BF609-VSK Development Board	
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FinBoard

BlackFin BF609-EVSK Development Board

4/10/2013

11:01:01 AM

Avnet Engineering Services		
Title: BF609-EVSK CoverSheet		
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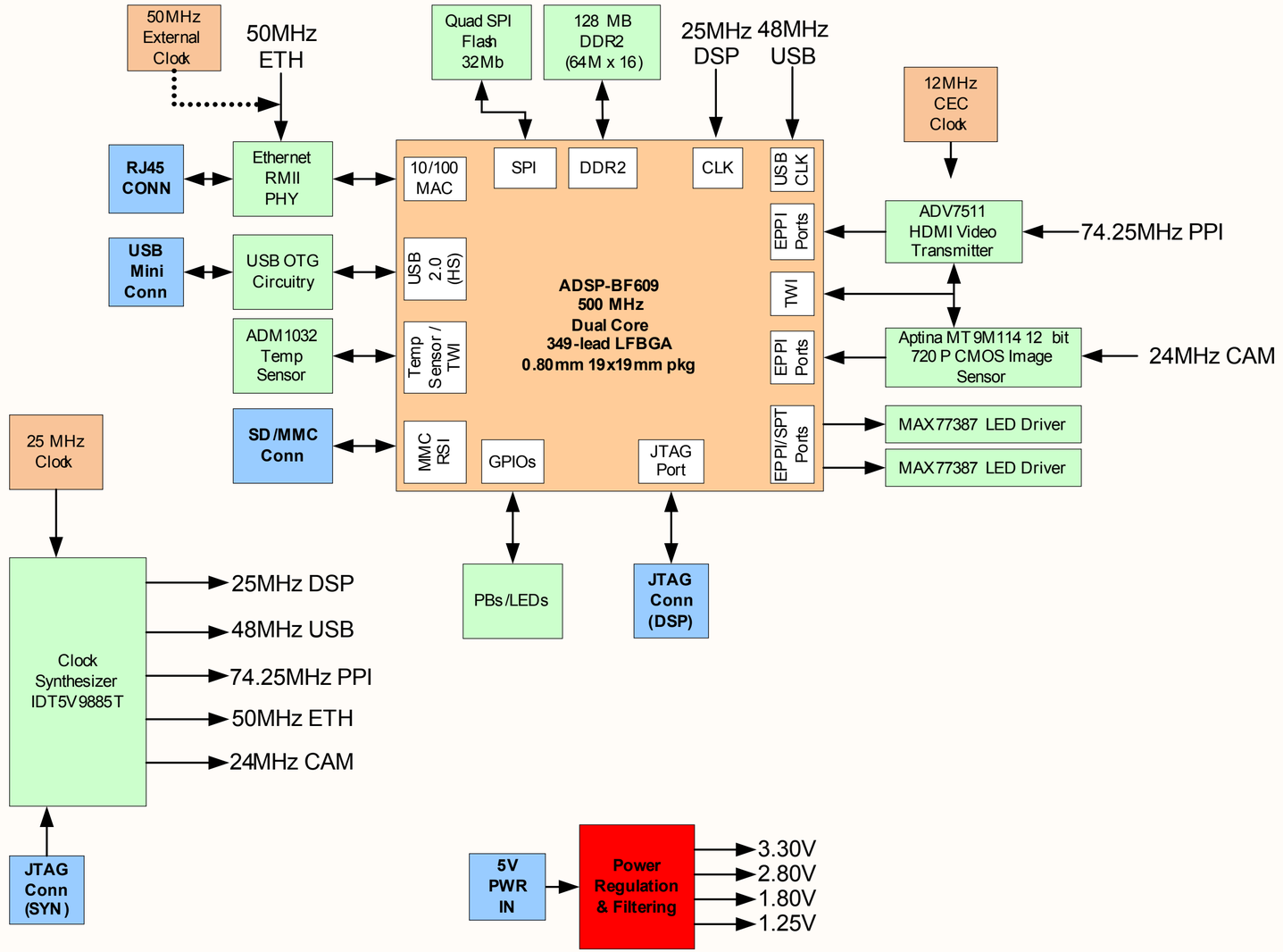
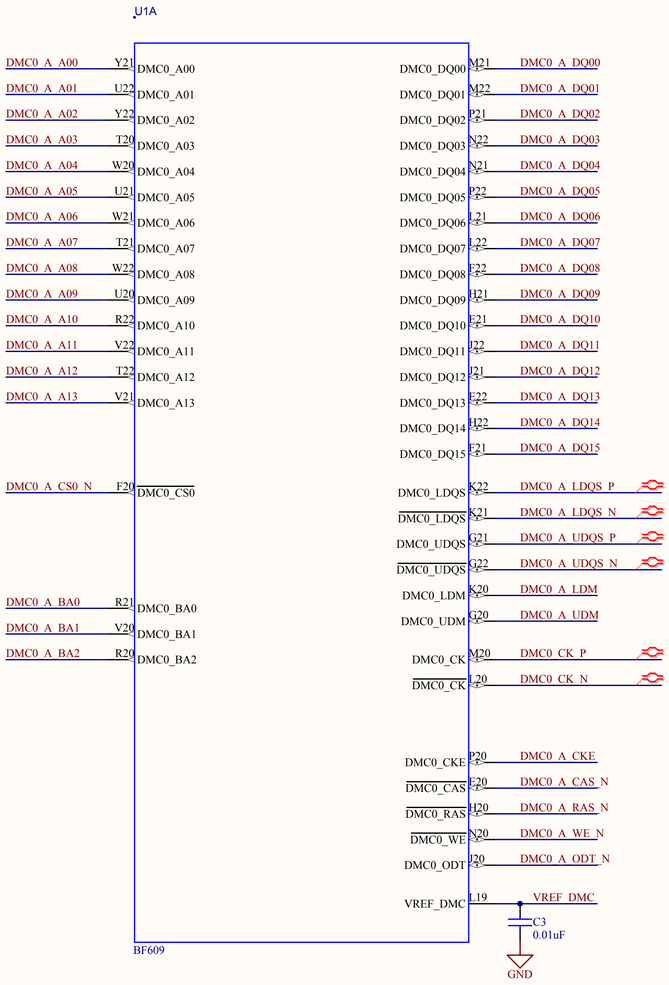
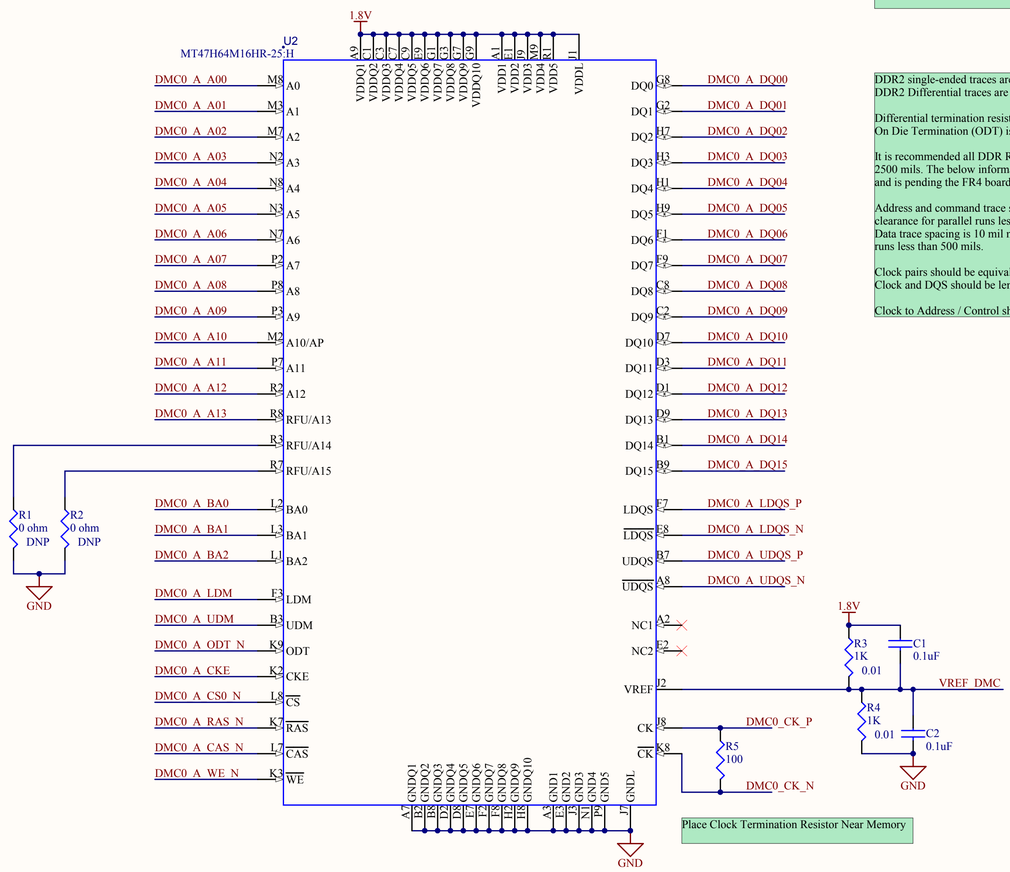


