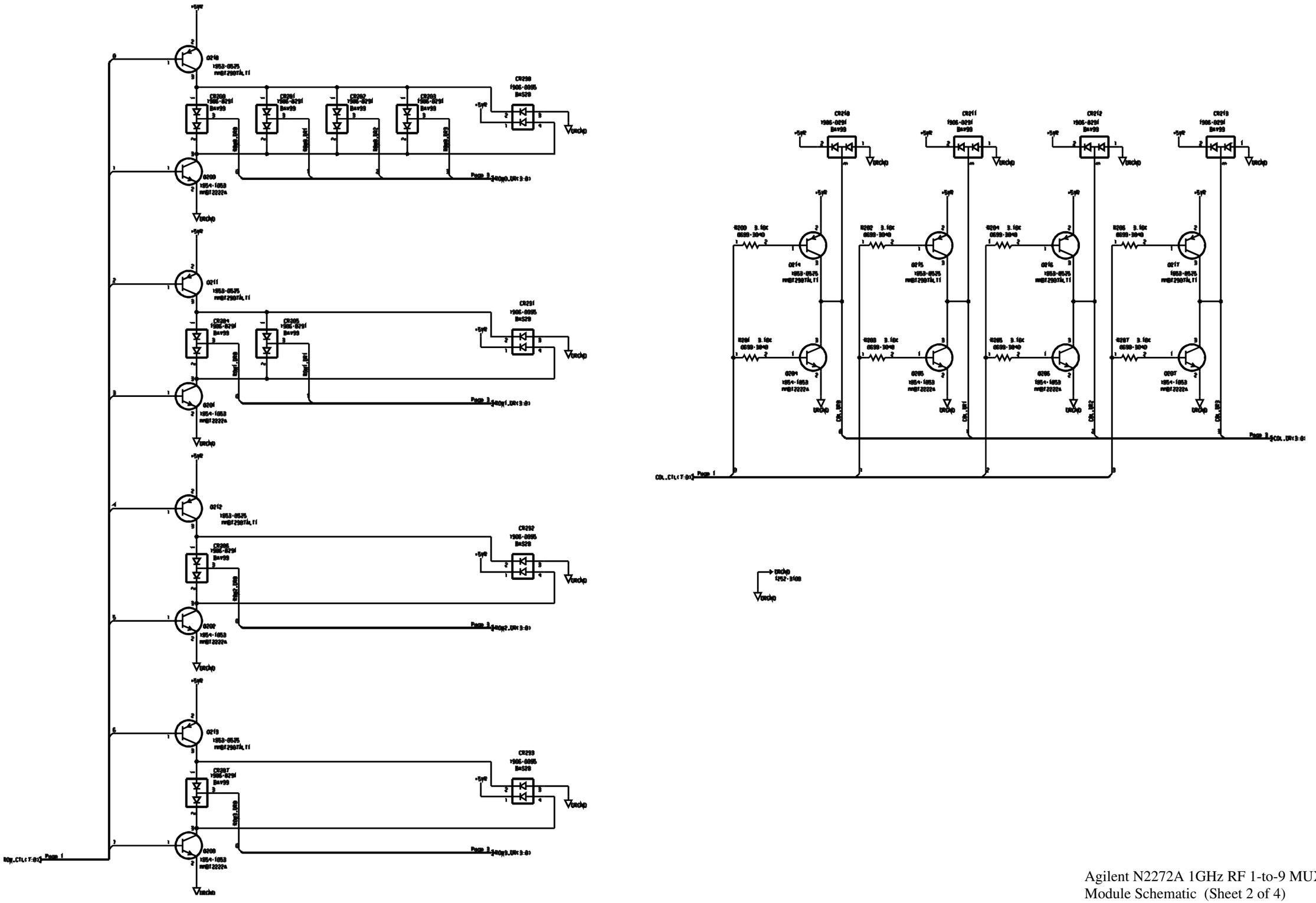


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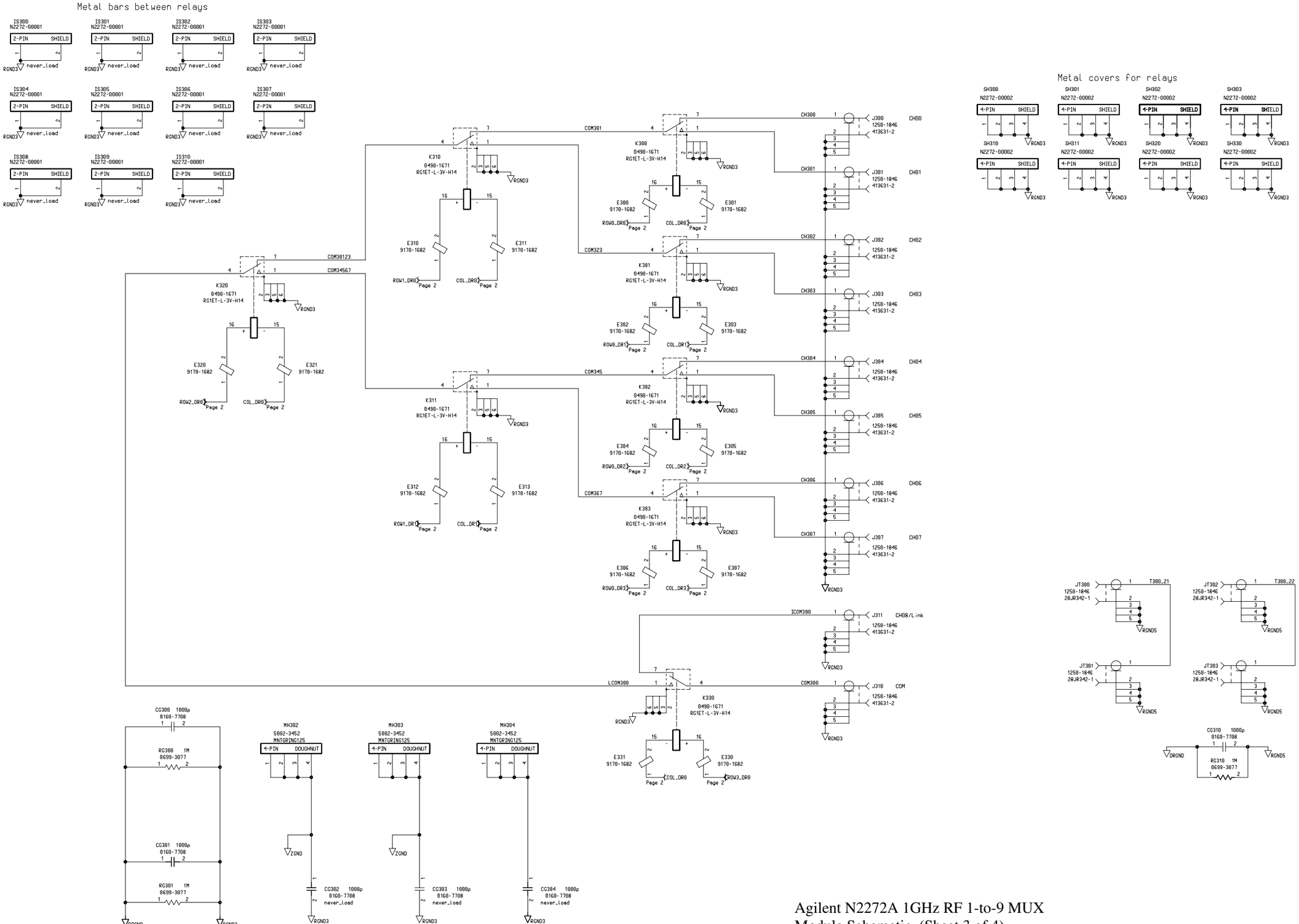
Agilent N2272A 1GHz RF 1-to-9 MUX
Module Schematic (Sheet 1 of 4)
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Agilent N2272A 1GHz RF 1-to-9 MUX
Module Schematic (Sheet 2 of 4)
Page 215

