Analog Section Control Signals

AFE_DIGITAL_OE

Bus interface and digital control

Spare output from AFE to LCB

Clock DAC Voltage Telemetry

AFE Offset DAC Voltage Telemetry

Notes:
CTC_OUT <= not CDS_latch(0);
INVERT_SIG <= not CDS_latch(1);
NONINV_SIG <= not CDS_latch(2);
INTEGRATE <= not CDS_latch(3);
DC_RESTORE <= not CDS_latch(4);
RESET_INT <= not CDS_latch(5);

tie nets GNDA & GNDA_V close to the AD5391 chip

Connector mounted on bottom Layer 10, accessible layer.

To CCD ADCs Pg. 7 & 8

From CCD ADCs
From BIASes
From CLOCKs
From BIASes
From CLOCKs

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REVISIONS

LTR	DESCRIPTION	ECR	DATE	BY	APPVD
1	U8 pin 10 to clk 3, Pin 7 to clk2, change /teladc0_ dout to teladc0_ dout				
A	see ECO for details	TRNT-007 TRNT-009	MAY2010	DMS	M.Hunten
B	major revision see ECO for details	TRNT-019	MAY2011	DMS	M.Hunten
C	fix cds state connection on U117, optimize for performance See ECO for details	TRNT-025	OCT 2011	DMS	P.Moore
C1	Remove C616, pg 3	TRNT-029	Dec 2011	DMS	r.george

UNLESS OTHERWISE NOTED
Resistors are in Ohms
Capacitors are in micro Farads uF
Inductors are in micro Henrys uH

DIG GND MGND
AGND EGND

NATIONAL OPTICAL ASTRONOMY OBSERVATORIES
OPERATED BY THE
ASSOCIATION OF UNIVERSITIES FOR RESEARCH IN ASTRONOMY
UNDER COOPERATIVE AGREEMENT WITH
NATIONAL SCIENCE FOUNDATION

DO NOT SCALE DRAWING

NEXT ASSEMBLY: TRNT-EL-04-0004

NAME: SCHEMATIC Torrent AFE CCD 01:Control Logic

USED ON: TORRENT

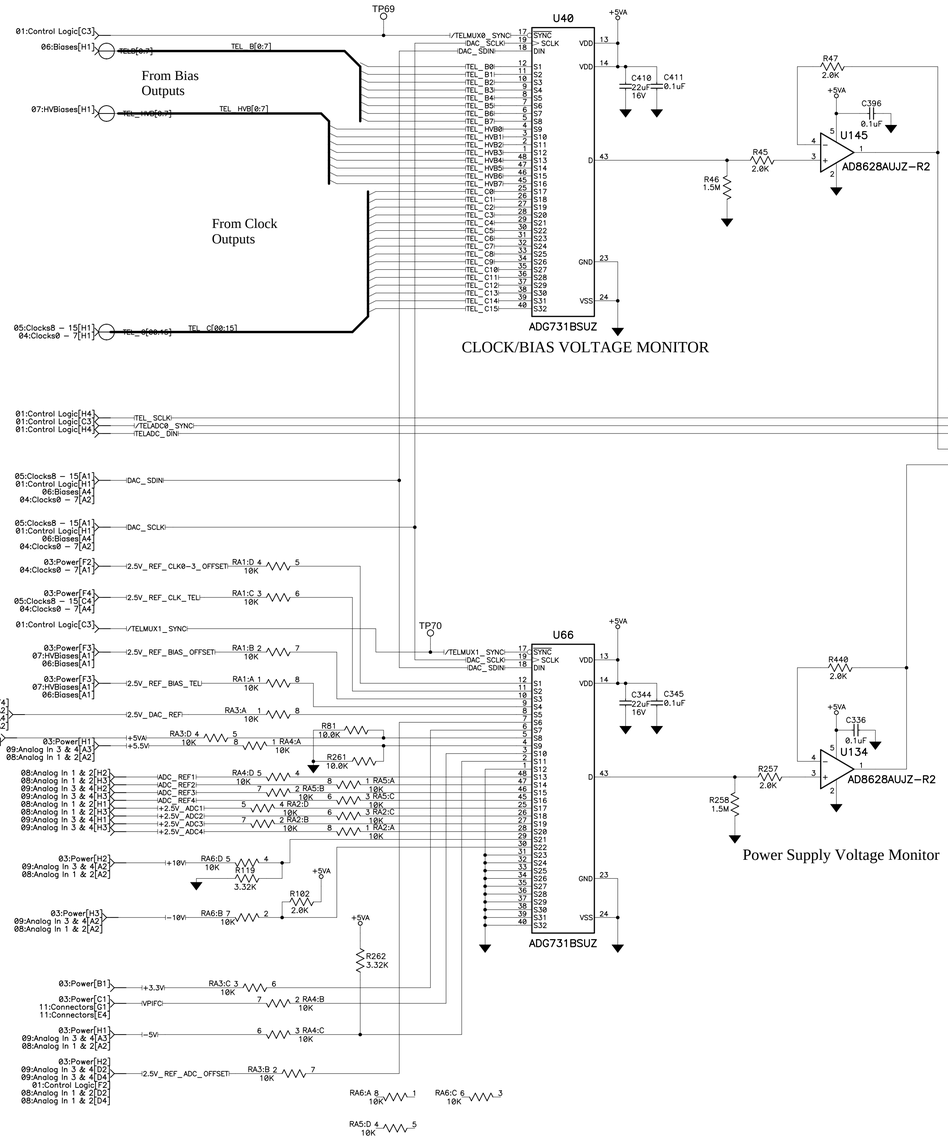
REF:

DWG SIZE: D

REV: C1

SCALE:	DESIGNED BY	DATE	CHECKED BY	DATE	DWG NO
DWG PRODUCED USING: PCAD 2006	Mark Hunten	28JUL08			TRNT-EL-04-2004
	DRAWN BY: Dee Stover	DATE: 30SEP08	APPROVED BY	DATE	
	PRINT ISSUED	DATE	APPROVED BY	DATE	RELEASED

Sheet 1 of 11



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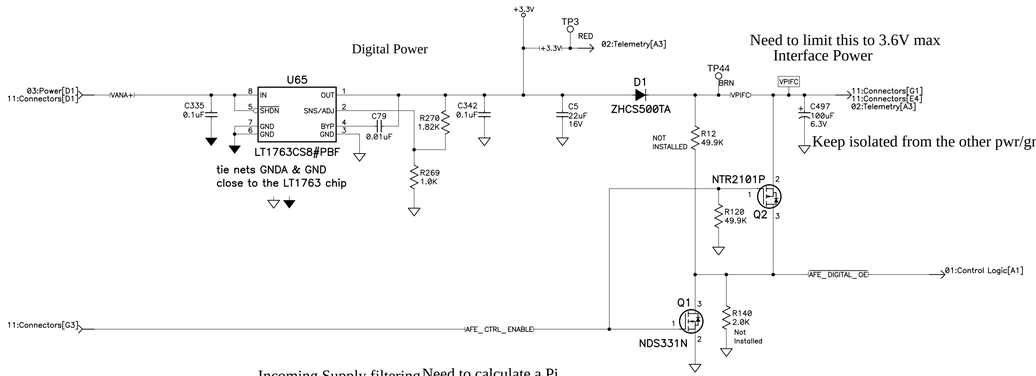
Print Date: Thu Jan 19, 2012

NATIONAL OPTICAL ASTRONOMY OBSERVATORIES			
NAME: SCHEMATIC Torrent AFE CCD 02:Telemetry			
DWG NO: TRNT-EL-04-2004	SIZE: D	REF:	REV: C1
RELEASED		Sheet 2 of 11	

Main Power

Digital Power

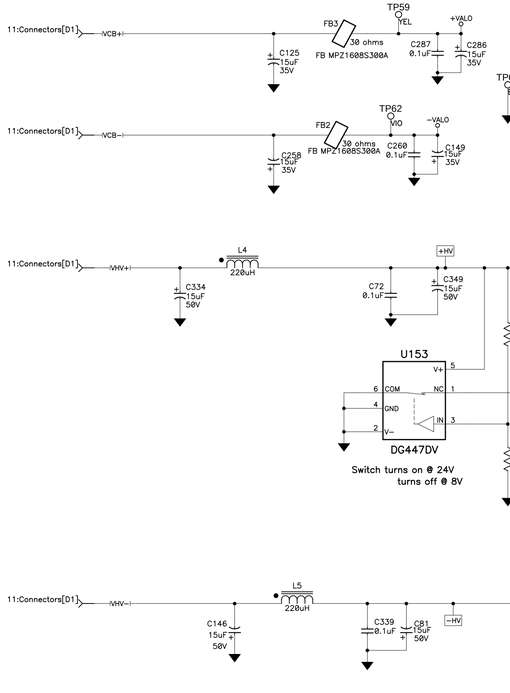


Need to limit this to 3.6V max
Interface Power

Keep isolated from the other pwr/gnd.

