40P201- NV40 HIGH END BOARD

NV 40 E201_A02 - NV40 Flipchip BGA, 4 x 64MB DDR3 (8 x 8Mx32 = 256MB)
Internal TMDS (dual link) and External TMDS (dual link), Internal TVout,
TV Capture 7114/5

Table of Contents:

1. Table of Contents .. this page
2. AGP 8X Interface
3. Memory: FB_A & FB_B Partitions
4. Memory: FB_A - Bank0
5. Memory: FB_B - Bank0
6. Memory: FB_C & FB_D Partitions
7. Memory: FB_C - Bank0
8. Memory: FB_D - Bank0
9. Memory Signal Constraints, FB Cal, Vref
10. External Clock Generators
11. BIOS, Strappings, PLL Filters
12. DAC_A, DAC_B, PLL and SYNCbuffer
13. DVO A & B Interface
14. DACA Filter and VGA connector
15. DACB VGA/TV Switch, misc GPU connections
16. DACB Filter and VGA connector
17. DVI Connectors South and Mid, Internal TMDS
18. DUAL TMDS External with Silicon Image
19. Video Capture (SAA7114)
20. Video In/Out Connector External/Internal (MiniDin)
    Video In Connector Internal, STEREO
21. GNDs, Thermal GNDs, FBVDDQ and FBVTT decoup caps
22. 3.3V and NVVDD decoup caps
23. GPIOs, NVVDD VID, Thermal and FAN Control
24. External Power Connection and Detection
25. Power Supply I: A3V3, TMDS POWER
26. Power Supply III: FBVDD, FBVDDQ, & FBVTT
27. Power Supply IV: NVVDD
28. Mechanical

SKU	VARIANT	NVPN	ASSEMBLY
B	BASE	600-10201-base-sch	BASE LEVEL GENERIC SCHEMATIC ONLY, COMMON & NO_STUFF ASSEMBLY NOTES AND BOM NOT FINAL
1	000	600-10201-0000-200	NV40-U, 500N/700M, 256MB, DVI-I DUAL, DVI-I DUAL, VIVO, PCIID:0x040
2	001	600-10201-0001-200	NV40, 350N/600M, 256MB, DVI-I DUAL, DVI-I DUAL, VIVO, PCIID:0x041
3	002	600-10201-0002-200	NV40, 350N/500M, 256MB, DVI-I DUAL, DVI-I DUAL, VIVO, PCIID:0x041
4	003	600-10201-0003-200	NV40-U, 400N/500M, 256MB, DVI-I DUAL, DVI-I DUAL, TV OUT, PCIID:0x040
5	004	600-10201-0004-200	NV40, 350N/500M, 256MB, DVI-I DUAL, DVI-I DUAL, TV OUT, PCIID:0x041
6	005	600-10201-0005-200	NV40-U, 400N/600M, 256MB, VGA, DVI-I DUAL, TV OUT, PCIID:0x040
7	006	600-10201-0006-200	NV40-U, 400N/500M, 256MB, DVI-I DUAL EXT, HDTV OUT, PCIID:0x040
8	007	600-10201-0007-200	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, PCIID:0x041
9	WS0	600-50201-0000-200	NV40GL, 400N/600M, 256MB, DVI-I DUAL, DVI-I DUAL, STEREO, PCIID:0x04E
10	WS1	600-50201-0001-200	NV40GL, 400N/600M, 256MB, DVI-I DUAL, DVI-I DUAL SDI, PCIID:0x04E
11	008	600-10201-0008-200	NV40-U, 400N/500M, 256MB, DVI-I SINGLE, DVI-I SINGLE, TV OUT, PCIID:0x040
12	0071	600-10201-0007-210	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
13	<UNDEFINED>	<UNDEFINED>	<UNDEFINED>
14	<UNDEFINED>	<UNDEFINED>	<UNDEFINED>
15	<UNDEFINED>	<UNDEFINED>	<UNDEFINED>

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ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	Table of Contents

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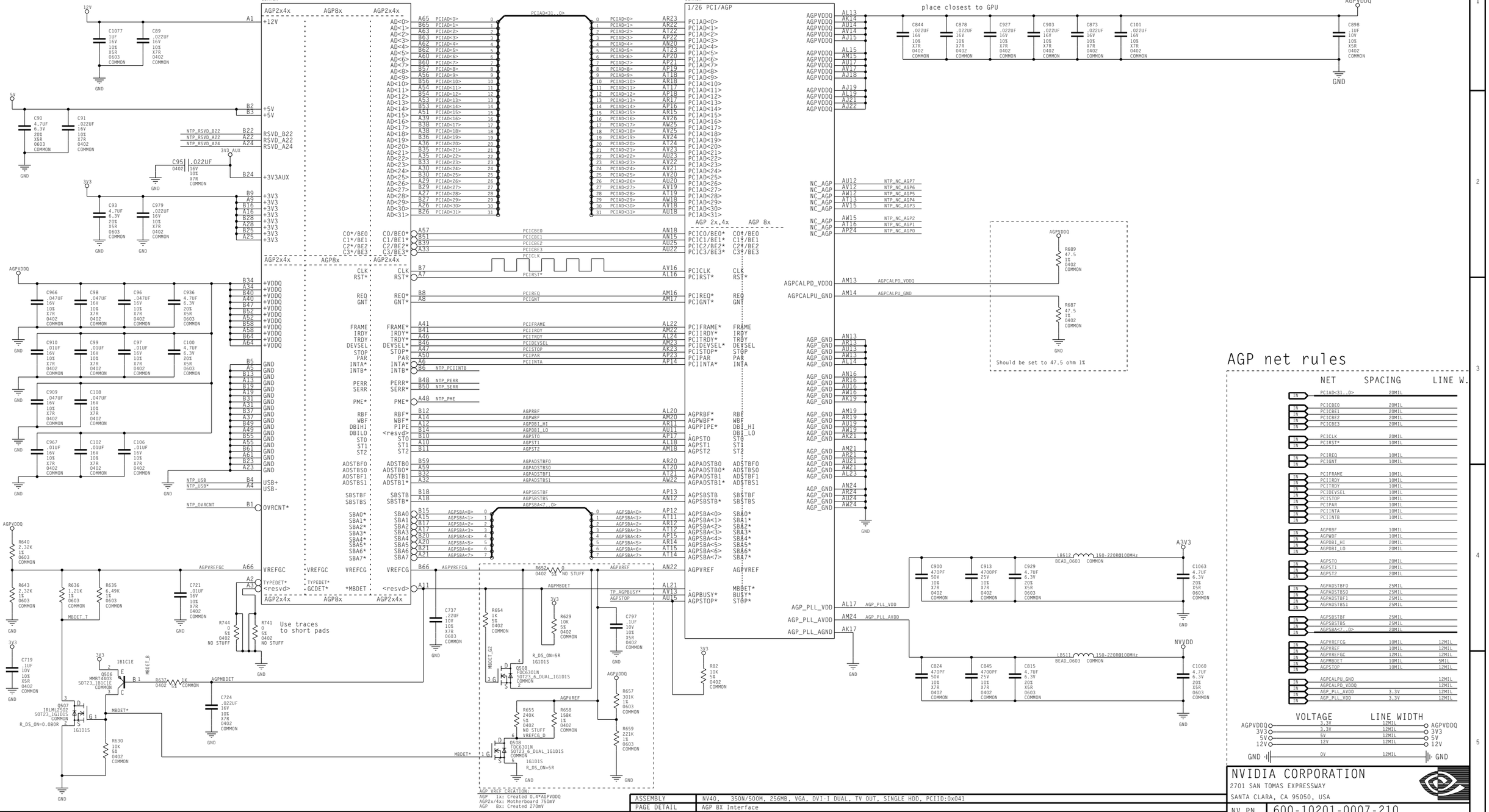
NV_PN	600-10201-0007-210		
ID	design	PAGE	1 OF 28
NAME	Hunter	DATE	20-APR-2004

2. AGP 8X Interface



AGP net rules

	NET	SPACING	LINE W.
IN	PCIAD<31..0>	20MIL	
IN	PCICBE0	20MIL	
IN	PCICBE1	20MIL	
IN	PCICBE2	20MIL	
IN	PCICBE3	20MIL	
IN	PCICLK	20MIL	
IN	PCIRST*	10MIL	
IN	PCIREQ	10MIL	
IN	PCIGNT	10MIL	
IN	PCIFRAME	10MIL	
IN	PCIIRDY	10MIL	
IN	PCITRDY	10MIL	
IN	PCIDEVSEL	10MIL	
IN	PCISTOP	10MIL	
IN	PCIPAR	10MIL	
IN	PCIINTA	10MIL	
IN	PCIINTB	10MIL	
IN	AGPRBF	10MIL	
IN	AGPWBF	10MIL	
IN	AGPDBI_HI	20MIL	
IN	AGPDBI_LO	20MIL	
IN	AGPST0	20MIL	
IN	AGPST1	20MIL	
IN	AGPST2	20MIL	
IN	AGPADSTBF0	25MIL	
IN	AGPADSTBS0	25MIL	
IN	AGPADSTBF1	25MIL	
IN	AGPADSTBS1	25MIL	
IN	AGPSBSTBF	25MIL	
IN	AGPSBSTBS	25MIL	
IN	AGPSBA<7..0>	20MIL	
IN	AGPVREFCG	10MIL	12MIL
IN	AGPVREF	10MIL	12MIL
IN	AGPVREFGC	12MIL	12MIL
IN	AGPMBDET	10MIL	5MIL
IN	AGPSTOP	10MIL	12MIL
IN	AGPCALPU_GND		12MIL
IN	AGPCALPD_VDDQ		12MIL
IN	AGP_PLL_AVDD	3.3V	12MIL
IN	AGP_PLL_VDD	3.3V	12MIL

VOLTAGE	LINE WIDTH	
AGPVDDQ	3.3V	12MIL
3V3	3.3V	12MIL
5V	5V	12MIL
12V	12V	12MIL
GND	0V	12MIL

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	AGP 8X Interface

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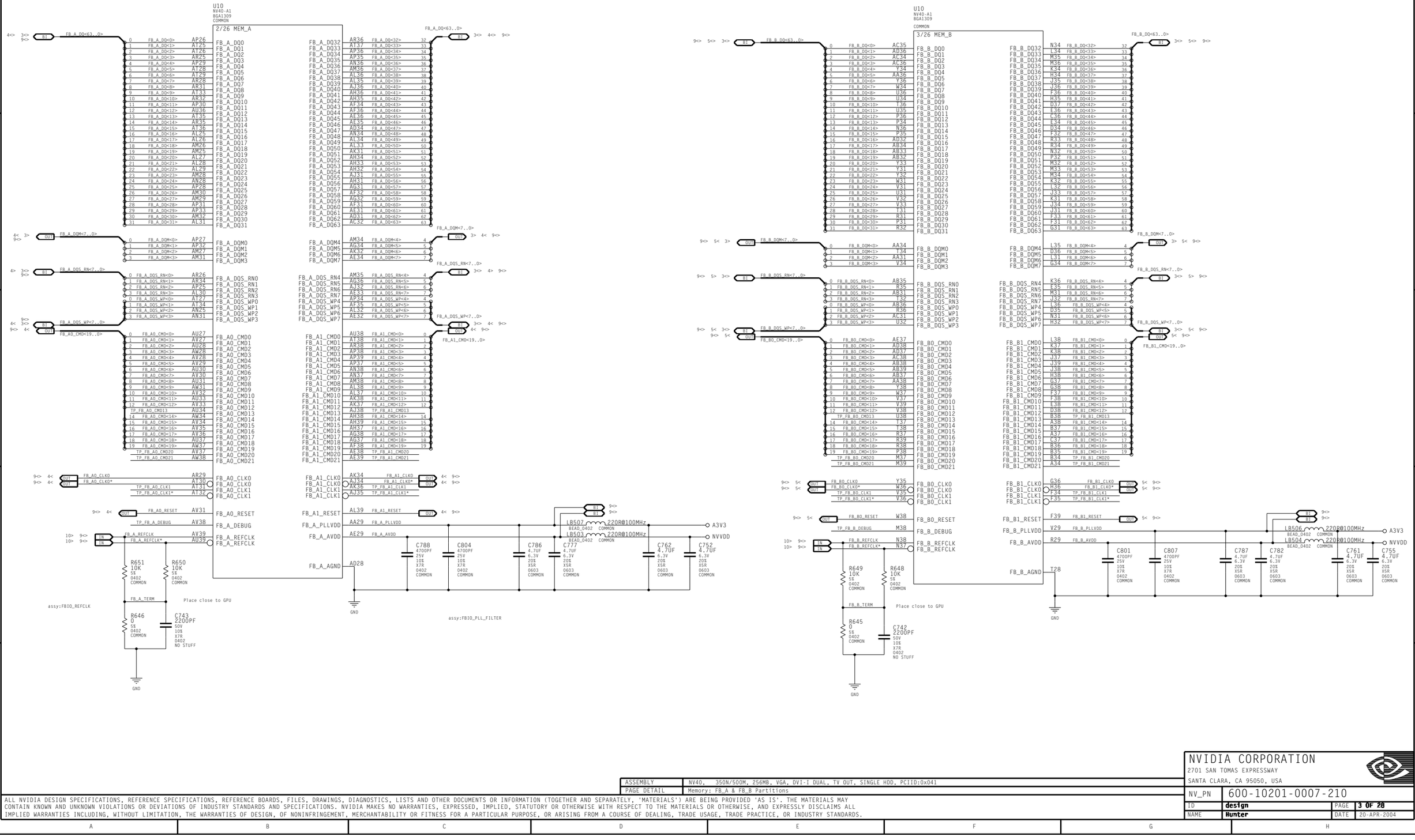
NV_PN	600-10201-0007-210		
ID	design	PAGE	2 OF 28
NAME	Hunter	DATE	20-APR-2004

3.Memory - FB_A & FB_B Partitions



ASSEMBLY	NV40, 350N/5DDM, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	Memory: FB_A & FB_B Partitions

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NV_PN	600-10201-0007-210		
ID	des1gn	PAGE	3 OF 28
NAME	Hunter	DATE	20-APR-2004

4. Memory Part. A

ASSY=FBIO_A

termination not required for DDR2

	144BGA
	TOP
	CS0
CMD0	A4
CMD1	A7
CMD2	A5
CMD3	A6
CMD4	A9
CMD5	A8
CMD6	CS0
CMD7	BA1
CMD8	WE*
CMD9	RAS*
CMD10	CKE
CMD11	CAS*
CMD12	BA0
CMD13	CS1
CMD14	A11
CMD15	A10
CMD16	A1
CMD17	A2
CMD18	A0
CMD19	A3
CMD20	<und>
CMD21	<und>

New CAPs.

Replicate to other pages!!

MEMORY BGA

placed TOP

MEMORY BGA

placed TOP

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ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	Memory: FB_A

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NV_PN	600-10201-0007-210		
ID	design	PAGE	4 OF 28
NAME	Hunter	DATE	20-APR-2004

5. Memory Part. B

ASSY=FBIO_B

	144BGA
	TOP
	CSO
CMD0	A4
CMD1	A7
CMD2	A5
CMD3	A6
CMD4	A9
CMD5	A8
CMD6	CS0
CMD7	BA1
CMD8	WE*
CMD9	RAS*
CMD10	CKE
CMD11	CAS*
CMD12	BA0
CMD13	CS1
CMD14	A11
CMD15	A10
CMD16	A1
CMD17	A2
CMD18	A0
CMD19	A3
CMD20	<und>
CMD21	<und>

termination not required for DDR2

U14 DDR3BGA144 PACK_TYPE=BGA144 VERSION=BGA144 COMMON

U13 DDR3BGA144 PACK_TYPE=BGA144 VERSION=BGA144 COMMON

H4 & H11 NC FOR DDR2

New CAPs.

Replicate to other pages!!

