REV	COMMENT	DATE	DRAWN BY
1.0	Initial Release	14/07/2023	SDD/KSS
V0110	PIN G6 & H6 from GND to VCL. Add two cap VCL PIN H1 and H2 from unnamed to VLO	15.06.2022	W.Rauser
2.0	P104 from J13-P9 to J20-P16 trace links added	27/06/2022	SDD/KSS
2.1	Added 0R links to support 3244 in place of 3245	30/06/2022	SDD/KSS
2.2	Removed 3.3V text from VCL_JLOB power net	15/07/2022	SDD/KSS
2.3	WS2 Release	16/08/2022	SDD/KSS
3.0	ES Release	06/12/2022	SDD/KSS
3.1	MP Release	14/07/2023	SDD/KSS

EK-RA8D1

Table of Contents:

1 TP11 Fiducial_0.5mm round

1 TP12 Fiducial_0.5mm round

Rubber Foot MP1 Rubber Foot MP2 Rubber Foot MP3 Rubber Foot MP4 Rubber Foot MP5 Rubber Foot MP6

Note that this schematic shows 13 off 74CBTLV3245BQ bus switch devices.
These may have been substituted with 74CBTLV3244BQ devices, in which case the associated 0R resistor connecting pin 1 to pin 19 will also have been fitted.

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Title Page

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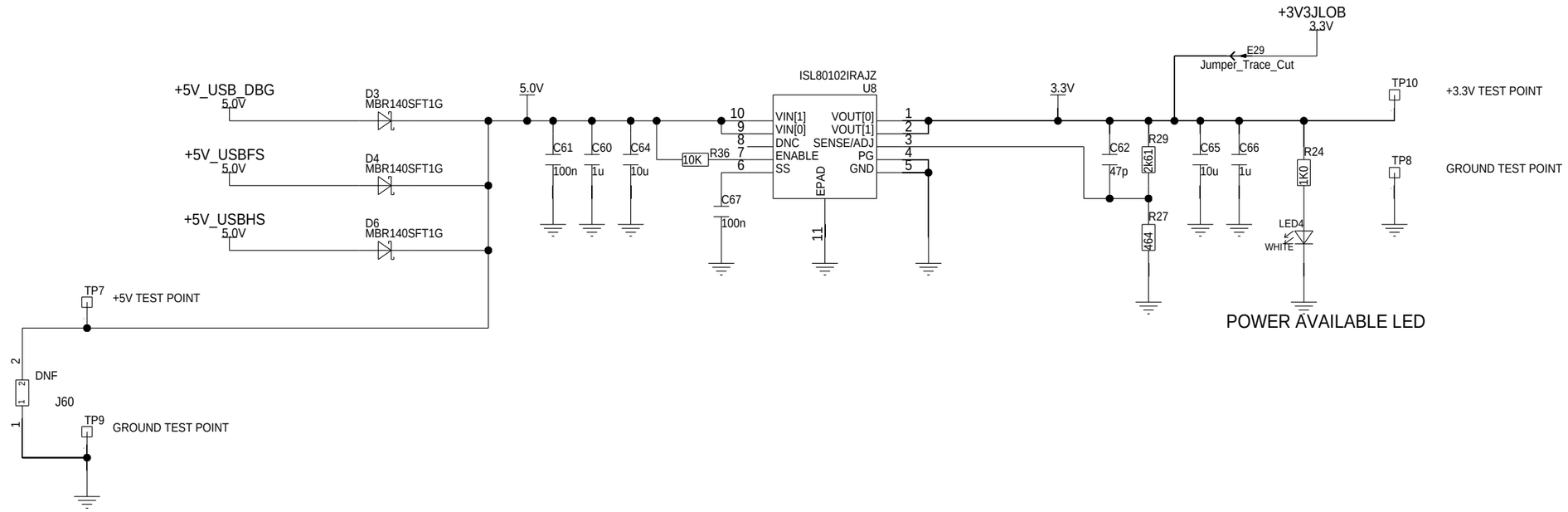
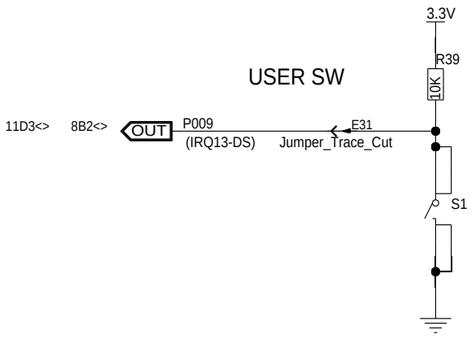
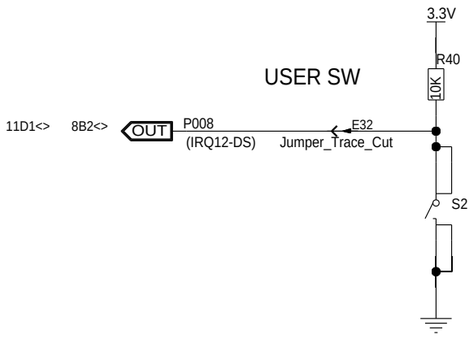
3.3V LINEAR REGULATOR