Incoming Supply filtering

Need to calculate a Pi circuit for 1MHz



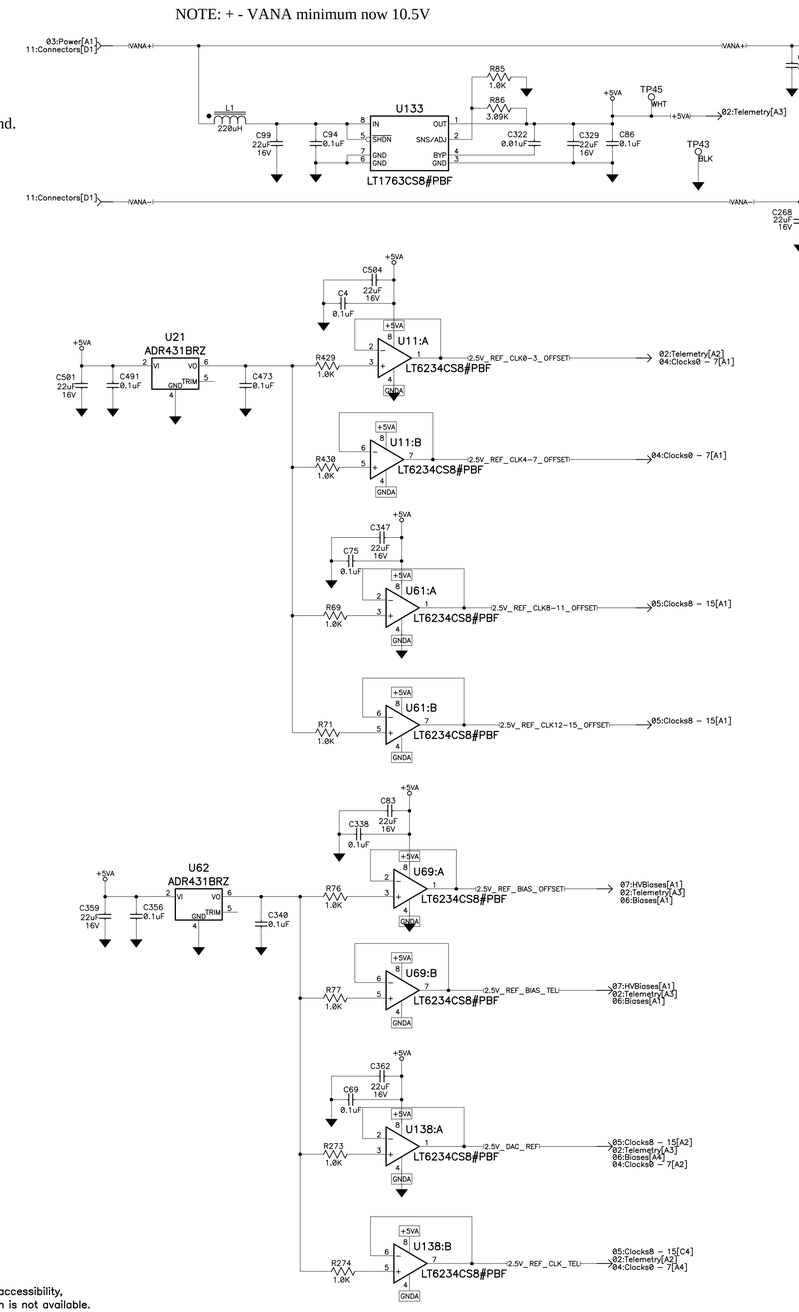
+31.6V / +2.7V

-3.3V / -32.2V

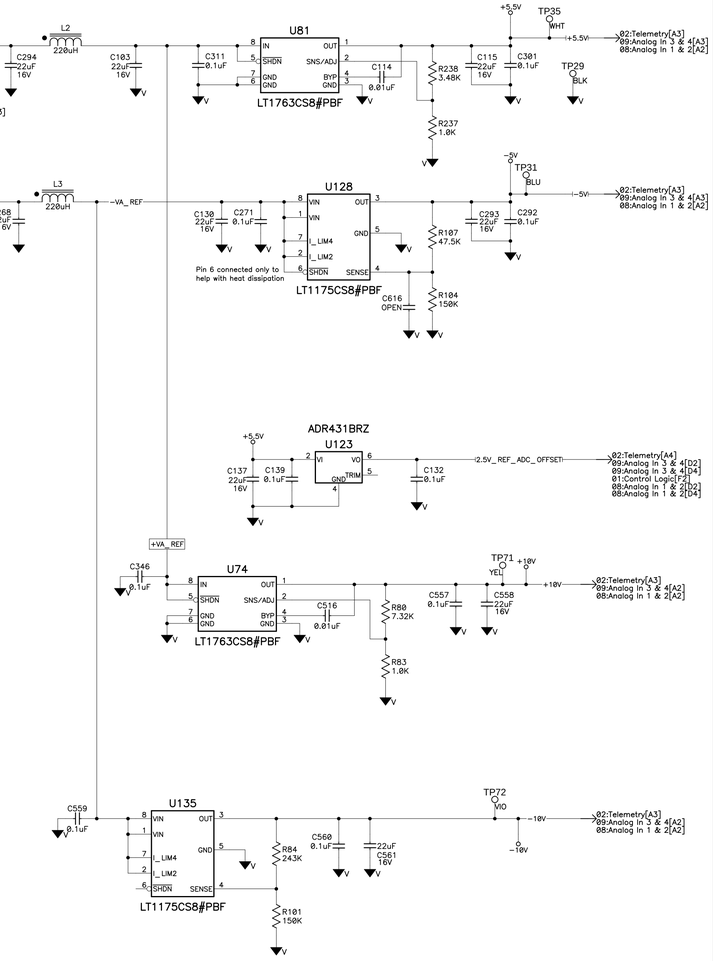
Difference between +VAHI & −VAHI = 31V

Clocks & Biases Power Supplies & References

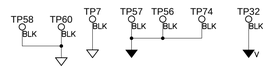
NOTE: + - VANA minimum now 10.5V



Analog low noise Signal Chain Power Supplies and References



Bring test points to the top edge of board for accessibility, connections may be a trace if plane connection is not available.