Avnet Engineering Services			
Title: BF609-EVSK Block Diagram			
Size: B	Document Number: BlackFin BF609-EVSK		Rev: B
Date: 4/10/2013	Sheet 2 of 11		





DDR2 end of line tterminators and VTT tracking circuit have been omitted since overall trace length is less than 2.5" per net.
For custom designs please adhere to all EE-notes from ADI and and recommendations by the memory manufacturer.

DDR2 single-ended traces are 50 Ohms impedance
DDR2 Differential traces are 100 Ohms differential impedance

Differential termination resistors are located near load.
On Die Termination (ODT) is used for data lines.

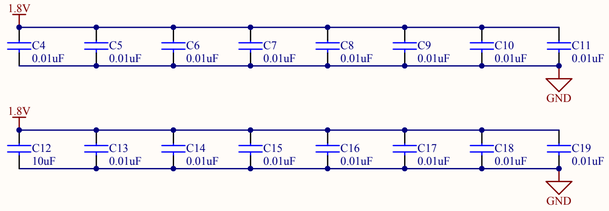
It is recommended all DDR RAM traces are matched length and less than 2500 mils. The below information is general guidance
and is pending the FR4 board material composition and stack up.

Address and command trace spacing is 10 mil min for short runs, 4 mils clearance for parallel runs less than 500 mils.
Data trace spacing is 10 mil min for short runs, 4 mils clearance for parallel runs less than 500 mils.

Clock pairs should be equivalent within +/- 20 mil.
Clock and DQS should be length matched.

Clock to Address / Control should be matched within +/-400 mil.

Place Clock Termination Resistor Near Memory



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Title: BF609-EVSK DDR2 Interface		
Size: C	Document Number: BlackFin BF609-EVSK	Rev: B
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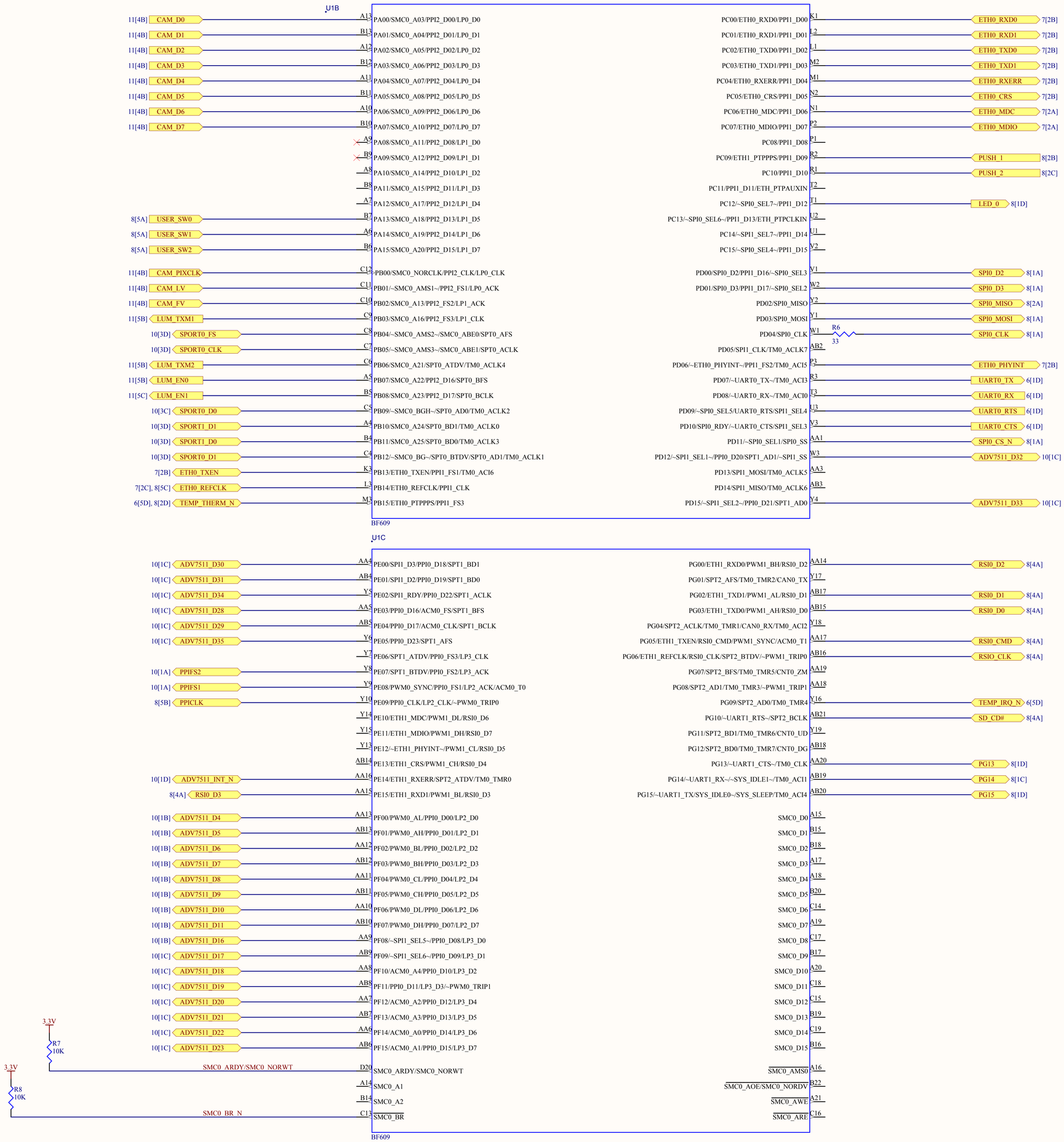