MEMORY BGA

placed TOP

MEMORY BGA

placed TOP

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NV_PN	600-10201-0007-210		
ID	design	PAGE	5 OF 28
NAME	Hunter	DATE	20-APR-2004

6. Memory - FBC & FBD Partitions

U10
NV40-A1
BGA1309
COMMON
4/26 MEM_C

U10
NV40-A1
BGA1309
COMMON
5/26 MEM_D

ASSEMBLY: NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL: Memory: FB_C & FB_D Partitions

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NV_PN	600-10201-0007-210		
ID	design	PAGE	6 OF 28
NAME	Hunter	DATE	20-APR-2004

7. Memory Part. C

ASSY=FBIO_C

termination not required for DDR2

	144BGA TOP CSO
CMD0	A4
CMD1	A7
CMD2	A5
CMD3	A6
CMD4	A9
CMD5	A8
CMD6	CS0
CMD7	BA1
CMD8	WE*
CMD9	RAS*
CMD10	CKE
CMD11	CAS*
CMD12	BA0
CMD13	CS1
CMD14	A11
CMD15	A10
CMD16	A1
CMD17	A2
CMD18	A0
CMD19	A3
CMD20	<und>
CMD21	<und>

MEMORY BGA
placed TOP

MEMORY BGA
placed TOP

H4 & H11 NC FOR DDR2

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	Memory: FB_C

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NV_PN	600-10201-0007-210		
ID	design	PAGE	7 OF 28
NAME	Hunter	DATE	20-APR-2004

8. Memory Part. D

termination not required for DDR2

ASSY=FBIO_D

	144BGA
	TOP CSO
CMD0	A4
CMD1	A7
CMD2	A5
CMD3	A6
CMD4	A9
CMD5	A8
CMD6	CS0
CMD7	BA1
CMD8	WE*
CMD9	RAS*
CMD10	CKE
CMD11	CAS*
CMD12	BA0
CMD13	CS1
CMD14	A11
CMD15	A10
CMD16	A1
CMD17	A2
CMD18	A0
CMD19	A3
CMD20	<und>
CMD21	<und>

MEMORY BGA
placed TOP

MEMORY BGA
placed TOP

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ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	Memory: FB_D

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NV_PN	600-10201-0007-210		
ID	design	PAGE	8 OF 28
NAME	Hunter	DATE	20-APR-2004

9. Memory NET SPACING RULES, FB CAL & VREF

Memory FBA FBB

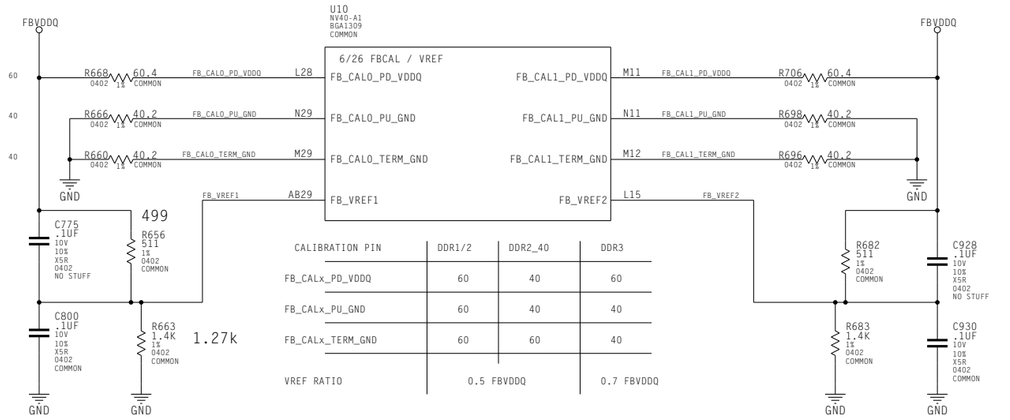
		NET Name	Diffpair	Spacing	
4< 3>	B1	FB_A0_CLK0	FBA0CLK0	80_OHM_DIFF	
4< 3>	B1	FB_A0_CLK0*	FBA0CLK0	80_OHM_DIFF	
4< 3>	B1	FB_A1_CLK0	FBA1CLK0	80_OHM_DIFF	
4< 3>	B1	FB_A1_CLK0*	FBA1CLK0	80_OHM_DIFF	
5< 3>	B1	FB_B0_CLK0	FBB0CLK0	80_OHM_DIFF	
5< 3>	B1	FB_B0_CLK0*	FBB0CLK0	80_OHM_DIFF	
5< 3>	B1	FB_B1_CLK0	FBB1CLK0	80_OHM_DIFF	
5< 3>	B1	FB_B1_CLK0*	FBB1CLK0	80_OHM_DIFF	
10> 3<	B1	FB_A_REFCLK	FBAREFCLK		100 ohm diff
10> 3<	B1	FB_A_REFCLK*	FBAREFCLK		
10> 3<	B1	FB_B_REFCLK	FBBREFCLK		
10> 3<	B1	FB_B_REFCLK*	FBBREFCLK		100 ohm diff
4<> 3<>	B1	FB_A_DQ<63..0>		10MIL	
5<> 3<>	B1	FB_B_DQ<63..0>		10MIL	
4< 3>	B1	FB_A_DQM<7..0>		10MIL	
4> 3<>	B1	FB_A_DQS_RN<7..0>		10MIL	
4< 3<>	B1	FB_A_DQS_WP<7..0>		10MIL	
5< 3>	B1	FB_B_DQM<7..0>		10MIL	
5> 3<>	B1	FB_B_DQS_RN<7..0>		10MIL	
5< 3<>	B1	FB_B_DQS_WP<7..0>		10MIL	
4< 3>	B1	FB_A0_CMD<19..0>		15MIL	
4< 3>	B1	FB_A1_CMD<19..0>		15MIL	
5< 3>	B1	FB_B0_CMD<19..0>		15MIL	
5< 3>	B1	FB_B1_CMD<19..0>		15MIL	
4< 3>	B1	FB_A0_RESET		10MIL	
4< 3>	B1	FB_A1_RESET		10MIL	
5< 3>	B1	FB_B0_RESET		10MIL	
5< 3>	B1	FB_B1_RESET		10MIL	

		NET Name	MIN_LINE_WIDTH	VOLTAGE
3<>	B1	FB_A_AVDD	12MIL	3.3V
3<>	B1	FB_A_PLLVDD	12MIL	3.3V
3<>	B1	FB_B_AVDD	12MIL	3.3V
3<>	B1	FB_B_PLLVDD	12MIL	3.3V
4<>	B1	FB_A0_ZQ	12MIL	0.9V
4<>	B1	FB_A1_ZQ	12MIL	0.9V
5<>	B1	FB_B0_ZQ	12MIL	0.9V
5<>	B1	FB_B1_ZQ	12MIL	0.9V
4<>	B1	FB_A0_VREF1	12MIL	0.9V
4<>	B1	FB_A0_VREF2	12MIL	0.9V
4<>	B1	FB_A1_VREF1	12MIL	0.9V
4<>	B1	FB_A1_VREF2	12MIL	0.9V
5<>	B1	FB_B0_VREF1	12MIL	0.9V
5<>	B1	FB_B0_VREF2	12MIL	0.9V
5<>	B1	FB_B1_VREF1	12MIL	0.9V
5<>	B1	FB_B1_VREF2	12MIL	0.9V

Memory FBC FBD

		NET Name	Diffpair	Spacing	
7< 6>	B1	FB_C0_CLK0	FBC0CLK0	80_OHM_DIFF	
7< 6>	B1	FB_C0_CLK0*	FBC0CLK0	80_OHM_DIFF	
7< 6>	B1	FB_C1_CLK0	FBC1CLK0	80_OHM_DIFF	
7< 6>	B1	FB_C1_CLK0*	FBC1CLK0	80_OHM_DIFF	
8< 6>	B1	FB_D0_CLK0	FBD0CLK0	80_OHM_DIFF	
8< 6>	B1	FB_D0_CLK0*	FBD0CLK0	80_OHM_DIFF	
8< 6>	B1	FB_D1_CLK0	FBD1CLK0	80_OHM_DIFF	
8< 6>	B1	FB_D1_CLK0*	FBD1CLK0	80_OHM_DIFF	
10> 6<	B1	FB_C_REFCLK	FBCREFCLK		
10> 6<	B1	FB_C_REFCLK*	FBCREFCLK		100 ohm diff
10> 6<	B1	FB_D_REFCLK	FBDREFCLK		
10> 6<	B1	FB_D_REFCLK*	FBDREFCLK		100 ohm diff
7<> 6<>	B1	FB_C_DQ<63..0>		10MIL	
8<> 6<>	B1	FB_D_DQ<63..0>		10MIL	
7< 6>	B1	FB_C_DQM<7..0>		10MIL	
7> 6<>	B1	FB_C_DQS_RN<7..0>		10MIL	
7< 6<>	B1	FB_C_DQS_WP<7..0>		10MIL	
8< 6>	B1	FB_D_DQM<7..0>		10MIL	
8> 6<>	B1	FB_D_DQS_RN<7..0>		10MIL	
8< 6<>	B1	FB_D_DQS_WP<7..0>		10MIL	
7< 6>	B1	FB_C0_CMD<19..0>		15MIL	
7< 6>	B1	FB_C1_CMD<19..0>		15MIL	
8< 6>	B1	FB_D0_CMD<19..0>		15MIL	
8< 6>	B1	FB_D1_CMD<19..0>		15MIL	
7< 6>	B1	FB_C0_RESET		10MIL	
7< 6>	B1	FB_C1_RESET		10MIL	
8< 6>	B1	FB_D0_RESET		10MIL	
8< 6>	B1	FB_D1_RESET		10MIL	

		NET Name	MIN_LINE_WIDTH	VOLTAGE
6<>	B1	FB_C_AVDD	12MIL	3.3V
6<>	B1	FB_C_PLLVDD	12MIL	3.3V
6<>	B1	FB_D_AVDD	12MIL	3.3V
6<>	B1	FB_D_PLLVDD	12MIL	3.3V
7<>	B1	FB_C0_ZQ	12MIL	0.9V
7<>	B1	FB_C1_ZQ	12MIL	0.9V
8<>	B1	FB_D0_ZQ	12MIL	0.9V
8<>	B1	FB_D1_ZQ	12MIL	0.9V
7<>	B1	FB_C0_VREF1	12MIL	0.9V
7<>	B1	FB_C0_VREF2	12MIL	0.9V
7<>	B1	FB_C1_VREF1	12MIL	0.9V
7<>	B1	FB_C1_VREF2	12MIL	0.9V
8<>	B1	FB_D0_VREF1	12MIL	0.9V
8<>	B1	FB_D0_VREF2	12MIL	0.9V
8<>	B1	FB_D1_VREF1	12MIL	0.9V
8<>	B1	FB_D1_VREF2	12MIL	0.9V



CALIBRATION PIN	DDR1/2	DDR2_4O	DDR3
FB_CALx_PD_VDDQ	60	40	60
FB_CALx_PU_GND	60	40	40
FB_CALx_TERM_GND	60	60	40
VREF RATIO		0.5 FBVDDQ	0.7 FBVDDQ

HIGH/LOW
VREF RATIO DDR2 RECOMMEND 1K/1K = 0.500 RATIO
VREF RATIO DDR3 RECOMMEND 511/1.21k = 0.703 RATIO

511/1.4k is better

DEFAULT BASE SCHEMATICS ARE SETUP FOR DDR3

		NET Name	Spacing
	B1	FB_CALO_PD_VDDQ	20MIL_G2G_30MIL
	B1	FB_CALO_PU_GND	20MIL_G2G_30MIL
	B1	FB_CALO_TERM_GND	20MIL_G2G_30MIL
	B1	FB_CAL1_PD_VDDQ	20MIL_G2G_30MIL
	B1	FB_CAL1_PU_GND	20MIL_G2G_30MIL
	B1	FB_CAL1_TERM_GND	20MIL_G2G_30MIL

		NET Name	MIN_LINE_WIDTH	VOLTAGE
	B1	FB_VREF1	12MIL	3.3V
	B1	FB_VREF2	12MIL	3.3V

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ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	Memory Signal Constraints, FB_CAL

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NV_PN	600-10201-0007-210		
ID	design	PAGE	9 OF 28
NAME	Hunter	DATE	20-APR-2004

10. EXTERNAL FBIO REFCLK

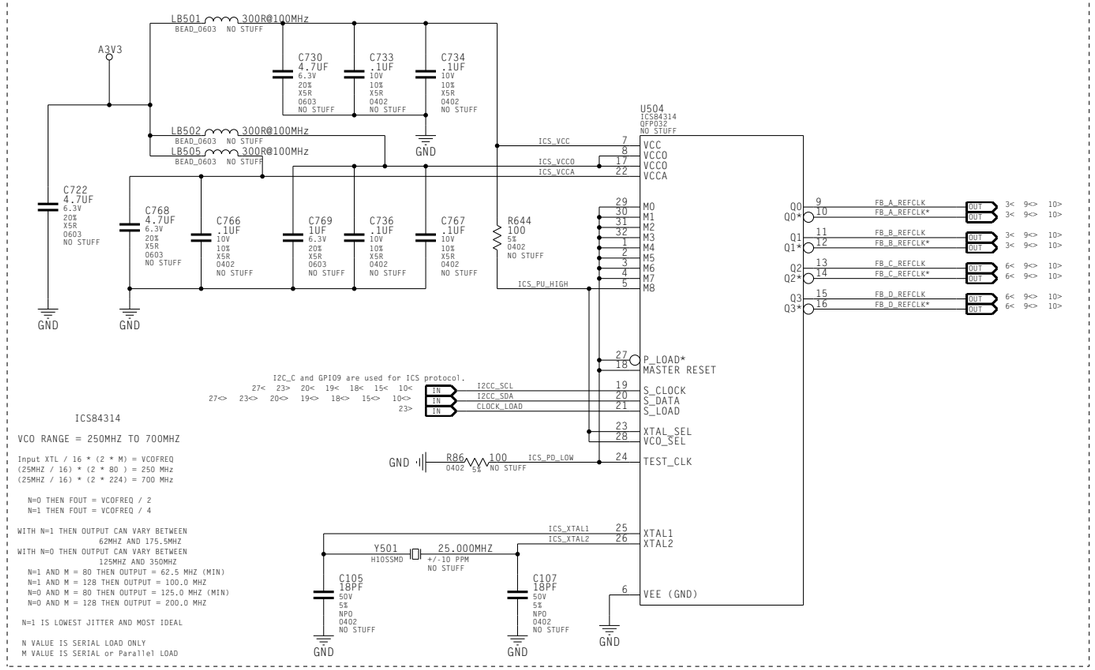
NET RULES

NET	SPACING	LINE WIDTH
ICS_XTAL1	15MIL	10MIL
ICS_XTAL2	15MIL	10MIL

VOLTAGE

ICS_VCC	3.3	10MIL
ICS_VCCO	3.3	10MIL
ICS_VCCA	3.3	10MIL
CY_VDD	3.3	10MIL

EXTERNAL REFCLOCK GENERATOR FOR FBIO ICS SOLUTION.



ICS84314

VCO RANGE = 250MHZ TO 700MHZ

Input XTL / 16 * (2 * M) = VCOFREQ
(25MHZ / 16) * (2 * 80) = 250 MHz
(25MHZ / 16) * (2 * 224) = 700 MHz

N=0 THEN FOUT = VCOFREQ / 2
N=1 THEN FOUT = VCOFREQ / 4

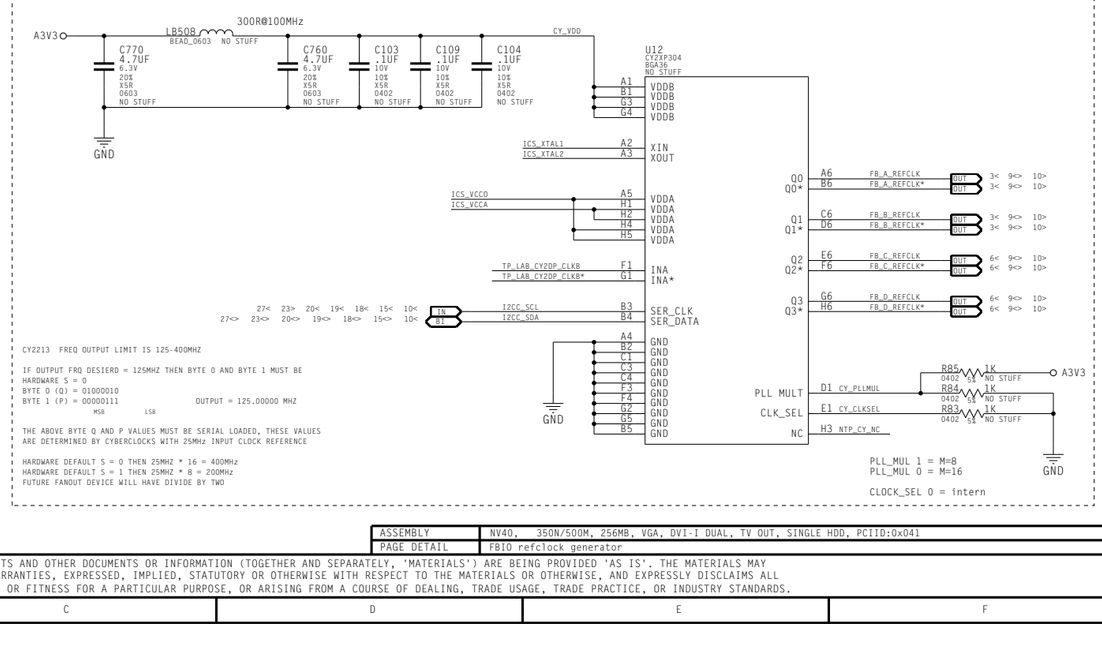
WITH N=1 THEN OUTPUT CAN VARY BETWEEN 62MHZ AND 175.5MHZ
WITH N=0 THEN OUTPUT CAN VARY BETWEEN 125MHZ AND 350MHZ

N=1 AND M = 80 THEN OUTPUT = 62.5 MHZ (MIN)
N=1 AND M = 128 THEN OUTPUT = 100.0 MHZ
N=0 AND M = 80 THEN OUTPUT = 125.0 MHZ (MIN)
N=0 AND M = 128 THEN OUTPUT = 200.0 MHZ

N=1 IS LOWEST JITTER AND MOST IDEAL

N VALUE IS SERIAL LOAD ONLY
M VALUE IS SERIAL or Parallel LOAD

EXTERNAL REFCLOCK GENERATOR FOR FBIO CYPRESS SOLUTION.