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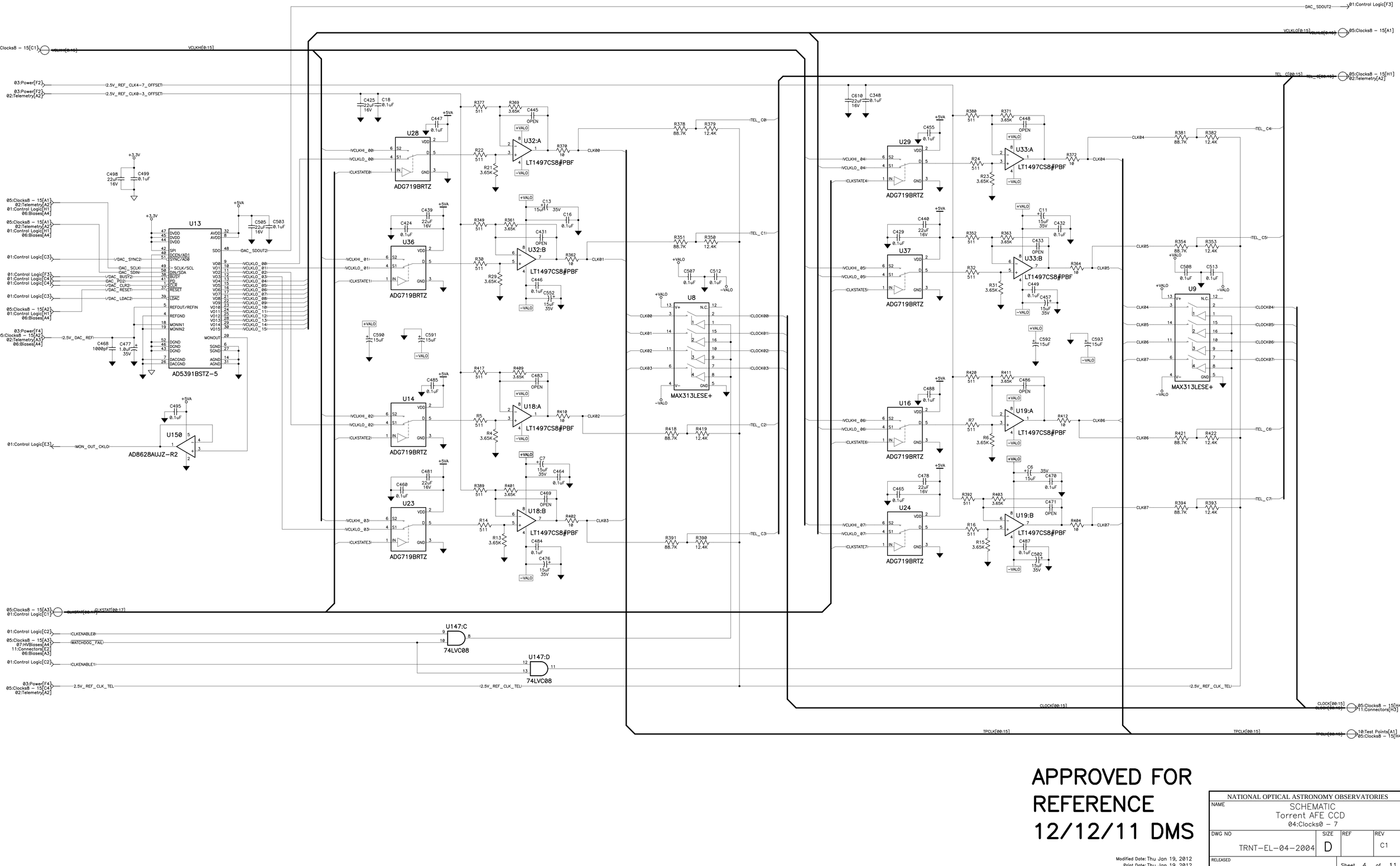
NATIONAL OPTICAL ASTRONOMY OBSERVATORIES			
NAME: SCHEMATIC Torrent AFE CCD Ø3:Power			
DWG NO: TRNT-EL-04-2004	SIZE: D	REF:	REV: C1
RELEASED		Sheet 3 of 11	



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Modified Date: Thu Jan 19, 2012
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NATIONAL OPTICAL ASTRONOMY OBSERVATORIES			
NAME: SCHEMATIC Torrent AFE CCD 04:Clocks0 - 7			
DWG NO: TRNT-EL-04-2004	SIZE: D	REF:	REV: C1
RELEASED		Sheet 4 of 11	

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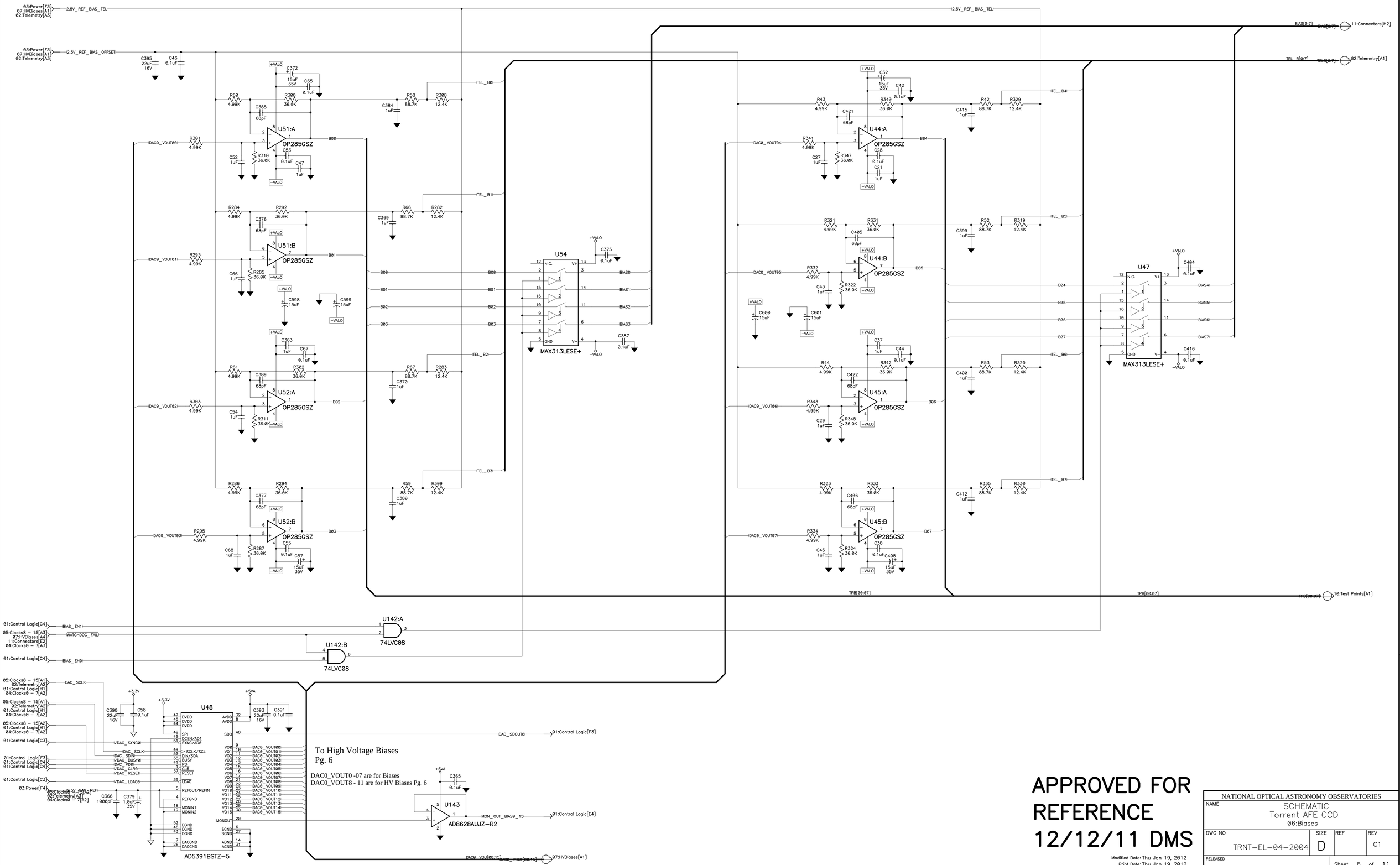
NATIONAL OPTICAL ASTRONOMY OBSERVATORIES			
NAME: SCHEMATIC Torrent AFE CCD 05:Clocks8 – 15			
DWG NO: TRNT–EL–04–2004	SIZE: D	REF:	REV: C1
RELEASED	Sheet 5 of 11		