Title:	BF609-EVSK DSP Signals
Size: C	Document Number: BlackFin BF609-EVSK
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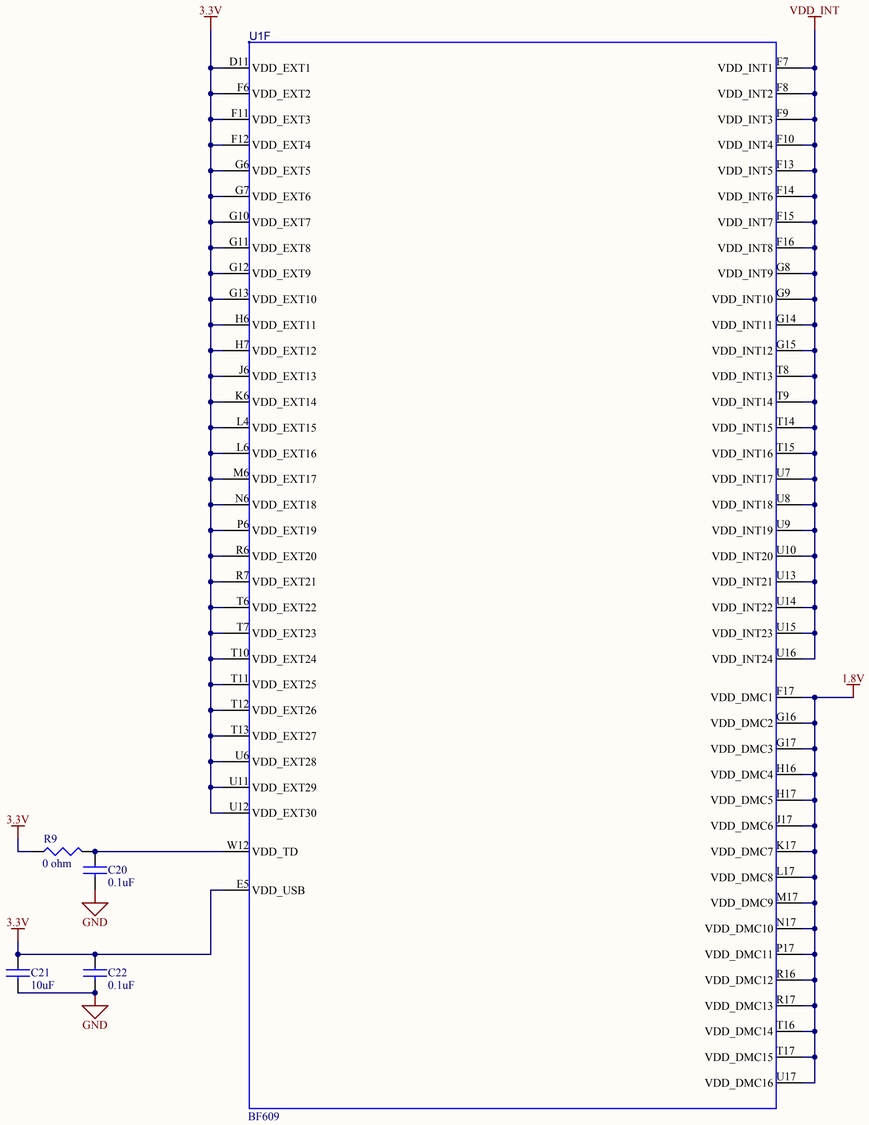

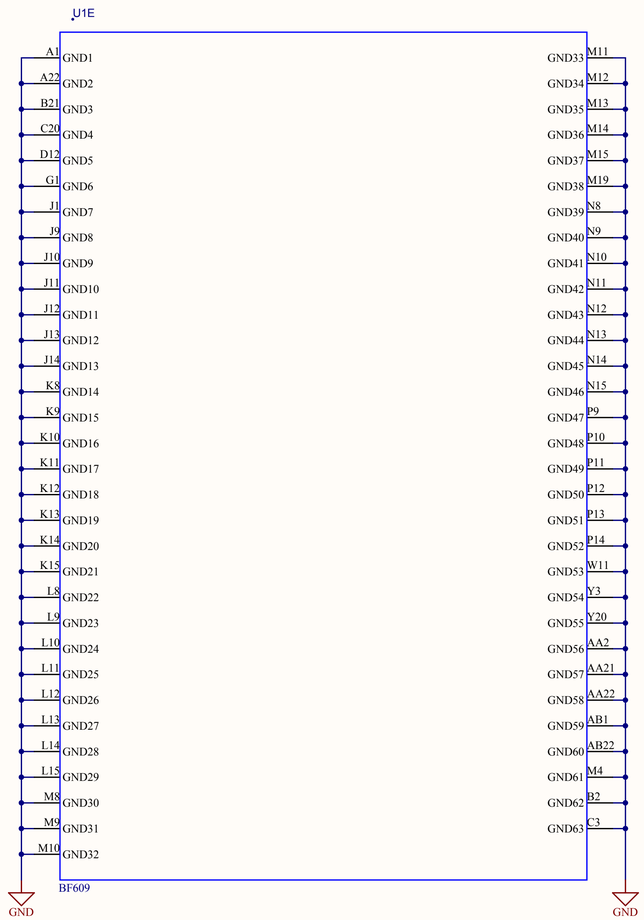

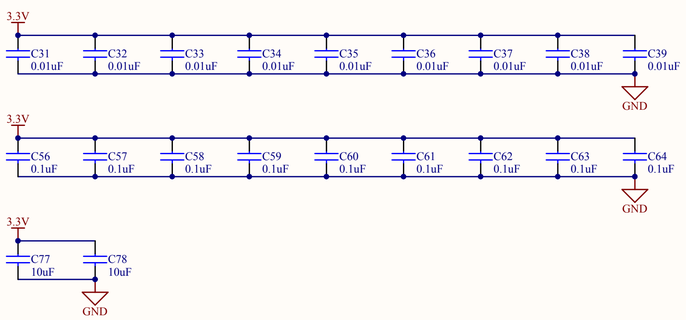

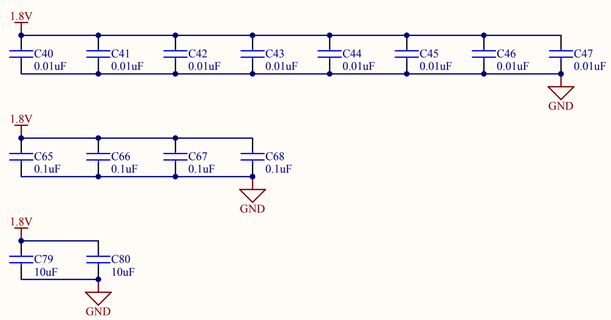

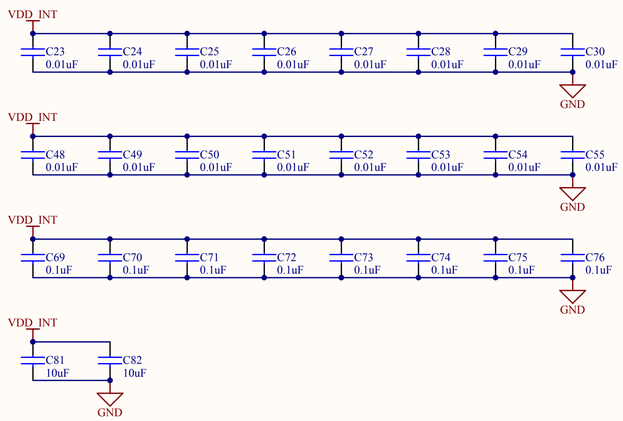

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Title: BF609-EVSK DSP Power

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Date: 4/10/2013 | Sheet 5 of 11

BOOT MODE SELECT

Boot Mode Select BMODE[2:0]: 011 = SPIO Master Boot, 010 = RSIO Master Boot

8[5A] SYS_BMODE0 — SYS_BMODE0

JT2 Jumper — Default 1-2 — 3.3V — GND
JT3 Jumper — Default 1-2 — 3.3V — GND

SYS_BMODE0 → U1D BF609 J3 SYS_BMODE0
SYS_BMODE1 → H3 SYS_BMODE1
SYS_BMODE2 → G3 SYS_BMODE2

5V
C95 4.7 uF
U18 FPF2125 (Vin, Vout, GND, ON, Iset)
USB0_VBC
R168 560
R168: Iset @ nominal 820mA. Range is: 610 to 1020mA.
R170 DNP 0 ohm
R169 10K DNP
D1 MBRA130LT3G
R171 10K
C84 4.7 uF
C96 0.1uF
R17 10K
USB0_VBUS

NOTE: For low power (< 500mA) USB Only powered applications, place R170 and do not use wall adapter power supply. The HB FLASH LEDs should NOT be used in this mode (board may reset).