CY2213 FREQ OUTPUT LIMIT IS 125-400MHZ

IF OUTPUT FRQ DESIERD = 125MHZ THEN BYTE 0 AND BYTE 1 MUST BE
HARDWARE S = 0
BYTE 0 (Q) = 01000010
BYTE 1 (P) = 00000111 OUTPUT = 125.00000 MHZ
MSB LSB

THE ABOVE BYTE Q AND P VALUES MUST BE SERIAL LOADED, THESE VALUES ARE DETERMINED BY CYBERCLOCKS WITH 25MHz INPUT CLOCK REFERENCE

HARDWARE DEFAULT S = 0 THEN 25MHZ * 16 = 400MHz
HARDWARE DEFAULT S = 1 THEN 25MHZ * 8 = 200MHz
FUTURE FANOUT DEVICE WILL HAVE DIVIDE BY TWO

PLL_MUL 1 = M=8
PLL_MUL 0 = M=16

CLOCK_SEL 0 = intern

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	FBIO refclock generator

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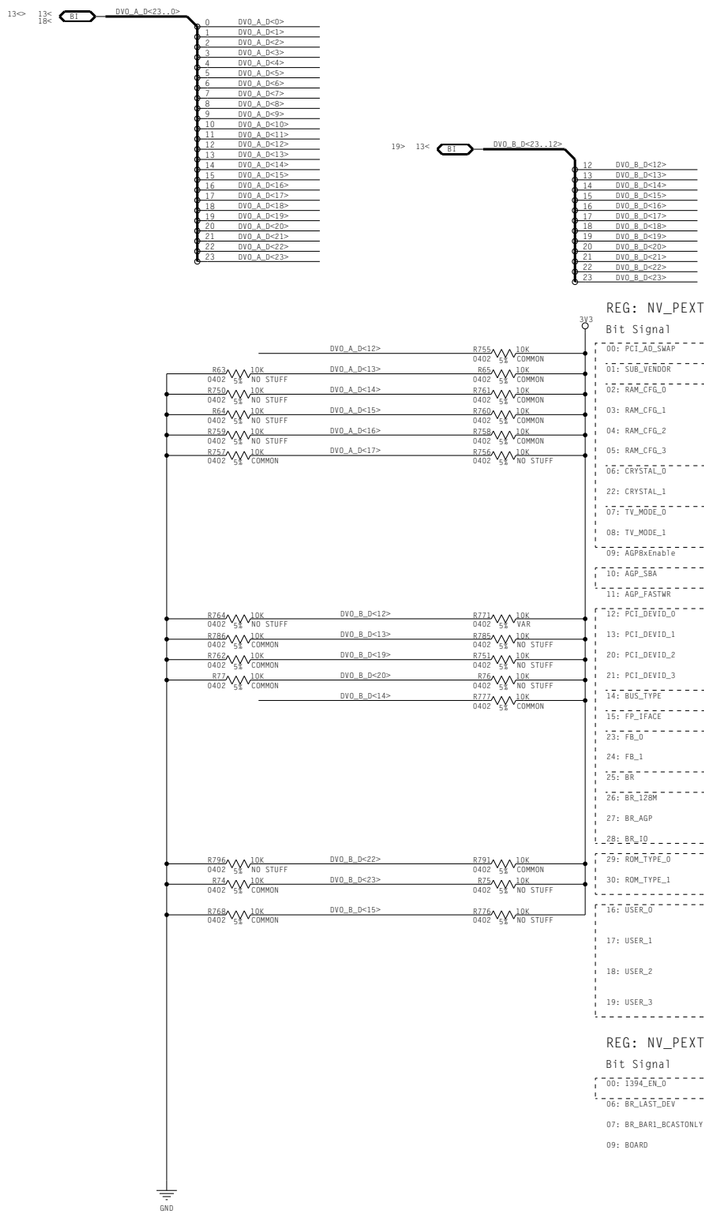
NV_PN	600-10201-0007-210		
ID	design	PAGE	10 OF 28
NAME	Hunter	DATE	20-APR-2004

11. BIOS, Straps, JTAG, PLL Filters

Straps

Assembly: BIOS



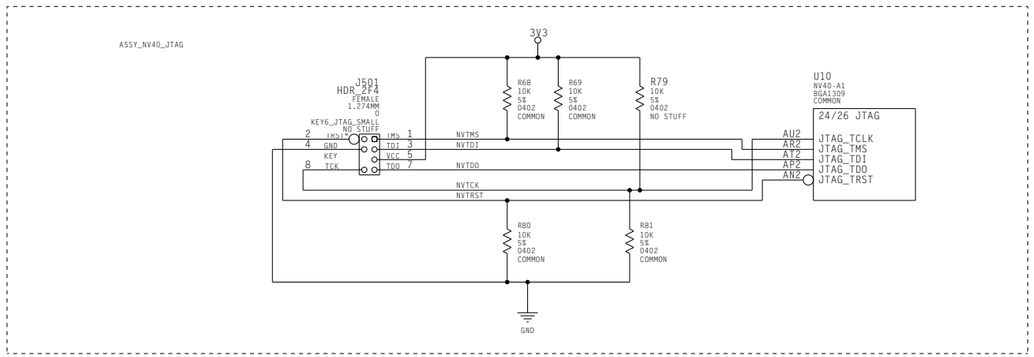
REG: NV_PEXTDEV_BOOT_0

Bit	Signal	VALUE_ID	VALUEs	
00:	PCI_AD_SWAP	PCI_AD_SWAP	0 REVERSED 1 NORMAL	
01:	SUB_VENDOR	SUB_VENDOR	0 NO_BIOS 1 read_from_BIOS	
02:	RAM_CFG_0	RAM_CFG[3:0]	0000 RFU 0001 RFU	1000 RFU 1001 RFU
03:	RAM_CFG_1		0010 RFU 0011 RFU	1010 RFU 1011 RFU
04:	RAM_CFG_2		0100 RFU 0101 RFU	1100 RFU 1101 RFU
05:	RAM_CFG_3		0110 RFU 0111 SMX32_GDDR3	1110 RFU 1111 RFU
06:	CRYSTAL_0	CRYSTAL[1:0]	00 13.500 Mhz 01 14.31818 Mhz	
22:	CRYSTAL_1		10 27.000 Mhz 11 unknown	
07:	TV_MODE_0	TV_MODE[1:0]	00 SECAM 01 NTSC	
08:	TV_MODE_1		10 PAL 11 CRT	
09:	AGPBxEnable	AGP_30_Bx	0 AGPBx enabled 1 AGPBx disabled	
10:	AGP_SBA	AGP_SBA[0]	0 SBA enabled 1 SBA disabled	
11:	AGP_FASTWR	AGP_FASTWR[0]	0 enabled 1 disabled	
12:	PCI_DEVID_0	PCI_DEVID[3:0]	0000 0x400 ... 1111 0x40F	
13:	PCI_DEVID_1		0000 (0x400) 0001 (0x401)	
20:	PCI_DEVID_2		1110 (0x40E)	
21:	PCI_DEVID_3			
14:	BUS_TYPE	BUS_TYPE[0]	0 PCI 1 AGP	
15:	FP_IFACE	FP_IFACE[0]	0 24Bit 1 12Bit	
23:	FB_0	FB[1:0]	00 64M 01 128M	
24:	FB_1		10 256M 11 512M	
25:	BR	BR[0]	0 BRIDGE disabled 1 BRIDGE enabled	
26:	BR_128M	BR bits are ignored if BRIDGE is disabled		
27:	BR_AGP			
28:	BR_IO			
29:	ROM_TYPE_0	ROM_TYPE[1:0]	00 Parallel 01 Serial_AT25F	
30:	ROM_TYPE_1		10 Serial_SST45VF 11 RFU	
16:	USER_0	STRAP_USER[3:0]	0000 (default)	
17:	USER_1			
18:	USER_2			
19:	USER_3			

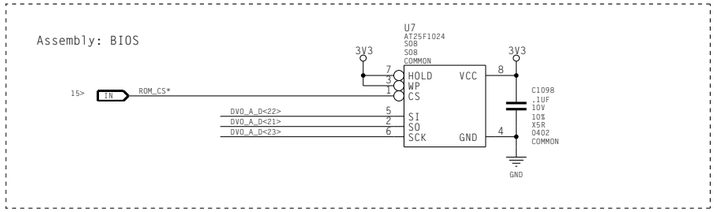
REG: NV_PEXTDEV_BOOT_3

Bit	Signal	VALUE_ID	VALUEs
00:	1394_EN_0	1394[0]	0 1394 disabled 1 1394 enabled
06:	BR_LAST_DEV		
07:	BR_BAR1_BCASTONLY		
09:	BOARD		

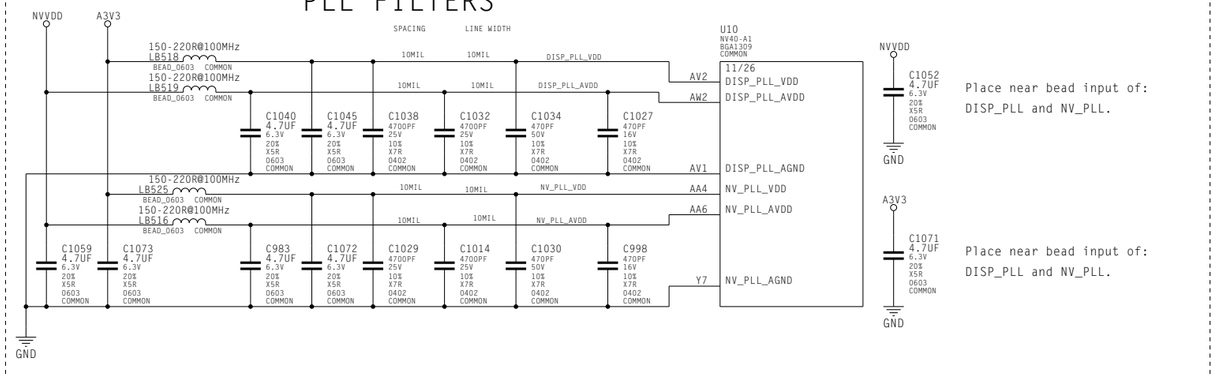
JTAG



BIOS (serial)



PLL FILTERS



ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	BIOS, Strappings, JTAG, and PLL FILTERS

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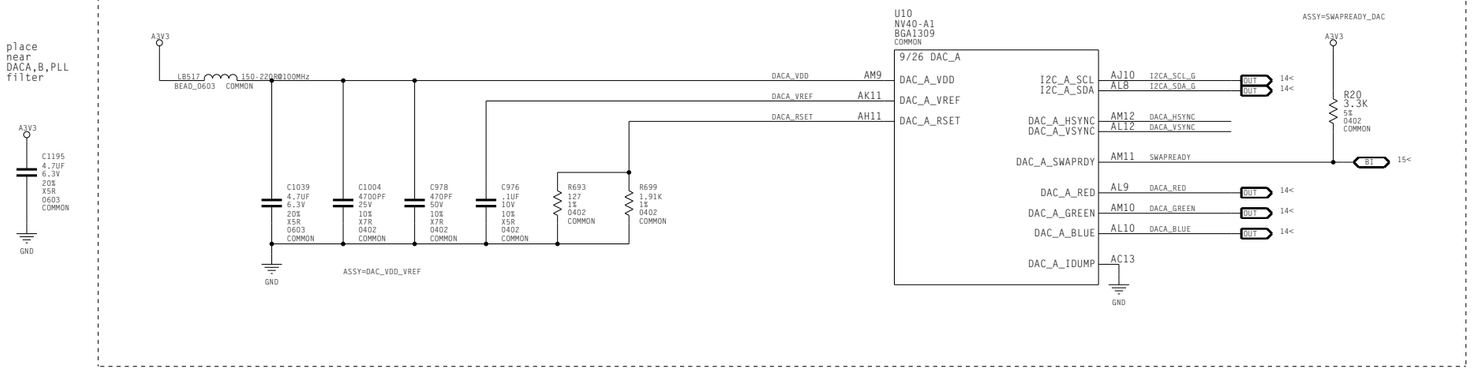
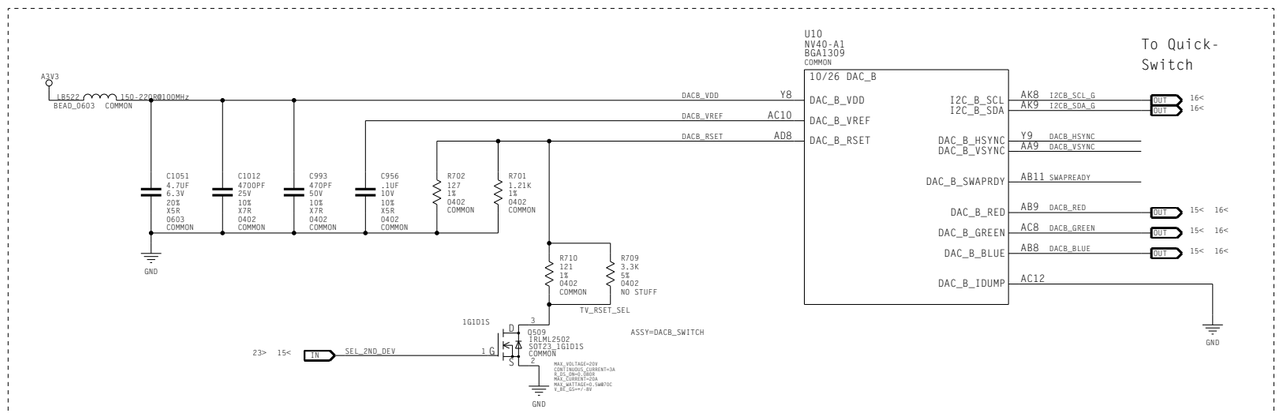
NV_PN	600-10201-0007-210		
ID	design	PAGE	11 OF 28
NAME	Hunter	DATE	20-APR-2004

12. DAC_A, DAC_B, PLL, SyncBuffer

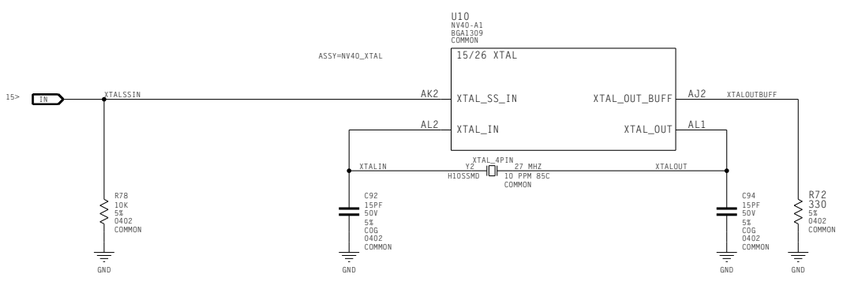
DACA



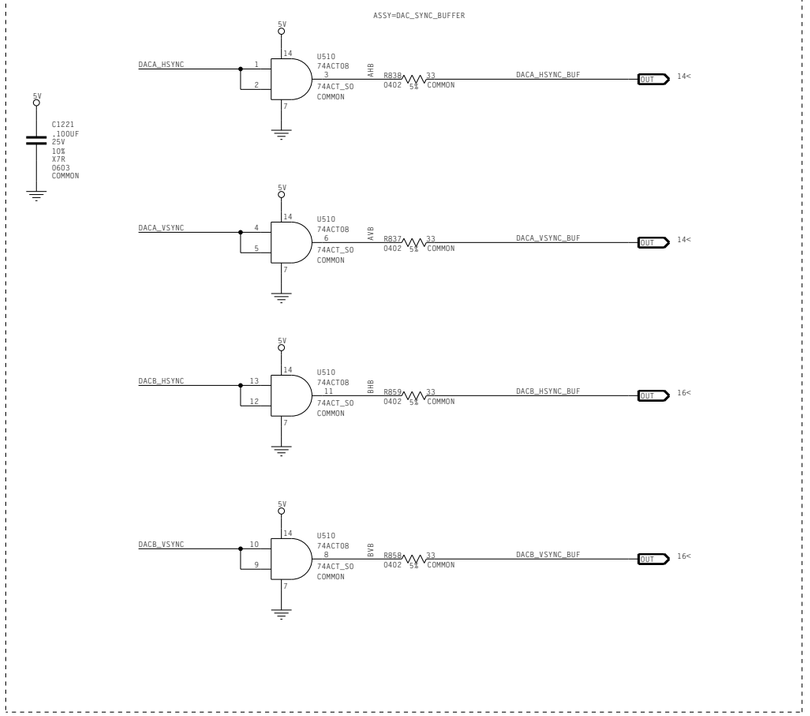
DACB



XTAL/PLLVDD



DAC Sync Buffer



NET RULES

NET	SPACING	LINE WIDTH
XTALIN	15MIL	5MIL
XTALOUT	15MIL	5MIL
DACB_VDD		16MIL
DACB_RSET		16MIL
DACB_VREF		16MIL
DACA_VDD		16MIL
DACA_RSET		16MIL
DACA_VREF		16MIL

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	DAC_A, DAC_B, PLL and SYNCbuffer

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NV_PN	600-10201-0007-210		
ID	design	PAGE	12 OF 28
NAME	Hunter	DATE	20-APR-2004

13. DVO/VIP Interface

NET RULES

	NET	LINE WIDTH	SPACING
IN	DVO_A_CALPD_VDDQ	12MIL	20MIL
IN	DVO_A_CALPU_GND	12MIL	20MIL
IN	DVO_A_VDDQ	16MIL	
IN	DVO_B_CALPD_VDDQ	12MIL	20MIL
IN	DVO_B_CALPU_GND	12MIL	20MIL
IN	DVO_B_VDDQ	16MIL	
IN	DVO_A_D<23..0>		10MIL
IN	DVO_A_CLKOUT		15MIL
IN	DVO_A_CLKOUT*		15MIL
IN	DVO_B_D<23..12>		10MIL

Si1178 supports either 3.3V or 1.0V-1.8V signaling

ASSY=DVO_A_NV40

A3V3
LB515 150-220R@100MHz COMMON BEAD_0603
C1011 4.7UF 6.3V 20% X5R 0603 COMMON
C973 .1UF 10V 10% X5R 0402 COMMON
C974 100PF 50V 5% C0G 0402 COMMON
C1007 1000PF 16V 10% X7R 0402 COMMON
GND
PLACE CLOSE TO NV40

DVO_A_VDDQ
R707 1K 1% 0402 COMMON
R711 1K 1% 0402 COMMON
C1013 .1UF 10V 10% X5R 0402 COMMON
DVO_A_VREF
R704 49.9 1% 0402 COMMON
DVO_A_CALPD_VDDQ
R705 49.9 1% 0402 COMMON
DVO_A_CALPU_GND
C63 4.7UF 6.3V 20% X5R 0603 COMMON

U10
NV40-A1 BGA1309 COMMON
13/26 DVO

AP10	DVO_A_VDDQ	
AR10	DVO_A_VDDQ	
AP11	DVO_A_VDDQ	
AT5	DVO_A_VREF	
AT8	DVO_A_CAL_PD_VDDQ	
AT9	DVO_A_CAL_PU_GND	

DVO_A_D0	AV4	DVO_A_D<0>	0
DVO_A_D1	AU5	DVO_A_D<1>	1
DVO_A_D2	AV5	DVO_A_D<2>	2
DVO_A_D3	AU6	DVO_A_D<3>	3
DVO_A_D4	AV6	DVO_A_D<4>	4
DVO_A_D5	AW6	DVO_A_D<5>	5
DVO_A_D6	AU8	DVO_A_D<6>	6
DVO_A_D7	AV8	DVO_A_D<7>	7
DVO_A_D8	AU9	DVO_A_D<8>	8
DVO_A_D9	AV9	DVO_A_D<9>	9
DVO_A_D10	AW9	DVO_A_D<10>	10
DVO_A_D11	AT10	DVO_A_D<11>	11
DVO_A_D12	AR9	DVO_A_D<12>	12
DVO_A_D13	AR8	DVO_A_D<13>	13
DVO_A_D14	AP9	DVO_A_D<14>	14
DVO_A_D15	AR6	DVO_A_D<15>	15
DVO_A_D16	AT6	DVO_A_D<16>	16
DVO_A_D17	AU3	DVO_A_D<17>	17
DVO_A_D18	AR5	DVO_A_D<18>	18
DVO_A_D19	AP8	DVO_A_D<19>	19
DVO_A_D20	AP5	DVO_A_D<20>	20
DVO_A_D21	AM8	DVO_A_D<21>	21
DVO_A_D22	AN9	DVO_A_D<22>	22
DVO_A_D23	AN4	DVO_A_D<23>	23

DUAL TMDS
DVO_A_D<23..0> → B1 (11<> 13< 18<)