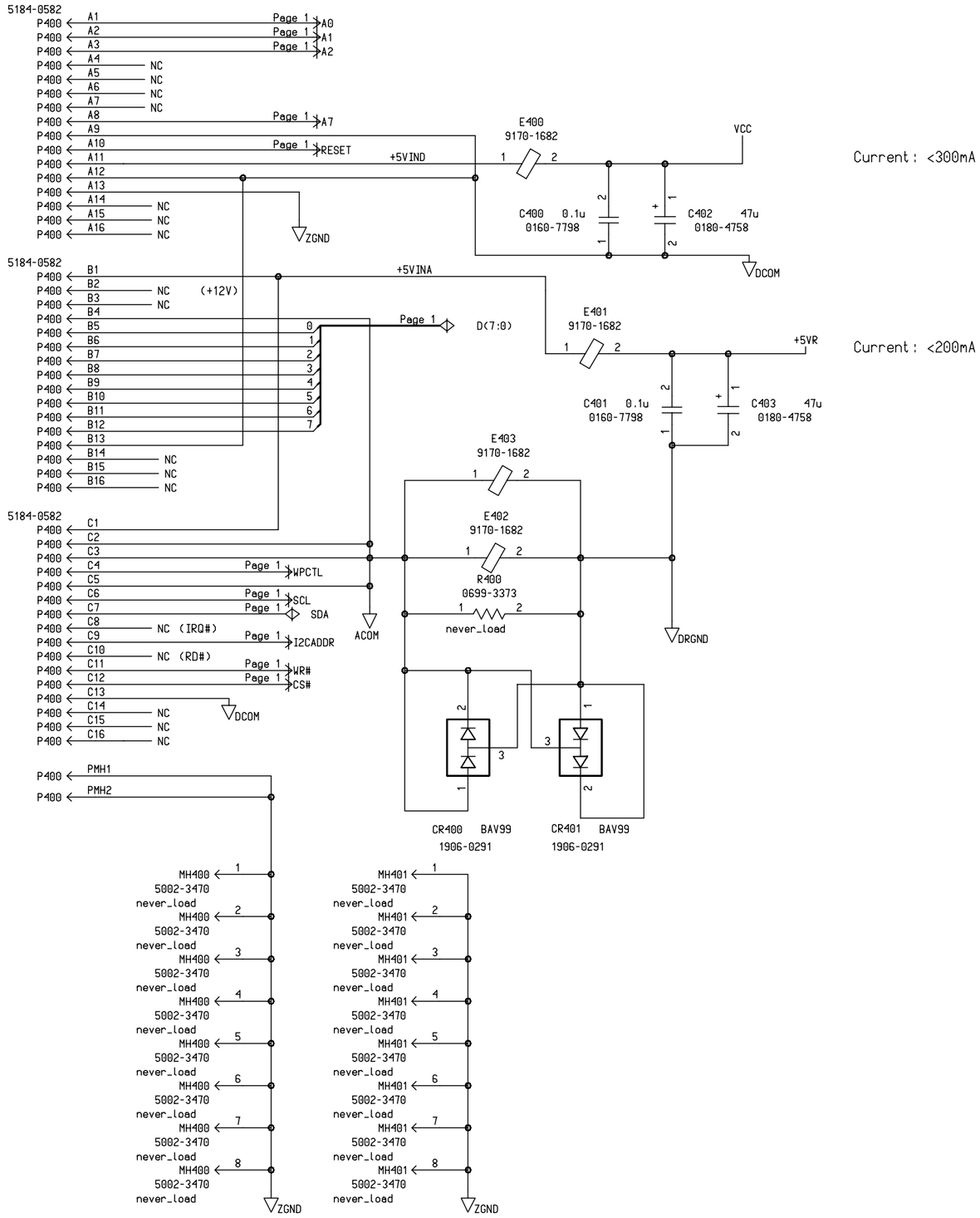
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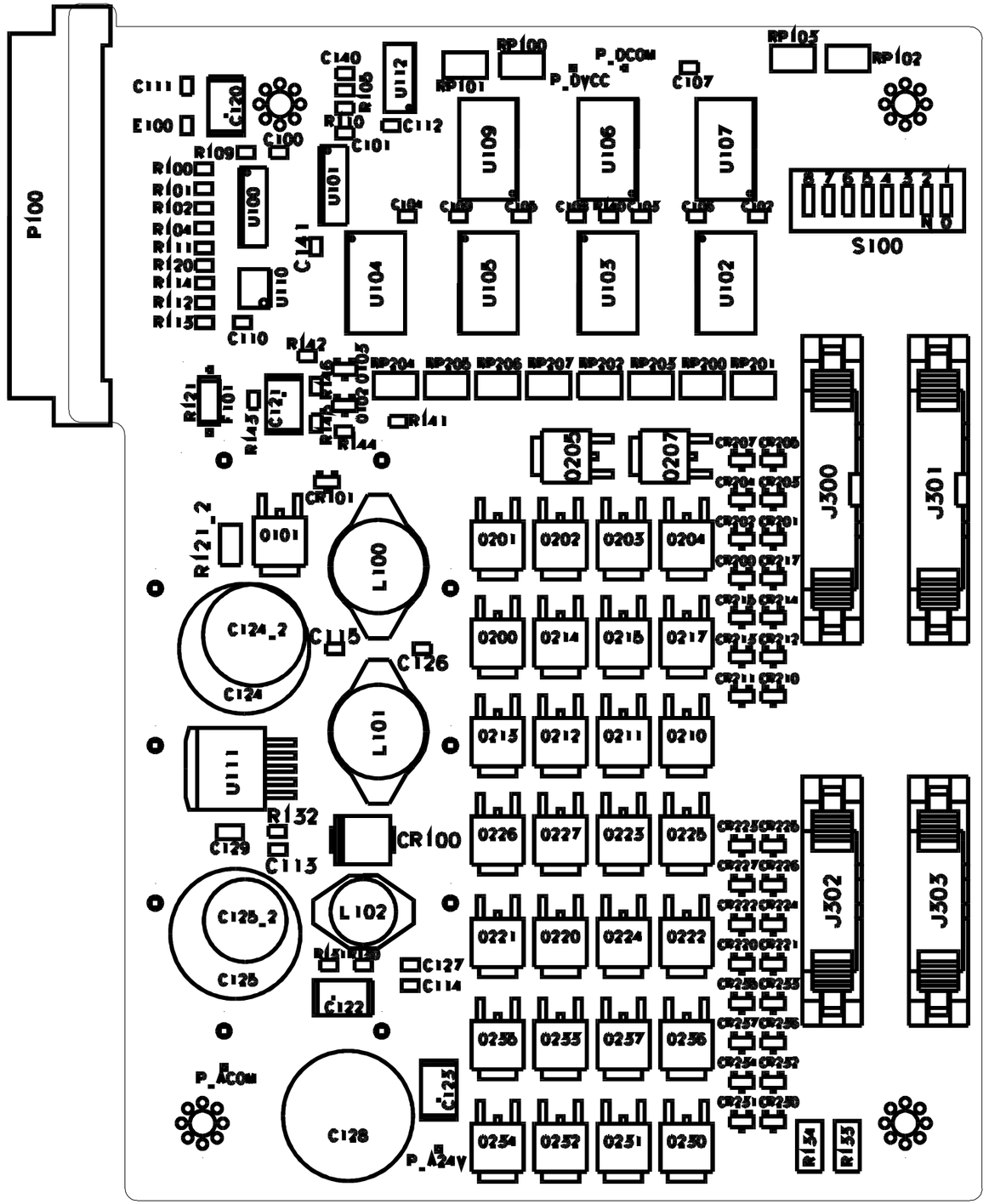
Agilent N2272A 1GHz RF 1-to-9 MUX
Module Schematic (Sheet 3 of 4)
Page 216

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Backplane Connector



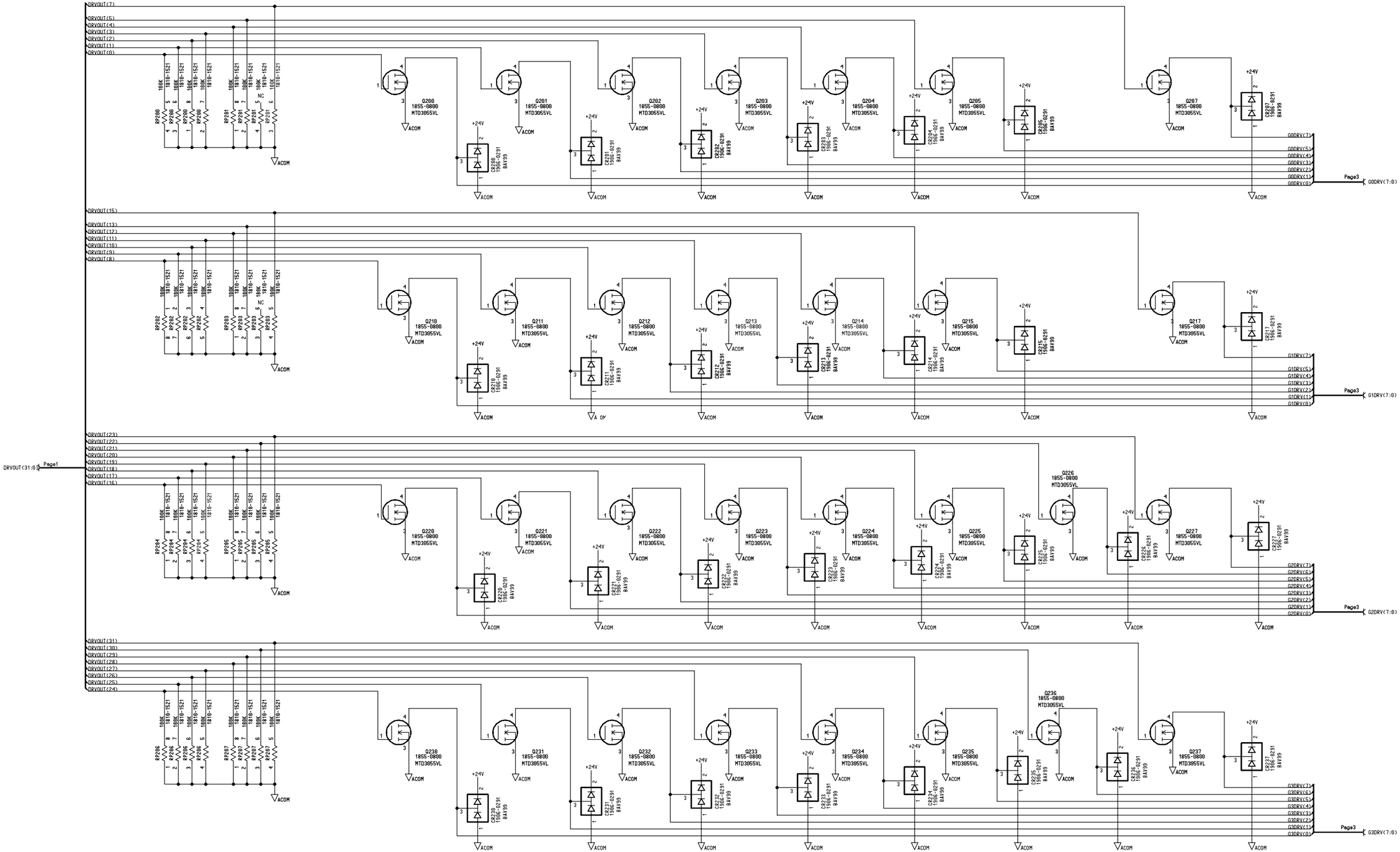
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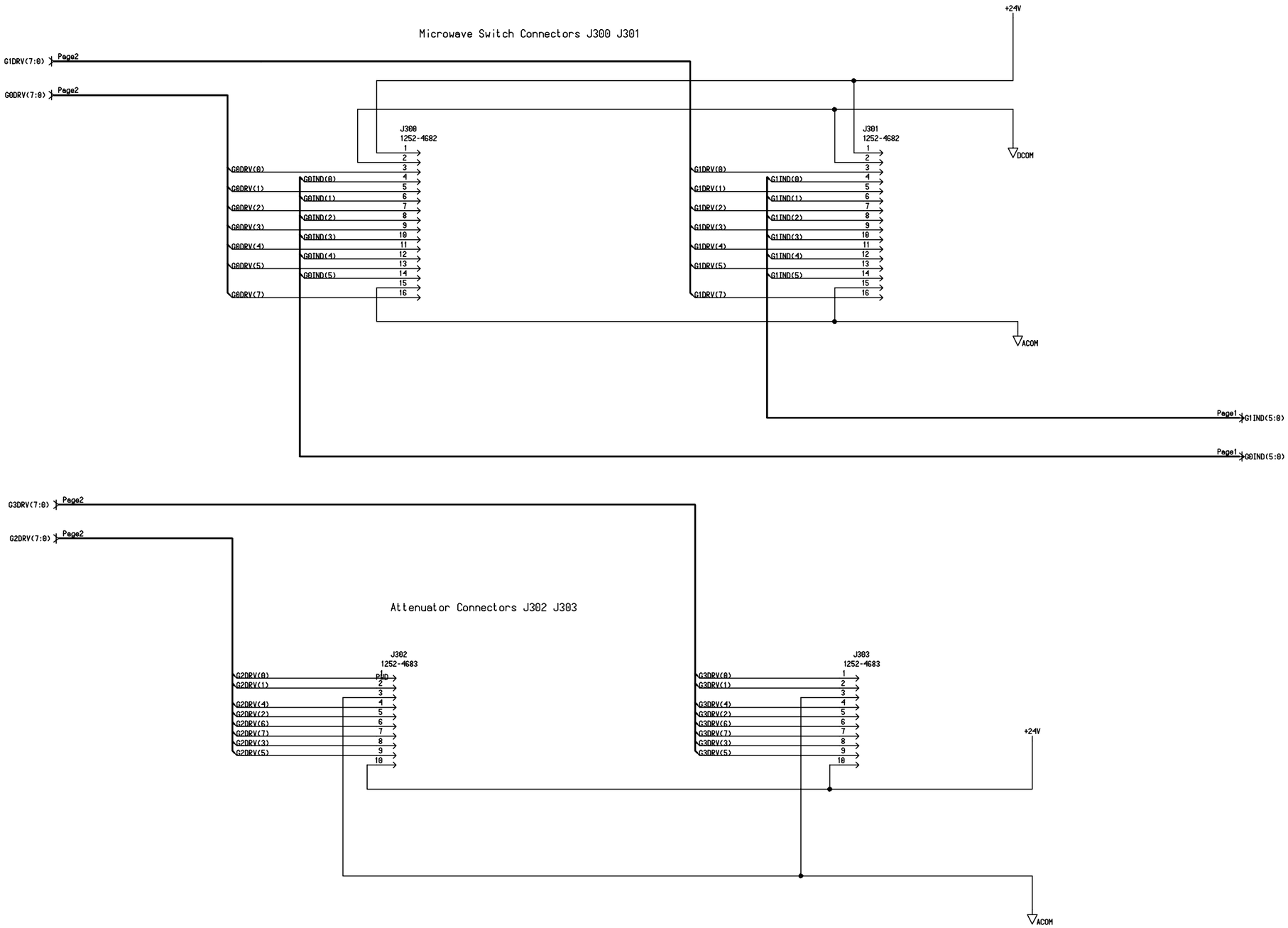
Agilent N2276A/B Dual 1-to-6(4) Microwave MUX/Attenuator Module Schematic (Sheet 1 of 3)
Page 219

