

SCT/PIXEL Grounding and Shielding Schematics
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These 5 schematics show a proposed SCT cable configuration. The most significant change is the proposed elimination of 2 pairs (4 conductors) in the module power tape.

Schematic 1 details a different configuration of conductors to support the temperature monitoring.

Schematic 2 is a block diagram of the cabling as a whole.

Schematic 3 shows the PP1 board.

Schematic 4 shows the PP2 board.

Schematic 5 shows the PP3 board.

DETAILS on each schematic:

Schematic 1

The temperature monitoring here would use DGND/TEMP1 as the current bias pair for the module thermistor. TEMP1 would be tapped at PP2 by TEMP2 to provide information on the temperature variation of the resistance of the TEMP1 path. DG_SENSE would monitor the low potential of the thermistor. TEMP1/TEMP2 senses the high potential.

DG_SENSE would be loaded by 2 high input impedance instrumentation amplifiers at the power supply end. With co-ordination between the temperature and power supply module designs, this should not be a problem. If carefully done, this path senses the low thermistor potential with negligible error, independent of temperature.

The temperature module front-end will need to use a supply referenced to the respective module supply DGND (or DG) potential. To avoid pickup, this is necessary in any case.

Schematic 2

This schematic shows our best understanding at UCSC of the cable layout. It includes a lower conductor count.

Note that the cabling from PP3 to the entry to the heat shield gets a wrap of 50 μm of aluminum foil. So there is a continuous cable shield, except for minor interruptions at the patch panels.

VISET pair (2 conductors) is cut because the 12 chip module is stable now, and the ABC DAC appears to work fine.

PINBIAS RETURN is cut because its current is very small (a few milliamps) and the receiving chip dumps the current into DGND. At PP1 and PP3 PINBIAS gets bypassing to SHIELD along with DGND. For a small well bypassed DC source like this, an independent path is unnecessary. In our bandpass, a source bypassed like this looks like AC ground. If there is a power supply problem with this, let me know.

Four conductors are cut, then. TEMP2, which starts at PP2 is an odd conductor in the conventional cable. Pair it if you must. It seems a waste to do so, since it is well shielded and essentially a DC signal.

The SCT/pixel detector common is shown as unreferenced to earth. Some tie for safety considerations is needed. If possible, this tie will be a lowpass one, below the 50 kHz lower end of the system bandpass. If possible the safety tie should be on the power supply side of the PP3 chokes.

Schematic 3

PP1 provides commoning for all the conductors in a bundle of 6 tapes. The heat spreader plate is tied tight to the thermal shield, so it is treated as the commoning plate. The RESET trace is the only conductor not getting bypassing at PP1.