DVO_A_DE_CLKIN	AV10	DVO_A_DE	OUT	18<
DVO_A_CLKOUT	AT7	DVO_A_CLKOUT	OUT	13< 18<
DVO_A_CLKOUT	AV7	DVO_A_CLKOUT*	OUT	13< 18<
DVO_A_HSYNC	AW3	DVO_A_HSYNC	OUT	18<
DVO_A_VSYNC	AV3	DVO_A_VSYNC	OUT	18<
DVO_A_CTL3	AV11	DVO_A_CTL3	OUT	18<

ASSY=DVO_B_NV40

A3V3
LB521 150-220R@100MHz COMMON BEAD_0603
C1062 4.7UF 6.3V 20% X5R 0603 COMMON
C1020 .1UF 10V 10% X5R 0402 COMMON
C981 100PF 50V 5% C0G 0402 COMMON
C1005 1000PF 16V 10% X7R 0402 COMMON
GND
PLACE CLOSE TO NV40

DVO_B_VDDQ
R690 1K 1% 0402 COMMON
R686 1K 1% 0402 COMMON
C938 .1UF 10V 10% X5R 0402 COMMON
DVO_B_VREF
R688 49.9 1% 0402 COMMON
DVO_B_CALPD_VDDQ
R684 49.9 1% 0402 COMMON
DVO_B_CALPU_GND

U10
NV40-A1 BGA1309 COMMON
14/26 DVO

AE6	DVO_B_VDDQ	
AE7	DVO_B_VDDQ	
AE8	DVO_B_VDDQ	
AG14	DVO_B_VREF	
AD13	DVO_B_CAL_PD_VDDQ	
AF13	DVO_B_CAL_PU_GND	

DVO_B_D0	AB2	NTP_DVO_B_D0	
DVO_B_D1	AB3	NTP_DVO_B_D1	
DVO_B_D2	AC2	NTP_DVO_B_D2	
DVO_B_D3	AC3	NTP_DVO_B_D3	
DVO_B_D4	AD2	NTP_DVO_B_D4	
DVO_B_D5	AD4	NTP_DVO_B_D5	
DVO_B_D6	AE3	NTP_DVO_B_D6	
DVO_B_D7	AF2	NTP_DVO_B_D7	
DVO_B_D8	AF3	NTP_DVO_B_D8	
DVO_B_D9	AG2	NTP_DVO_B_D9	
DVO_B_D10	AG4	NTP_DVO_B_D10	
DVO_B_D11	AH1	NTP_DVO_B_D11	
DVO_B_D12	AF4	DVO_B_D<12>	12
DVO_B_D13	AE4	DVO_B_D<13>	13
DVO_B_D14	AE5	DVO_B_D<14>	14
DVO_B_D15	AF6	DVO_B_D<15>	15
DVO_B_D16	AD6	DVO_B_D<16>	16
DVO_B_D17	AC5	DVO_B_D<17>	17
DVO_B_D18	AC6	DVO_B_D<18>	18
DVO_B_D19	AB6	DVO_B_D<19>	19
DVO_B_D20	AC4	DVO_B_D<20>	20
DVO_B_D21	AB4	NTP_DVO_B_D21	
DVO_B_D22	AB5	DVO_B_D<22>	22
DVO_B_D23	AB7	DVO_B_D<23>	23

VIP
VIP CLOCK
DVO_B_D<23..12> → IN (11<> 13< 19>)

DVO_B_DE_CLKIN	AH2	DVO_B_CLKIN	IN	15>
DVO_B_CLKOUT	AE1	NTP_DVO_B_CLKOUT		
DVO_B_CLKOUT	AE2	NTP_DVO_B_CLOCKOUT*		
DVO_B_HSYNC	AB1	NTP_DVO_B_HSYNC		
DVO_B_VSYNC	AA2	NTP_DVO_B_VSYNC		
DVO_B_CTL3	AJ3	NTP_DVOB_CTL3		

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	DVO/VIP Interface

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NV_PN	600-10201-0007-210		
ID	design	PAGE	13 OF 28
NAME	Hunter	DATE	20-APR-2004

14. DACA RGB filters, VGA connector Output (south)

NET RULES

	NET	LINE W.	IMPEDANCE	SPACING
14< 12> IN	DACA_RED		ALL:ALL:37.5 OHM:2 %	20MIL_G2G_30MIL
14< 12> IN	DACA_GREEN		ALL:ALL:37.5 OHM:2 %	20MIL_G2G_30MIL
14< 12> IN	DACA_BLUE		ALL:ALL:37.5 OHM:2 %	20MIL_G2G_30MIL
IN	DACA_R_F	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
IN	DACA_G_F	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
IN	DACA_B_F	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
17< 14> IN	DACA_RED_C	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
17< 14> IN	DACA_GREEN_C	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
17< 14> IN	DACA_BLUE_C	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL

DACA RGB-FILTER

12> IN I2CA_SDA_G — R828 33 0402 5% COMMON — I2CA_SDA — LB533 150-220R@100MHz BEAD_0603 COMMON — I2CA_SDA_C — BI 17<

12> IN I2CA_SCL_G — R827 33 0402 5% COMMON — I2CA_SCL — LB534 150-220R@100MHz BEAD_0603 COMMON — I2CA_SCL_C — OUT 17<

ASSY=DACA

12> IN DACA_VSYNC_BUF — L3 27nH 0603 COMMON — DACA_VSYNC_C — OUT 17<

12> IN DACA_HSYNC_BUF — L4 27nH 0603 COMMON — DACA_HSYNC_C — OUT 17<

Place 0ohm Resistor Incident with Common Mode Choke

14< 12> IN DACA_RED — L502 27nH 0603 COMMON — DACA_R_F — R848 0 0402 5% NO STUFF — L511 cmf1tr4_2012 360R@100mhz COMMON WIRE_WOUND — R857 0 0402 5% NO STUFF — DACA_RED_C — OUT 14< 17<

14< 12> IN DACA_GREEN — L503 27nH 0603 COMMON — DACA_G_F — R852 0 0402 5% NO STUFF — L512 cmf1tr4_2012 360R@100mhz COMMON WIRE_WOUND — R847 0 0402 5% NO STUFF — DACA_GREEN_C — OUT 14< 17<

14< 12> IN DACA_BLUE — L504 27nH 0603 COMMON — DACA_B_F — R856 0 0402 5% NO STUFF — L515 cmf1tr4_2012 360R@100mhz COMMON WIRE_WOUND — R851 0 0402 5% NO STUFF — DACA_BLUE_C — OUT 14< 17<

DACA_RGB_GND — BI 17<

ASSY=DACA_FILTER

DACA VGA connector

ASSY=DACA_DB15

J2 CON_DSUB15HD VGA_SLIM_DVIMTG VGA_SLIM_DVIMTG VAR

6 GND-R	1		
1 R	2		
7 GND-G	3		
2 G	4		
8 GND_B	5		
3 B	6		
9 5V	7		
4 ID2	8		
10 GND	9		
5 GND	10		
	11	IDO	NTP_A_MON_IDO
	12	SDA	
	13	HSYNC	
	14	VSYNC	
	15	SCL	

DDC_5V — NTP_A_MONID2

Place in output filter section!

ASSEMBLY	NV40, 350N/5DDM, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	DACA filter and VGA connector

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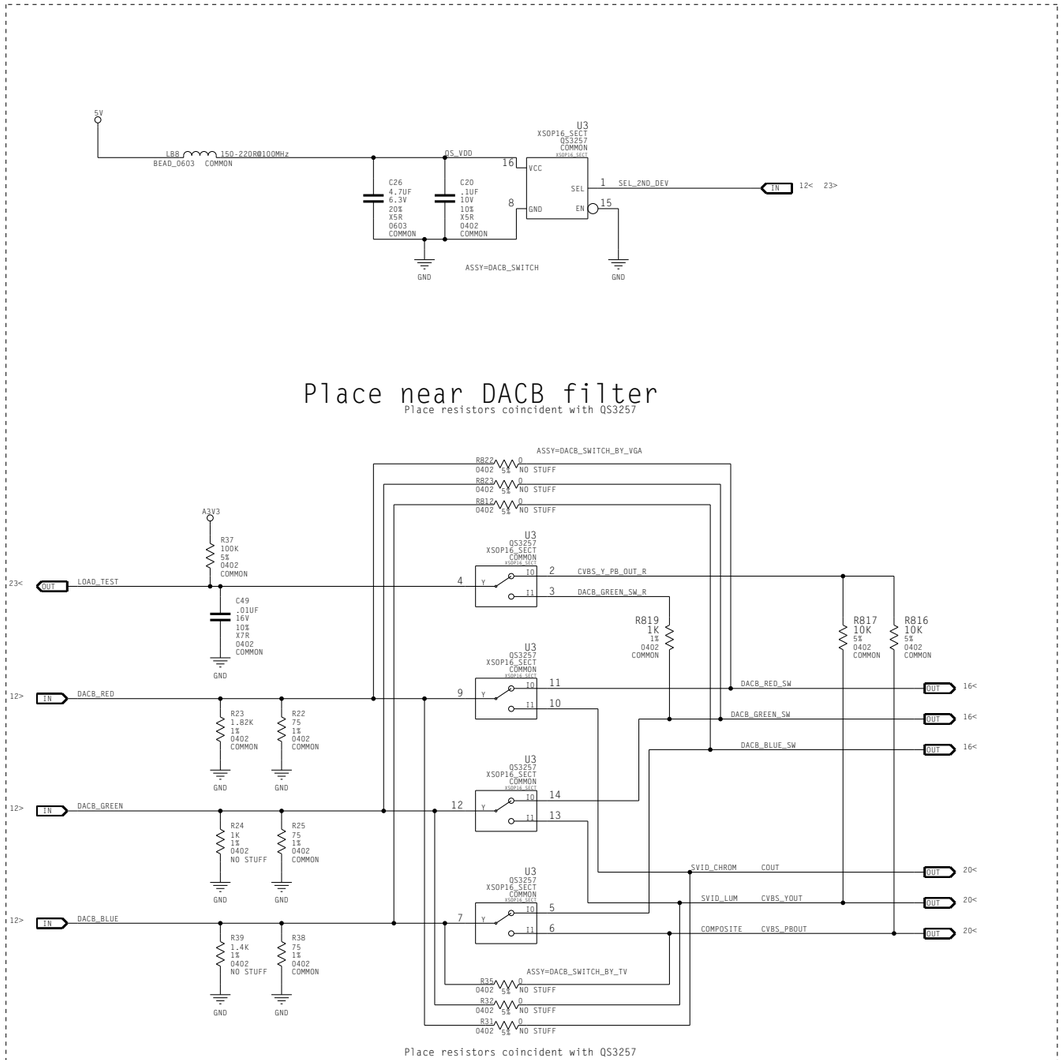
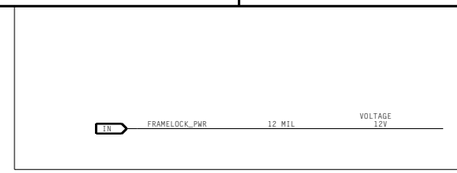
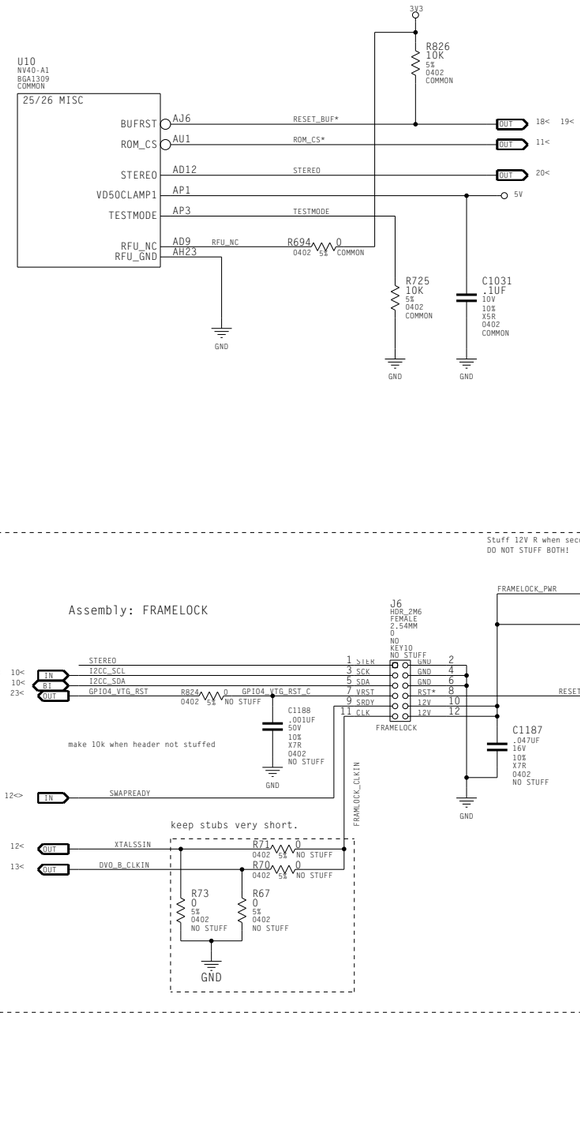
NV_PN	600-10201-0007-210		
ID	design	PAGE	14 OF 28
NAME	Hunter	DATE	20-APR-2004

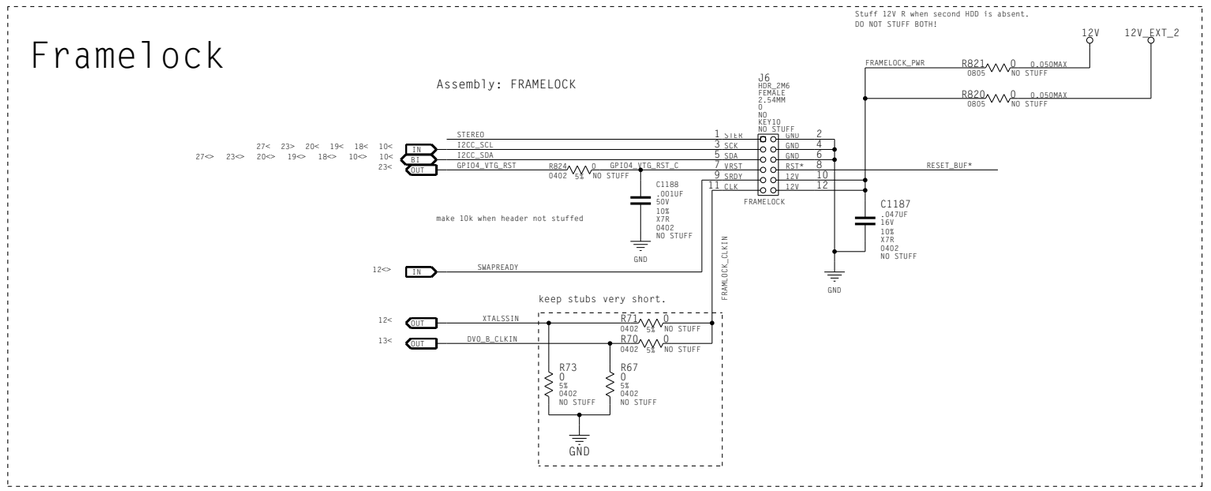
15. DACB VGA/TV Switch, miscellaneous GPU connections

Quickswitch for DACB









ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	DACB VGA/TV Switch, Framelock, MISC GPU signals

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NV_PN	600-10201-0007-210		
ID	design	PAGE	15 OF 28
NAME	Hunter	DATE	20-APR-2004

16. DACB RGB filters, VGA connector (north)

NET RULES

		NET	LINE W.	IMPEDANCE	SPACING
15<	12>	DACB_RED		ALL:ALL:37.5 OHM:2 %	20MIL_G2G_30MIL
15<	12>	DACB_GREEN		ALL:ALL:37.5 OHM:2 %	20MIL_G2G_30MIL
15<	12>	DACB_BLUE		ALL:ALL:37.5 OHM:2 %	20MIL_G2G_30MIL
16<	15>	DACB_RED_SW	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
16<	15>	DACB_GREEN_SW	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
16<	15>	DACB_BLUE_SW	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
		DACB_R_F	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
		DACB_G_F	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
		DACB_B_F	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
17<	16>	DACB_RED_C	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
17<	16>	DACB_GREEN_C	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL
17<	16>	DACB_BLUE_C	4MIL	ALL:ALL:75 OHM:2 %	20MIL_G2G_30MIL

DACB RGB-FILTER

12> IN I2CB_SDA_G — R842 33 5% 0402 COMMON — I2CB_SDA — L8532 150-220R@100MHz BEAD_0603 COMMON — OUT 17< I2CB_SDA_C

5V — R845 2.2K 5% 0402 COMMON — R3 2.2K 5% 0402 COMMON

D521 BAV99 SOT23 100V 100mA NO STUFF — C1218 220PF 50V 5% NPO 0603 COMMON

12> IN I2CB_SCL_G — R5 33 5% 0402 COMMON — I2CB_SCL — LB1 150-220R@100MHz BEAD_0603 COMMON — OUT 17< I2CB_SCL_C

D5 BAV99 SOT23 100V 100mA NO STUFF — C5 220PF 50V 5% NPO 0603 COMMON

ASSY=DACB

12> IN DACB_VSYNC_BUF — L1 27nH 0603 COMMON — OUT 17< DACB_VSYNC_C

D3 BAV99 SOT23 100V 100mA NO STUFF — C3 15PF 50V 5% NPO 0603 COMMON

12> IN DACB_HSYNC_BUF — L2 27nH 0603 COMMON — OUT 17< DACB_HSYNC_C

D4 BAV99 SOT23 100V 100mA NO STUFF — C4 15PF 50V 5% NPO 0603 COMMON

Place Oohm Resistor Incident with Common Mode Choke

16< 15> IN DACB_RED_SW — L504 27nH 0603 COMMON — DACB_R_F — R850 0 5% 0402 NO STUFF — OUT 16< 17< DACB_RED_C

L514 cmf1tr4_2012_2 360R@100mhz 3 COMMON WIRE_WOUND — R856 0 5% 0402 NO STUFF

D519 BAV99 SOT23 100V 100MA NO STUFF — C1199 22PF 50V 5% NPO 0402 NO STUFF — C1209 1BPF 50V 5% NPO 0402 COMMON

GND — ASSY=DACB_FILTER — GND

16< 15> IN DACB_GREEN_SW — L501 27nH 0603 COMMON — DACB_G_F — R846 0 5% 0402 NO STUFF — OUT 16< 17< DACB_GREEN_C

L510 cmf1tr4_2012_2 360R@100mhz 3 COMMON WIRE_WOUND — R849 0 5% 0402 NO STUFF

D518 BAV99 SOT23 100V 100MA NO STUFF — C1196 22PF 50V 5% NPO 0402 NO STUFF — C1206 15PF 50V 5% C0G 0402 COMMON

GND — GND

16< 15> IN DACB_BLUE_SW — L505 27nH 0603 COMMON — DACB_B_F — R855 0 5% 0402 NO STUFF — OUT 16< 17< DACB_BLUE_C

L513 cmf1tr4_2012_2 360R@100mhz 3 COMMON WIRE_WOUND — R853 0 5% 0402 NO STUFF — OUT 17< DACB_RGB_GND

D520 BAV99 SOT23 100V 100MA NO STUFF — C1200 22PF 50V 5% NPO 0402 NO STUFF — C1210 15PF 50V 5% C0G 0402 COMMON

GND — GND

DACB VGA connector

assy: DACB_DB15

J1 CON_DSUB15HD VGA_SLIM_DVIMTG VGA_SLIM_DVIMTG NO STUFF

6	GND-R	IDO 11	NTP_B_MON_IDO
1	R		
7	GND-G	SDA 12	
2	G		
8	GND_B	HSYNC 13	
3	B		
9	5V	VSYNC 14	
4	IDZ		
10	GND	SCL 15	
5	GND		

DDC_5V — NTP_B_MONID2

GND

5V — C1194 4.7UF 6.3V 20% X5R 0603 COMMON — C1193 4700PF 25V 10% X7R 0402 COMMON — C1192 470PF 50V 10% X7R 0402 COMMON

Place in output filter section!