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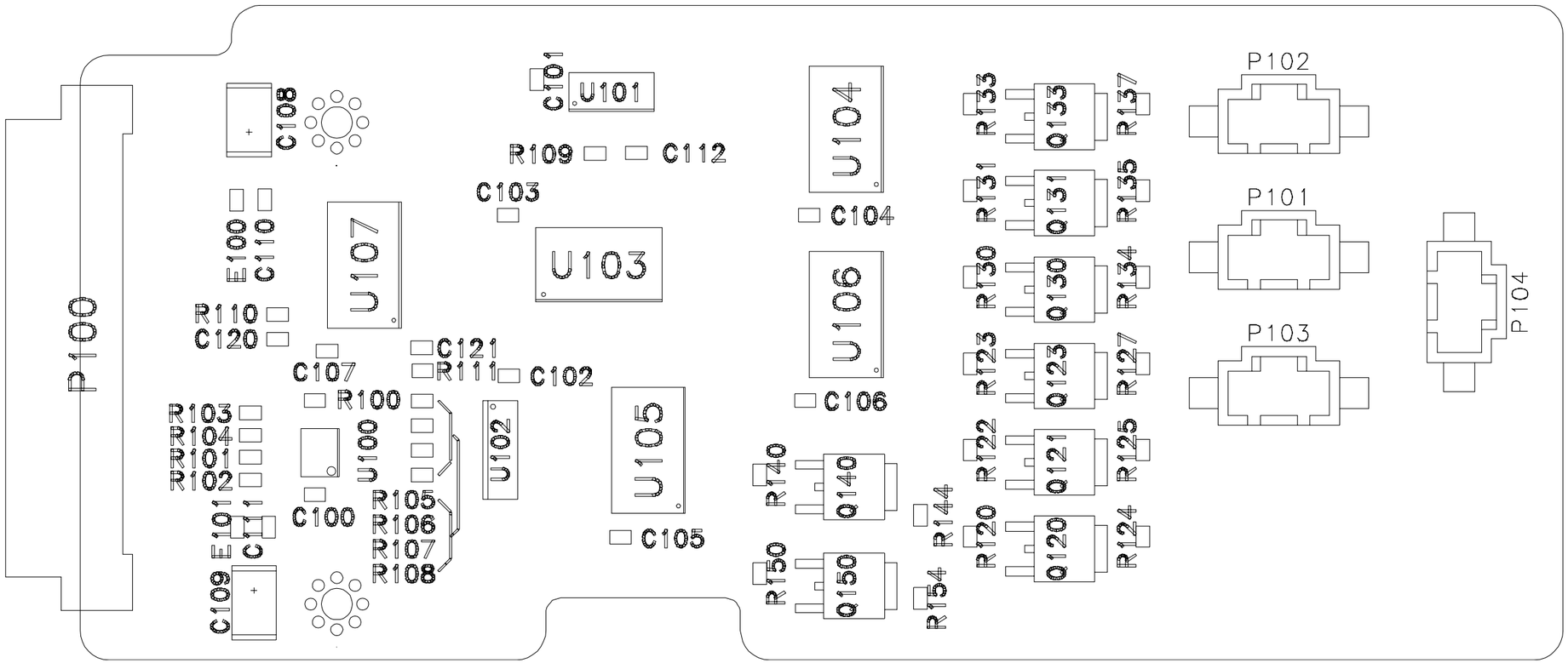


Agilent N2276A/B Dual 1-to-6(4) Microwave
MUX/Attenuator Module Schematic (Sheet 2 of 3)
Page 220

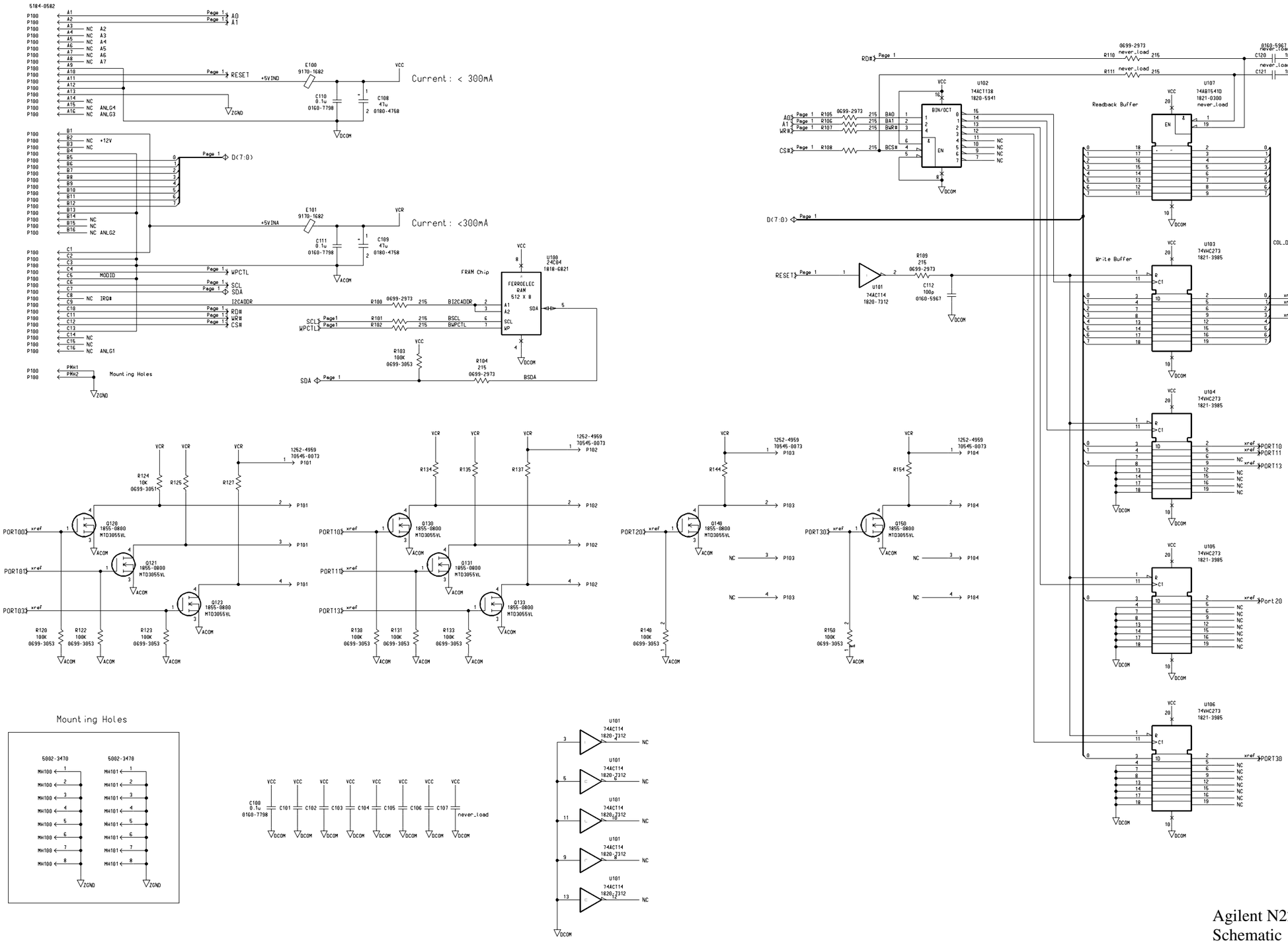
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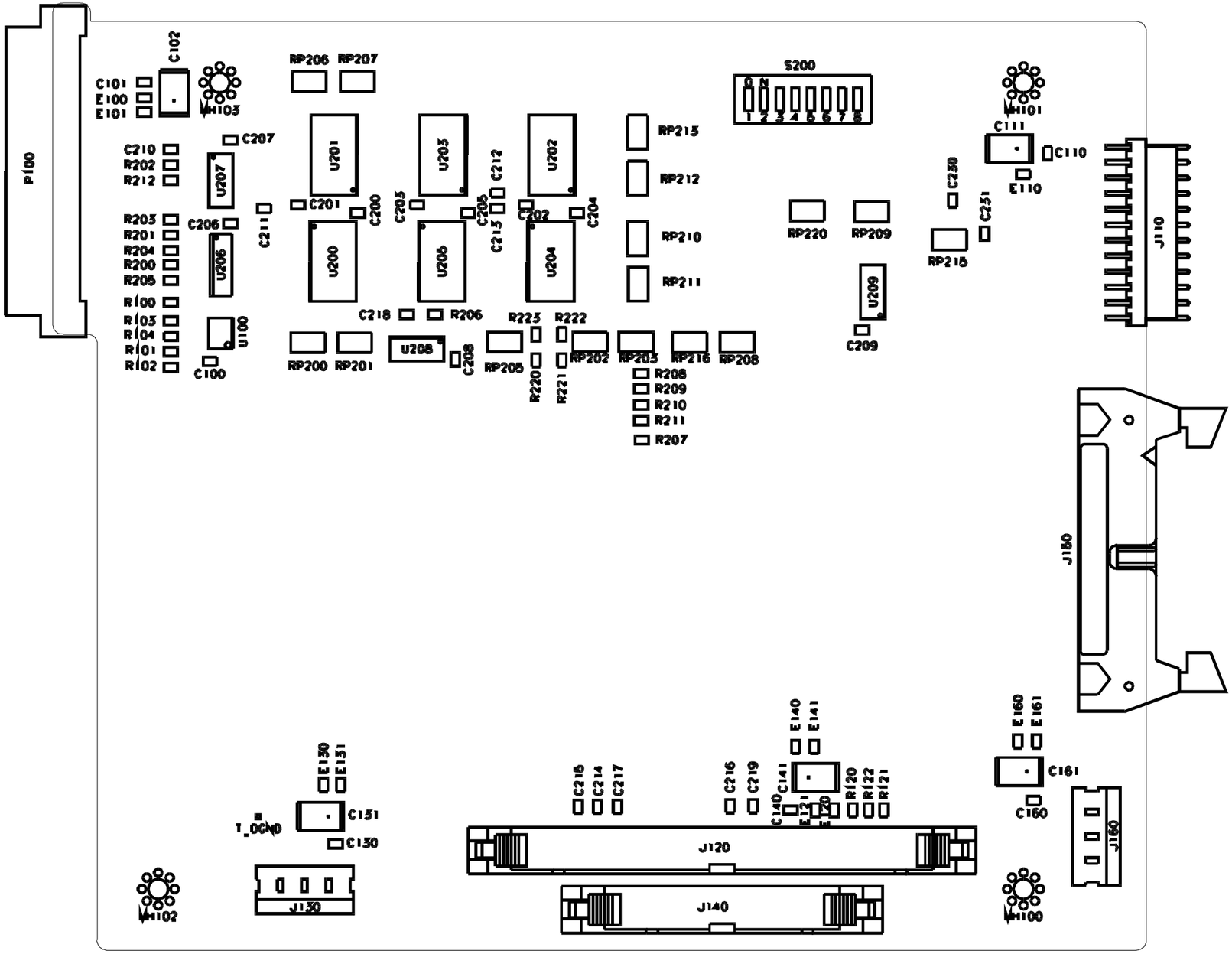