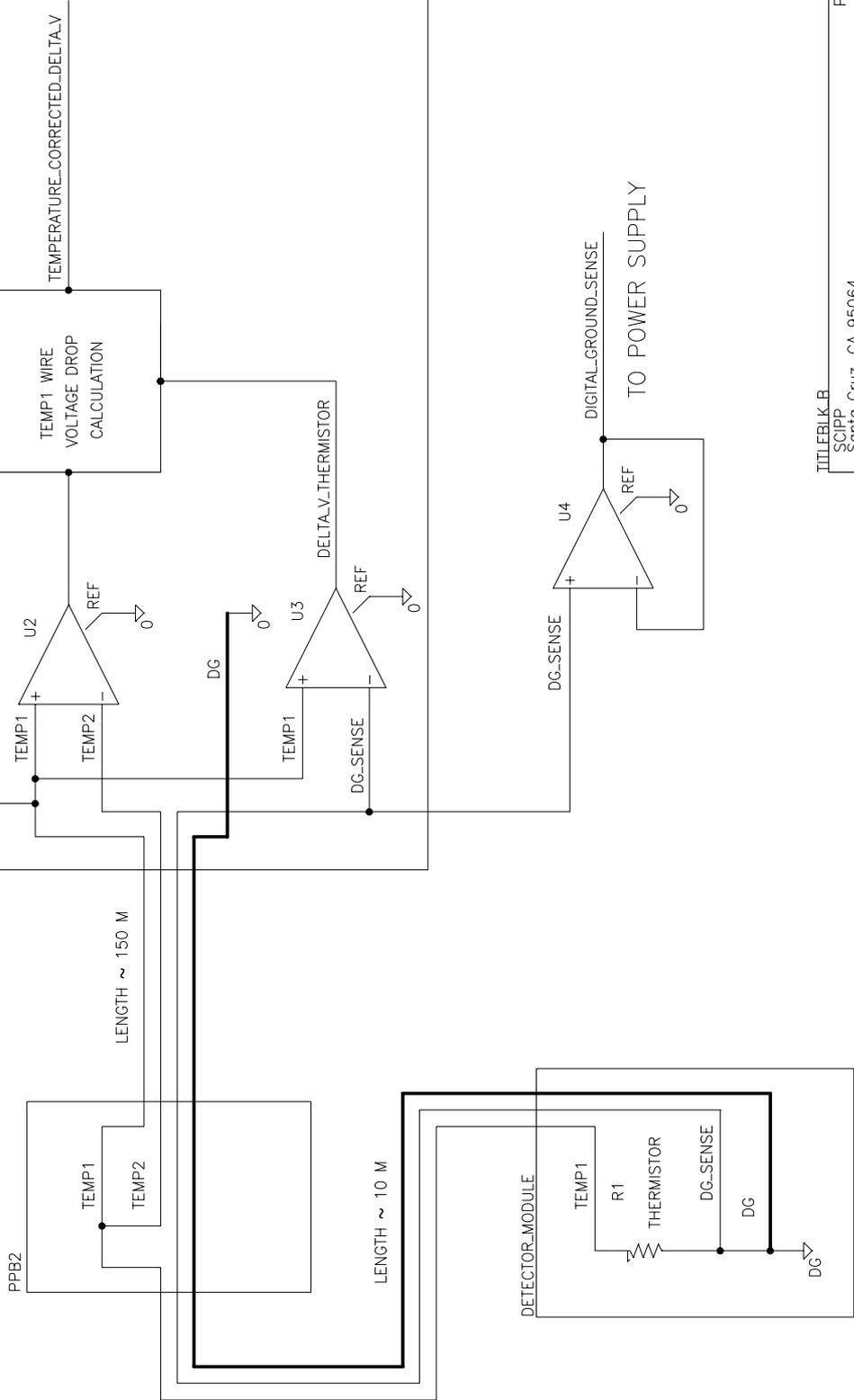
Schematic 4

PP2 has the tie from TEMP1 to the TEMP2 monitoring conductor. The specific tie between the shield and heat spreader foot provides a tie between the power tape foil wrap and the small conventional cable shield.