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	DACB Filter and VGA connector

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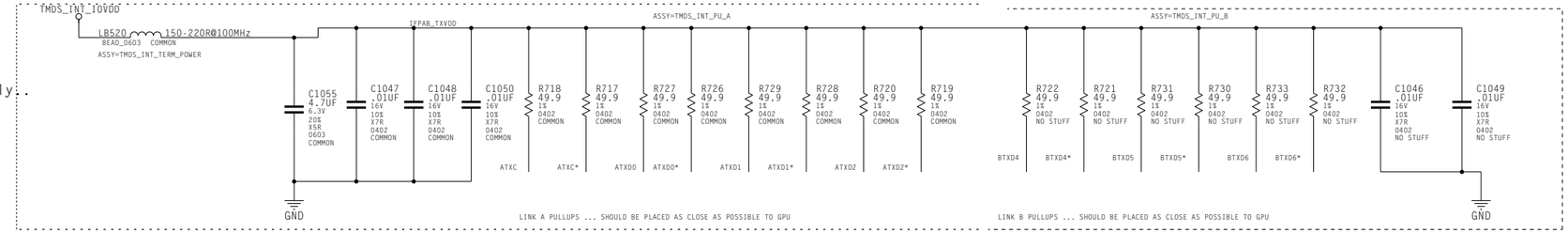
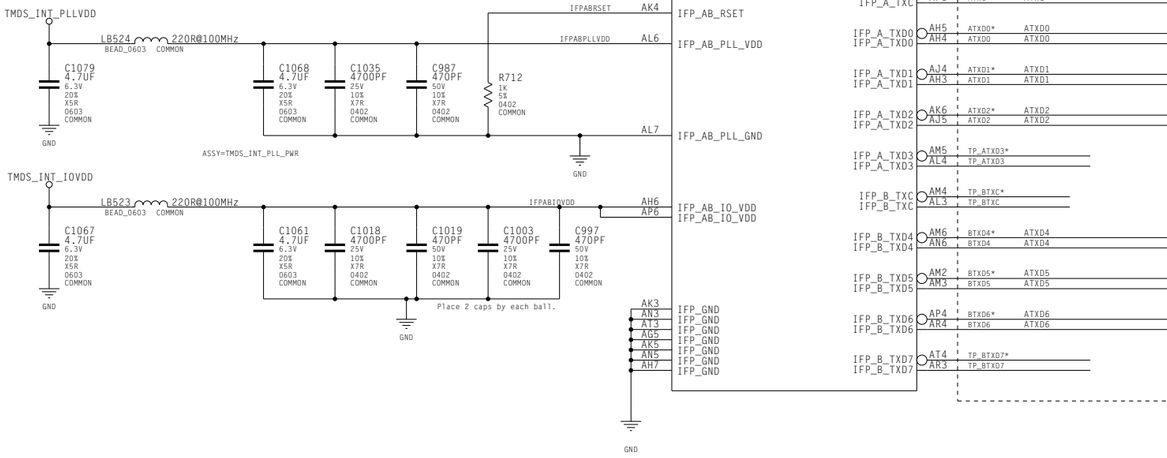
NV_PN	600-10201-0007-210		
ID	design	PAGE	16 OF 28
NAME	Hunter	DATE	20-APR-2004

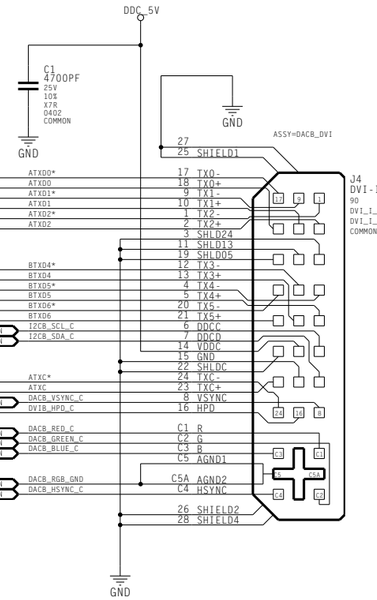
17. Internal and External TMDS (dual link X2)

See page 23 for power supply.

DVI B (mid) DAC B INTERNAL DUAL TMDS



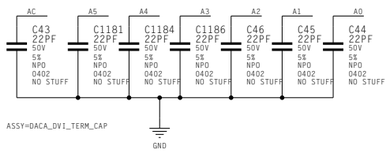


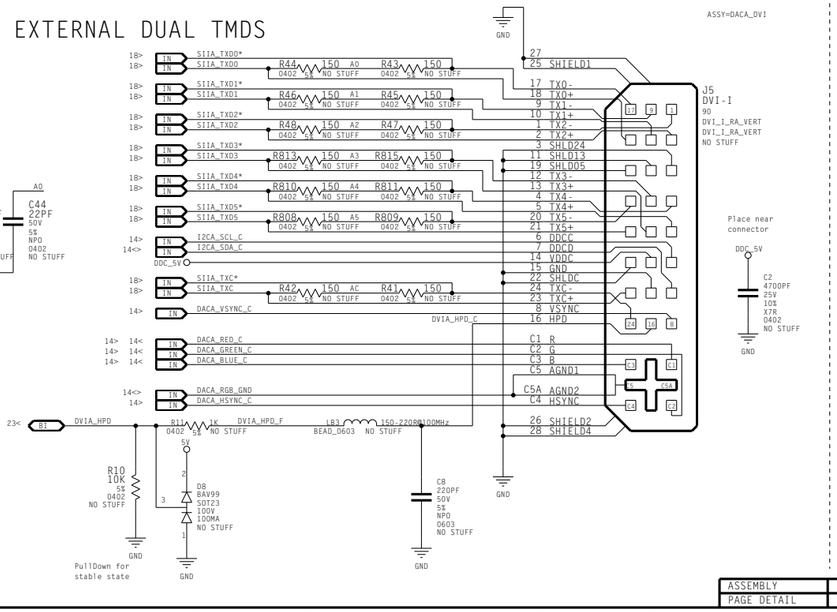


DVI A (south) DAC A, EXTERNAL DUAL TMDS

Place termination close to Silicon Image Chip

MODIFIED AC TERMINATION





NET	LINE WIDTH	VOLTAGE
IFPABVREF	12 MIL	3.3V
IFPABPLLVDD	12 MIL	3.3V
IFPAIOVDD	12 MIL	3.3V
IFPBIOVDD	12 MIL	3.3V
TMDS_INT_PLLVDD	12 MIL	3.3V
TMDS_INT_IOVDD	12 MIL	3.3V
TMDS_BACK	12 MIL	3.3V
TMDS_BACK_1	12 MIL	3.3V
TMDS_BACK_2	12 MIL	3.3V
TMDS_BACK_3	12 MIL	3.3V
TMDS_BACK_4	12 MIL	3.3V

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	DUAL LINK Internal TMDS, DVI Connectors

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NV_PN	600-10201-0007-210		
ID	design	PAGE	17 OF 28
NAME	Hunter	DATE	20-APR-2004

18. External Dual-Link TMDS Transmitter

NET RULES (OTHER)

LINE WIDTH

SIIA_VCC	12 MIL	SIIA_VCC
SIIA_AVCC	12 MIL	SIIA_AVCC
SIIA_PVCC1	12 MIL	SIIA_PVCC1
SIIA_PVCC2	12 MIL	SIIA_PVCC2

ASSY: TMDS_EXT_SD stuff for single/dual link
ASSY: TMDS_EXT_D stuff for dual link
ASSY: TMDS_EXT_S stuff for single link

I2C=0x72 (Slave)

U507
SII178
78_TQFP64
NO STUFF

SLAVE
BOTTOM

SII1xx (combi_sym)

NET RULES

NET	DIFFPAIR	SPACING	PHYSICAL
SIIA_TXD3	SIIA_TXD3	20MIL	4MIL_TRACE
SIIA_TXD3*	SIIA_TXD3	20MIL	4MIL_TRACE
SIIA_TXD4	SIIA_TXD4	20MIL	4MIL_TRACE
SIIA_TXD4*	SIIA_TXD4	20MIL	4MIL_TRACE
SIIA_TXD5	SIIA_TXD5	20MIL	4MIL_TRACE
SIIA_TXD5*	SIIA_TXD5	20MIL	4MIL_TRACE
NTP_SIIA_TXC			
NTP_SIIA_TXC*			

NV40 Dual Link:
Even (D11..0) pixel via master, odd (D23..12) via slave.

DVO_A_D<23..0>

DUAL_SYNC_R

DVO_A_VSYNC
DVO_A_DE
DVO_A_CLKOUT
DVO_A_CLKOUT*
I2CC_SCL
I2CC_SDA
RESET_BUF*

SIIA_VCC
R793 4.7K 0402 5% NO STUFF
R789 4.7K 0402 5% NO STUFF
SIIA2_MSEN
SIIA2_HDP

Note a:
STUFFING OPTION:
Rdual for Dual-Link
Rsing for Single-Link

Note a:
Rdual R58 0 5% 0402 NO STUFF
Rsing R57 0 5% 0402 NO STUFF

Note a:
Rdual R780 1.5K 5% 0402 NO STUFF
Rsing R779 1.5K 5% 0402 NO STUFF

SIIA_AVCC
SIIA_PVCC2
SIIA_PVCC1
SIIA_VCC
SIIA2_VREF
CTL3

C1120 .1UF 10V 10% X5R 0402 NO STUFF
C1119 100PF 50V 5% C0G 0402 NO STUFF
Make 0.1uF for single
C1172 100PF 50V 5% C0G 0402 NO STUFF
C1182 .1UF 10V 10% X5R 0402 NO STUFF
C1179 4.7UF 6.3V 20% X5R 0603 NO STUFF
C1165 2200PF 16V 20% X7R 0402 NO STUFF
C1141 100PF 50V 5% C0G 0402 NO STUFF
C1131 100PF 50V 5% C0G 0402 NO STUFF

R60 4.7K 5% 0402 NO STUFF
R783 4.7K 5% 0402 NO STUFF
C1149 .1UF 10V 10% X5R 0402 NO STUFF

Caps in BLUE are only required for dual link

I2C=0x70 (Master)

U5
SII178
78_TQFP64
NO STUFF

MASTER
TOP

NET RULES

NET	DIFFPAIR	SPACING	PHYSICAL
SIIA_TXD0	SIIA_TXD0	20MIL	4MIL_TRACE
SIIA_TXD0*	SIIA_TXD0	20MIL	4MIL_TRACE
SIIA_TXD1	SIIA_TXD1	20MIL	4MIL_TRACE
SIIA_TXD1*	SIIA_TXD1	20MIL	4MIL_TRACE
SIIA_TXD2	SIIA_TXD2	20MIL	4MIL_TRACE
SIIA_TXD2*	SIIA_TXD2	20MIL	4MIL_TRACE
SIIA_TXC	SIIA_TXC	20MIL	4MIL_TRACE
SIIA_TXC*	SIIA_TXC	20MIL	4MIL_TRACE

DUAL_SYNC
DUAL_SELECT
DVO_A_HSYNC
I2CC_SDA

SIIA_VCC
R56 4.7K 0402 5% NO STUFF
R55 4.7K 0402 5% NO STUFF
SIIA_MSEN
SIIA_HPD

For Single Link SIL164/168 is used

STUFF OPTION
Rx for SII164/166
Ry for SII178

SIIA_VCC
Rx R54 10K 5% 0402 NO STUFF
SIAA_DKEN
Ry R53 0 5% 0402 NO STUFF

SIIA_AVCC
SIIA_PVCC2
SIIA_PVCC1
SIIA_VCC
SIIA_VREF

C57 100PF 50V 5% C0G 0402 NO STUFF
C1175 2200PF 16V 20% X7R 0402 NO STUFF
C59 .1UF 10V 10% X5R 0402 NO STUFF
C60 .1UF 10V 10% X5R 0402 NO STUFF
C64 4.7UF 6.3V 20% X5R 0603 NO STUFF
C54 4.7UF 6.3V 20% X5R 0603 NO STUFF
C1121 100PF 50V 5% C0G 0402 NO STUFF
C84 .1UF 10V 10% X5R 0402 NO STUFF
C85 4.7UF 6.3V 20% X5R 0603 NO STUFF
C62 4.7UF 6.3V 20% X5R 0603 NO STUFF
C56 .1UF 10V 10% X5R 0402 NO STUFF
C1171 100PF 50V 5% C0G 0402 NO STUFF
C77 100PF 50V 5% C0G 0402 NO STUFF
C71 2200PF 16V 20% X7R 0402 NO STUFF
C69 2200PF 16V 20% X7R 0402 NO STUFF
C72 .1UF 10V 10% X5R 0402 NO STUFF
C73 .1UF 10V 10% X5R 0402 NO STUFF
C1129 4.7UF 6.3V 20% X5R 0603 NO STUFF
C1111 4.7UF 6.3V 20% X5R 0603 NO STUFF

R66 0 5% 0402 NO STUFF DVO_A_CTL3
ASSY=TMDS_EXT_CTL3
R62 0 5% 0402 NO STUFF

R61 4.7K 5% 0402 NO STUFF
R59 4.7K 5% 0402 NO STUFF
C76 .1UF 10V 10% X5R 0402 NO STUFF

Sil178 Dual-Link TMDS

ISEL/RST - I2C Interface Select.
HIGH - active (config programmed by I2C)

When ISEL/RST = HIGH
BSEL/SCL - I2C CLK
DSEL/SDA - I2C DATA

MASTER
I2C Address is 70h and is based on MAST and DUAL pins.

SLAVE
I2C Address is 72h

Notes:

Make sure Software knows and programs this correctly.
1. Detect Dual-Link Capable
2. Detect Master and Slave
3. Both Master and Slave transmitters must set bit 2 (BSEL) at register addr 0x0B to 0 for 12-biot mode
4. For frequencies less than or equal to 165Mhz, bit 0 (PD) at register addr 0x0B of Slave must be set to 0. For frequencies greater than 165Mhz, bit 0 (PD) at register addr 0x0B of Slave must be set to 1.
5. Skew between Master and Slave can be controlled by DCTL[2:0] register
6. Both Single-Link and Dual-Link mode will be configured via I2CC

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	DUAL LINK TMDS External with Silicon Image

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NV_PN	600-10201-0007-210		
ID	design	PAGE	18 OF 28
NAME	Hunter	DATE	20-APR-2004

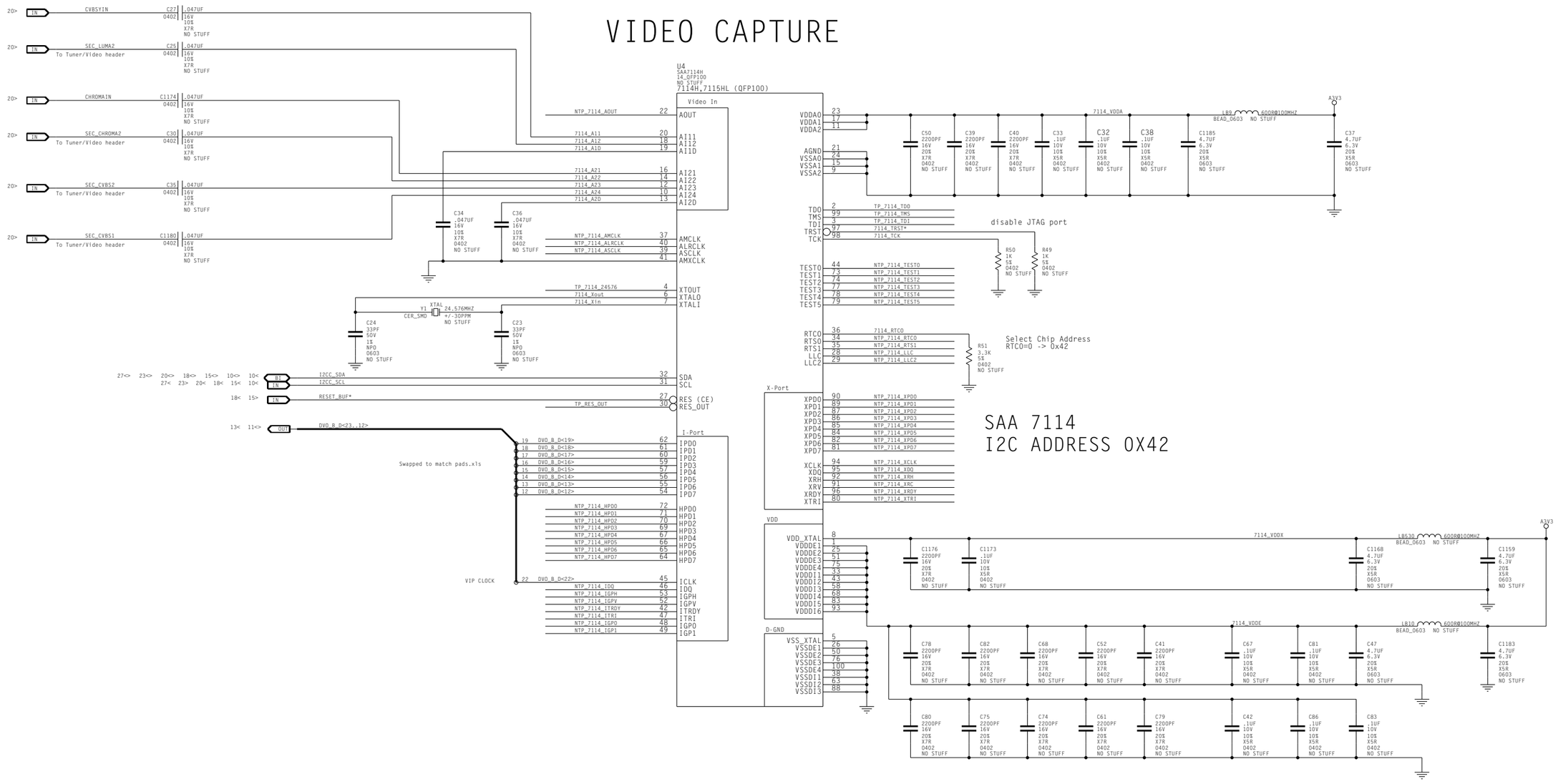
19. Video Capture

NET RULES

NET	SPACING	LINE WIDTH	VOLTAGE
7114_VDDA		12 MIL	3.3V
7114_VDDE		12 MIL	3.3V
7114_VDDX		12 MIL	3.3V
7114_Xout	20MIL		
7114_Xin	20MIL		