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Agilent N2280A/N2281A Optical Switch Module
Schematic (Sheet 1 of 1)
Page 223

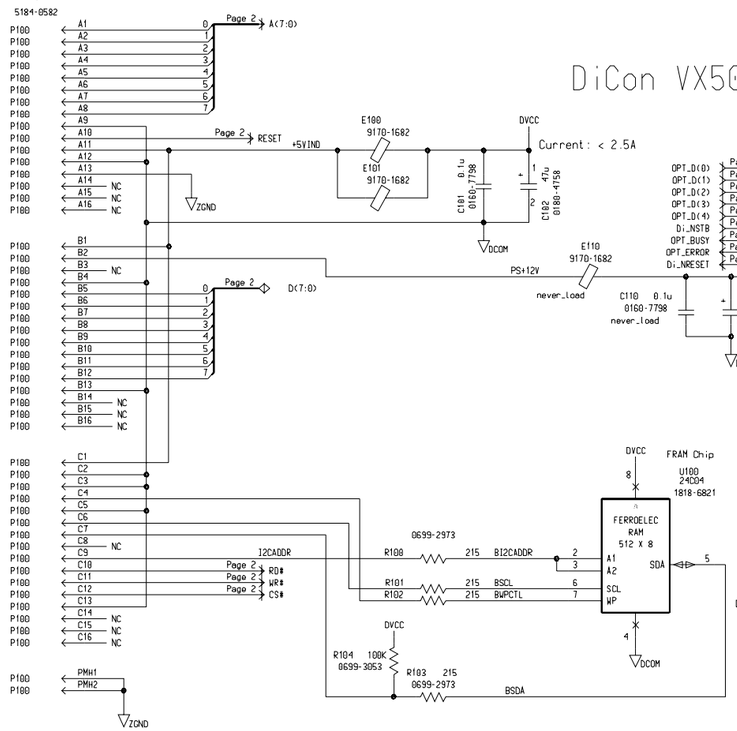
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Agilent N2282A 1-to-8 Optical Switch MUX Module
Component Locator
Page 224

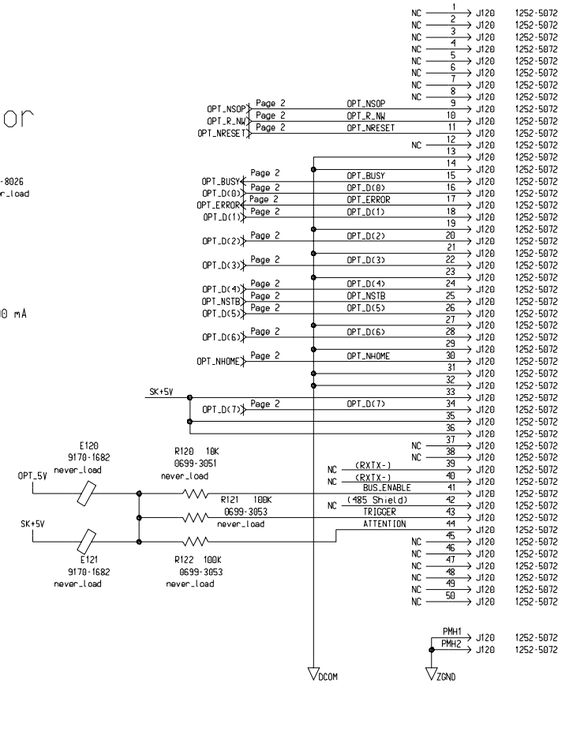
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Backplane Connector

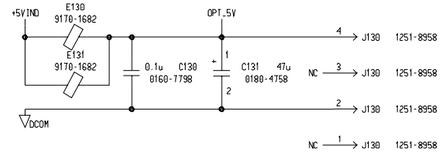


DiCon VX500 Connector

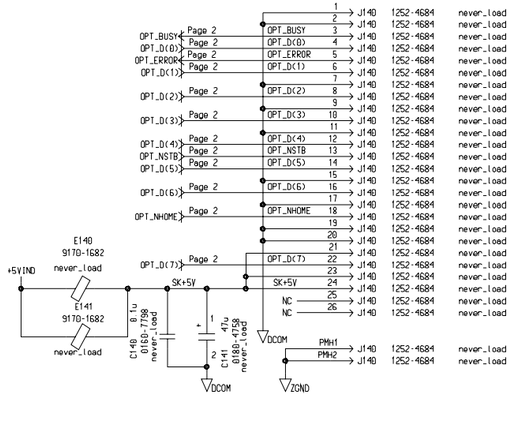
Parallel SKB Connector (IDE50)



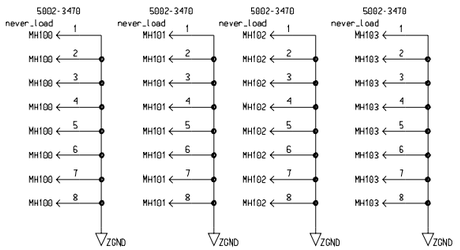
Power for Switch (Twisted for SKB)



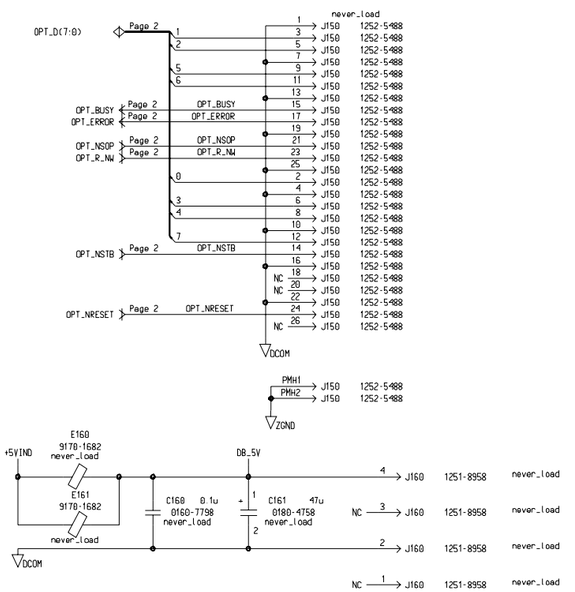
Parallel SK Connector (IDE26)



Mounting Holes

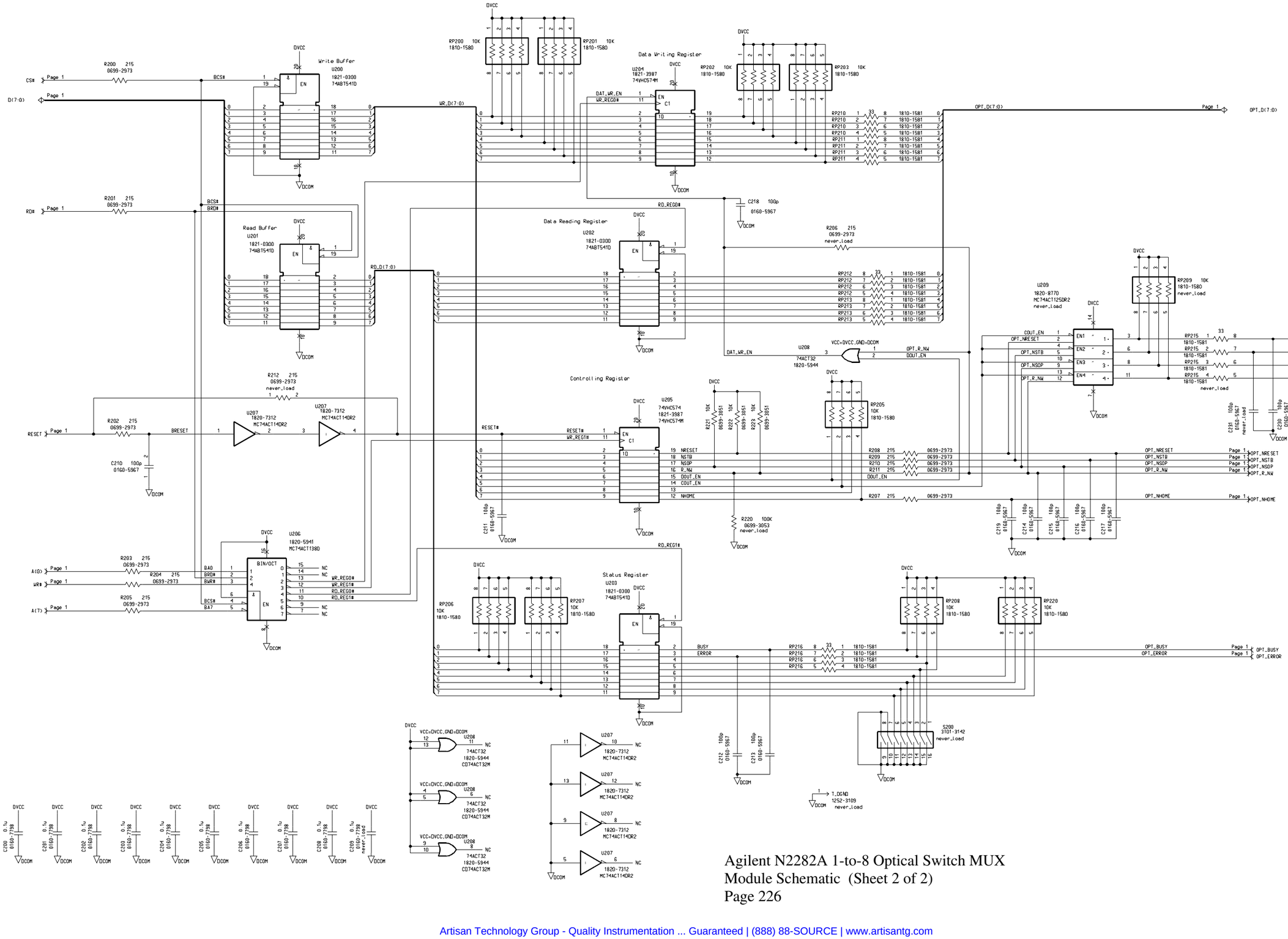


Parallel Interface (For SKB to D25)