8[5B] USB0_CLKIN → C1 USB0_CLKIN
USB0_P → A3 USB0_DP
USB0_N → A2 USB0_DM
USB0_VBUS → B1 USB0_VBUS
USB0_ID → B3 USB0_ID
USB0_VBC → C2 USB0_VBC

8[5B] SYS_CLKIN → H1 SYS_CLKIN
SYS_CLKOUT → R18 33 → N3 SYS_CLKOUT
SYS_XTAL → H2 SYS_XTAL

3.3V — R19 10K
7[2B], 8[2B] SYS_HWRS_N → G2 SYS_HWRST
SYS_NMI/SYS_RESETOUT_N → F3 SYS_NMI/SYS_RESETOUT

SYS_PWRGD → J2 SYS_PWRGD
SYS_EXTWAKE → K2 SYS_EXTWAKE

3.3V — R10 1.5K, R11 1.5K, R12 10K, R13 10K

TWI0_SCL → C22 TWI0_SCL
TWI0_SDA → D22 TWI0_SDA
TWI1_SCL → C21 TWI1_SCL
TWI1_SDA → D21 TWI1_SDA
SYS_TDA → Y12 SYS_TDA
SYS_TDK → Y11 SYS_TDK
JTG_EMU → R16 33 → E2 JTG_EMU_N
JTG_TCK → D3 JTG_TCK
JTG_TMS → E3 JTG_TMS
JTG_TDI → D1 JTG_TDI
JTG_TDO → R20 33 → D2 JTG_TDO
JTG_TRST → E1 JTG_TRST_N
SYS_FAULT → F2 SYS_FAULT
SYS_FAULT → F1 SYS_FAULT_N

USB-OTG

J1 EC141 1734035-1 (USB5V0, D-, D+, ID, GND, S1–S4)
USB0_N
USB0_P
USB0_ID
C92 0.01uF
R21 0 ohm
EARTH_UOTG, GND
D2, D3, D4, D32 PESD0402-140

Length Match D+ and D- +/- 10mil Differential Impedance = 90 Ohms

I2C Select

Default 0 ohm 1-2

JT1 Jumper: TWI0_SCL — S_SCLK 11[2B] — TWI1_SCL
JT4 Jumper: TWI0_SDA — S_SDATA 11[2B] — TWI1_SDA
JT5 Jumper: TWI0_SCL — HDMI_SCLK 10[1D] — TWI1_SCL
JT6 Jumper: TWI0_SDA — HDMI_SDATA 10[1D] — TWI1_SDA

SYS_NMI/SYS_RESETOUT_N — CAM_RST# 11[2B]

JTAG - DSP

J2 TSM-107-01-L-DV
3.3V — R22 10K
JTG_TDO, JTG_TDI, JTG_TRST_N, JTG_TCK — R23 33, JTG_TMS, JTG_EMU_N
R24 4.7k
JT7 Jumper — Default 0 ohm 1-2
GND

USB-UART

Voltage select for USB Reset.
JT8 Jumper (+3V3_USB_B, +3V3_USB, 3.3V)

U5 CP2102
+5V_USB_B, +3V3_USB_B, +3V3_USB
C86 4.7 uF, C87 0.1uF, C88 0.1uF
R26 4.7k
D5 ZEN056V130A24LS
EARTH_UUART J3 EC141 1734035-1

Route USB D+/- as 90 ohm differential pairs, 45 ohm to GND

USBB_N, USBB_P
D6, D7 PESD0402-140
R29 0 ohm
R30 330
D8 LTST-C191KSKT
C93 0.01uF
R31 0 ohm

4[4B] UART0_RTS — UART_RX
4[4B] UART0_RX — UART_TX
4[4B] UART0_TX
4[4B] UART0_CTS

TEMP SENSE

U6 ADM1032
3.3V — C89 0.01uF
TWI0_SCL, TWI0_SDA, SYS_TDA, SYS_TDK
TEMP_IRQ_N — R27 10K — 3.3V
TEMP_THERM_N — R28 10K
ALERT → TEMP_IRQ_N → 4[4C]
THERM → TEMP_THERM_N → 4[1B], 8[2D]

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Title: BF609-EVSK System I/O			
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ETHERNET

50 Ohms Single Ended Impedance
Locate series term resistor near transmission source

100 Ohms Differential Impedance

U7
DP83848

4[4A] ETH0_MDIO	R40 49.9	MDIO	30 MDIO
4[4A] ETH0_MDC	R41 49.9	MDC	31 MDC
		PHYAD4	46 RXD3/PHYAD4
		PHYAD3	45 RXD2/PHYAD3
4[4A] ETH0_RXD1	R43 49.9	RXD1	44 RXD1/PHTAD2
4[4A] ETH0_RXD0	R44 49.9	RXD0	43 RXD0/PHYAD1
		PHYAD0	42 COL/PHYAD0
		MII_MODE	39 RX_DV/MII_MODE
			38 RX_CLK
4[4A] ETH0_RXERR	R46 49.9	RX_ER	41 RX_ER/MDIX_EN
			1 TX_CLK
4[1B] ETH0_TXEN	R47 49.9	TX_EN	2 TX_EN
4[4A] ETH0_TXD0	R48 49.9	TXD0	3 TXD0
4[4A] ETH0_TXD1	R49 49.9	TXD1	4 TXD1
			5 TXD2
		SNI_MODE	6 TXD3/SNI_MODE
4[4A] ETH0_CRS	R50 49.9	CRS	40 CRS/CRS_DV/LED_CFG
6[3B], 8[2B] SYS_HWRS_N		SYS_HWRS_N	29 RESET
4[4B] ETH0_PHYINT		PHY_PWR_DN_INT	7 PWR_DOWN/INT
8[5B] PHY_CLKIN		PHY_CLKIN	34 X1
			33 X2
			25 25MHZ_OUT

TXP	17 TX_P
TXN	16 TX_N
RXP	14 RX_P
RXN	13 RX_N
LED_LINK/AN0	28
LED_SPEED/AN1	27
LED_ACT/AN_EN	26
TCK	8
TDO	9
TMS	10
TRST	11
TDI	12
RESERVED1	20
RESERVED2	21
RBIAS	24
PFBOUT	23
PFBIN1	18
PFBIN2	37

IOVDD1 32, IOVDD2 48, AVDD 22, IOGND1 35, IOGND2 47, DGND 36, AGND1 15, AGND2 19

3.3V
C101 0.01uF
C102 0.01uF
C103 0.01uF
GND

D9
LTST-C190GKT

R32 220
R33 2.21K
R34 2.21K
C99 0.1uF
R35 49.9
R36 49.9
C100 0.1uF
R37 49.9
R38 49.9

J4
5-1840406-8

11 D4	D3 12	
1 TD+	RJ-1	TXP
2 TD-	RJ-2	TXN
3 RD+	RJ-3	RXP
4 TCT	RJ-4	
5 RCT	RJ-5	
6 RD-	RJ-6	RXN
7 NC	RJ-7	
8 C1	RJ-8	
10 D2	D1 9	
13 GND	GND 14	

R39 301
R42 301
EARTH_ENET

R45 0 ohm
C91 0.01uF
GND
EARTH_ENET

R51 4.87K
R52 2.21K
C104 10uF
C105 0.1uF
C106 0.1uF
C107 0.1uF

ETHERNET OSC - 50MHz - DO NOT POPULATE
PLACE DNP PARTS CLOSE TO PHY IC

U8
3.3V
C108 0.01uF DNP
VCC 4
INH 1
GND 2
OUT 3
50.000 MHz
DNP
R57 33 DNP
R58 33 DNP
PHY_CLKIN
ETH0_REFCLK
4[1B], 8[5C]
GND