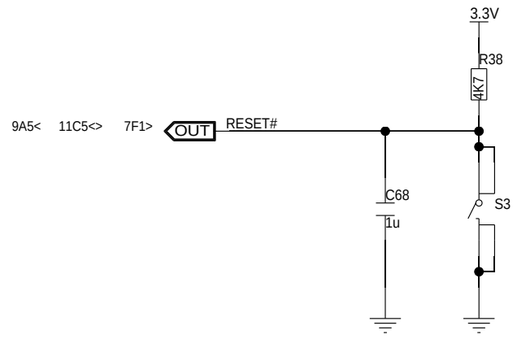


USER PUSH-BUTTONS

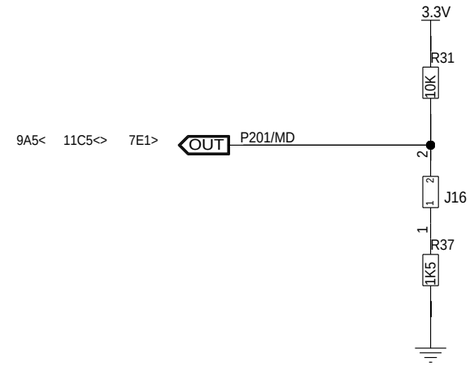




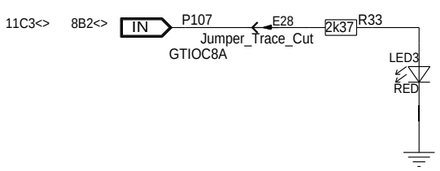
RESET PUSH-BUTTON

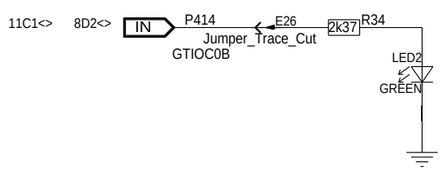


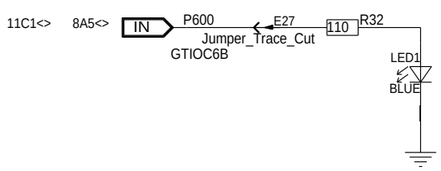
MCU BOOT MODE



USER LEDS







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Power Supply and HMI Features

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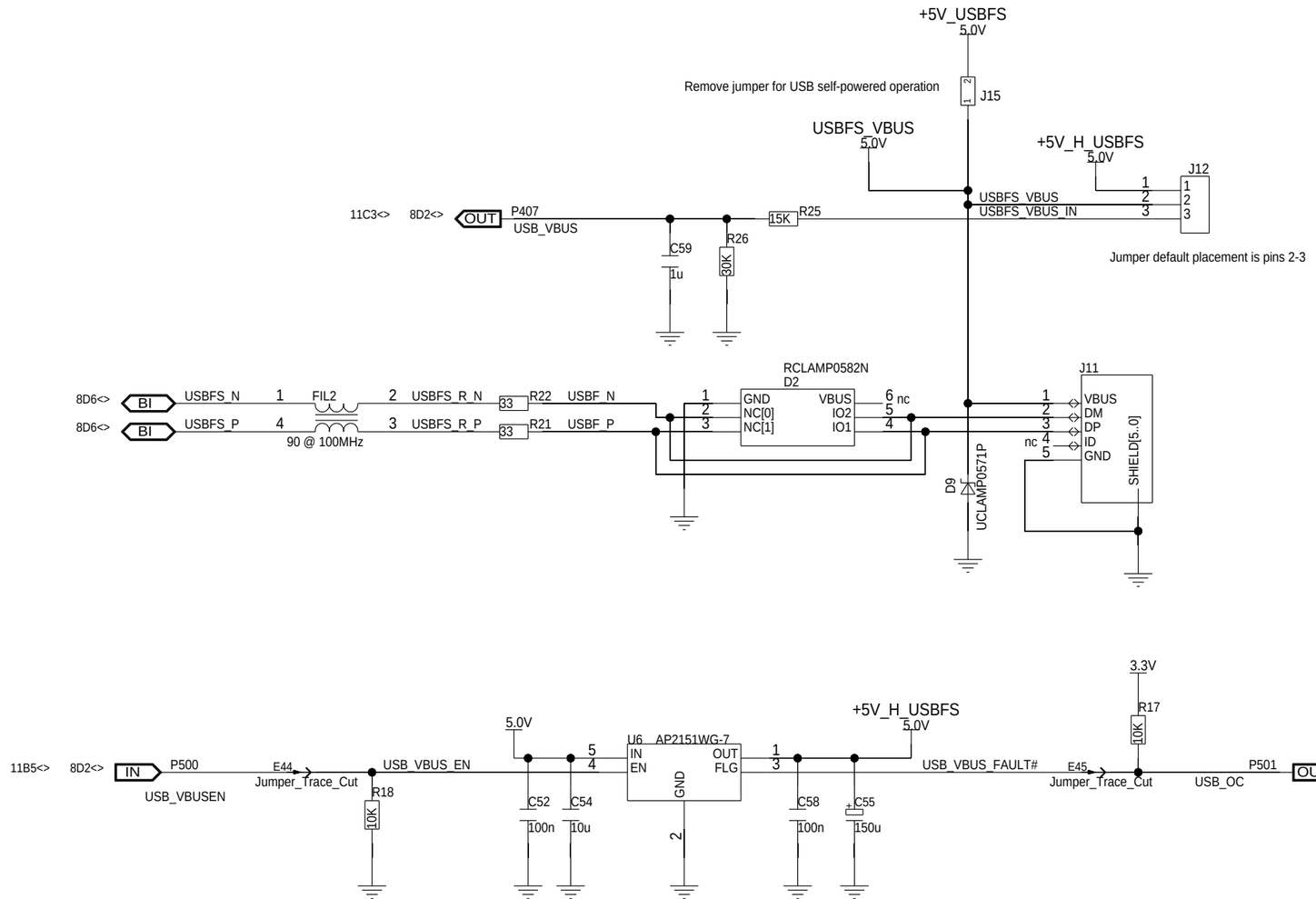
USB FS INTERFACE