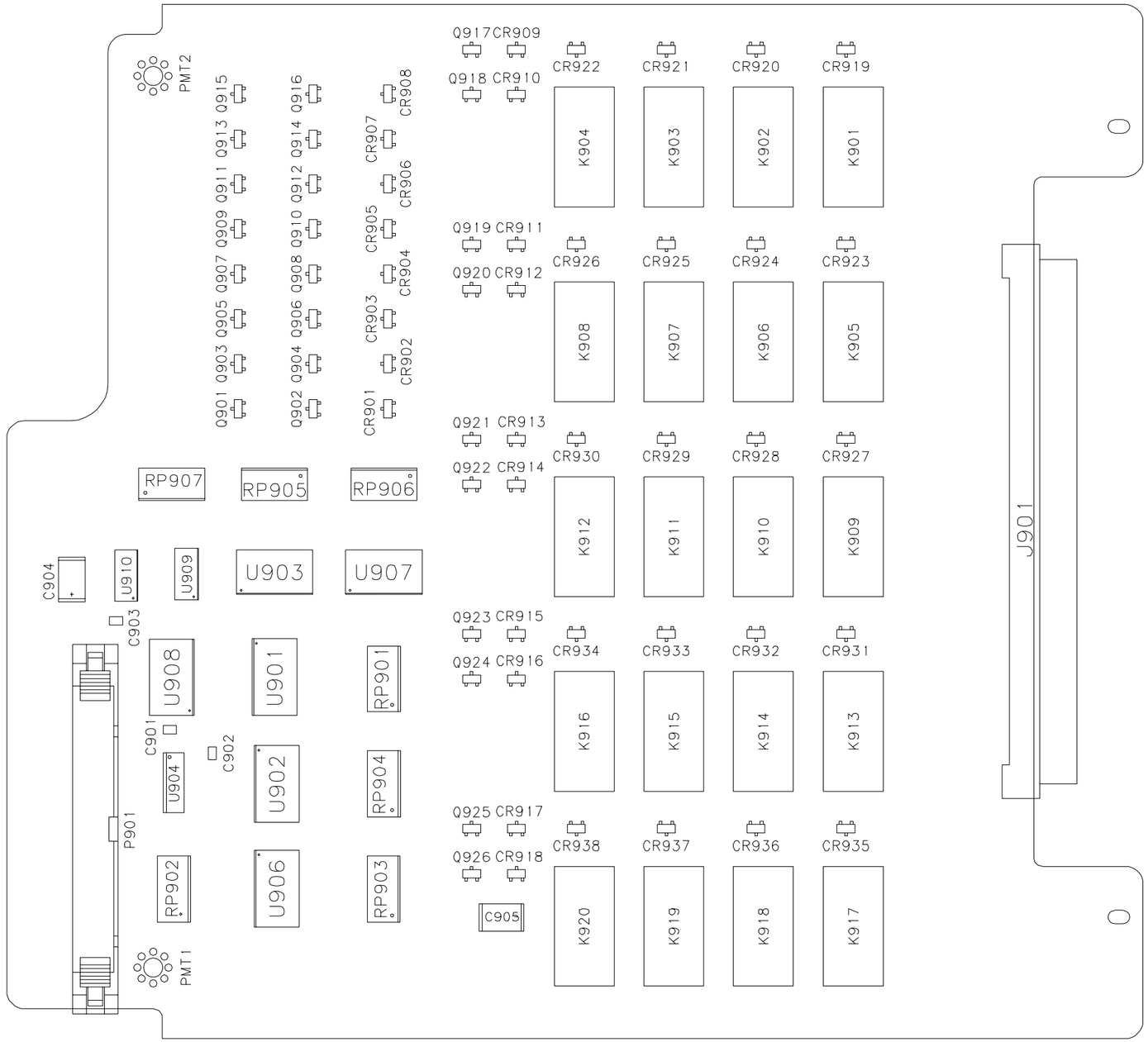
Agilent N2282A 1-to-8 Optical Switch MUX Module Schematic (Sheet 1 of 2)
Page 225

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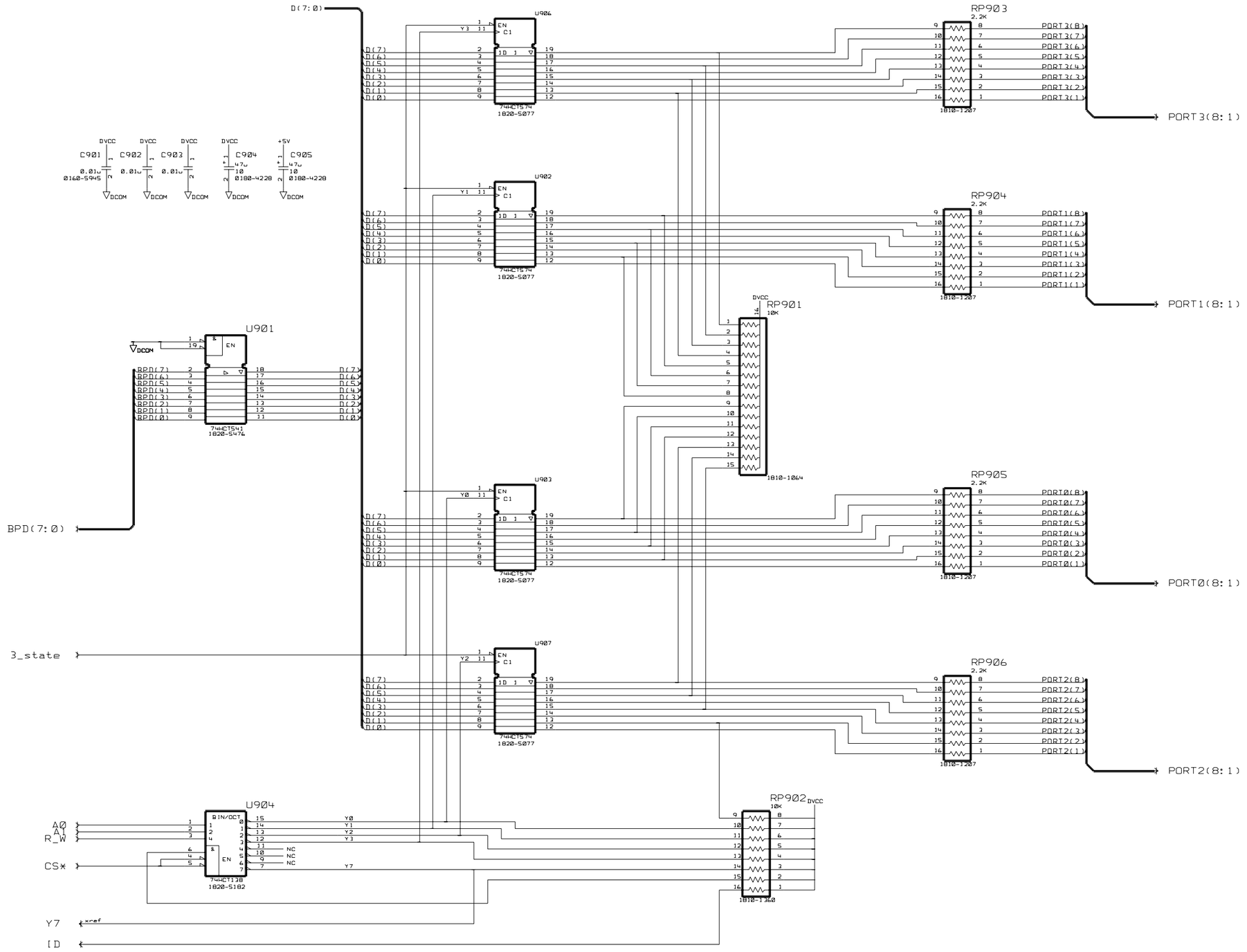
Agilent N2282A 1-to-8 Optical Switch MUX
Module Schematic (Sheet 2 of 2)
Page 226

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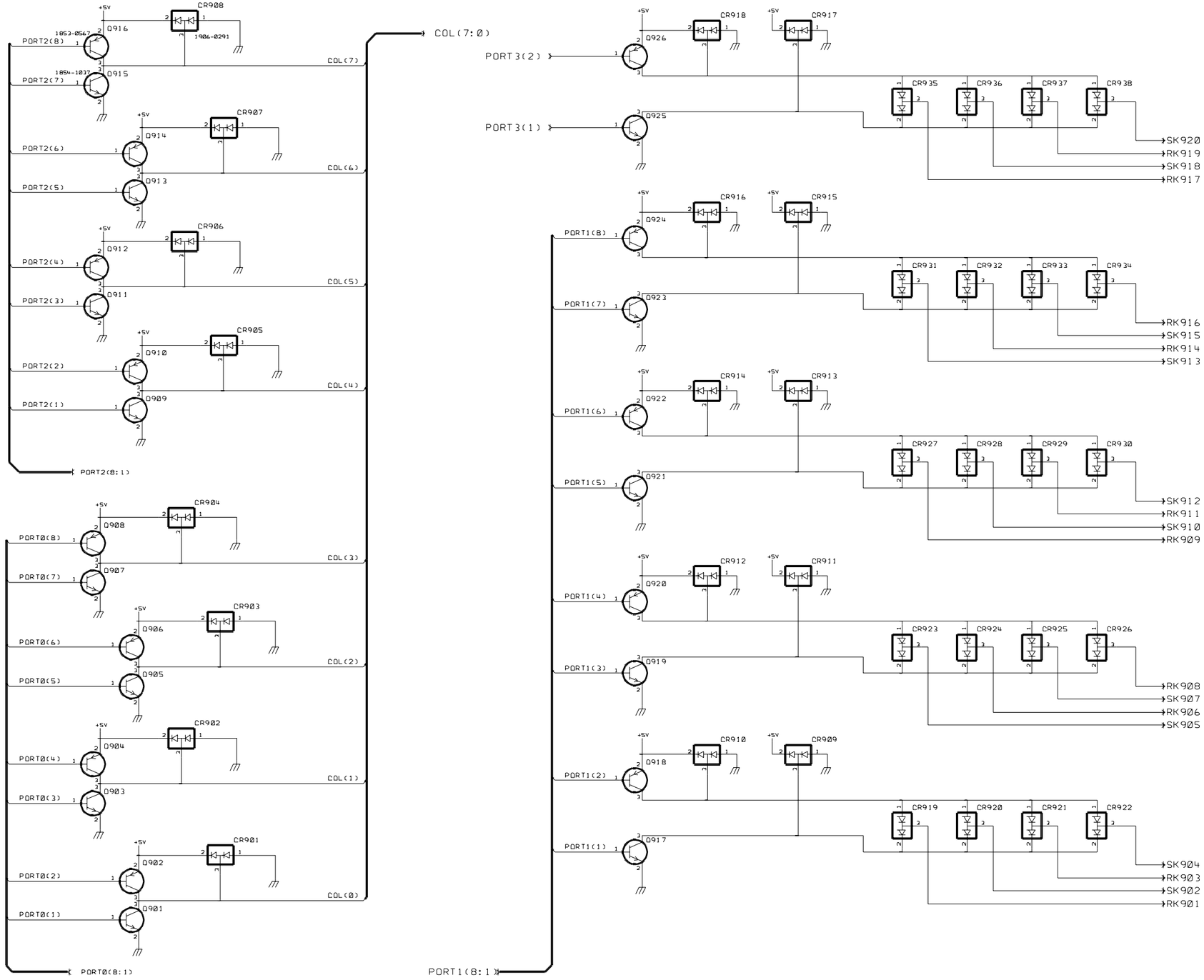
Agilent 44470D 20-Channel MUX Module
Component Locator
Page 227