Default: DNP

MII_MODE
R53 2.21K
R54 1.5K
R55 10K
MII_MODE
MDIO
PHY_PWR_DN_INT
SNI_MODE
R62 2.21K
GND

R56 2.21K
R59 2.21K
R60 2.21K
R61 2.21K
JT9
B 3
Com 2
A 1
Jumper
PHYAD4
PHYAD3
RXD1
RXD0
PHYAD0
GND

Default
0 ohm 1-2
PHY address is 00001

0 ohm 2-3
PHY address is 10001

Avnet Engineering Services			
Title: BF609-EVSK Ethernet			
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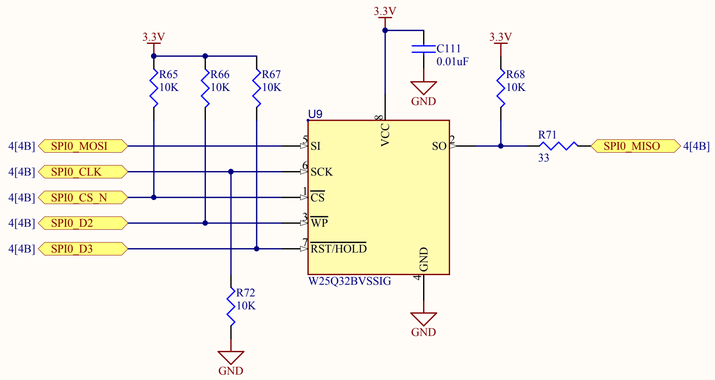
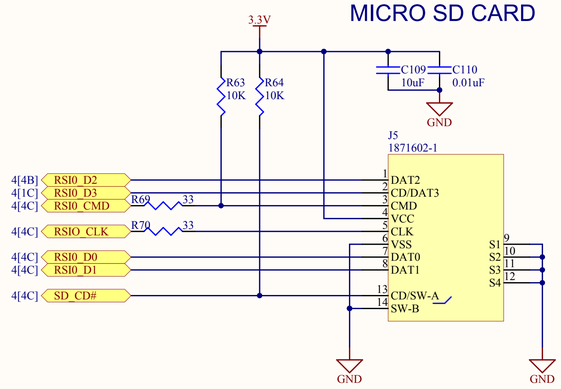
32Mb QUAD SPI FLASH

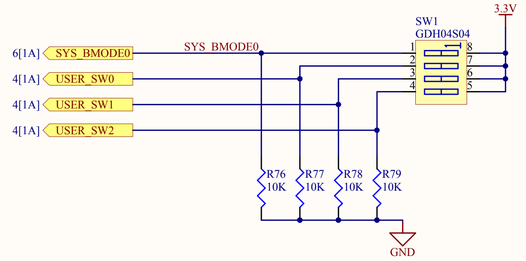


MICRO SD CARD

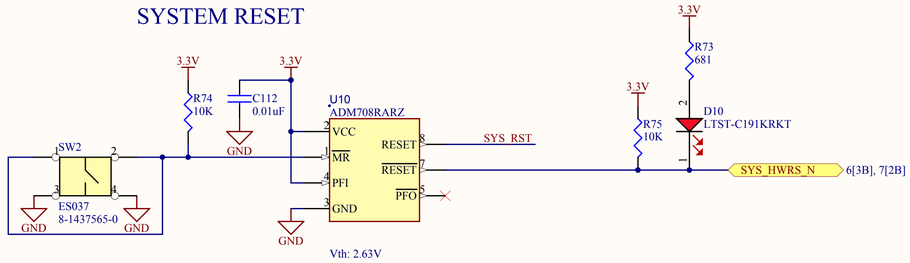


SWx-1 = BOOT MODE SELECT

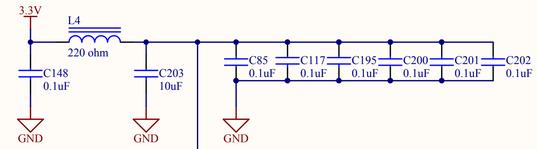
Boot Mode Select BMODE[2:0]: 011 = SPIO Master Boot, 010 = RSIO Master Boot