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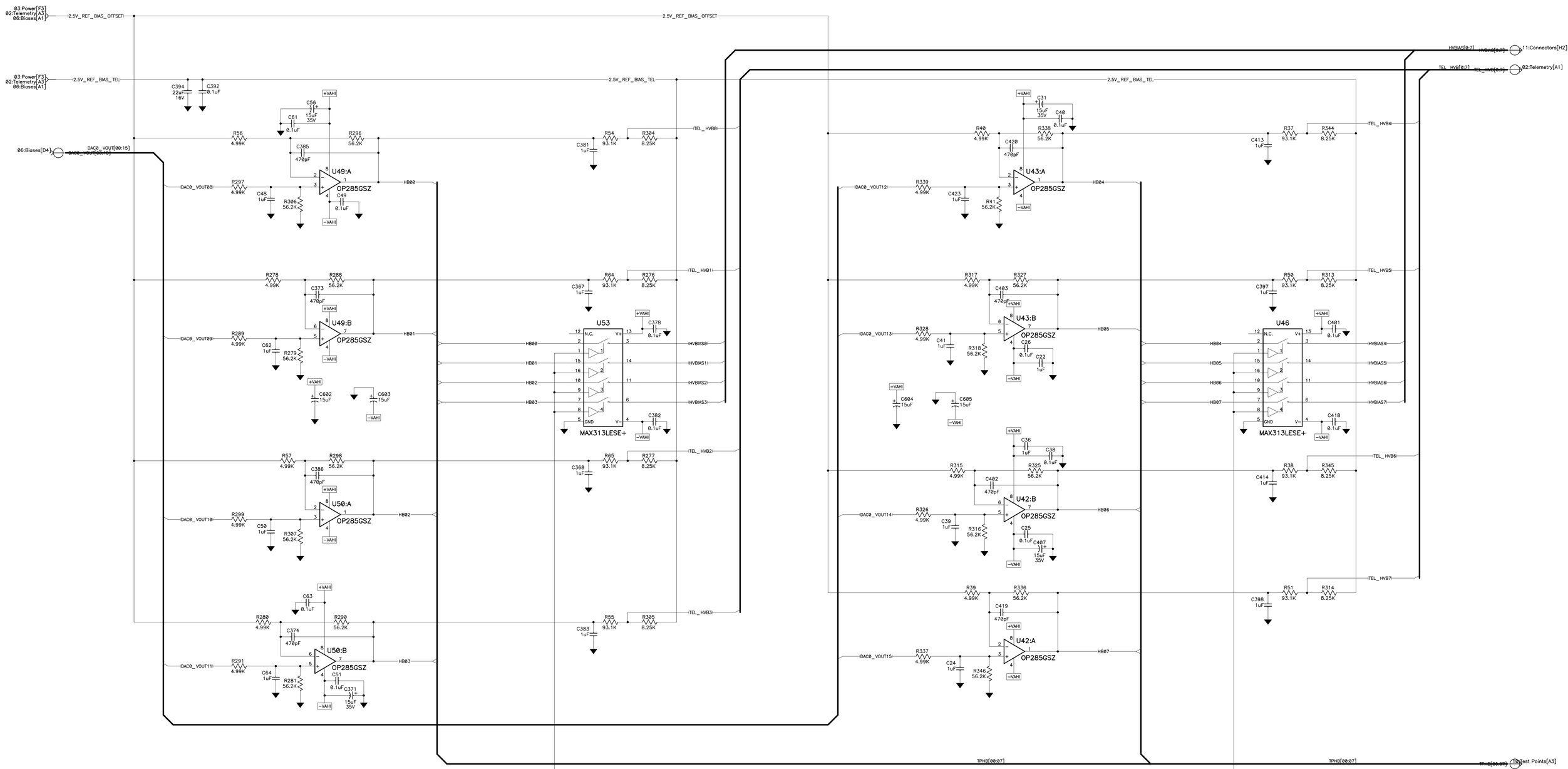
NATIONAL OPTICAL ASTRONOMY OBSERVATORIES			
NAME	SCHEMATIC Torrent AFE CCD 06:Biases		
DWG NO	SIZE	REF	REV
TRNT-EL-04-2004	D		C1
RELEASED	Sheet 6 of 11		