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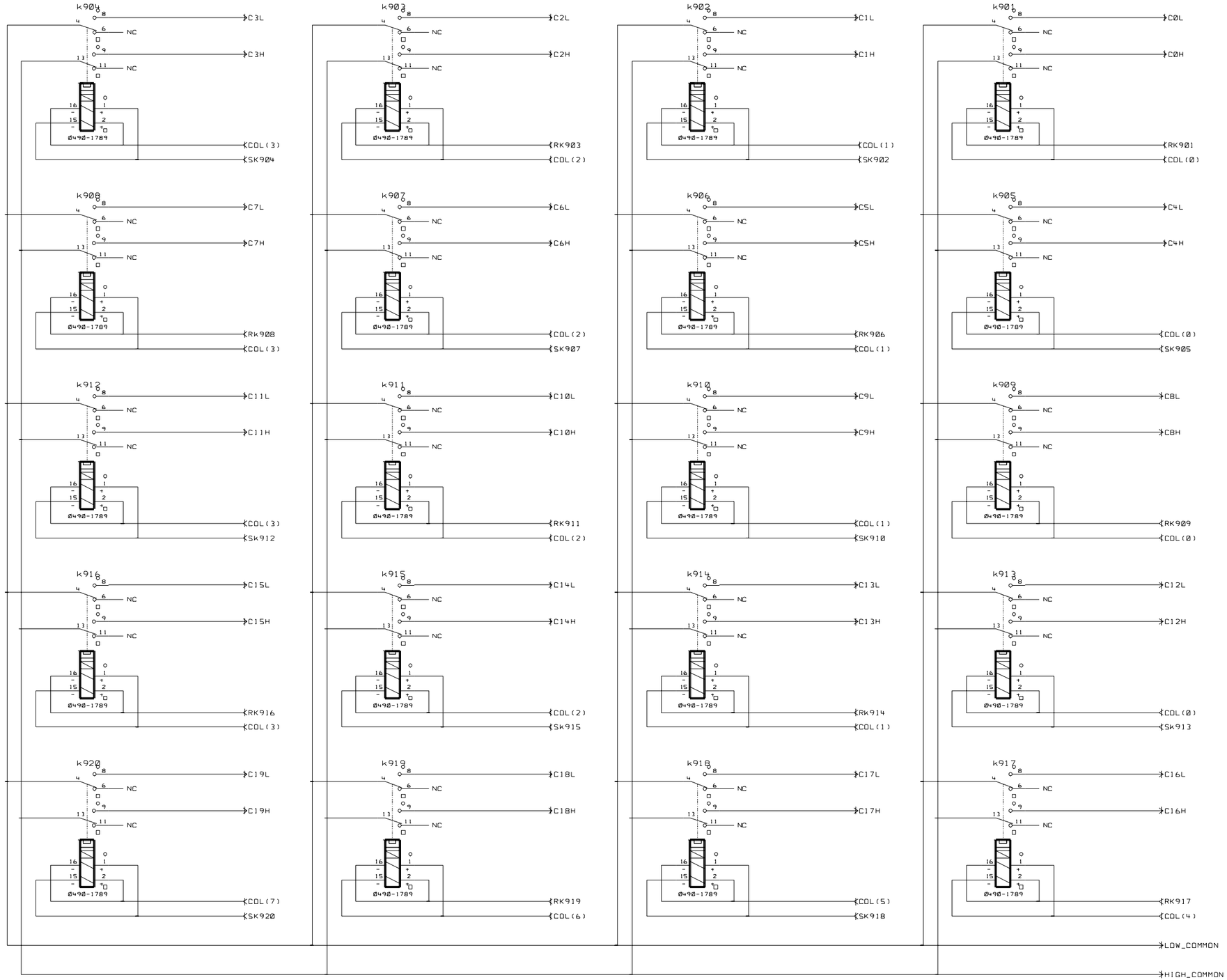
Agilent 44470D 20-Channel MUX Module
Schematic (Sheet 1 of 4)
Page 228

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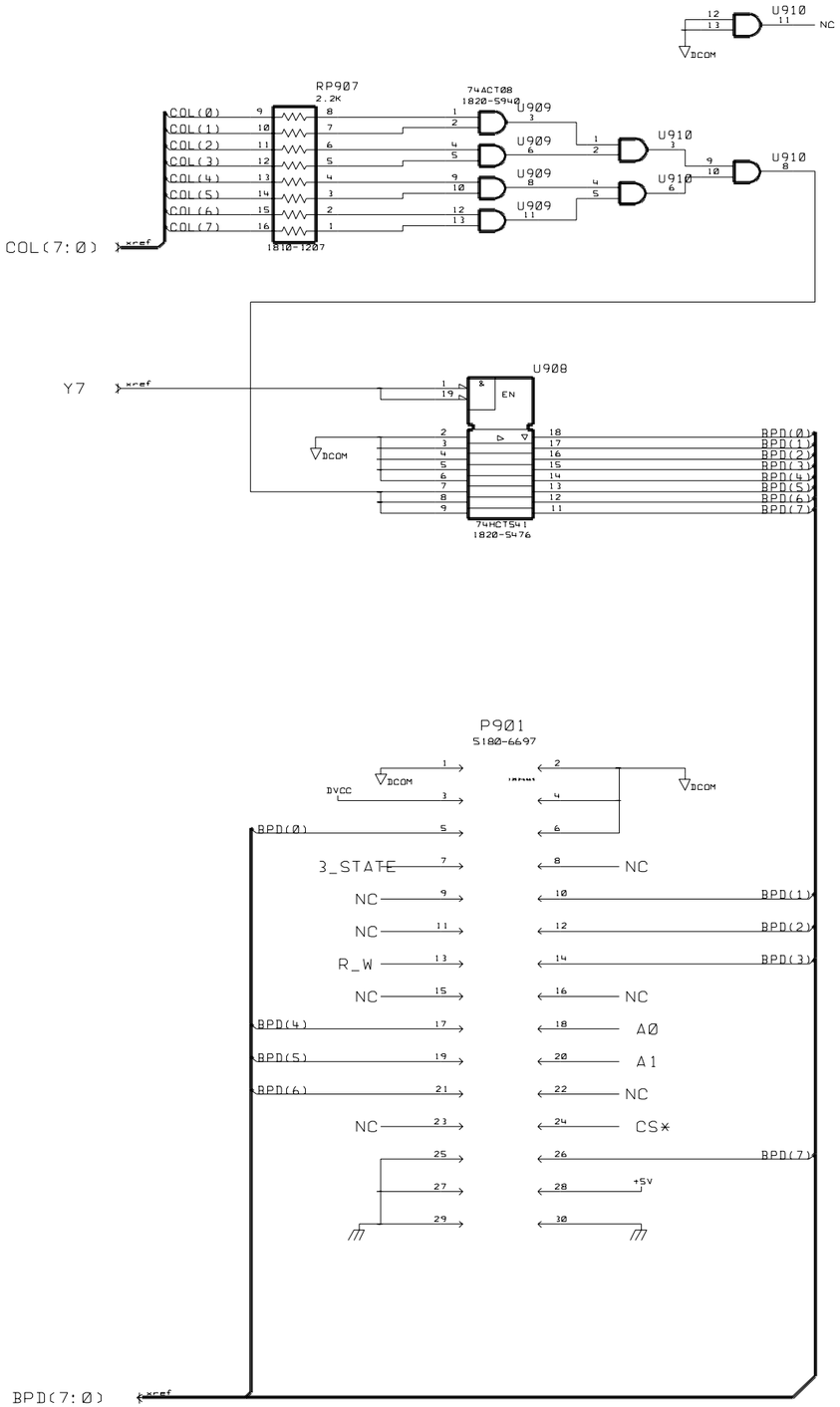
Agilent 44470D 20-Channel MUX Module
Schematic (Sheet 2 of 4)
Page 229

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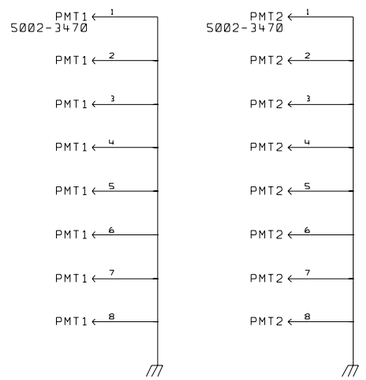
Agilent 44470D 20-Channel MUX Module
Schematic (Sheet 3 of 4)
Page 230

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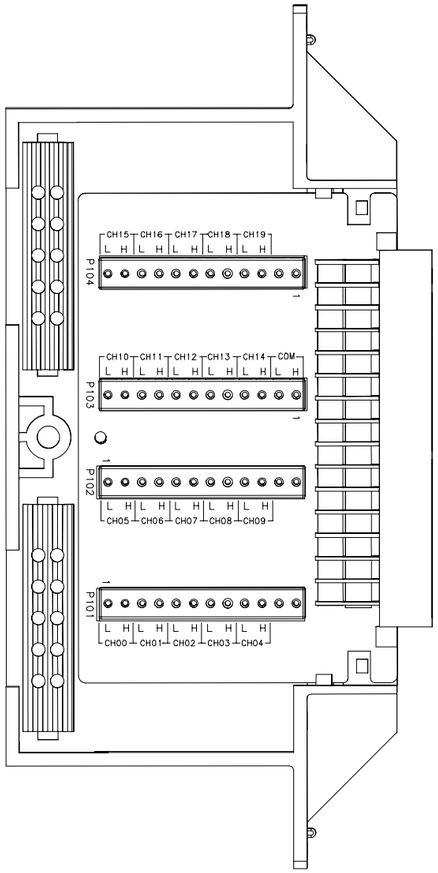


J901
1252-1575

A2 C0L	C2 C0H	E2 C1L
A4 C2L	C4 C2H	E4 C1H
A6 C3L	C6 C3H	E6 C4L
A8 C5L	C8 C5H	E8 C4H
A10 C6L	C10 C6H	E10 C7L
A12 C8L	C12 C8H	E12 C7H
A14 C9L	C14 C9H	E14 NC
A16 LOW_COMMON	C16 NC	E16 HIGH_COMMON
A18 C10L	C18 C10H	E18 C11L
A20 C12L	C20 C12H	E20 C11H
A22 C13L	C22 C13H	E22 C14L
A24 C15L	C24 C15H	E24 C14H
A26 C16L	C26 C16H	E26 C17L
A28 C18L	C28 C18H	E28 C17H
A30 C19L	C30 C19H	E30 NC
A32 NC	C32 NC	E32 NC



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J101
1252-1577

A2	C0L	1	P101
C2	C0H	2	P101
E2	C1L	3	P101
E4	C1H	4	P101
A4	C2L	5	P101
C4	C2H	6	P101
A6	C3L	7	P101
C6	C3H	8	P101
E6	C4L	9	P101
E8	C4H	10	P101
NC		11	P101
NC		12	P101

Ø360-2624

A8	C5L	1	P102
C8	C5H	2	P102
A10	C6L	3	P102
C10	C6H	4	P102
E10	C7L	5	P102
E12	C7H	6	P102
A12	C8L	7	P102
C12	C8H	8	P102
A14	C9L	9	P102
C14	C9H	10	P102
NC		11	P102
NC		12	P102