USB HOST POWER SUPPLY
TOTAL CURRENT AVAILABLE IS 500mA MAX

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Title	EK-RA8D1 USB FS
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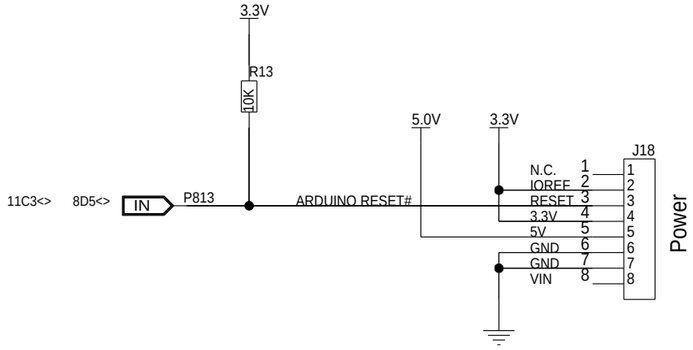
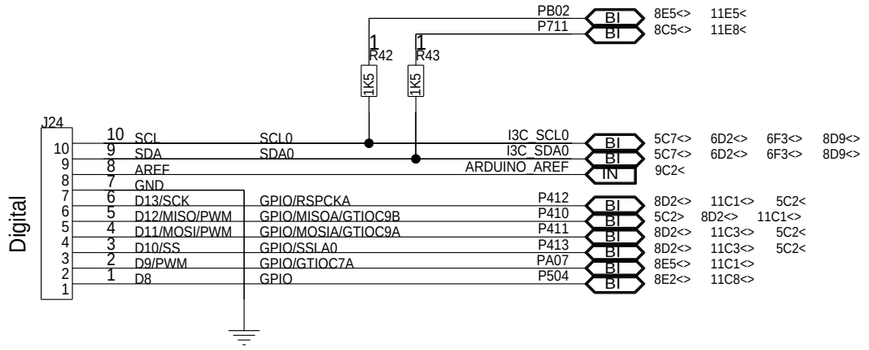
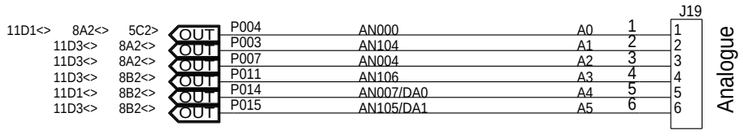
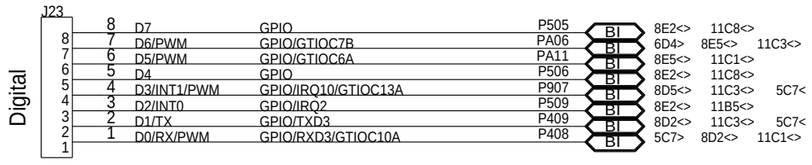
Arduino Uno









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Title: EK-RA8D1
Arduino Shield Connection