Schematic 5

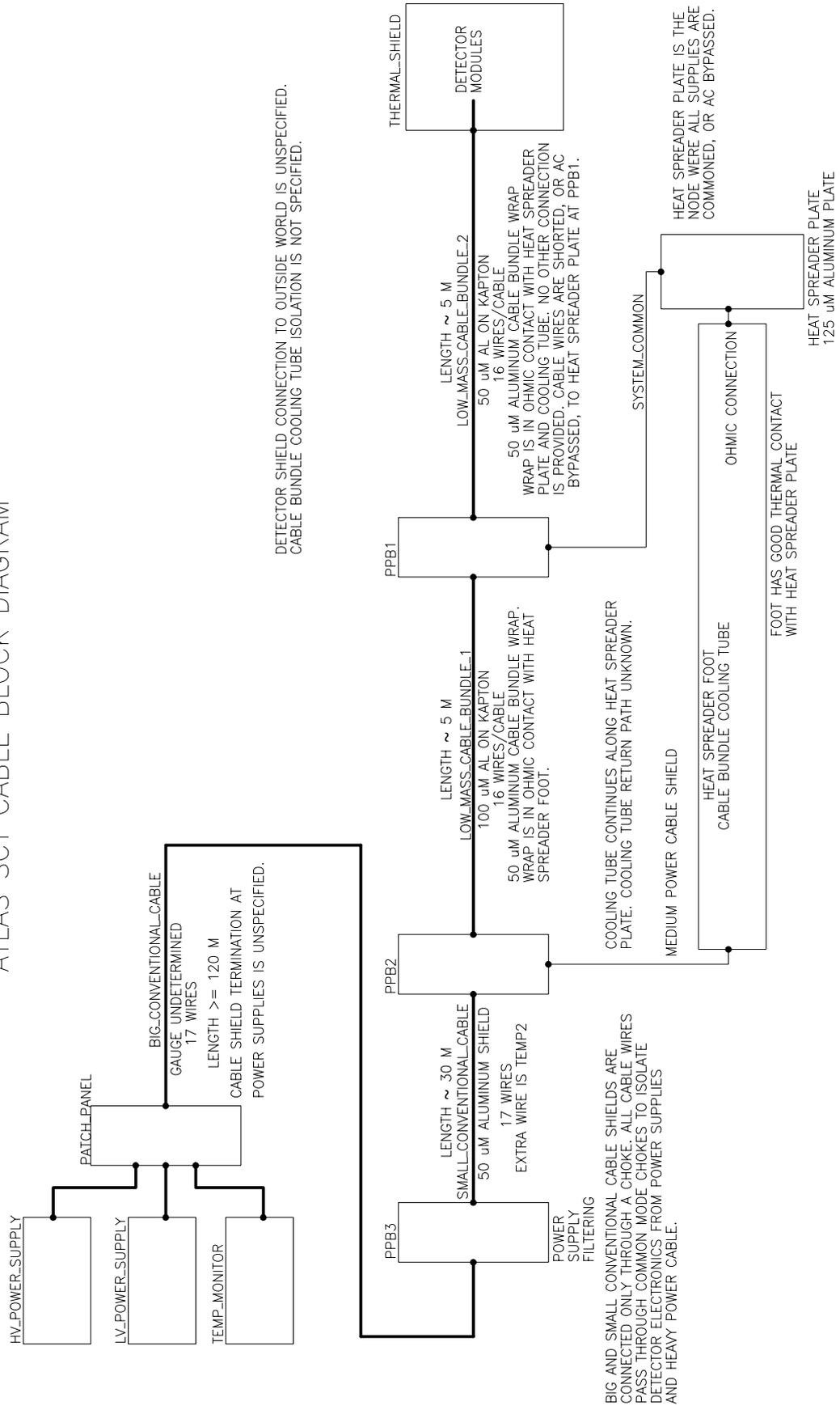
PP3 uses common-mode ferrite chokes to decouple the long cable runs to the power supply from the module environment. This unit will need some magnetic shielding so that the field for the ferrites is less than 60 gauss. A standard soft steel tube with open ends for each PP3 board will probably work well. The rise time for the RESET signal using the 0.2 μ F load to DGND is 3.5 μ s.

SCHEMATIC 1 ATLAS SCT DETECTOR MODULE TEMPERATURE READOUT



PLACE DG-SENSE CONNECTION
AT THERMISTOR LEAD

SCHEMATIC 2 ATLAS SCT CABLE BLOCK DIAGRAM



DETECTOR SHIELD CONNECTION TO OUTSIDE WORLD IS UNSPECIFIED.
CABLE BUNDLE COOLING TUBE ISOLATION IS NOT SPECIFIED.