Ø360-2624

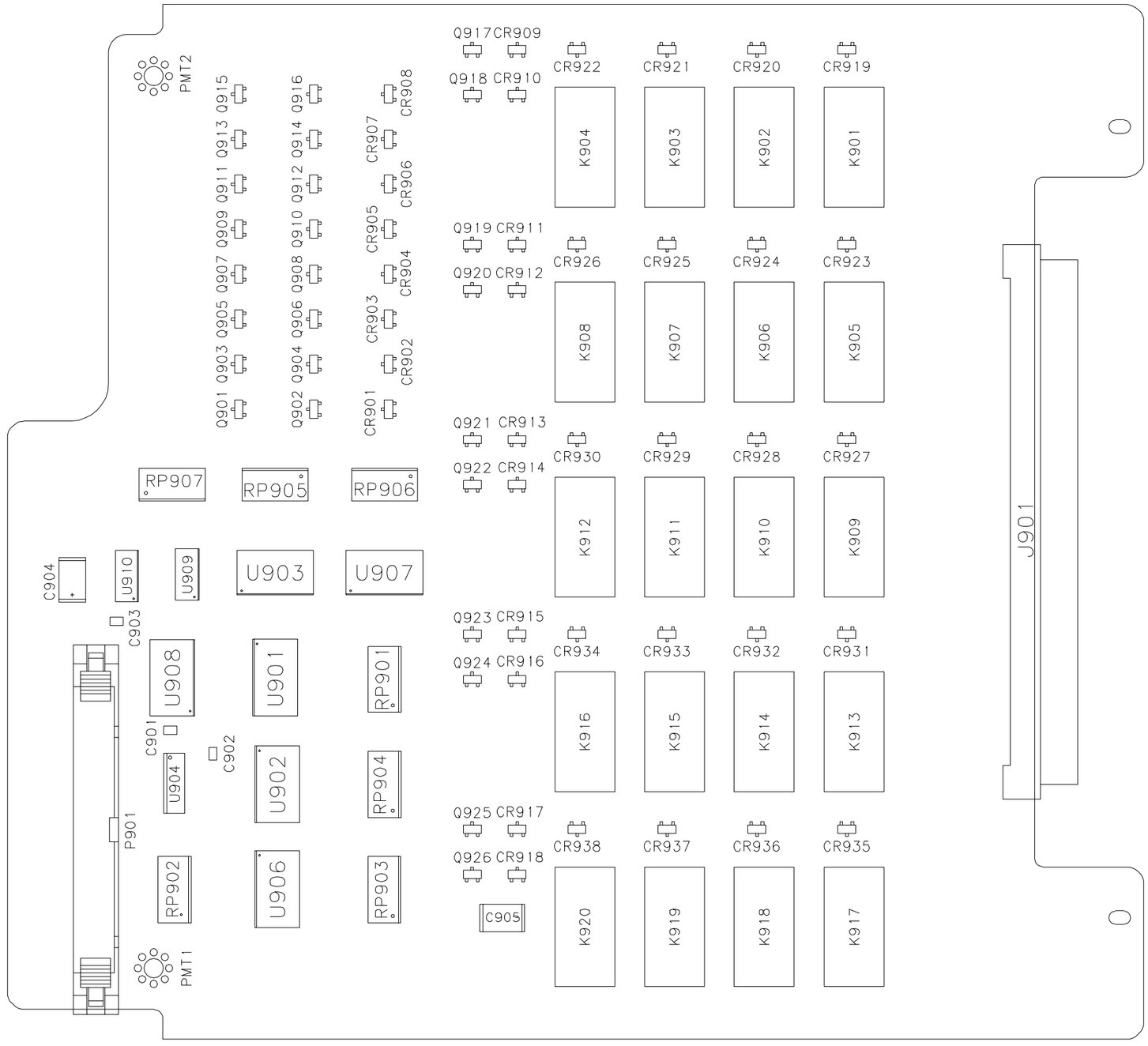
A18	C10L	12	P103
C18	C10H	11	P103
E18	C11L	10	P103
E20	C11H	9	P103
A20	C12L	8	P103
C20	C12H	7	P103
A22	C13L	6	P103
C22	C13H	5	P103
E22	C14L	4	P103
E24	C14H	3	P103
A16	LOW_COMMON	2	P103
E16	HIGH_COMMON	1	P103

Ø360-2624

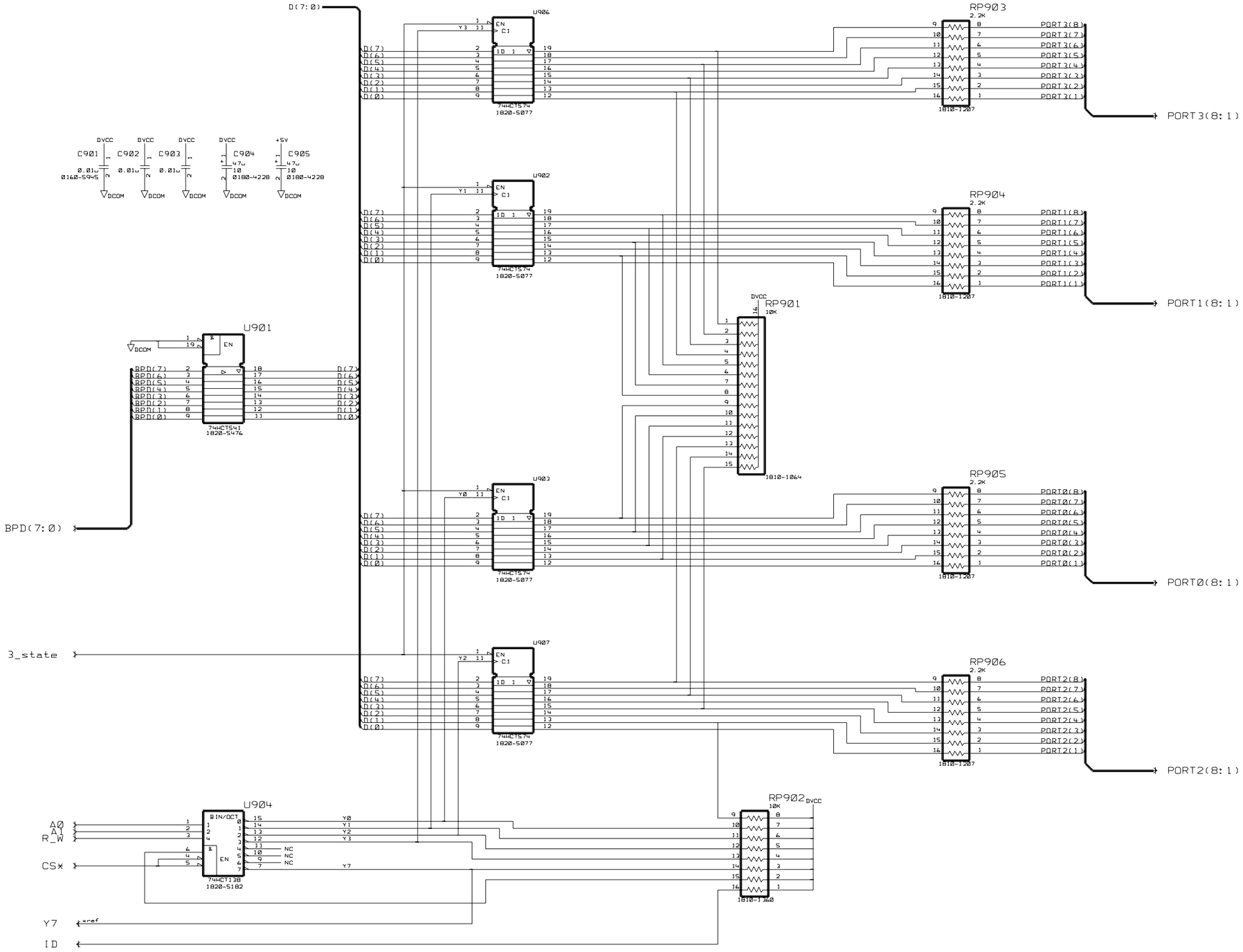
A24	C15L	12	P104
C24	C15H	11	P104
A26	C16L	10	P104
C26	C16H	9	P104
E26	C17L	8	P104
E28	C17H	7	P104
A28	C18L	6	P104
C28	C18H	5	P104
A30	C19L	4	P104
C30	C19H	3	P104
NC		2	P104
NC		1	P104

A32 NC	C16 NC	E14 NC
	C32 NC	E30 NC
		E32 NC

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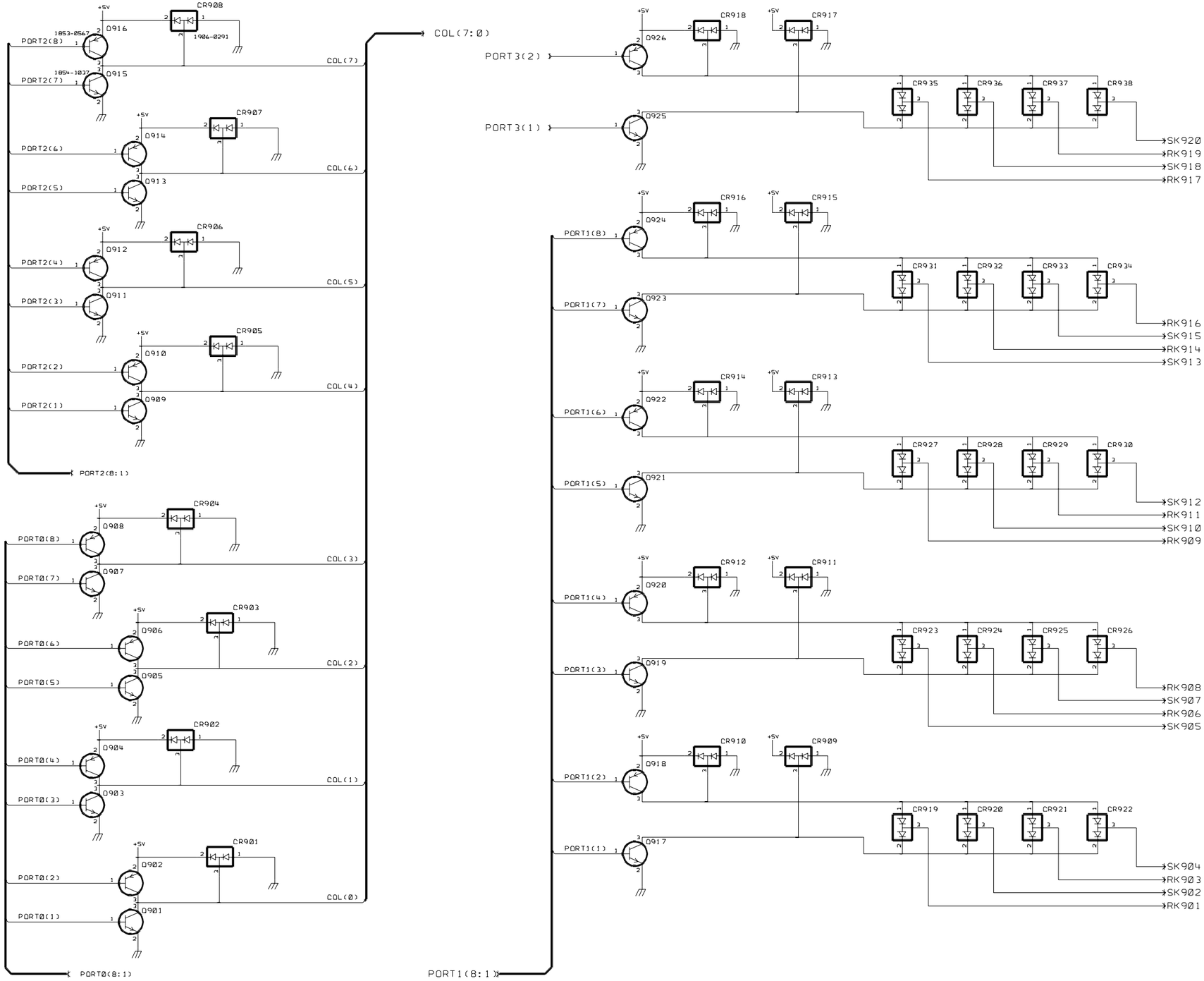