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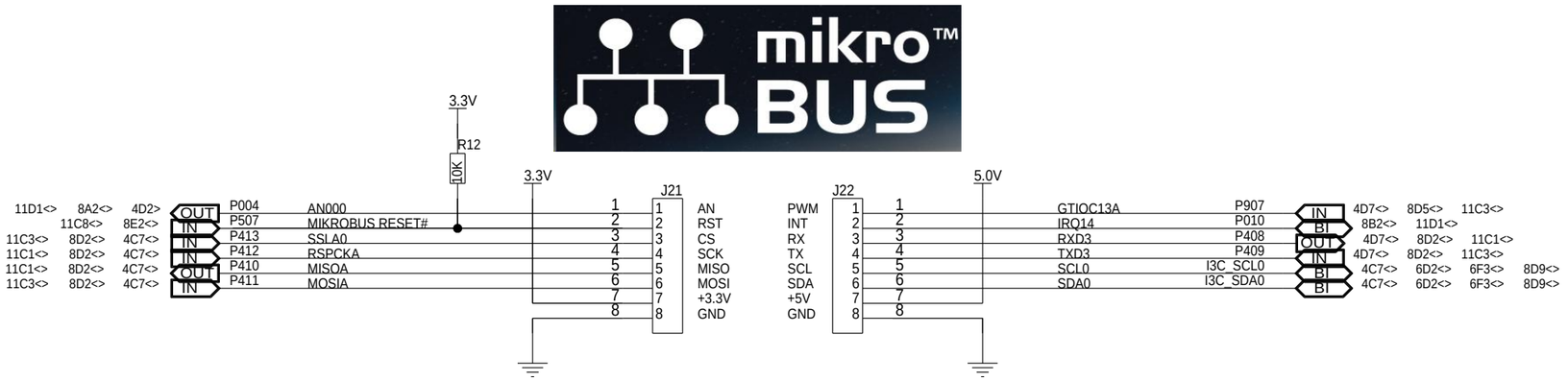

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Title	EK-RA8D1 mikroBUS Connection		
Size A3	Document Number D018942_04_V0310		
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PMOD1
SPI/UART/I2C

11B8<> IN PMOD1_CTS_RTS0
11B5<> IN PMOD1_TXD0
11B5<> OUT PMOD1_RXD0
11B8<> IN PMOD1_SCK0
11B8<> IN PMOD1_RESET
11B5<> BI PMOD1_GPIO1
11B5<> BI PMOD1_GPIO2
11B8<> OUT PMOD1_CTS0

8F6< IN PMOD1_SPI_OE_L

U10
74CBTLV3245BQ
3.3V
VCC 20
OE 19
GND 10
NC EXPAD 21

16E1<> 8B5<> IN P612 18 B1 A1 2
16E1<> 8B5<> IN P609 17 B2 A2 3
16E1<> 8B5<> OUT P610 16 B3 A3 4
16E1<> 8B5<> IN P611 15 B4 A4 5
11C1<> 8E5<> IN PA12 14 B5 A5 6
16E1<> 8B5<> BI P614 13 B6 A6 7
16E1<> 8B5<> BI P615 12 B7 A7 8
16E1<> 8B5<> OUT P613 11 B8 A8 9

R20 0 note

3.3V C84 100n

E17
E18
E19
E20
E25 Jumper_Trace_Cut

SS0 / CTS_RTS0
MOSI0 / TXD0
MISO0 / RXD0
SCK0 / RTS0

J26
Pmod pin sequence
IRQ11
RESET
GPIO
GPIO
P006 OUT 8A2<> 11D1<>
4.7u C69

5.0V
E36 E37 E38
Jumper_Solder_Bridge

3.3V R16 1K5
R30 1K5

15B7< 11D8< 10B8< 8E2<> BI P512 IIC/SCL1
15B7<> 11D8<> 10B5<> 8E2<> BI P511 IIC/SDA1

3.3V
J27
100n C72

Grove 1
I2C

PMOD2
SPI/UART

11C3<> 8E5<> 4D7<> OUT PA06 E10
Jumper_Solder_Bridge
E14
11E4<> 8E5<> IN PA05 E15 SS2 / CTS_RTS2
11E4<> 8E5<> IN PA03 MOSI2 / TXD2
11E1<> 8E5<> OUT PA02 MISO2 / RXD2
11E1<> 8E5<> IN PA04 E16 SCK2 / RTS2
Jumper_Trace_Cut

3.3V
J25
Pmod pin sequence
IRQ1
RESET
GPIO
GPIO
P508 OUT 8E2<> 11B8<>
P809 IN 8C5<> 11B5<>
P810 BI 8C5<> 11B8<>
P811 BI 8C5<> 11B5<>
3.3V
4.7u C70

11D3<> 8A2<> OUT P005 AN001
11D1<> 8A2<> OUT P002 AN102
Jumper_Solder_Bridge
E41 E42

8D9<> 6D2<> 5C7<> 4C7<> BI I3C_SCL0 E39
8D9<> 6D2<> 5C7<> 4C7<> BI I3C_SDA0 E40
Jumper_Trace_Cut