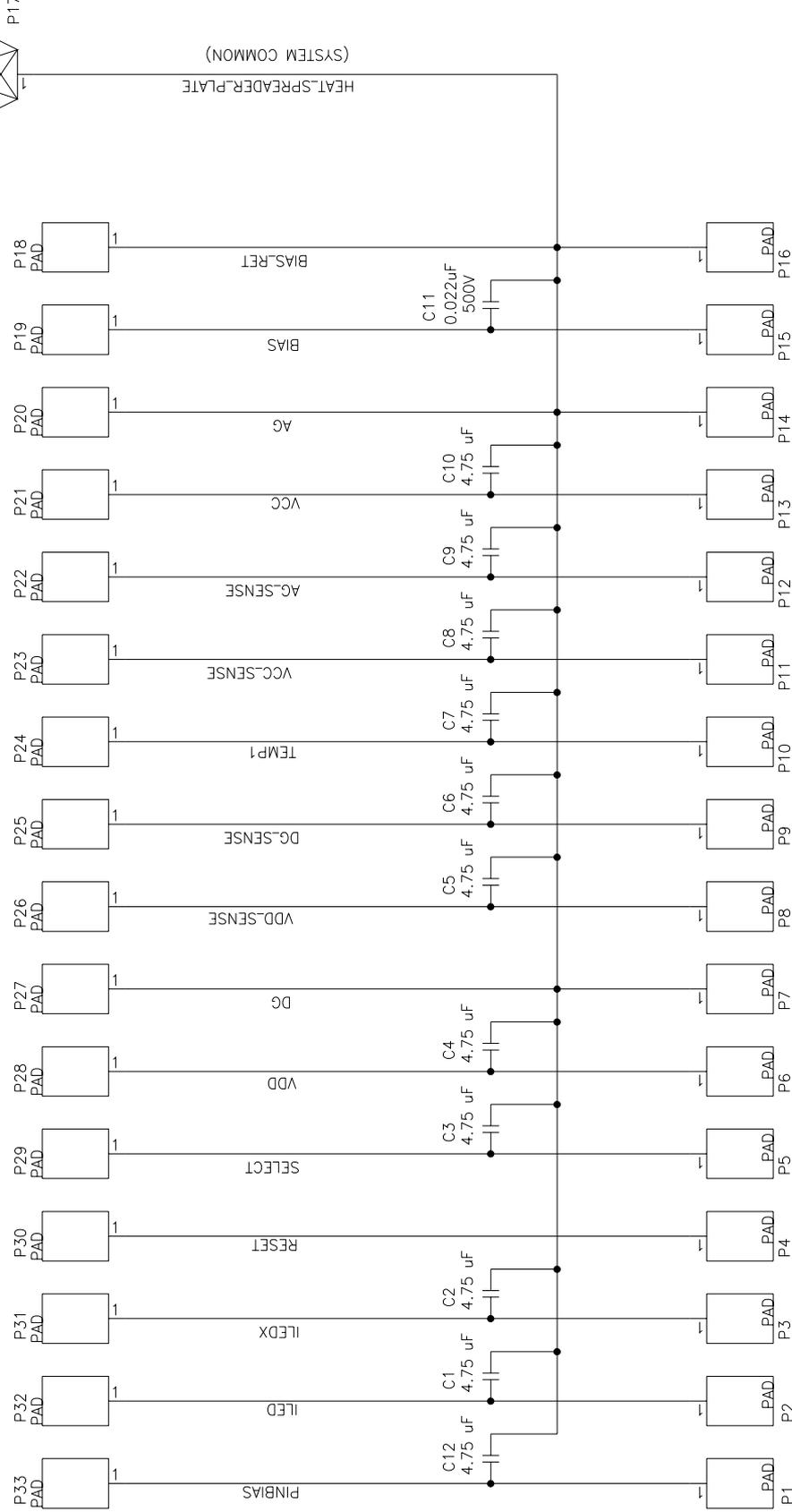
SCHEMATIC 3

ATLAS SCT POWER SUPPLY PATCH PANEL 1 (PPB1)

CONNECTION TO HEAT SPREADER PLATE:
 1) LOW INDUCTANCE
 2) LOW RESISTANCE
 3) CORROSION AND OXIDATION RESISTANT

THE HEAT SPREADER PLATE IS THE NODE
 WERE ALL SUPPLIES ARE COMMONED.

ATTACHMENT PADS FOR ONE
 POWER TAPE FROM PATCH PANEL 2.



ATTACHMENT PADS FOR ONE
 POWER TAPE TO DETECTOR MODULE

12 POWER TAPES PER BOARD:
 SIX TAPES WITH 100 μ M ALUMINUM
 SIX TAPES WITH 50 μ M ALUMINUM
 USE MURATA X5R DIELECTRIC CAPACITORS

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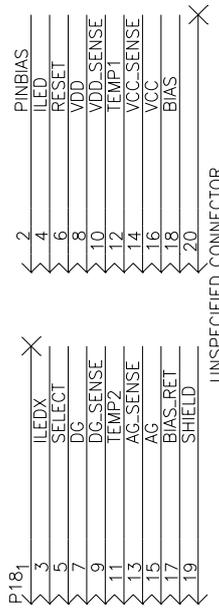
ATLAS SCT POWER SUPPLY
 PATCH PANEL 1 (PPB1)

Revision: 1.0

10/28/99

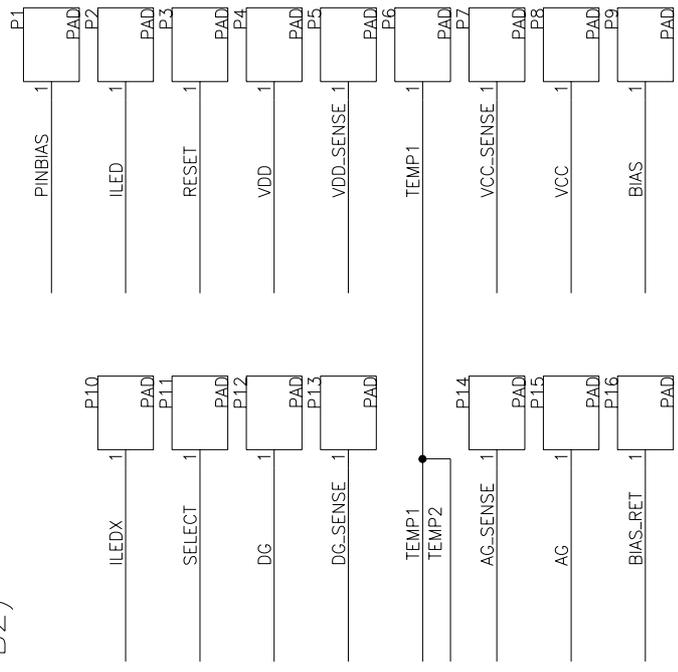
PPB1.SCH
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SCHEMATIC 4 ATLAS SCT POWER SUPPLY PATCH PANEL 2 (PPB2)