ASSY: 7114_COMMON

VIDEO CAPTURE



ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	Video Capture (SAA7114)

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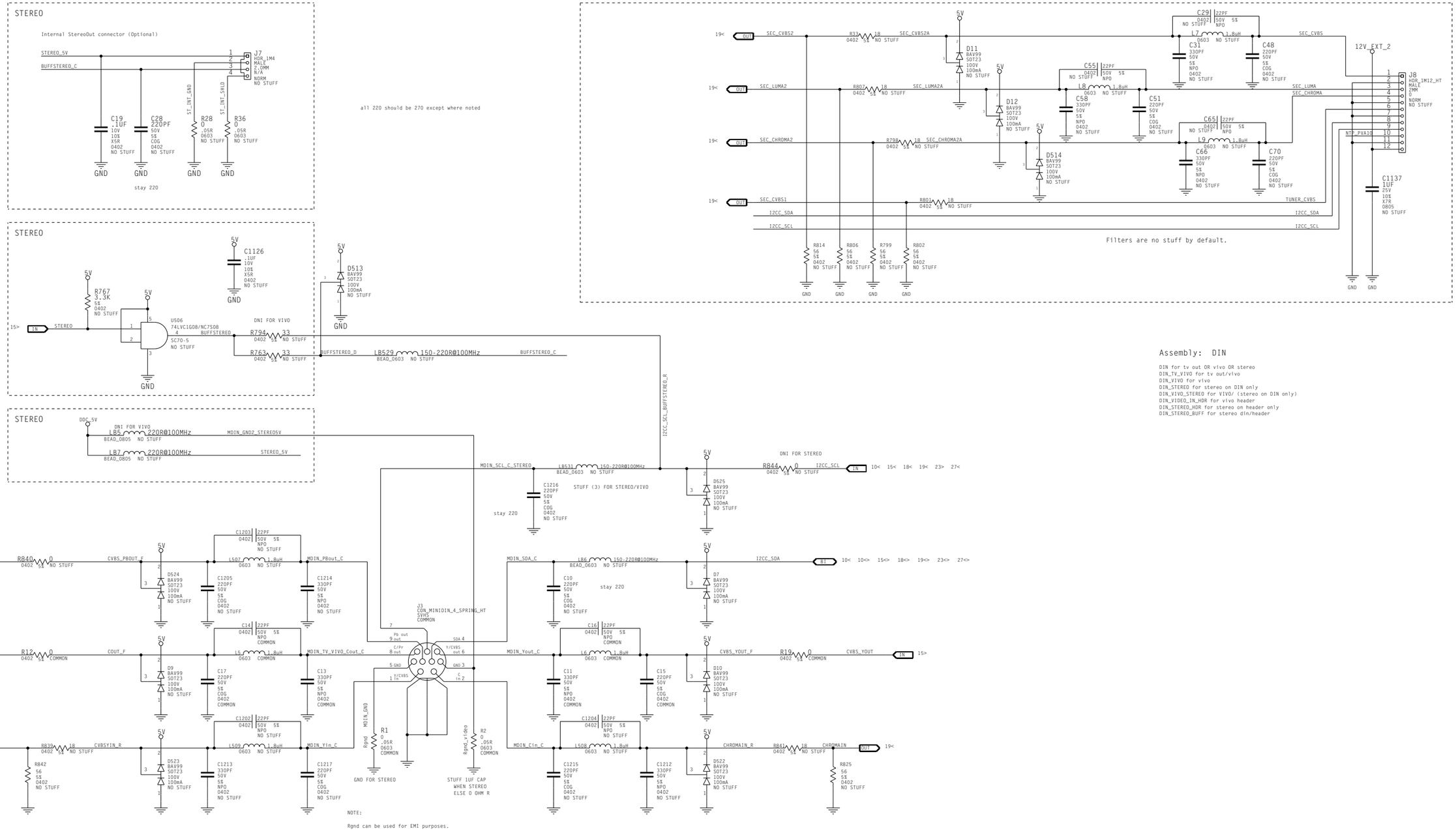
NV_PN	600-10201-0007-210		
ID	design	PAGE	19 OF 28
NAME	Hunter	DATE	20-APR-2004

20. S-Video Out, CVBS Out, CVBS/S-Video in, MINIDIN

PCI TUNER / INTERNAL VIDEO NOTES:
1X5 header can be used if only internal video is required.
1X12 header will be populated for both PCI tuner and internal video.



Assembly: DIN

DIN for tv out OR vivo OR stereo
DIN_TV_VIVO for tv out/vivo
DIN_VIVO for vivo
DIN_STEREO for stereo on DIN only
DIN_VIVO_STEREO for VIVO/ (stereo on DIN only)
DIN_VIDEO_IN_HDR for vivo header
DIN_STEREO_HDR for stereo on header only
DIN_STEREO_BUFF for stereo din/header

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	Video In/Out Connector External/Internal (MiniDin), STEREO header

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NV_PN	600-10201-0007-210		
ID	design	PAGE	20 OF 28
NAME	Hunter	DATE	20-APR-2004

21. FBVTT AND FBVDDQ DECOUPLING, AND Misc...

U10
NV40-A1
BGA1309
COMMON

8/26

FB_VTT	P13
FB_VTT	R13
FB_VTT	T13
FB_VTT	V13
FB_VTT	W13
FB_VTT	N14
FB_VTT	N15
FB_VTT	N16
FB_VTT	N18
FB_VTT	N22
FB_VTT	N24
FB_VTT	N25
FB_VTT	N26
FB_VTT	AG26
FB_VTT	AH26
FB_VTT	P27
FB_VTT	R27
FB_VTT	T27
FB_VTT	AC27
FB_VTT	AE27
FB_VTT	AF27
FB_VTT	AC28

FBVTT

FBVDDQ

U10
NV40-A1
BGA1309
COMMON

7/26

V11	FB_VDDQ
W11	FB_VDDQ
N12	FB_VDDQ
R12	FB_VDDQ
T12	FB_VDDQ
U12	FB_VDDQ
V12	FB_VDDQ
W12	FB_VDDQ
L13	FB_VDDQ
M13	FB_VDDQ
N13	FB_VDDQ
M14	FB_VDDQ
M15	FB_VDDQ
M17	FB_VDDQ
L18	FB_VDDQ
M18	FB_VDDQ
M22	FB_VDDQ
M23	FB_VDDQ
M25	FB_VDDQ
AJ25	FB_VDDQ
M26	FB_VDDQ
L27	FB_VDDQ
M27	FB_VDDQ
N27	FB_VDDQ
W27	FB_VDDQ
AA27	FB_VDDQ
AG27	FB_VDDQ
AH27	FB_VDDQ
AJ27	FB_VDDQ
N28	FB_VDDQ
P28	FB_VDDQ
R28	FB_VDDQ
U28	FB_VDDQ
V28	FB_VDDQ
AB28	FB_VDDQ
AE28	FB_VDDQ
AF28	FB_VDDQ
AG28	FB_VDDQ
AJ28	FB_VDDQ
AG29	FB_VDDQ
AH29	FB_VDDQ

FBVDDQ — Place near BGA

C955 4700PF 25V 10% X7R 0402 COMMON	C796 .022UF 16V 10% X7R 0402 COMMON	C774 .1UF 10V 10% X5R 0402 COMMON	C771 .1UF 10V 10% X5R 0402 COMMON	GND
C953 4700PF 25V 10% X7R 0402 COMMON	C847 .022UF 16V 10% X7R 0402 COMMON	C758 .1UF 10V 10% X5R 0402 COMMON	C802 .1UF 10V 10% X5R 0402 COMMON	GND
C823 4700PF 25V 10% X7R 0402 COMMON	C848 .022UF 16V 10% X7R 0402 COMMON	C901 .1UF 10V 10% X5R 0402 COMMON	C792 .1UF 10V 10% X5R 0402 COMMON	GND
C773 4700PF 25V 10% X7R 0402 COMMON	C791 .022UF 16V 10% X7R 0402 COMMON	C778 .1UF 10V 10% X5R 0402 COMMON	C765 .1UF 10V 10% X5R 0402 COMMON	GND
C757 1UF 10V 10% X7R 0603 COMMON	C776 1UF 10V 10% X7R 0603 COMMON	C753 1UF 10V 10% X7R 0603 COMMON	C911 10UF 6.3V 20% X5R 0805 COMMON	GND
C865 10UF 6.3V 20% X5R 0805 COMMON	C1041 10UF 6.3V 20% X5R 0805 COMMON		C749 10UF 6.3V 20% X5R 0805 COMMON	GND
C745 10UF 6.3V 20% X5R 0805 COMMON	C794 10UF 6.3V 20% X5R 0805 COMMON	C747 10UF 6.3V 20% X5R 0805 COMMON		GND

FBVTT — Place near BGA

C939 4700PF 25V 10% X7R 0402 NO STUFF	C822 .022UF 16V 10% X7R 0402 NO STUFF	C819 .1UF 10V 10% X5R 0402 NO STUFF	C864 .1UF 10V 10% X5R 0402 NO STUFF	C905 .1UF 10V 10% X5R 0402 NO STUFF

GND

C795 .01UF 25V 10% X7R 0402 COMMON	C904 .01UF 25V 10% X7R 0402 COMMON	C949 .01UF 25V 10% X7R 0402 COMMON	C923 .01UF 25V 10% X7R 0402 COMMON
C817 .01UF 25V 10% X7R 0402 COMMON	C942 .01UF 25V 10% X7R 0402 COMMON	C882 .01UF 25V 10% X7R 0402 COMMON	C941 .01UF 25V 10% X7R 0402 COMMON
C814 .01UF 25V 10% X7R 0402 COMMON	C960 .01UF 25V 10% X7R 0402 COMMON	C836 .01UF 25V 10% X7R 0402 COMMON	C948 .01UF 25V 10% X7R 0402 COMMON

GND

C754 4700PF 25V 10% X7R 0402 COMMON	C957 .022UF 16V 10% X7R 0402 COMMON	C827 .1UF 10V 10% X5R 0402 COMMON	C954 .1UF 10V 10% X5R 0402 COMMON	GND
C995 4700PF 25V 10% X7R 0402 COMMON	C841 .022UF 16V 10% X7R 0402 COMMON	C813 .1UF 10V 10% X5R 0402 COMMON	C764 .1UF 10V 10% X5R 0402 COMMON	GND
C994 4700PF 25V 10% X7R 0402 COMMON	C1016 .022UF 16V 10% X7R 0402 COMMON	C816 .1UF 10V 10% X5R 0402 COMMON	C793 .1UF 10V 10% X5R 0402 COMMON	GND
C763 1UF 10V 10% X7R 0603 COMMON	C980 1UF 10V 10% X7R 0603 COMMON	C867 1UF 10V 10% X7R 0603 COMMON	C963 10UF 6.3V 20% X5R 0805 COMMON	GND

GND

C863 4700PF 25V 10% X7R 0402 COMMON	C922 .022UF 16V 10% X7R 0402 COMMON	C952 .1UF 10V 10% X5R 0402 COMMON	C849 .1UF 10V 10% X5R 0402 COMMON	GND
C846 4700PF 25V 10% X7R 0402 COMMON	C835 .022UF 16V 10% X7R 0402 COMMON	C811 .1UF 10V 10% X5R 0402 COMMON	C902 .1UF 10V 10% X5R 0402 COMMON	GND
C673 4700PF 25V 10% X7R 0402 COMMON	C996 .022UF 16V 10% X7R 0402 COMMON	C818 .1UF 10V 10% X5R 0402 COMMON	C1025 .1UF 10V 10% X5R 0402 COMMON	GND
C899 1UF 10V 10% X7R 0603 COMMON	C1000 1UF 10V 10% X7R 0603 COMMON	C838 1UF 10V 10% X7R 0603 COMMON	C1021 10UF 6.3V 20% X5R 0805 COMMON	GND

GND

U10
NV40-A1
BGA1309
COMMON

21/26 GND

K23	GND	GND	D1
N23	GND	GND	G1
AG23	GND	GND	K1
A24	GND	GND	N1
E24	GND	GND	T1
G24	GND	GND	W1
C26	GND	GND	AA1
K26	GND	GND	AD1
AK26	GND	GND	AG1
AU26	GND	GND	AK1
A27	GND	GND	AN1
E27	GND	GND	A11
G27	GND	GND	E3
U27	GND	GND	H3
AD27	GND	GND	L3
AN27	GND	GND	P3
AR27	GND	GND	U3
AW27	GND	GND	Y3
M28	GND	GND	AA3
Y28	GND	GND	AD3
AH28	GND	GND	AG3
C29	GND	GND	A4
K29	GND	GND	AU4
AK29	GND	GND	AW4
AU29	GND	GND	C5
A30	GND	GND	G5
E30	GND	GND	K5
G30	GND	GND	N5
L30	GND	GND	T5
P30	GND	GND	W5
U30	GND	GND	AA5
W30	GND	GND	AD5
AA30	GND	GND	A7
AC30	GND	GND	E7
AF30	GND	GND	G7
AJ30	GND	GND	K7
AN30	GND	GND	N7
AR30	GND	GND	T7
AW30	GND	GND	AD7
C32	GND	GND	AG7
W32	GND	GND	AK7
AA32	GND	GND	AN7
AU32	GND	GND	AP7
A33	GND	GND	AR7
E33	GND	GND	AU7
G33	GND	GND	AW7
K33	GND	GND	C8
N33	GND	GND	W8
T33	GND	GND	AA8
AD33	GND	GND	AC9
AG33	GND	GND	AF9
AK33	GND	GND	AJ9
AN33	GND	GND	A10
AR33	GND	GND	E10
AW33	GND	GND	G10
C35	GND	GND	L10
G35	GND	GND	P10
K35	GND	GND	U10
N35	GND	GND	W10
T35	GND	GND	AA10
W35	GND	GND	AN10
AA35	GND	GND	AU10
AD35	GND	GND	AW10
AG35	GND	GND	C11
AK35	GND	GND	K11
AN35	GND	GND	AL11
AU35	GND	GND	AA12
A36	GND	GND	AE12
AW36	GND	GND	AH12
E37	GND	GND	AJ12
H37	GND	GND	A13
L37	GND	GND	E13
P37	GND	GND	G13
U37	GND	GND	U13
Y37	GND	GND	AE13
AA37	GND	GND	C14
AC37	GND	GND	K14
AF37	GND	GND	AH14
AJ37	GND	GND	A16
AM37	GND	GND	E16
AR37	GND	GND	G16
C38	GND	GND	M16
D39	GND	GND	C17
G39	GND	GND	K17
K39	GND	GND	N17
N39	GND	GND	AG17
T39	GND	GND	AH17
W39	GND	GND	A19
AA39	GND	GND	C19
AD39	GND	GND	E19
AG39	GND	GND	H19
AK39	GND	GND	K19
AN39	GND	GND	C20
A139	GND	GND	M20
		GND	AH20
		GND	A21
		GND	E21
		GND	H21
		GND	K21
		GND	C23

GND

U10
NV40-A1
BGA1309
COMMON

26/26

NC	AA11	NTP_NC_0
NC	AG13	NTP_NC_1
NC	W29	NTP_NC_2

U10
NV40-A1
BGA1309
COMMON

22/26 TGND

AC20	T_GND	T_GND	U15
AD20	T_GND	T_GND	Y15
AE20	T_GND	T_GND	AC15
U21	T_GND	T_GND	U16
V21	T_GND	T_GND	Y16
W21	T_GND	T_GND	AC16
AA21	T_GND	T_GND	R17
AB21	T_GND	T_GND	T17
AC21	T_GND	T_GND	U17
U22	T_GND	T_GND	V17
V22	T_GND	T_GND	W17
W22	T_GND	T_GND	Y17
Y22	T_GND	T_GND	AA17
AA22	T_GND	T_GND	AB17
AB22	T_GND	T_GND	AC17
AC22	T_GND	T_GND	AD17
R23	T_GND	T_GND	AE17
T23	T_GND	T_GND	U18
U23	T_GND	T_GND	V18
V23	T_GND	T_GND	W18
W23	T_GND	T_GND	Y18
Y23	T_GND	T_GND	AA18
AA23	T_GND	T_GND	AB18
AB23	T_GND	T_GND	AC18
AC23	T_GND	T_GND	U19
AD23	T_GND	T_GND	V19
AE23	T_GND	T_GND	W19
U24	T_GND	T_GND	AA19
Y24	T_GND	T_GND	AB19
AC24	T_GND	T_GND	AC19
U25	T_GND	T_GND	R20
Y25	T_GND	T_GND	T20
AC25	T_GND	T_GND	U20
		T_GND	V20
		T_GND	AB20