3.3V
J28
100n C71

Grove 2
I2C/Analogue

3.3V
SM04B-SRSS-TB
J30
8D9<> 6F3<> 5C7<> 4C7<> BI I3C_SCL0
8D9<> 6F3<> 5C7<> 4C7<> BI I3C_SDA0
100n C25

qwiic®

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Title: EK-RA8D1
PMOD, Grove and qwiic Connections

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JTAG CONNECTORS

3.3V
R15 30K
J13
nc
3.3V
J20
JTAG GND DETECT
E30 Jumper_Trace_Cut
JTAG_EXT_TMS
JTAG_EXT_TCK
JTAG_EXT_TDI
JTAG_EXT_RST

11C8<> IN JTAG_TCLK
11C8<> IN JTAG_TDATA0
11C5<> IN JTAG_TDATA1
E9 Jumper_Solder_Bridge
11C5<> IN JTAG_TDATA2
11C5<> IN JTAG_TDATA3

8F6< IN TRACE_OE_L

U11
74CBTLV3245BQ
VCC OE
16B1< 12A2< 8C2<> BI P304 B1 A1
16B1< 12A2< 8C2<> BI P305 B2 A2
16B1< 12B2< 8C2<> BI P306 B3 A3
16C1< 12A2< 8C2<> IN P308 B4 A4
16B1< 12A2<> 8C2<> BI P307 B5 A5
B6 A6
B7 A7
B8 A8
GND NC EXPAD
R64 0 Note
C105 100n

R65 10K R66 10K
J29
11C5<> 8C2<> OUT P208 TDI
11C5<> 8C2<> IN P209 TDO
11C5<> 8C2<> BI P210 SWDIO
11C5<> 8C2<> IN P211 SWCLK
9A5< 11C5<> 2D8> OUT P201/MD MD
J6
9A5< 11C5<> 2D6> OUT RESET#
J8

JTAG_TDO
JTAG_TMS
JTAG_TCK
JTAG_TDI
JTAG_TRST
R114 150
R115 150
R116 150
R1 150
E8
R117 150 JTAG_RESET#

J-LINK RA4M2 RE-PROG.

+5V_USB_DBG 5.0V
+3V3JLOB 3.3V
R10 2K0
LED5 YELLOW
R45 10K R9 10K R28 10K
DNF J32
DNF J33
nc
J9

U7
R7FA4M2AD3CFL
nc P000 nc P001 nc P002 nc P013 nc P014 nc P015
P100 P101 P102 P103 P104
nc P108/TMS/SWDIO nc P109/TDO/SWO nc P110/TDI
P111 P112
P200 P201/MD
nc P206 nc P207 P212/EXTAL
P213/XTAL nc P300/TCK/SWCLK
P301 P302
nc P402 P407 nc P408 nc P409 nc P500
USB_DM USB_DP
VBATT VCC[0] VCC[1] VSS[0] VSS[1]
AVCC0 VREFH AVSS0/VREFL
VREFL0 VREFH0
VCC_USB VSS_USB
VCL
XCIN XCOUT nc
RES

+3V3JLOB 3.3V
C51 100n C56 100n C57 100n C116 100n C117 100n C118 100n
VCL_JLOB
C111 220n
R119 10K