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NATIONAL OPTICAL ASTRONOMY OBSERVATORIES			
NAME: SCHEMATIC Torrent AFE CCD 07:HVBiases			
DWG NO: TRNT-EL-04-2004	SIZE: D	REF:	REV: C1
RELEASED		Sheet 7 of 11	

Channel 1

Front Panel MUX

From Preamp

DC Restoration

Inverting / Non−inverting Path Selection

Integrator Stage

Differential Driver

ADC Digital Supply

ADC

Offset Pre−ADC

Differential Driver

Channel 2

Front Panel MUX

From Preamp

DC Restoration

Inverting / Non−inverting Path Selection

Integrator Stage

Offset Pre−ADC

Differential Driver

ADC Digital Supply

ADC

CTC_OUT <= not CDS_latch(0);
INVERT_SIG <= not CDS_latch(1);
NONINV_SIG <= not CDS_latch(2);
INTEGRATE <= not CDS_latch(3);
DC_RESTORE <= not CDS_latch(4);
RESET_INT <= not CDS_latch(5);

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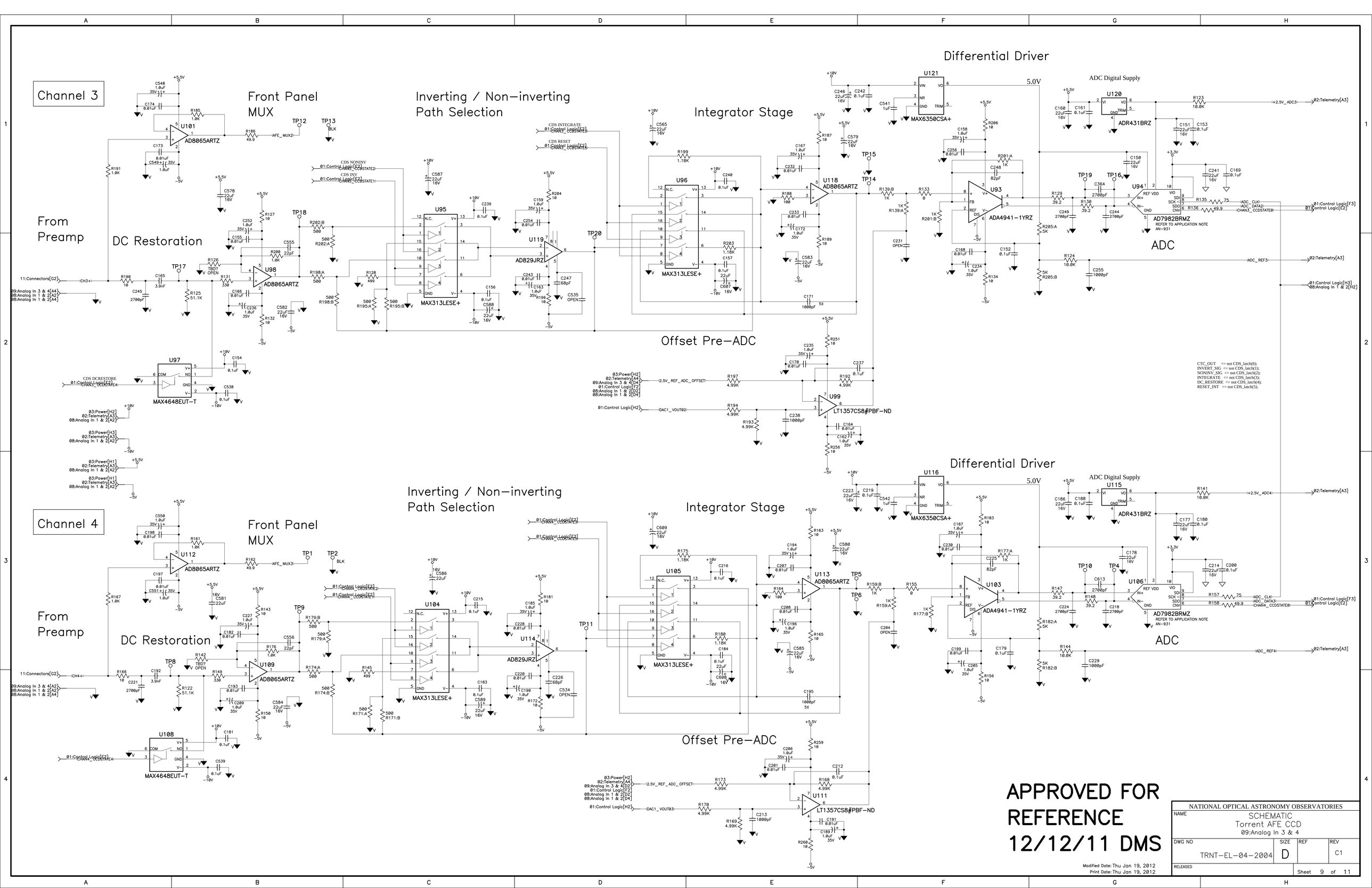
NATIONAL OPTICAL ASTRONOMY OBSERVATORIES			
NAME	SCHEMATIC Torrent AFE CCD 08:Analog In 1 & 2		
DWG NO	SIZE	REF	REV
TRNT−EL−04−2004	D		C1
RELEASED	Sheet 8 of 11		