GND

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	FBVDDQ, FBVTT DECOUP

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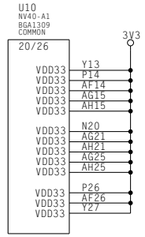
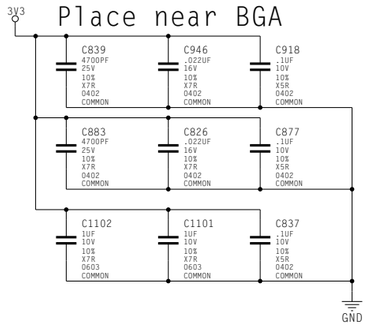
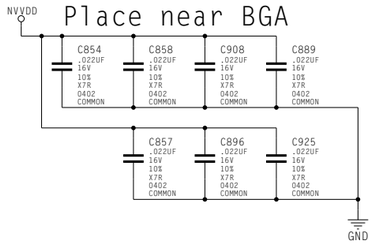
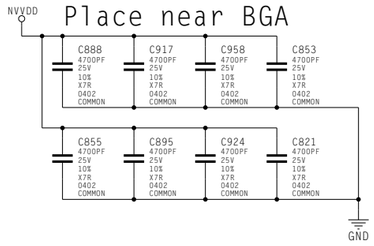
ID	design	PAGE	21 OF 28
NAME	Hunter	DATE	20-APR-2004

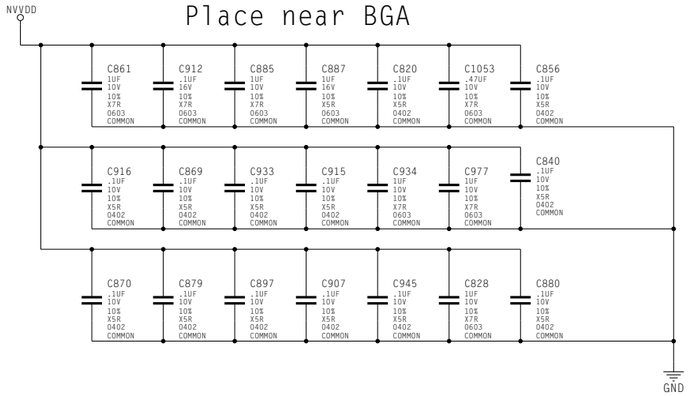
22. VDD AND NVVDD DECOUPLING

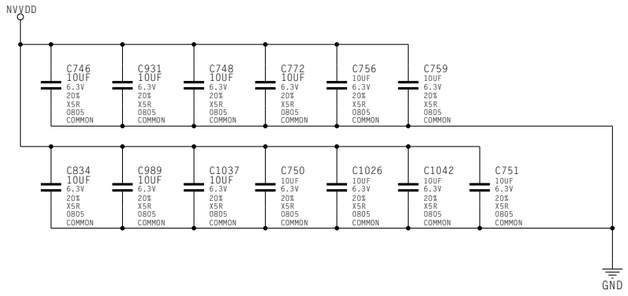


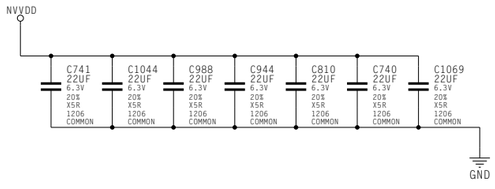


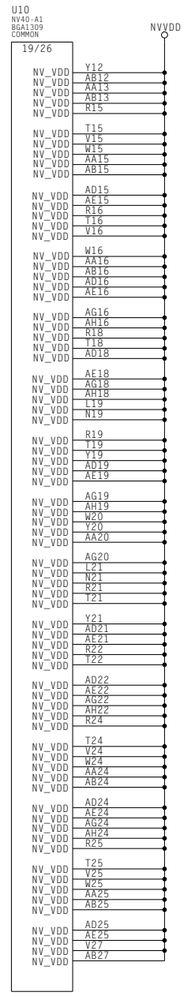












ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	3V3, NVVDD DECOUP

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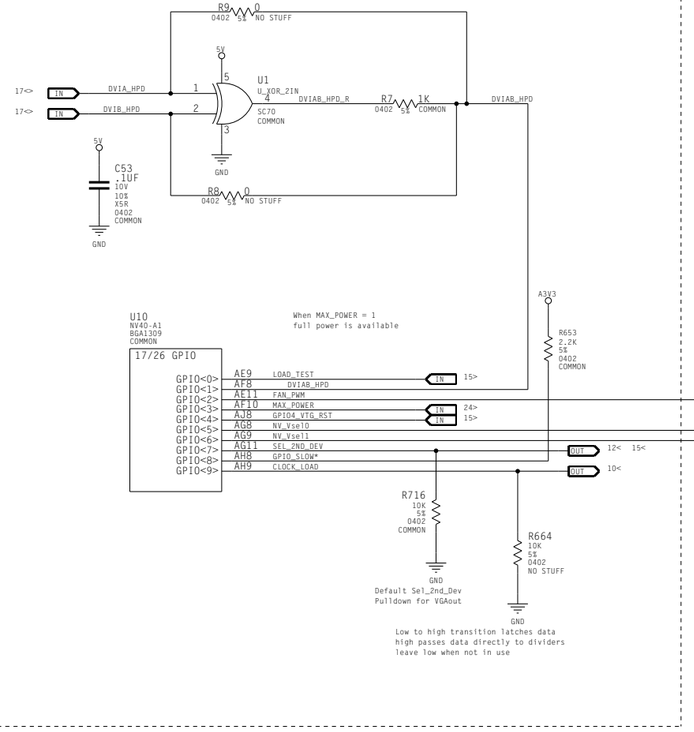
NV_PN	600-10201-0007-210		
ID	design	PAGE	22 OF 28
NAME	Hunter	DATE	20-APR-2004

23. GPIO's, NVVDD Control, Fan & Thermal Control

NET RULES

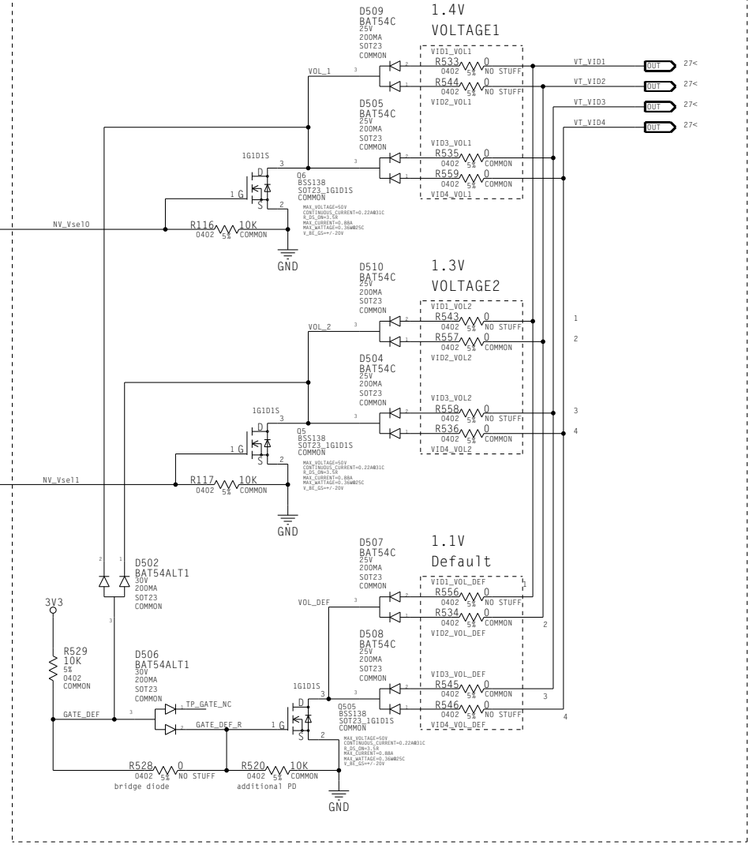
NET	SPACING	LINE WIDTH
THERMDA	10MIL	10MIL
THERMDC	10MIL	10MIL
FAN_PWM	20MIL	
FAN_PWM_A	20MIL	
FAN_PWM_B	20MIL	
FAN_PWM_L	20MIL	12MIL

GPIO CONTROL

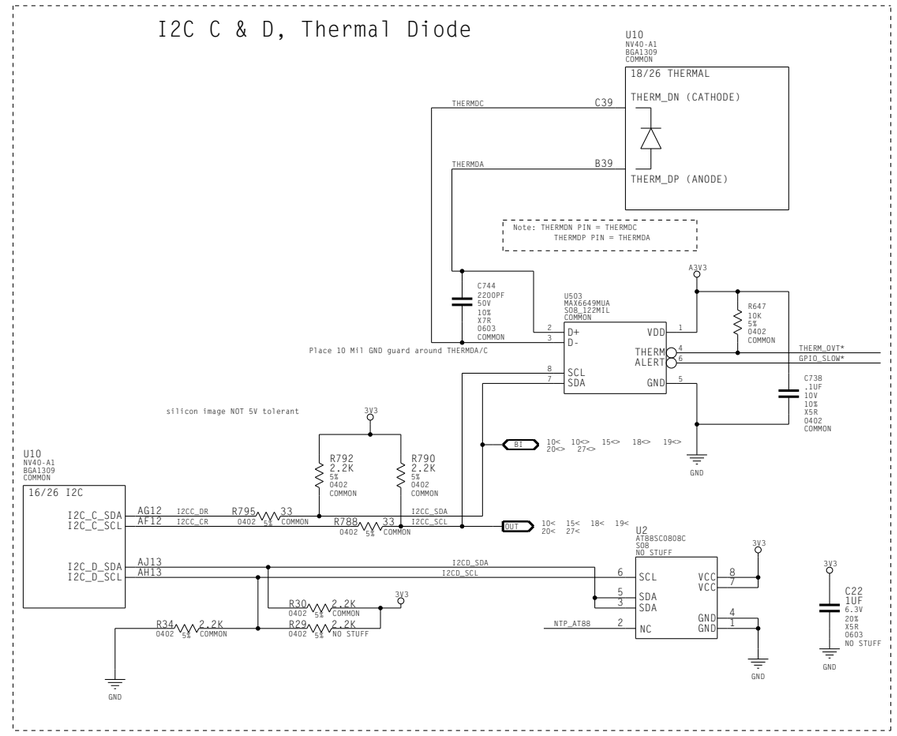


VID CONTROL

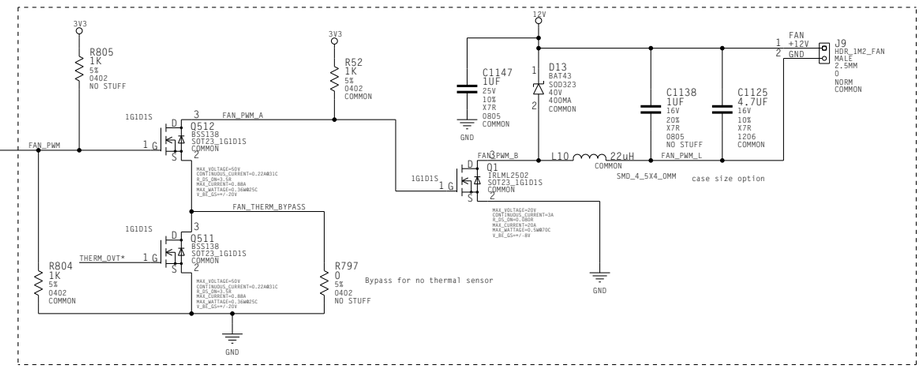
Default selection for NVVDD_VID[4..1]



I2C C & D, Thermal Diode



FAN CONTROL



If THERM_OVT*=0 then fan is on.

If THERM_OVT*=1 then:
FAN_PWM = 0 turns fan ON
FAN_PWM = 1 turns fan OFF

NVVDD Voltage Select

NVVDD = 0.8V-1.55V (60A)

Regulator: VT1103

Control via NV_GPIOs NV_VSEL[2..0] :

VID 4 3 2 1	NVVDD Vout
1 1 1 1	0.80V
1 1 1 0	0.85V
1 1 0 1	0.90V
1 1 0 0	0.95V
1 0 1 1	1.00V
1 0 1 0	1.05V
1 0 0 1	1.10V
1 0 0 0	1.15V
0 1 1 1	0.20V
0 1 1 0	1.25V
0 1 0 1	1.30V
0 1 0 0	1.35V
0 0 1 1	1.40V
0 0 1 0	1.45V
0 0 0 1	1.50V
0 0 0 0	1.55V

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	GPIOs, NVVDD VID, TEMP and FAN Control

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NV_PN	600-10201-0007-210		
ID	design	PAGE	23 OF 28
NAME	Hunter	DATE	20-APR-2004

24. EXT POWER CONNECTION AND DETECTION

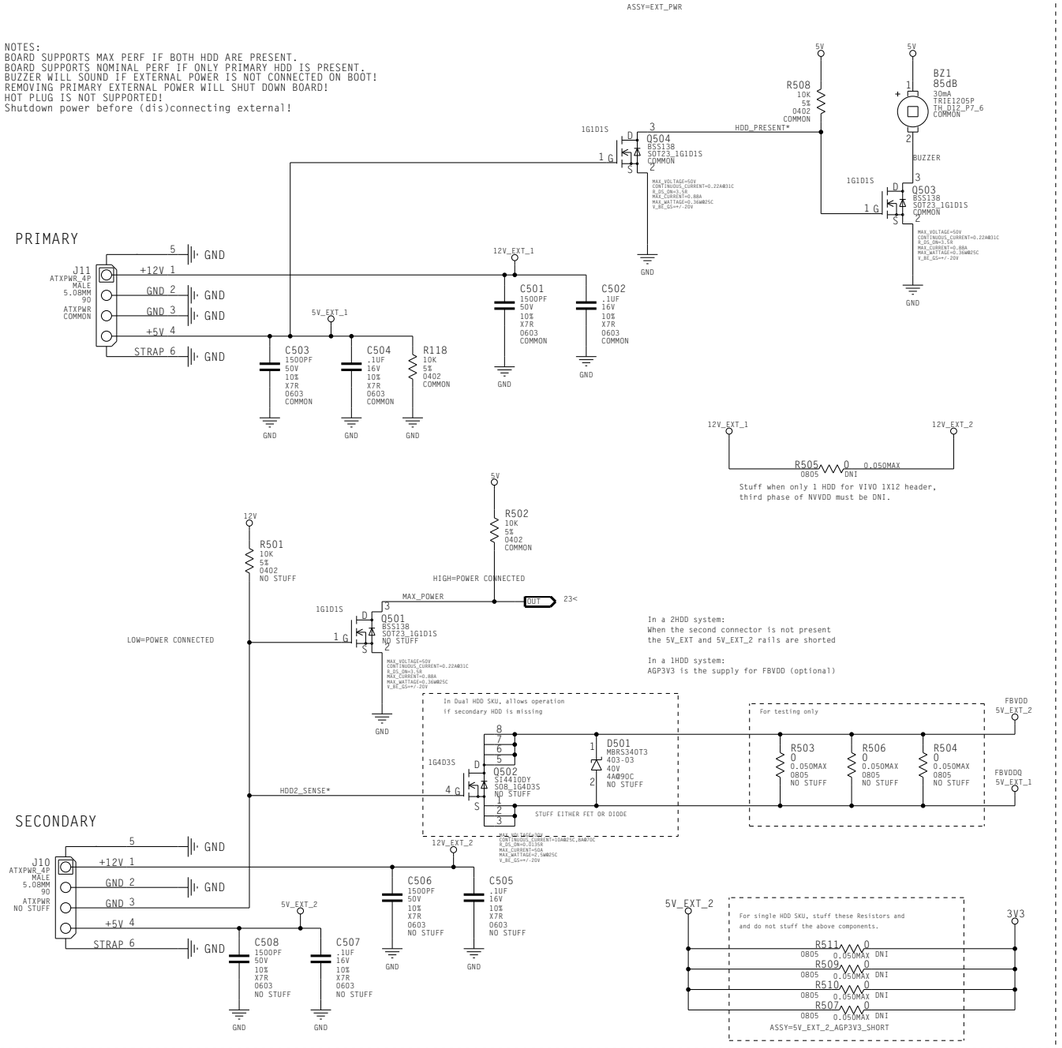
NET RULES

NET	LINE WIDTH	VOLTAGE
DDC_5V	12 MIL	5V
5V_FUSED	12 MIL	5V
BUZZER	5 MIL	5V

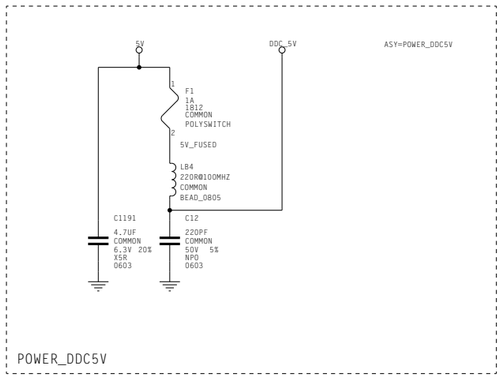
EXTERNAL POWER CONNECTORS, AUDIO ALERT

ASSY=EXT_PWR

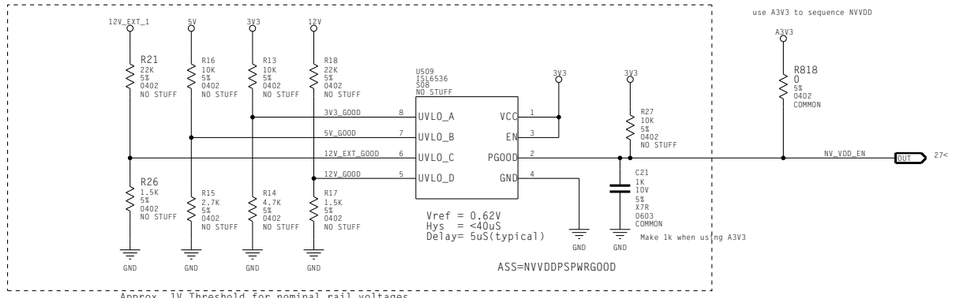
NOTES:
BOARD SUPPORTS MAX PERF IF BOTH HDD ARE PRESENT.
BOARD SUPPORTS NOMINAL PERF IF ONLY PRIMARY HDD IS PRESENT.
BUZZER WILL SOUND IF EXTERNAL POWER IS NOT CONNECTED ON BOOT!
REMOVING PRIMARY EXTERNAL POWER WILL SHUT DOWN BOARD!
HOT PLUG IS NOT SUPPORTED!
Shutdown power before (dis)connecting external!