C119 10p X2 C120 10p 12.000 MHz 10pF

11E1<> 8E5<> IN PA14
11E4<> 8E5<> OUT PA15
R118 150

R4 15K R5 30K
USB_JLOB_N
USB_JLOB_P

+5V_USB_DBG 5.0V
RCLAMP0582N D7
GND NC[0] NC[1] VBUS IO2 IO1
J10
VBUS DM DP ID GND SHIELD[3..0]
D11 UCLAMP0571P

J-Link OB USB

For normal operation (on-board debugger):
Jumper J9 open
Jumper J8 pins 1-2

For external debug:
Jumper J9 pins 1-2
Jumper J8 pins 1-2

For J-Link debug out:
Jumper J9 open
Jumper J8 pins 2-3

RENESAS Electronics Europe GmbH

Title	EK-RA8D1 J-Link On Board with RA4M2
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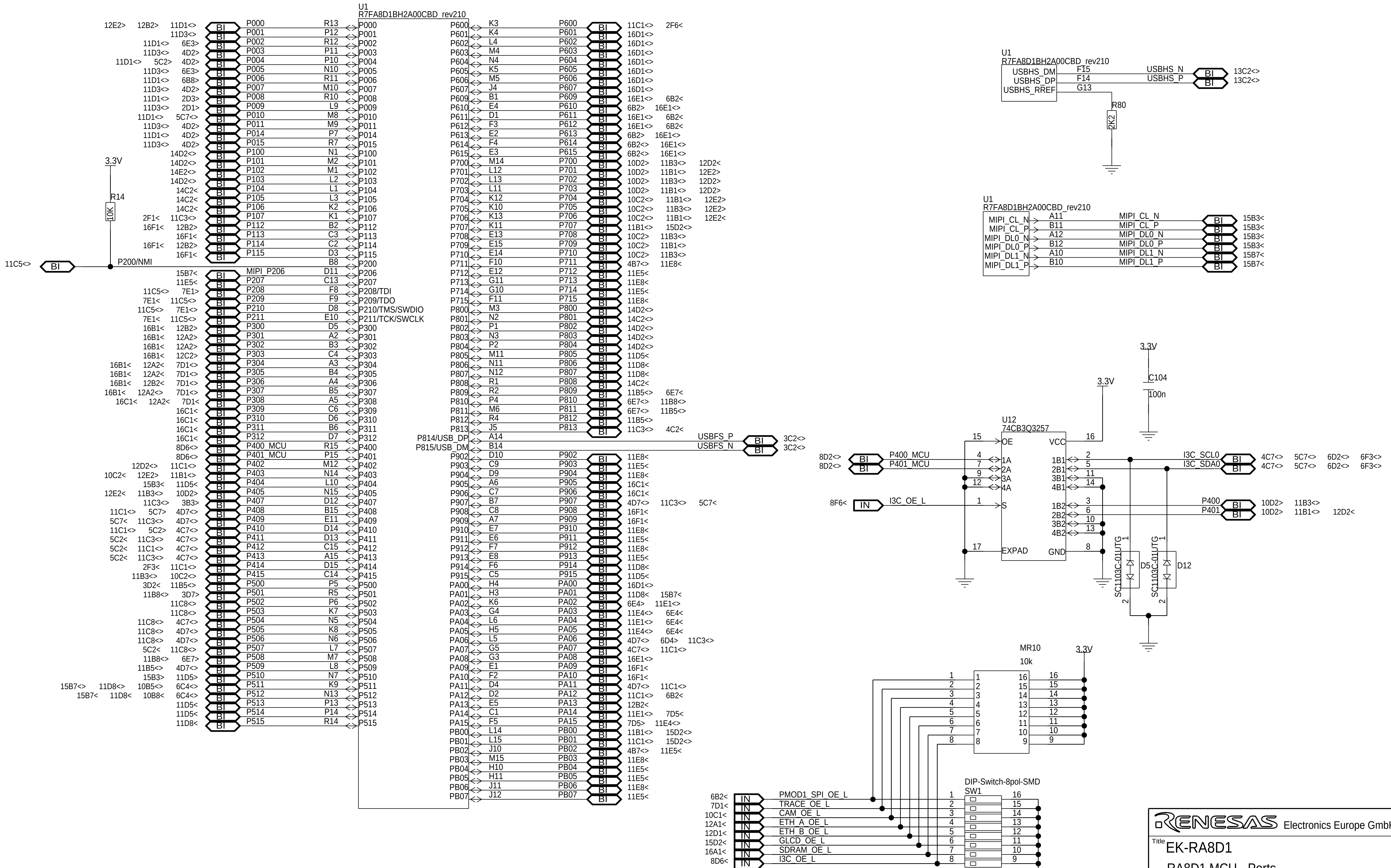
RA8D1 Microcontroller