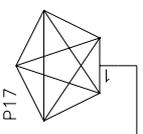


UNSPECIFIED_CONNECTOR

CABLE CONNECTOR FOR ONE
SMALL CONVENTIONAL CABLE FROM
FROM POWER SUPPLY FILTERS AT PP3.



CONNECTION TO HEAT SPREADER FOOT:
1) LOW INDUCTANCE
2) LOW RESISTANCE
3) CORROSION AND OXIDATION RESISTANT



SHIELD

ATTACHMENT PADS FOR
POWER TAPE TO PATCH PANEL 1

SIX POWER TAPES PER BOARD.

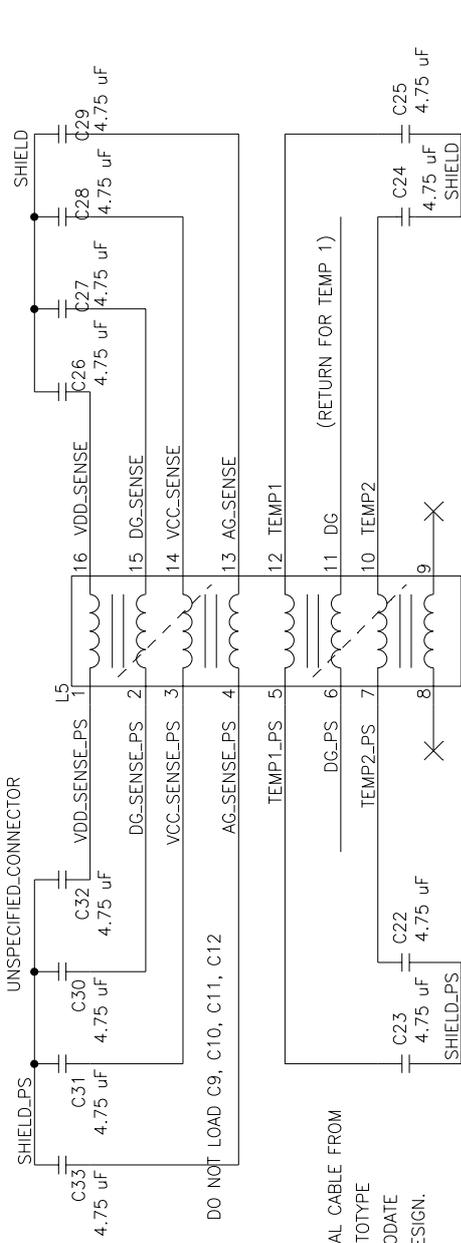
SCHEMATIC 5 ATLAS SCT POWER SUPPLY PATCH PANEL 3 (PPB3)

P1 AND P2 PIN ASSIGNMENT IS ARBITRARY AND IS NOT INTENDED TO INDICATE A PREFERRED ASSIGNMENT OF WIRES TO TWISTED PAIRS. "-PS" WIRE SUFFIX DENOTES WIRES COMING FROM POWER SUPPLY.