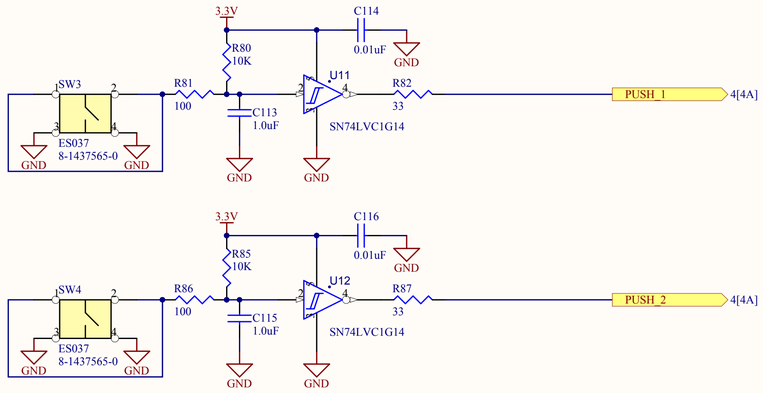
SYSTEM RESET



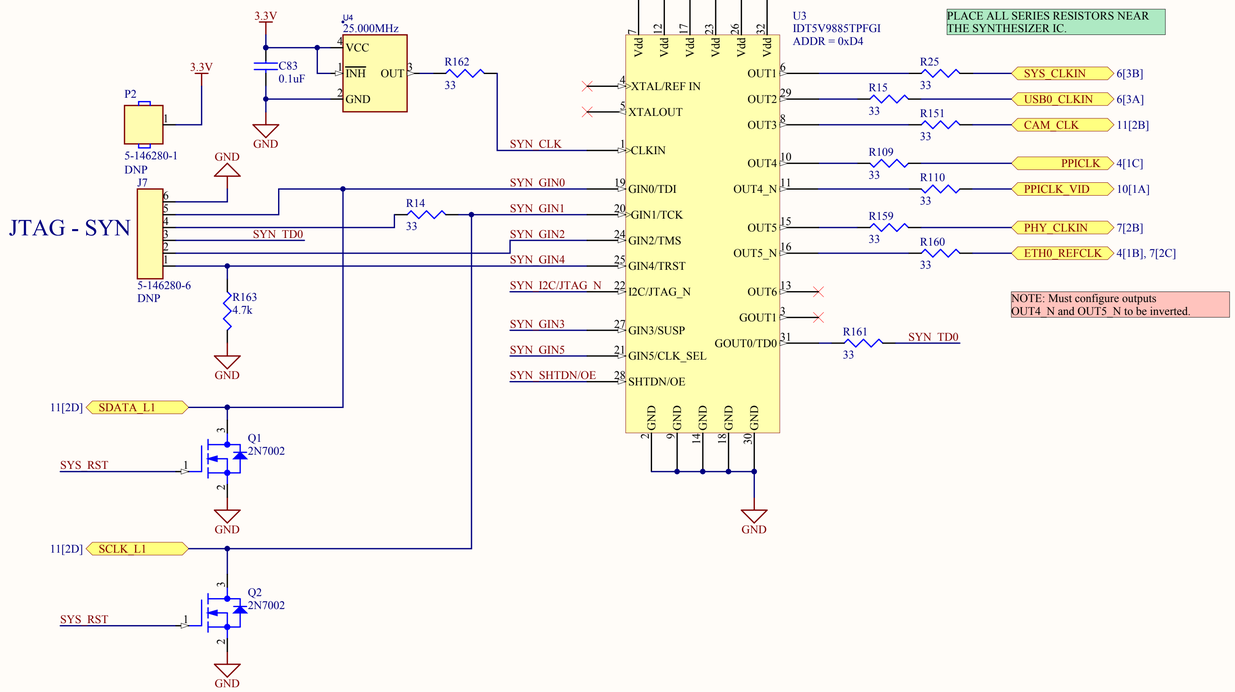
CLOCK SYNTHESIZER



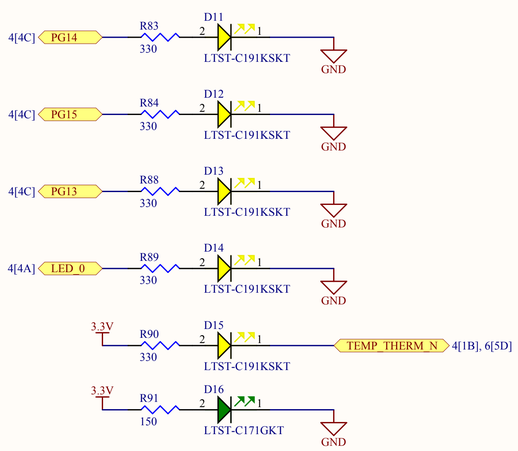
PUSH BUTTONS



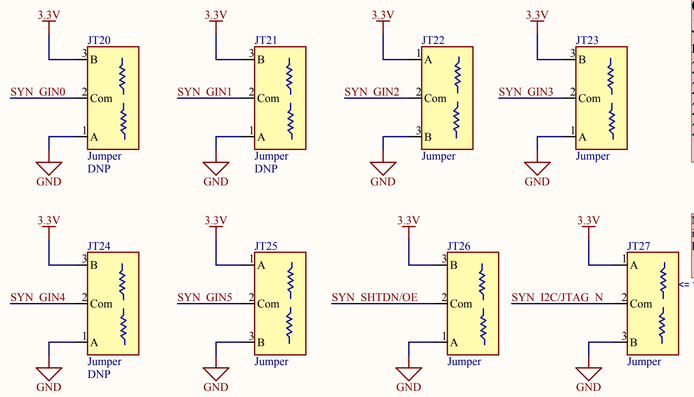
JTAG - SYN



SYSTEM LED's



CLOCK SYNTHESIZER CONFIGURATION



Clock Synthesizer default setup is
JTxx: Pins connected: DNP
means Do Not Populate

20:	DNP	24:	DNP
21:	DNP	25:	1 - 2
22:	1 - 2, 10K	26:	1 - 2
23:	1 - 2	27:	1 - 2, 10K

NOTE: Default configuration for synthesizer is "I2C" enabled via a 10K resistor at Pin 1 - 2. For JTAG, short JT27 2-3 or pull pin low.

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Title:	BF609-EVSK PB-Reset-LED	
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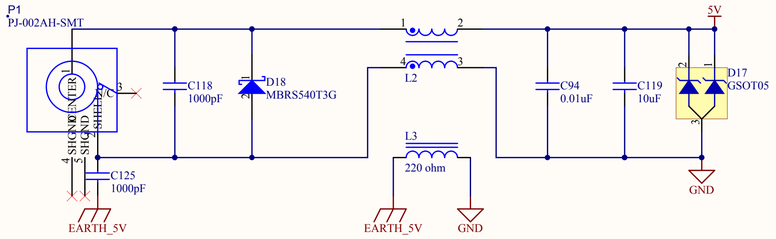
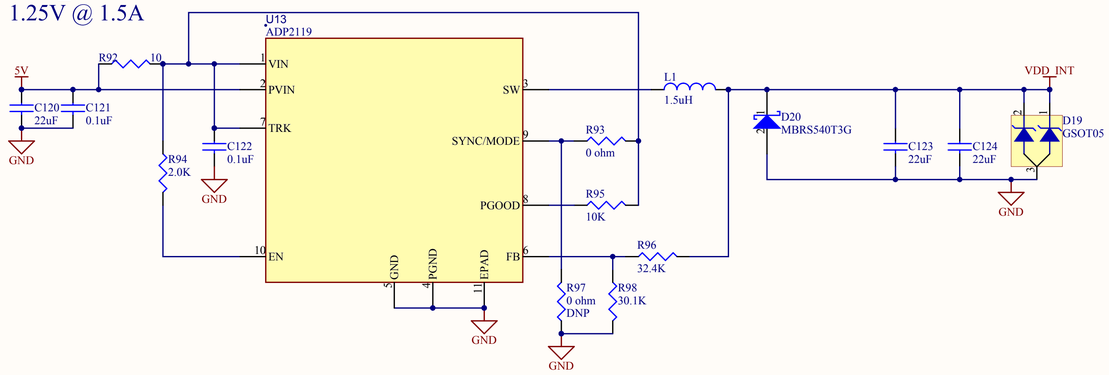
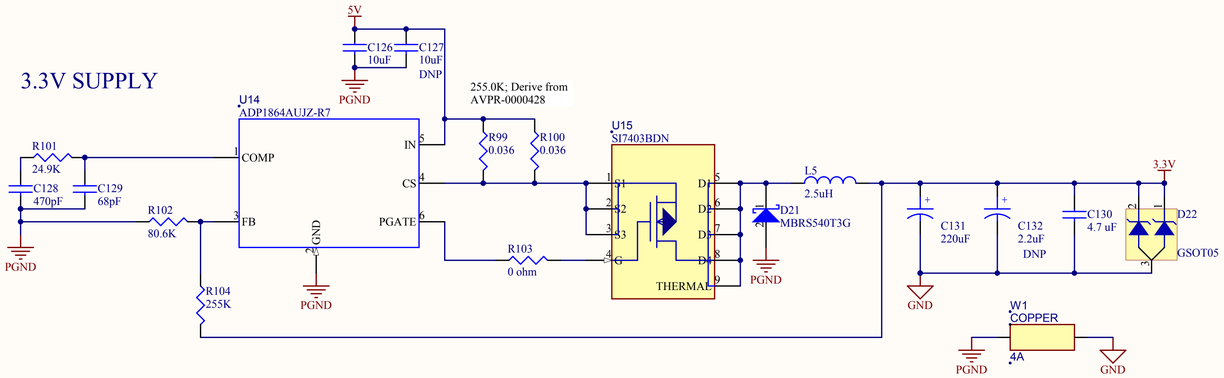
5V INPUT



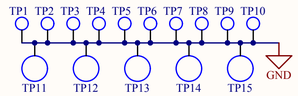
VDD_INT SUPPLY
1.25V @ 1.5A



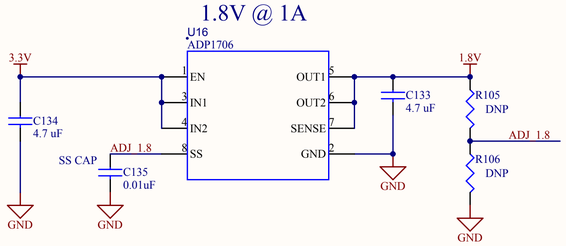
3.3V SUPPLY



Add Test Points Liberally



1.8V @ 1A

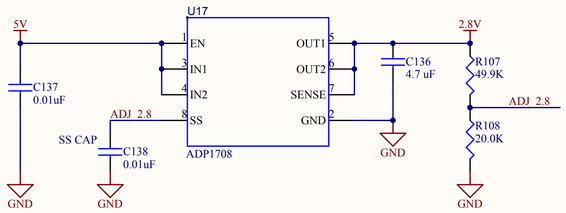


To use ADP1708 with adjustable Vout in place of ADP1706, remove the SS CAP and place resistor divider per the formula below.