Channel 3
From Preamp
DC Restoration
Front Panel MUX
Inverting / Non–inverting Path Selection
Integrator Stage
Offset Pre–ADC
Differential Driver
ADC Digital Supply
ADC
AD8065ARTZ
MAX313LESE+
AD829JRZ
MAX4648EUT–T
MAX6350CSA+
ADR431BRZ
ADA4941–1YRZ
AD7982BRMZ
REFER TO APPLICATION NOTE AN–931
LT1357CS8#PBF–ND
5.0V
Channel 4
From Preamp
DC Restoration
Front Panel MUX
Inverting / Non–inverting Path Selection
Integrator Stage
Offset Pre–ADC
Differential Driver
ADC Digital Supply
ADC
AD8065ARTZ
MAX313LESE+
AD829JRZ
MAX4648EUT–T
MAX6350CSA+
ADR431BRZ
ADA4941–1YRZ
AD7982BRMZ
REFER TO APPLICATION NOTE AN–931
LT1357CS8#PBF–ND
5.0V
CTC_OUT <= not CDS_latch(0);
INVERT_SIG <= not CDS_latch(1);
NONINV_SIG <= not CDS_latch(2);
INTEGRATE <= not CDS_latch(3);
DC_RESTORE <= not CDS_latch(4);
RESET_INT <= not CDS_latch(5);
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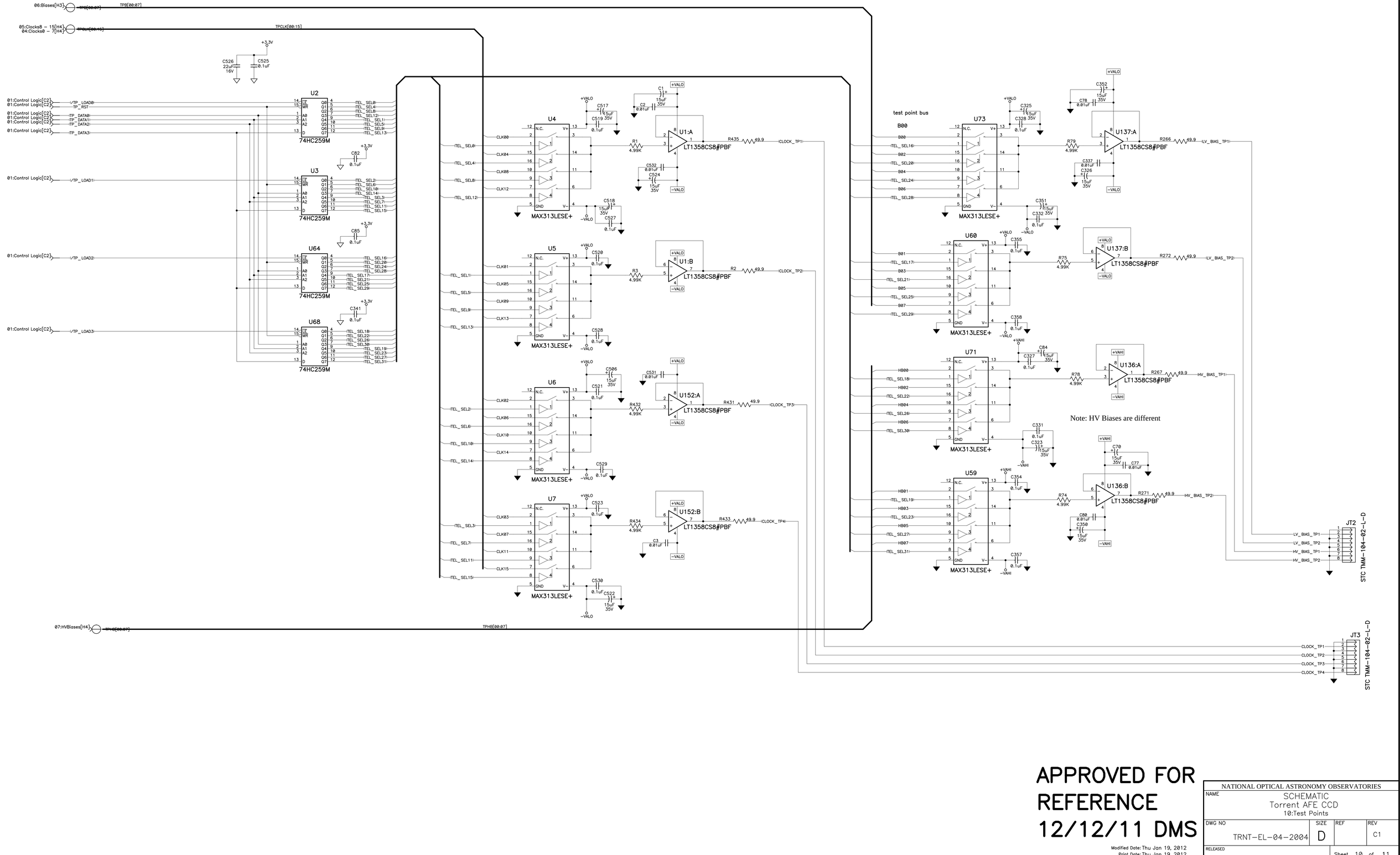
12/12/11 DMS
Modified Date: Thu Jan 19, 2012
Print Date: Thu Jan 19, 2012
NATIONAL OPTICAL ASTRONOMY OBSERVATORIES
NAME
SCHEMATIC
Torrent AFE CCD
09:Analog In 3 & 4
DWG NO
TRNT–EL–04–2004
SIZE
D
REF
REV
C1
RELEASED
Sheet 9 of 11



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NATIONAL OPTICAL ASTRONOMY OBSERVATORIES			
NAME: SCHEMATIC Torrent AFE CCD 10:Test Points			
DWG NO: TRNT-EL-04-2004	SIZE: D	REF:	REV: C1
RELEASED			Sheet 10 of 11