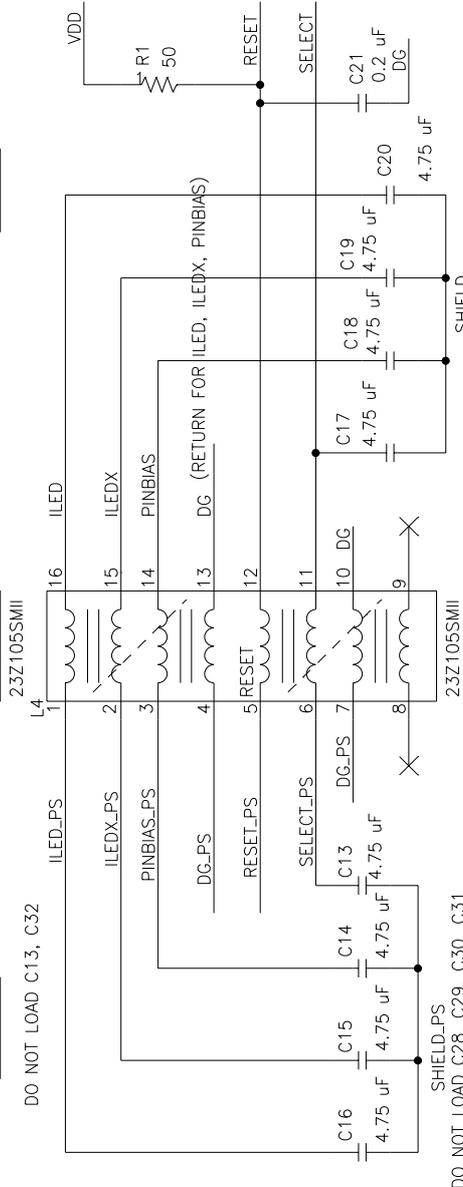
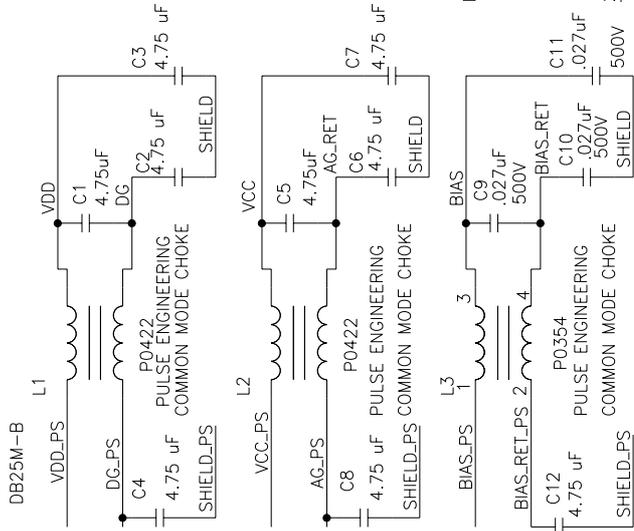
1	PINBIAS_PS
2	ILED_PS
3	ILEDX_PS
4	RESET_PS
5	SELECT_PS
6	VDD_PS
7	DG_PS
8	VDD_SENSE_PS
9	DG_SENSE_PS
10	TEMP1_PS
11	VCC_SENSE_PS
12	AG_SENSE_PS
13	VCC_PS
14	AG_PS
15	BIAS_PS
16	BIAS_RET_PS
17	SHIELD_PS
18	
19	
20	
21	
22	
23	
24	
25	

2	PINBIAS
3	ILED
4	RESET
5	VDD
6	DG
7	VDD_SENSE
8	DG_SENSE
9	TEMP1
10	VCC_SENSE
11	TEMP2
12	VCC
13	VCC_SENSE
14	AG
15	AG_SENSE
16	BIAS
17	BIAS_RET
18	SHIELD
19	

POWER CABLE RUNNING BETWEEN PP2 AND PP3 PLUGS INTO CONNECTOR P2. THIS CABLE CONTAINS 1.0 MM²-2 AND 0.1 MM²-2 WIRES. MATING CONNECTOR TO P1 MUST ACCOMMODATE CRIMP PINS FOR BOTH WIRE SIZES.



CONNECTOR FOR BIG CONVENTIONAL CABLE FROM POWER SUPPLIES. THIS IS A PROTOTYPE CONNECTOR. IT WILL NOT ACCOMMODATE LARGER WIRES OF FINAL CABLE DESIGN.



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ATLAS SCT POWER SUPPLY FILTERS AT PP3
PRELIMINARY

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SELECT LINE DOUBLES AS AC CURRENT RETURN FOR RESET LINE THIS REQUIRES SELECT TO BE BYPASSED TO SHIELD, AT PPB3, PPB1, AND DETECTOR MODULE.

23Z105SM COMMON MODE CHOKE CONTAINS TWO FERRITE TORROIDS WOUND WITH 38 AWG MAGNET WIRE. EACH TORROID IS WOUND WITH TWO TWISTED PAIRS, SHOWN CONNECTED BY DOTTED LINES IN THE SCHEMATIC SYMBOL.