VOUT = 0.8 V (1 + R1/R2)
where:
R1 is the resistor from OUT to ADJ.
R2 is the resistor from ADJ to GND. (<60K)

R2=20.0K, R1=24.9K yields 1.796V
R2=20.0K, R1=49.9K yields 2.796V

MT9M114 SUPPLY
2.8V @ 1A



Avnet Engineering Services			
Title: BF609-EVSK Power			
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ADV7511 POWER SUPPLY FILTERS

U19
ADV7511

ADV7511_PVDD
ADV7511_PLVDD
ADV7511_BGVDD
ADV7511_AVDD
ADV7511_DVDD
ADV7511_33

DVDD1 19
DVDD2 49
DVDD3 76
DVDD4 77
DVDD5 1
PVDD1 21
PVDD2 24
PVDD3 25
BGVDD 26
AVDD1 29
AVDD2 54
AVDD3 41
DVDD_33V 47

8[5B] PPICLK_VID → 79 CLK
4[1C] PPIFS1 → R112 33 → 98 HSYNC
4[1C] PPIFS2 → R113 33 → 2 VSYNC
TP19 → 97 DE

PLACE SERIES RESISTORS CLOSE TO BF609

4[1C] ADV7511_D4 → R115 33 → 92 D4
4[1C] ADV7511_D5 → R116 33 → 91 D5
4[1C] ADV7511_D6 → R117 33 → 90 D6
4[1C] ADV7511_D7 → R118 33 → 89 D7
4[1D] ADV7511_D8 → R119 33 → 88 D8
4[1D] ADV7511_D9 → R120 33 → 87 D9
4[1D] ADV7511_D10 → R123 33 → 86 D10
4[1D] ADV7511_D11 → R126 33 → 85 D11
4[1D] ADV7511_D16 → R129 33 → 80 D16
4[1D] ADV7511_D17 → R130 33 → 78 D17
4[1D] ADV7511_D18 → R131 33 → 74 D18
4[1D] ADV7511_D19 → R132 33 → 73 D19
4[1D] ADV7511_D20 → R134 33 → 72 D20
4[1D] ADV7511_D21 → R135 33 → 71 D21
4[1D] ADV7511_D22 → R136 33 → 70 D22
4[1D] ADV7511_D23 → R137 33 → 69 D23
4[1C] ADV7511_D28 → R138 33 → 64 D28
4[1C] ADV7511_D29 → R139 33 → 63 D29
4[1B] ADV7511_D30 → R140 33 → 62 D30
4[1C] ADV7511_D31 → R141 33 → 61 D31
4[4B] ADV7511_D32 → R142 33 → 60 D32
4[4B] ADV7511_D33 → R143 33 → 59 D33
4[1C] ADV7511_D34 → R144 33 → 58 D34
4[1C] ADV7511_D35 → R145 33 → 57 D35

ADV7511_33 → R146 4.7k → 4[1C] ADV7511_INT_N → 45 INT
38 PD
6[6B] HDMI_SCLK → 55 SCL
6[6B] HDMI_SDATA → R148 0 ohm → 56 SDA

R149 2.0K → GND
GND

GND1 18, GND2 20, GND3 22, GND4 23, GND5 27, GND6 31, GND7 34, GND8 44, GND9 95, GND10 100, GND11 106 → GND

28 R_EXT → R150 887 → GND
Place close to chip and opposite side of board

TXC- 32 TXC_N
TXC+ 33
TX0- 35 TX0_N
TX0+ 36
TX1- 39 TX1_N
TX1+ 40
TX2- 42 TX2_N
TX2+ 43

CEC 48 CEC
CEC_CLK 50 CEC_CLK
DDCSCL 53 DDCSCL
DDCSDA 54 DDCSDA
HEAC- 51 HEAC1_N
HEAC+ 52 HEAC1_P
HPD 30 HEAC_N

DSD0 3
DSD1 4
DSD2 5
DSD3 6
DSD4/DST_ST 7
DSD5/DST_FL 8
DSD_CLK/DST_CLK 9
→ GND

SPDIF 10
I2S0 12 SPORT0_D0 → 4[1B]
I2S1 13 SPORT0_D1 → 4[1B]
I2S2 14 SPORT1_D0 → 4[1B]
I2S3 15 SPORT1_D1 → 4[1B]
MCLK 11
SCLK 16 SPORT0_CLK → 4[1B]
LRCLK 17 SPORT0_FS → 4[1B]
SPDIF_OUT 46

ADV7511_33 → R111 27.4K → D23 BAT54LT1G → CEC

U20
12.000MHz DNP
ADV7511_AVDD → C159 0.1uF DNP → GND
VCC 4, INH 1, OUT 3, GND 2, SPAD 5 → GND
R114 33 DNP → CEC_CLK

CEC OSC - 12MHz
Default: DNP

CEC → R164 4.7k → GND
CEC_CLK → R165 4.7k → GND

5V → R121 2.0K → DDCSCL
5V → R122 2.0K → DDCSDA

ADV7511_DVDD → R124 49.9, R125 49.9
DDCSCL → C166 1.0uF → HEAC_P
HEAC1_N → C167 1.0uF → R127 0 ohm → HEAC_N
HEAC_N → R128 10K → GND

3.3V → C168 0.1uF → GND
3.3V → U21 SN74LVC1G125 (1, 2, 4, 5) → R133 330 → D24 LTST-C191KSKT → GND

1.8V
FER1 NFE61PT472C1H9L: IN 1, OUT 3, GND 2 → GND
L6 10uH
C139 10uF, C140 0.01uF, C141 0.1uF, C142 0.01uF, C143 0.1uF, C144 0.01uF, C145 0.1uF, C146 0.01uF, C147 0.1uF → ADV7511_DVDD

FER2 NFE61PT472C1H9L: IN 1, OUT 3, GND 2 → GND
L7 10uH
ADV7511_PVDD
C149 10uF, C150 0.1uF, C151 0.01uF
L8 10uH
ADV7511_PLVDD
C152 10uF

FER3 NFE61PT472C1H9L: IN 1, OUT 3, GND 2 → GND
L9 10uH
C153 10uF, C154 0.01uF, C155 0.1uF, C156 0.01uF, C157 0.1uF, C158 0.01uF → ADV7511_AVDD