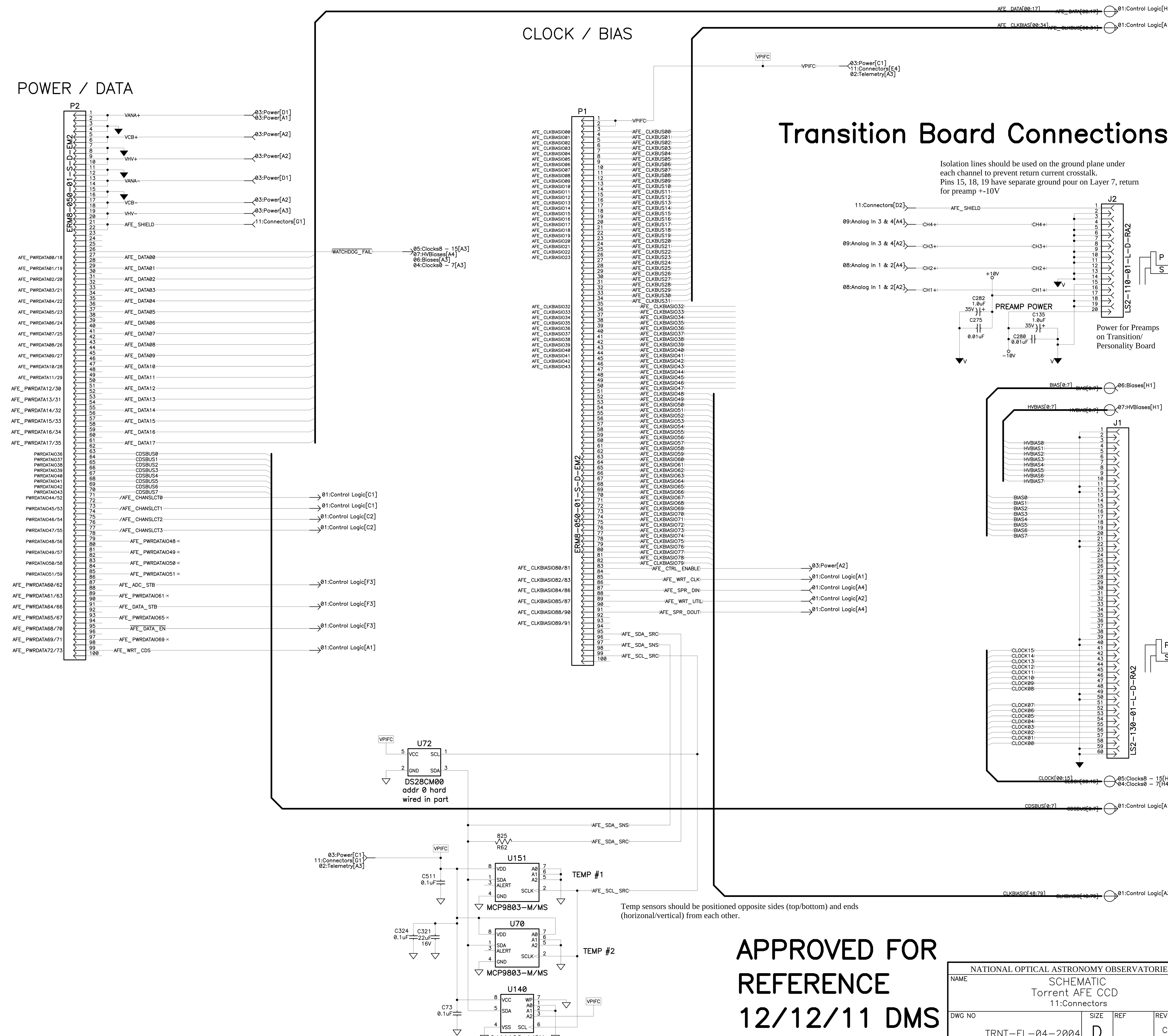
LCB I/O

LAYER STACK UP & PLANE ASSIGNMENTS

(SIDE J1 & J2 ARE MOUNTED) LAYER 1 TOP
LAYER 2 PLANE GNDA, GND, GNDA_V
LAYER 3 SIGNAL
LAYER 4 SIGNAL
LAYER 5 PLANE −VAHI, VANA+, +VALO, +3.3V, +5.5V
LAYER 6 PLANE +3.3V, −VALO, +5VA, +VAHI, −5V
LAYER 7 SIGNAL
LAYER 8 PLANE GNDA, VPIFC, −VAHI, VANA−, +VAHI, VANA+, GND, GNDA_V
LAYER 9 PLANE GNDA, GND, GNDA_V
(SIDE THAT IS VISABLE WHEN INSTALLED) LAYER 10 BOTTOM

FIRST NET CALLED OUT IS ASSIGNED AS THE PLANE NET NAME. ALL OTHERS ARE PLACED PLANES

LAYOUT SPECIFICATIONS:
1. All test points to be mounted on bottom of board.
2. All through hole components should be mounting on bottom side, (Layer 10)
3. Layer 3 has two tie points where grounds come together – one is as close as possible to U92, AD5391B bringing GNDA and GND_V together. The other should be near U65 tying GND to GNDA together.
4.



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NATIONAL OPTICAL ASTRONOMY OBSERVATORIES				
NAME	SCHEMATIC Torrent AFE CCD 11:Connectors			
DWG NO	TRNT−EL−04−2004	SIZE D	REF	REV C1
RELEASED		Sheet 11 of 11		