RENESAS Electronics Europe GmbH

Title EK-RA8D1

RA8D1 MCU - Ports

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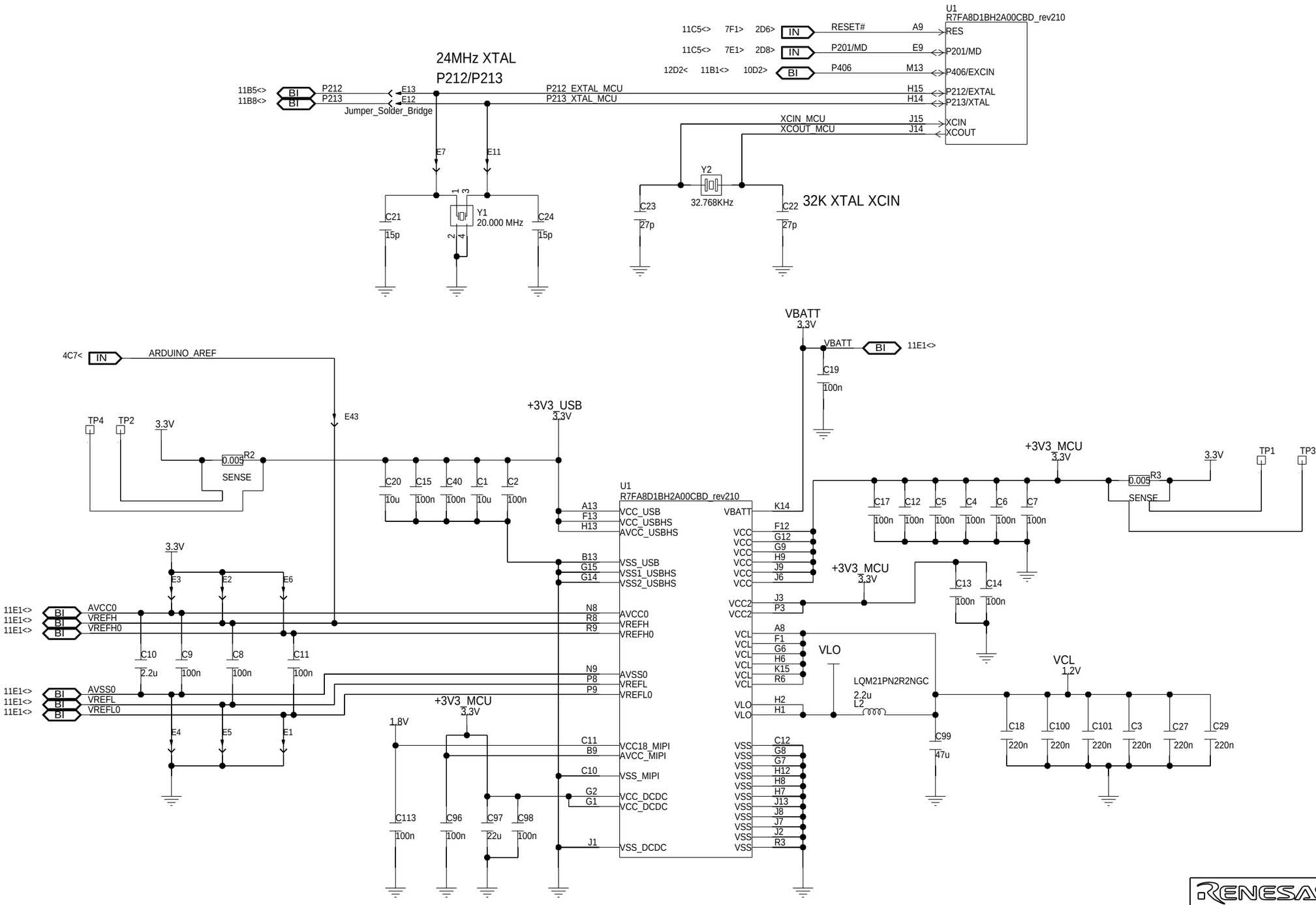
RA8D1 Microcontroller



RENESAS Electronics Europe GmbH

Title	EK-RA8D1 RA8D1 MCU - POWER AND CLOCKS
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Camera Interface

15B7<> 11D8<> 8E2<> 6C4<> BI P511 IIC/SDA1

IIC/SCL1 P512 IN 6C4<> 8E2<> 11D8< 15B7<

socket 20way
J59

3.3V

	1	1	2	2	
	3	3	4	4	
CAM_HD	5	5	6	6	CAM_VD
CAM_XCLK	7	7	8	8	CAM_CLK
CAM_D6	9	9	10	10	CAM_D7
CAM_D4	11	11	12	12	CAM_D5
CAM_D2	13	13	14	14	CAM_D3
CAM_D0	15	15	16	16	CAM_D1
CAM_D9	17	17	18	18	CAM_D8
CAM_D12	19	19	20	20	CAM_D10

Pins 17-20 to be configured as needed.
CAM_D8, D9, D10, D12 can be used as LSB data bits,
Power Down, Power Enable, Standby, or Reset
D11 is intentionally not used.

NOTE: Camera module pin numbers are reversed from normal.

Pin 1 on this socket aligns with pin 2 on the camera module.

U13
74CBTLV3245BQ

3.3V

8F6< IN CAM_OE_L 19 OE VCC 20

11B3<>	8B5<>	OUT	P710	2	A1	B1	18	CAM_VD
11B1<>	8B5<>	OUT	P709	3	A2	B2	17	CAM_HD
11B3<>	8B5<>	OUT	P708	4	A3	B3	16	CAM_CLK
12E2> 11B1<>	8B5<>	BI	P704	5	A4	B4	15	CAM_D8
12E2> 11B3<>	8B5<>	BI	P705	6	A5	B5	14	CAM_D9
12E2< 11B1<>	8B5<>	BI	P706	7	A6	B6	13	CAM_D10
11B3<>	8D2<>	BI	P415	8	A7	B7	12	CAM_D12
12E2> 11B1<>	8D2<>	IN	P403	9	A8	B8	11	CAM_XCLK GTIOC3A