DDC 5V



Power Good



ASSEMBLY	BASE LEVEL GENERIC SCHEMATIC ONLY. COMMON & NO_STUFF ASSEMBLY NOTES AND BOM NOT FINAL
PAGE DETAIL	EXTERNAL POWER CONNECTION AND DETECTION

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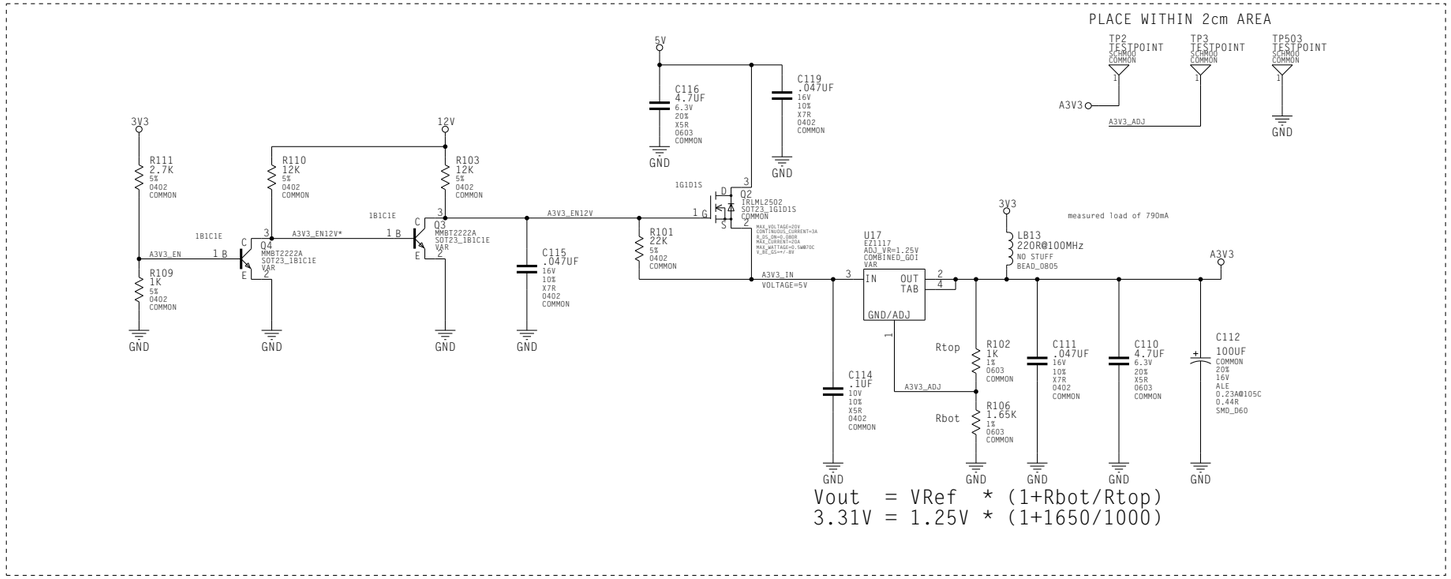
NV_PN	600-10201-base-sch		
ID	design	PAGE	24 OF 28
NAME	Hunter	DATE	16-APR-2004

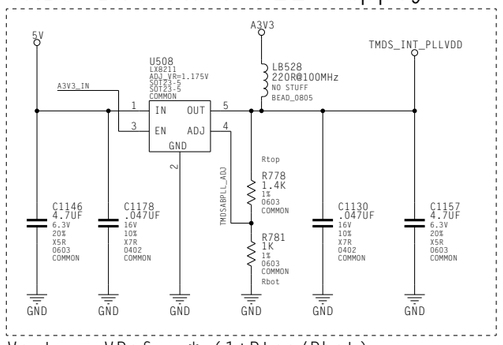
25. Power Supply I: Analog 3V3

NET	MIN_LINE_WIDTH	VOLTAGE	
A3V3	12MIL	3.3V	A3V3
TMDS_INT_IOVDD	12MIL	3.3V	TMDS_INT_IOVDD
TMDS_INT_PLLVDD	12MIL	3.3V	TMDS_INT_PLLVDD
A3V3_IN	12MIL	5V	
A3V3_ADJ	10MIL		
A3V3_EN12V	10MIL		
A3V3_EN12V*	10MIL		
A3V3_EN	10MIL		
TMDSOI_IN	12MIL	5V	

Analog Power Supply

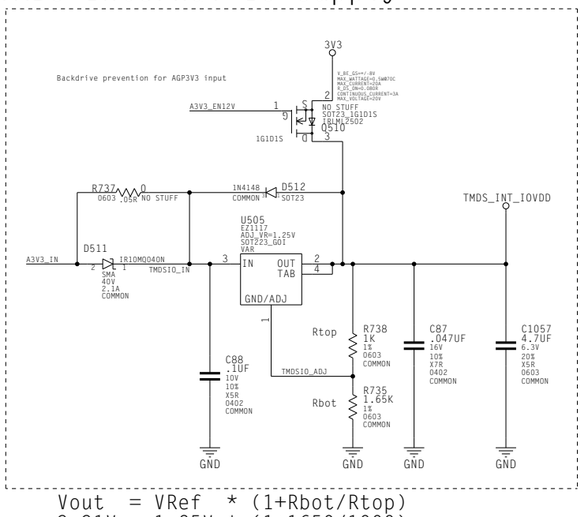


TMDS Internal PLL Supply



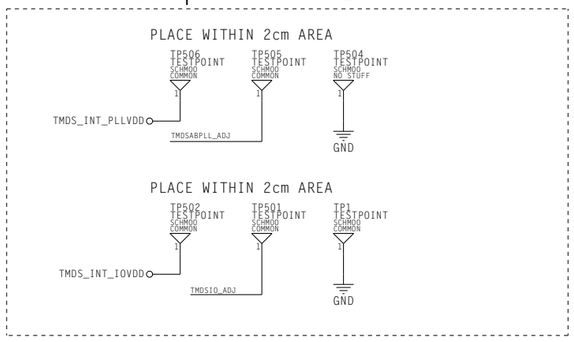
Vout = VRef * (1+Rtop/Rbot)
2.8V = 1.175V * (1+1400/1000)

TMDS Internal IO Supply



Vout = VRef * (1+Rbot/Rtop)
3.31V = 1.25V * (1+1650/1000)

SHMOO Testpoints TMDS



TMDS power sequencing done by using A3V3_IN.

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	A3V3, TMDS IO POWER SUPPLIES

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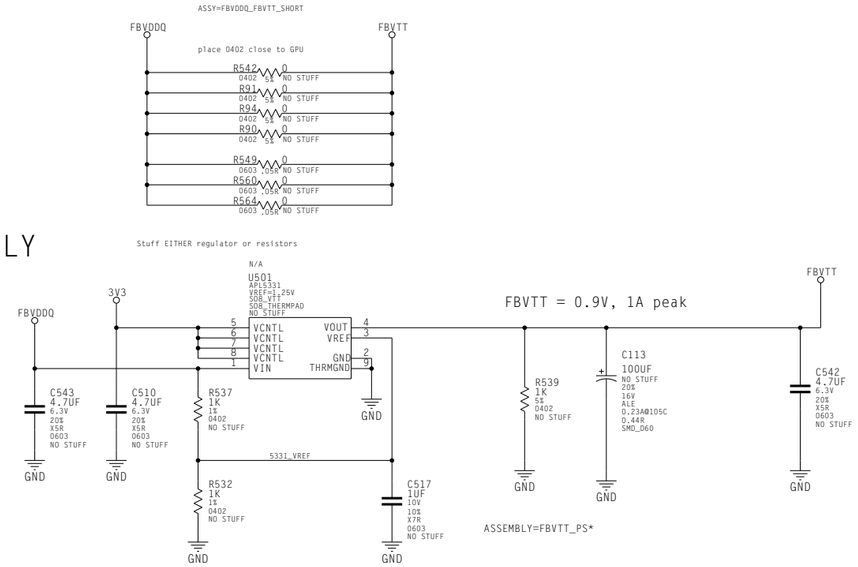
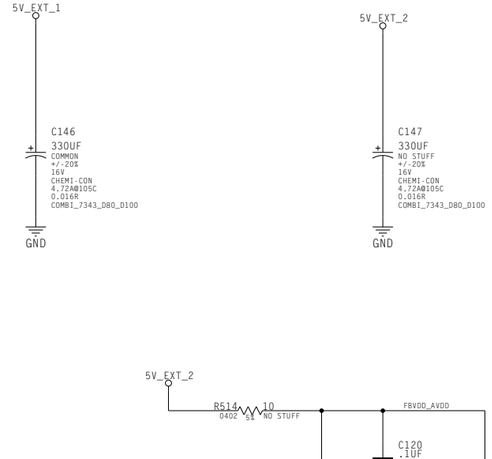
NV_PN	600-10201-0007-210		
ID	design	PAGE	25 OF 28
NAME	Hunter	DATE	20-APR-2004

26. Power Supply III: FBVDDQ/FBVTT

FBVTT SUPPLY



INPUT FILTERS



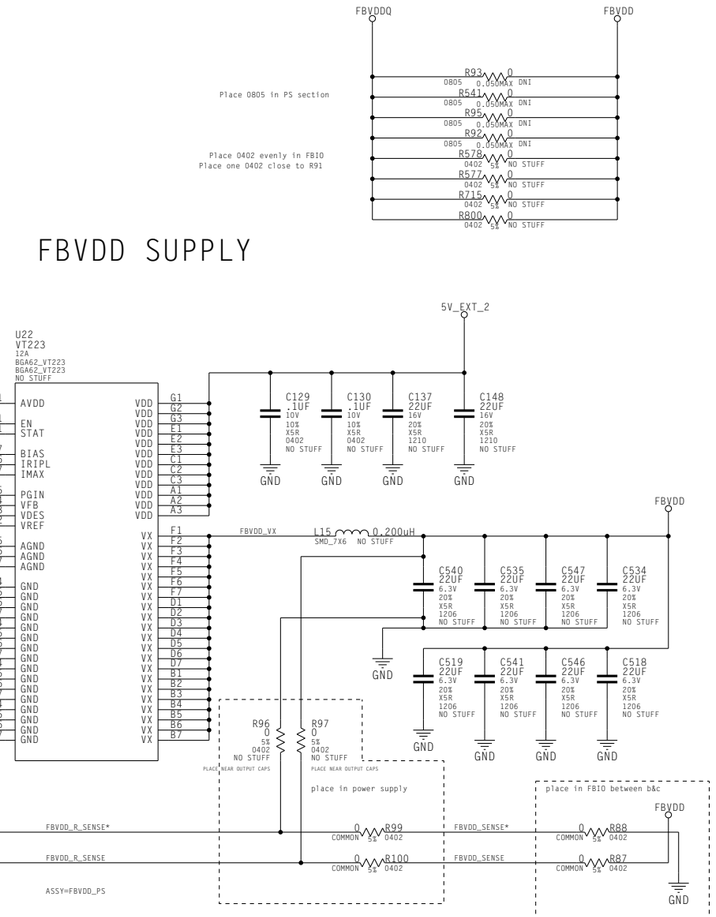
NET RULES

NET	LINE WIDTH	VOLTAGE
FBVDDQ_VX	12 MIL	3.3V
FBVDD_VX	12 MIL	3.3V

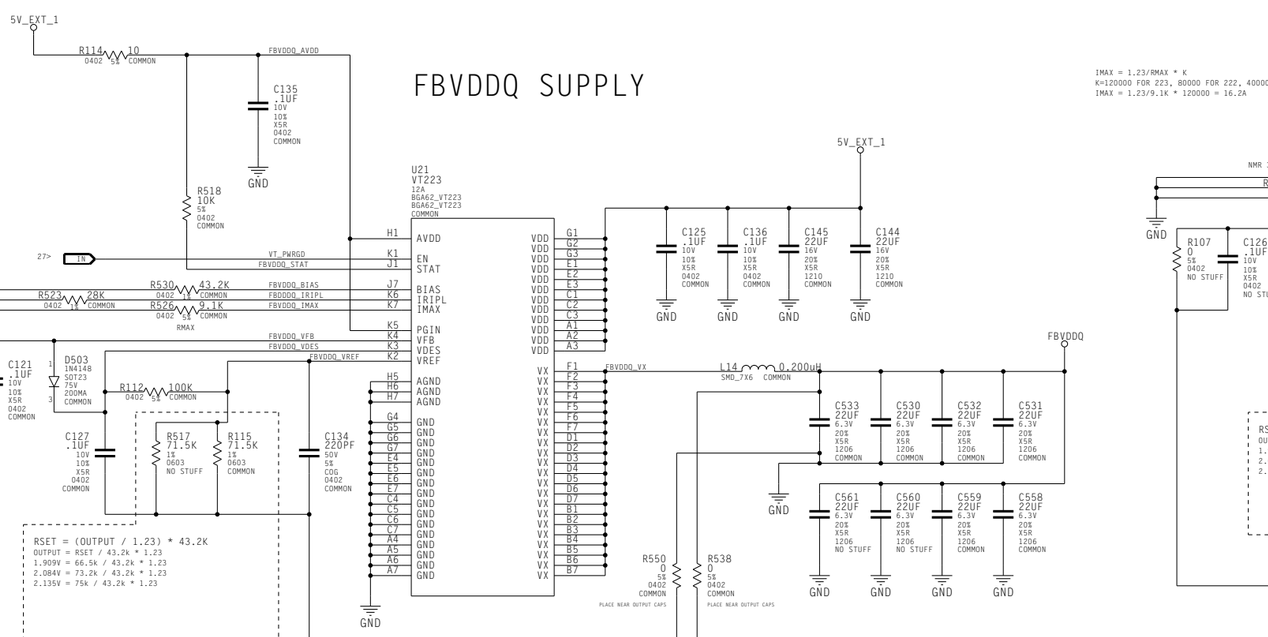
FBVDD	12 MIL	1.8V	FBVDD
FBVDDQ	12 MIL	1.8V	FBVDDQ
FBVTT	10 MIL	0.9V	FBVTT
5V_EXT_1	12 MIL	5V	5V_EXT_1
5V_EXT_2	12 MIL	5V	5V_EXT_2

NET	DIFFPAIR	SPACING	LINE WIDTH
FBVDD_SENSE	FBVDD_SENSE	10MIL	10MIL_TRACE
FBVDD_SENSE*	FBVDD_SENSE	10MIL	10MIL_TRACE

FBVDD SUPPLY



FBVDDQ SUPPLY



FBVDD SUPPLY

ASSEMBLY	ASSEMBLY=NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	FBVDD, FBVDDQ, FBVTT POWER SUPPLIES

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NV_PN	600-10201-0007-210		
ID	design	PAGE	26 OF 28
NAME	Hunter	DATE	20-APR-2004

27. Power Supply IV: NVVDD

NVVDD = 0.8V..1.5V (60A)

NOTES:
For each 1103S, the ground pins H6, H7, and Iref should be connected with traces to the input cap ground on J7 and there the via is located to tie to regular GND.

The analog ground amongst different 1103S should not be connected together.

4AMP SPEC Iripple each 22UF input CAP AT 100MF

NET RULES

NET	LINE WIDTH	VOLTAGE
5V	12 MIL	5V
NVVDD	24 MIL	1.4V
12V_EXT_1	12 MIL	12V
12V_EXT_2	12 MIL	12V
VT_VX0	12 MIL	1.4V
VT_VX1	12 MIL	1.4V
VT_VX2	12 MIL	1.4V

NET	DIFFPAIR	SPACING	LINE WIDTH
NVVDD_SENSE	NVVDD_SENSE	10MIL	10MIL_TRACE
NVVDD_SENSE*	NVVDD_SENSE	10MIL	10MIL_TRACE
FBVDDQ_SENSE	FBVDDQ_SENSE	10MIL	10MIL_TRACE
FBVDDQ_SENSE*	FBVDDQ_SENSE	10MIL	10MIL_TRACE

NVVDD Voltage Select

Regulator: VT1103

Control via NV_GPIOs NV_VSEL[2..0] :

NV_VSEL VID 2 1 0	4 3 2 1 0	NVVDD (Vofs=0V) Vout
1 1 1	0 0 0 1 0	1.50V
1 1 0	0 0 1 1 0	1.40V
1 0 1	0 1 0 1 0	1.30V
1 0 0	0 1 1 1 0	1.20V
0 1 1	1 0 0 1 0	1.10V (default)
0 1 0	1 0 0 1 0	1.00V
0 0 1	1 1 0 1 0	0.90V
0 0 0	1 1 1 1 0	0.80V

* GPIO's are inverted

Defaults are defined on Page 23

Rofs = OR

ASSEMBLY: NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041

PAGE DETAIL: NVVDD POWER SUPPLY

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NV_PN	600-10201-0007-210		
ID	design	PAGE	27 OF 28
NAME	Hunter	DATE	20-APR-2004

28. MECHANICAL

bracket to connectors

MEC4
HEX_JACK_SCREW
STD
COMMON

MEC3
HEX_JACK_SCREW
STD
COMMON

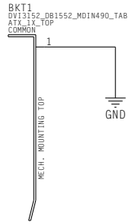
MEC1
HEX_JACK_SCREW
STD
COMMON

MEC2
HEX_JACK_SCREW
STD
COMMON

bracket to PCB

MEC5
PH_4_40X3/16_SCREW
STD
COMMON

BKT1
DVI315Z_DB1552_MDIN490_TAB
ATI_IX_TOP
COMMON



bkt - dual slot   DB15-DVI-MDIN = 151-10001-0007-002
bkt - single slot   DB15-DVI-MDIN = 151-10001-0006-002
bkt - single slot   DVI-DVI-MDIN = 151-10001-0006-000

cooler - single slot TM30 = 365-00000-0010-000
cooler - dual slot TM24 = 365-00000-0009-000

ASSEMBLY	NV40, 350N/500M, 256MB, VGA, DVI-I DUAL, TV OUT, SINGLE HDD, PCIID:0x041
PAGE DETAIL	Mechanical

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NV_PN	600-10201-0007-210		
ID	design	PAGE	28 OF 28
NAME	Hunter	DATE	20-APR-2004