FER4 NFE61PT472C1H9L: IN 1, OUT 3, GND 2 → GND
L10 10uH
ADV7511_BGVDD
C160 10uF, C161 0.1uF, C162 0.01uF

3.3V
FER5 NFE61PT472C1H9L: IN 1, OUT 3, GND 2 → GND
L11 10uH
ADV7511_33
C163 10uF, C164 0.1uF, C165 0.01uF

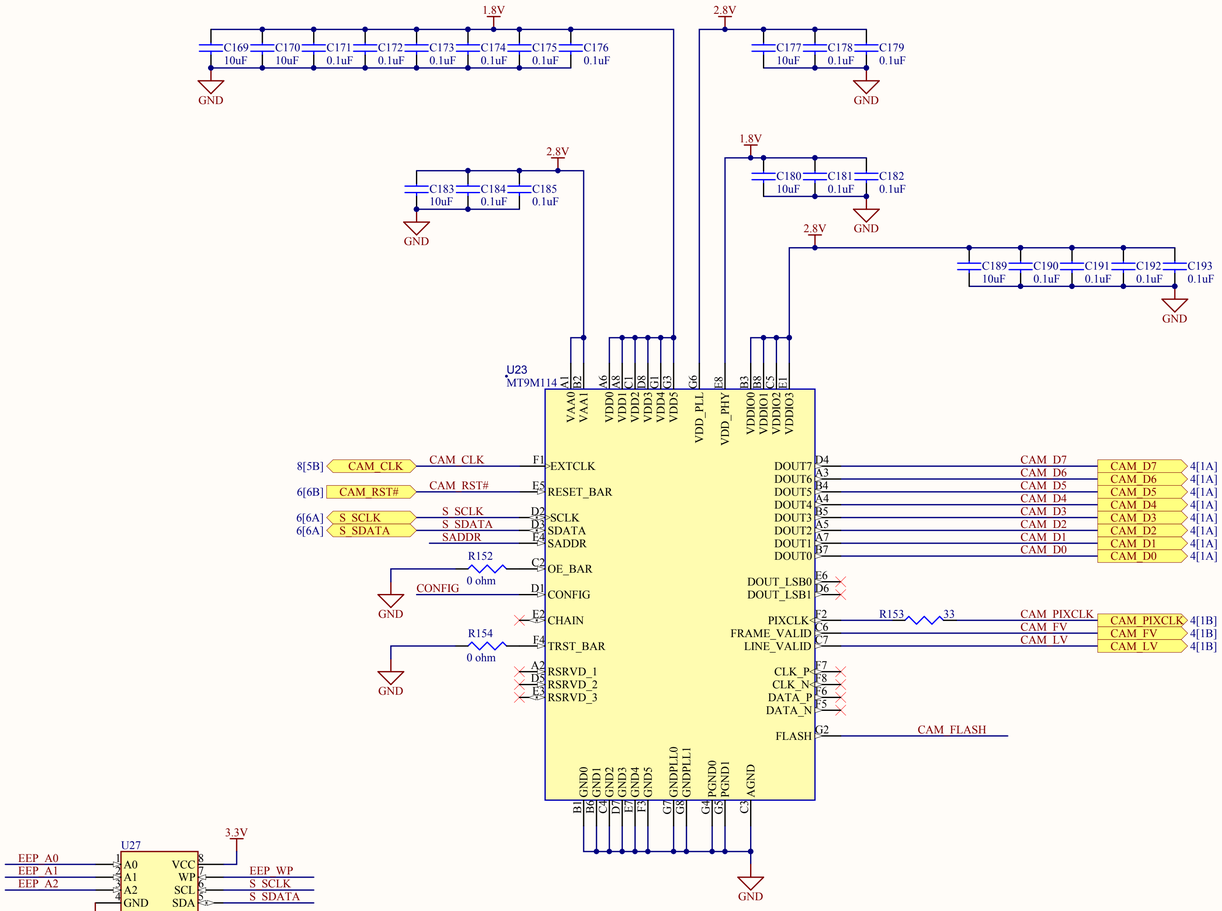
D25 SESD0802Q4UG-0020-090: DDCSCL, HEAC_N, DDCSDA, HEAC_P
D26 SESD0802Q4UG-0020-090: TX0_N, TXC_N, TXC_P, TX0_P
D27 SESD0802Q4UG-0020-090: TX2_N, TX1_N, TX1_P, TX2_P
R147 Varistor PO041 → CEC
GND

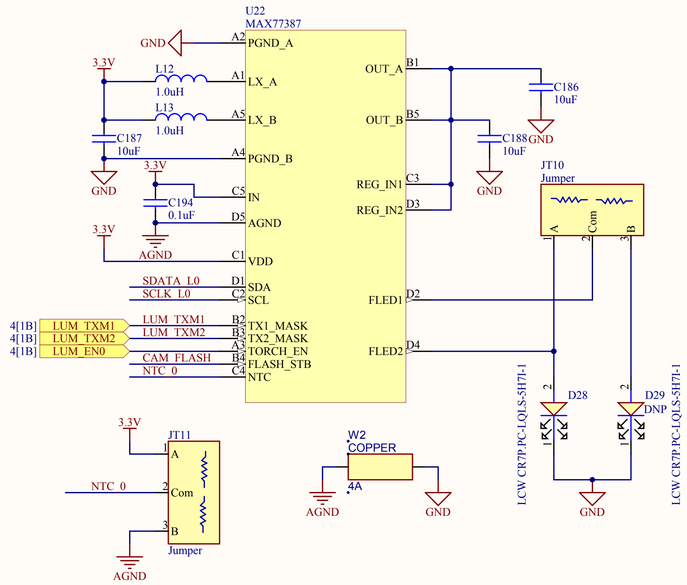
HDMI

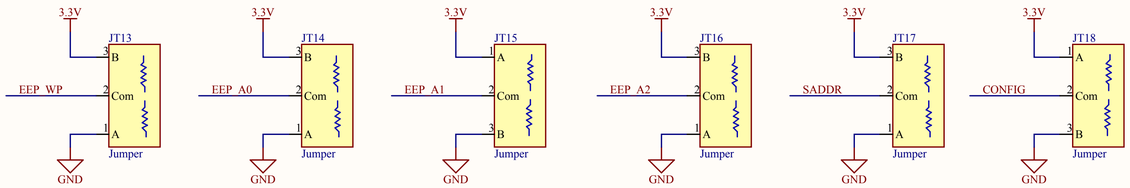
100 Ohm Diff Pairs (50 Ohms to GND)

J6
EC169 5-1903015-1
TX2_P, TX2_N, TX1_P, TX1_N, TX0_P, TX0_N, TXC_P, TXC_N, HEAC_P, HEAC_N, CEC, DDCSCL, DDCSDA
D2+ 1, D2S 2, D2- 3, D1+ 4, D1S 5, D1- 6, D0+ 7, D0S 8, D0- 9, CLK+ 10, CLKS 11, CLK- 12, CEC 13, RES 14, SCL 15, SDA 16, DDC/CECG 17, 5V0 18, HPD 19, S1 20, S2 21, S3 22, S4 23
5V → R166 0 ohm → C90 0.01uF → GND

AVNET electronics marketing	Avnet Engineering Services		
Title: BF609-EVSK Video Encoder			
Size: C	Document Number: BlackFin BF609-EVSK		Rev: B
Date: 4/10/2013		Sheet 10 of 11	



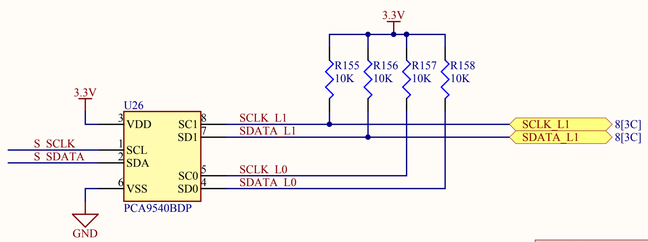




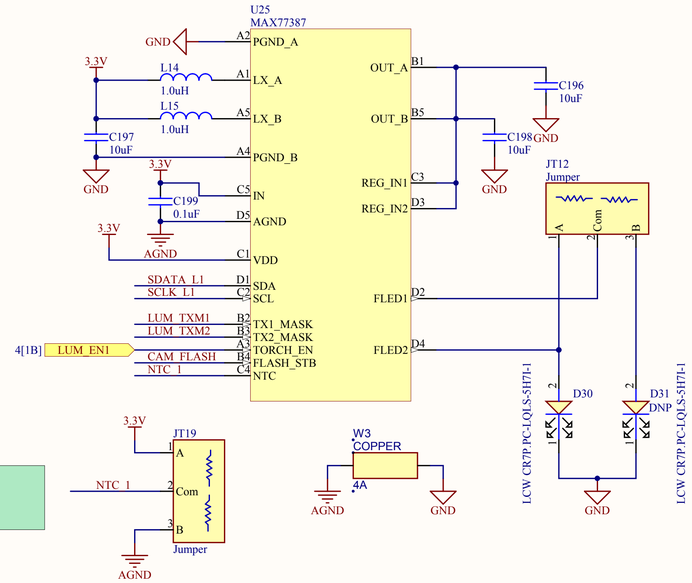
Default for all JT jumpers
0 ohm 1-2

I2C Slave Address Map:

SEEPROM	= 0xA4
Temp Sensor	= 0x4C
Camera	= 0x90
MUX:	= 0xE0
MAX77387	= 0x94
MAX77387	= 0x94
Clock Synthesizer	= 0xD4



B2	B1	B0	Command
0	X	X	no channel selected (power-up default state)
1	0	0	channel 0 enabled
1	0	1	channel 1 enabled
1	1	X	no channel selected



Place Part directly under MAX77387
0 ohm Res 1-2 to disable NTC (Default)
Thermistor 2-3 (Panasonic ERT-J0ER103J)

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