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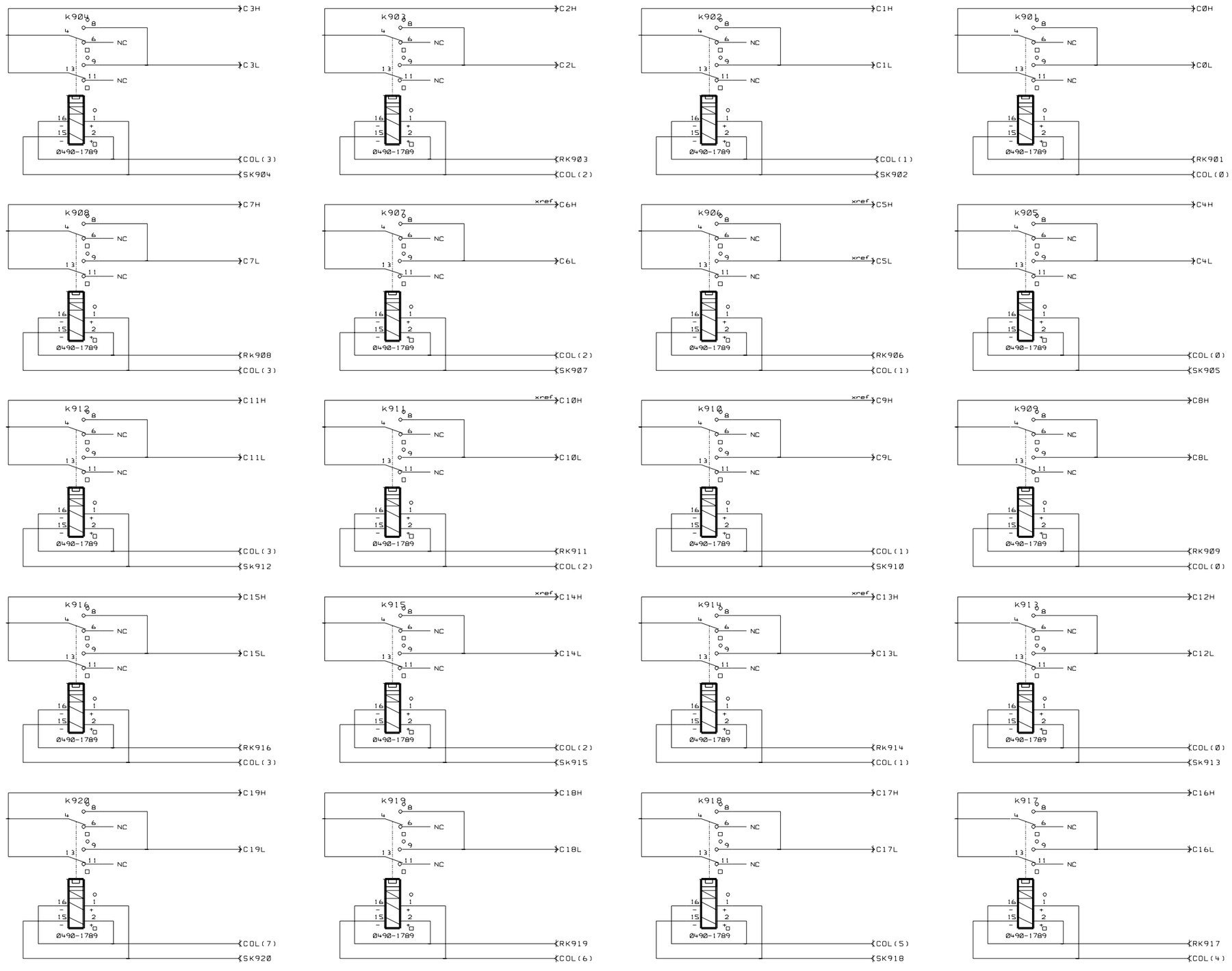
Agilent 44471D 20-Channel GP Relay
Module Schematic (Sheet 1 of 4)
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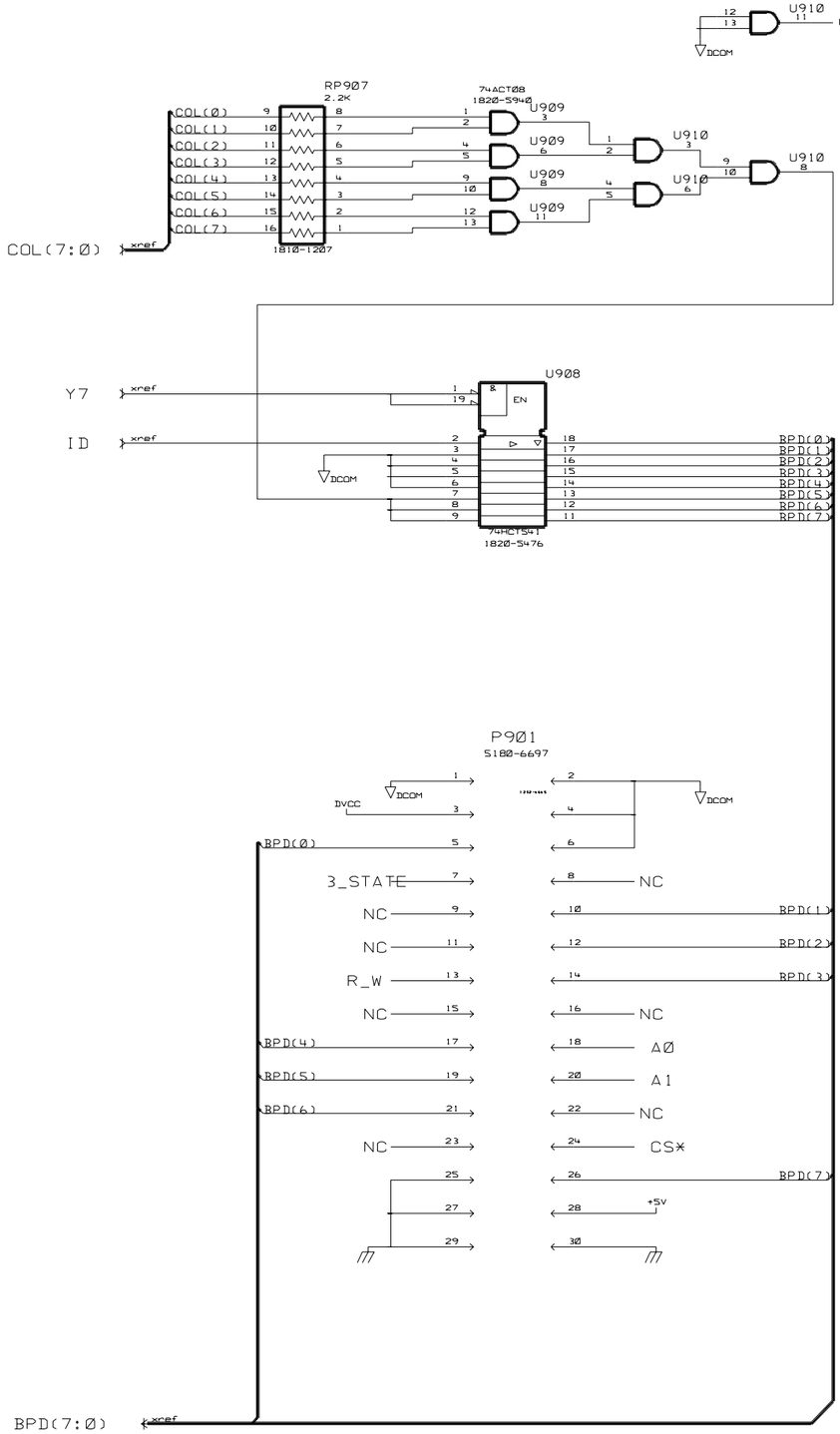
Agilent 44471D 20-Channel GP Relay Module Schematic (Sheet 2 of 4)
Page 235

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Agilent 44471D 20-Channel GP Relay
Module Schematic (Sheet 3 of 4)
Page 236

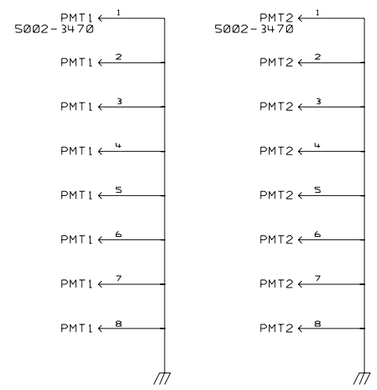
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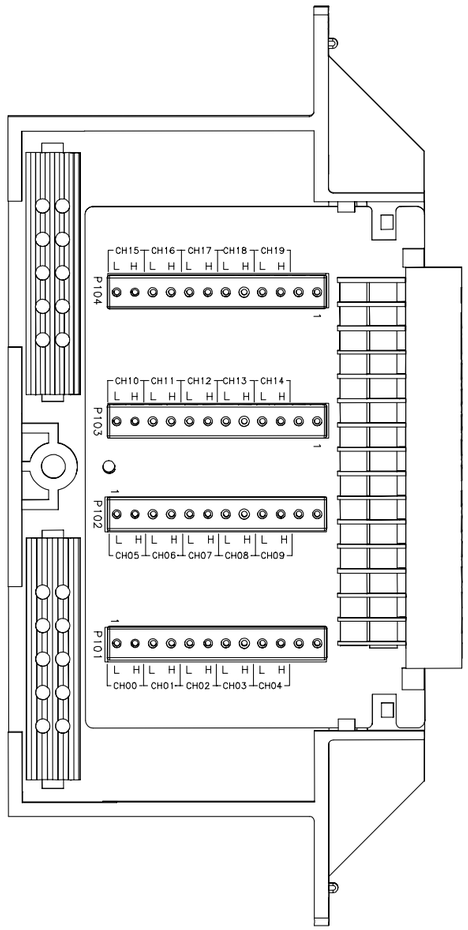
J901

1252-1575

A2 C0L	C2 C0H	E2 C1L
A4 C2L	C4 C2H	E4 C1H
A6 C3L	C6 C3H	E6 C4L
A8 C5L	C8 C5H	E8 C4H
A10 C6L	C10 C6H	E10 C7L
A12 C8L	C12 C8H	E12 C7H
A14 C9L	C14 C9H	E14 NC
A16 NC	C16 NC	E16 NC
A18 C10L	C18 C10H	E18 C11L
A20 C12L	C20 C12H	E20 C11H
A22 C13L	C22 C13H	E22 C14L
A24 C15L	C24 C15H	E24 C14H
A26 C16L	C26 C16H	E26 C17L
A28 C18L	C28 C18H	E28 C17H
A30 C19L	C30 C19H	E30 NC
A32 NC	C32 NC	E32 NC



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J101
1252-1577

A2	C0L	1	P101		
C2	C0H	2	P101		
E2	C1L	3	P101		
E4	C1H	4	P101		
A4	C2L	5	P101		
C4	C2H	6	P101		
A6	C3L	7	P101		
C6	C3H	8	P101		
E6	C4L	9	P101		
E8	C4H	10	P101		
NC		11	P101		
NC		12	P101		

Ø360-2624

A8	C5L	1	P102		
C8	C5H	2	P102		
A10	C6L	3	P102		
C10	C6H	4	P102		
E10	C7L	5	P102		
E12	C7H	6	P102		
A12	C8L	7	P102		
C12	C8H	8	P102		
A14	C9L	9	P102		
C14	C9H	10	P102		
NC		11	P102		
NC		12	P102		

Ø360-2624

A18	C10L	12	P103		
C18	C10H	11	P103		
E18	C11L	10	P103		
E20	C11H	9	P103		
A20	C12L	8	P103		
C20	C12H	7	P103		
A22	C13L	6	P103		
C22	C13H	5	P103		
E22	C14L	4	P103		
E24	C14H	3	P103		
NC		2	P103		
NC		1	P103		

Ø360-2624

A24	C15L	12	P104		
C24	C15H	11	P104		
A26	C16L	10	P104		
C26	C16H	9	P104		
E26	C17L	8	P104		
E28	C17H	7	P104		
A28	C18L	6	P104		
C28	C18H	5	P104		
A30	C19L	4	P104		
C30	C19H	3	P104		
NC		2	P104		
NC		1	P104		

A16 NC	C16 NC	E14 NC
A32 NC	C32 NC	E16 NC
		E30 NC
		E32 NC

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