R23 0

1 NC
21 EXPAD
GND 10

R35 0

U14
74CBTLV3245BQ

19 OE VCC 20

11B3<>	8D9<>	OUT	P400	2	A1	B1	18	CAM_D0
12D2< 11B1<>	8D9<>	OUT	P401	3	A2	B2	17	CAM_D1
12E2< 11B3<>	8D2<>	OUT	P405	4	A3	B3	16	CAM_D2
12D2< 11B1<>	9A5<>	OUT	P406	5	A4	B4	15	CAM_D3
12D2< 11B3<>	8B5<>	OUT	P700	6	A5	B5	14	CAM_D4
12E2> 11B1<>	8B5<>	OUT	P701	7	A6	B6	13	CAM_D5
12D2> 11B3<>	8B5<>	OUT	P702	8	A7	B7	12	CAM_D6
12D2> 11B1<>	8B5<>	OUT	P703	9	A8	B8	11	CAM_D7

1 NC
21 EXPAD
GND 10

3.3V

C85 100n C86 100n

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Title EK-RA8D1
CEU CAMERA INTERFACE

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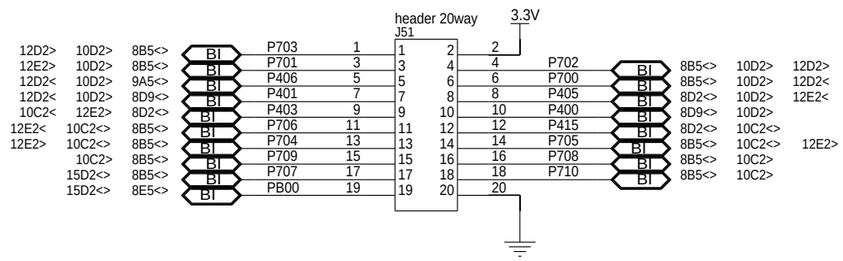
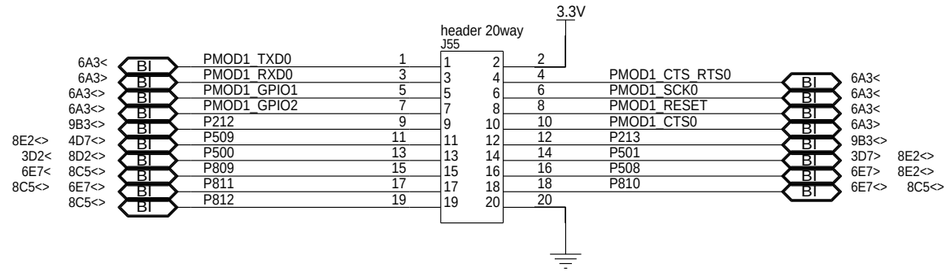
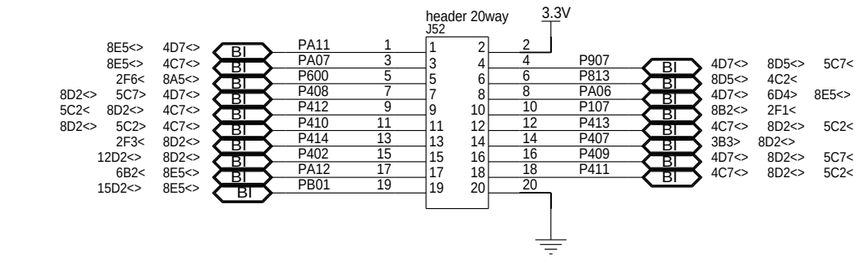
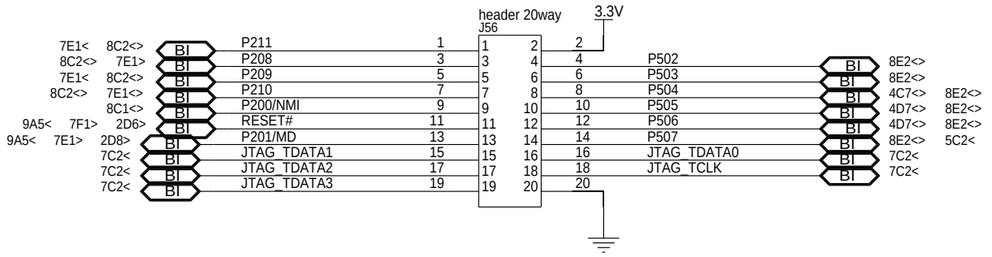
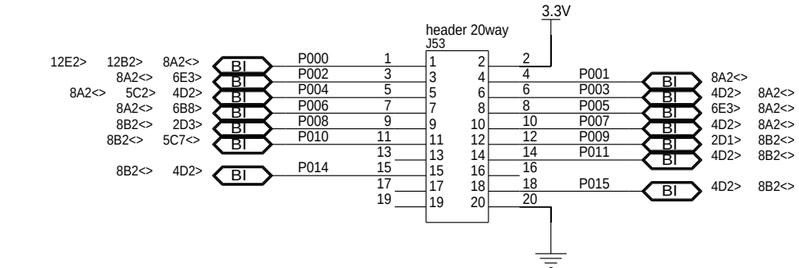
Pin Headers

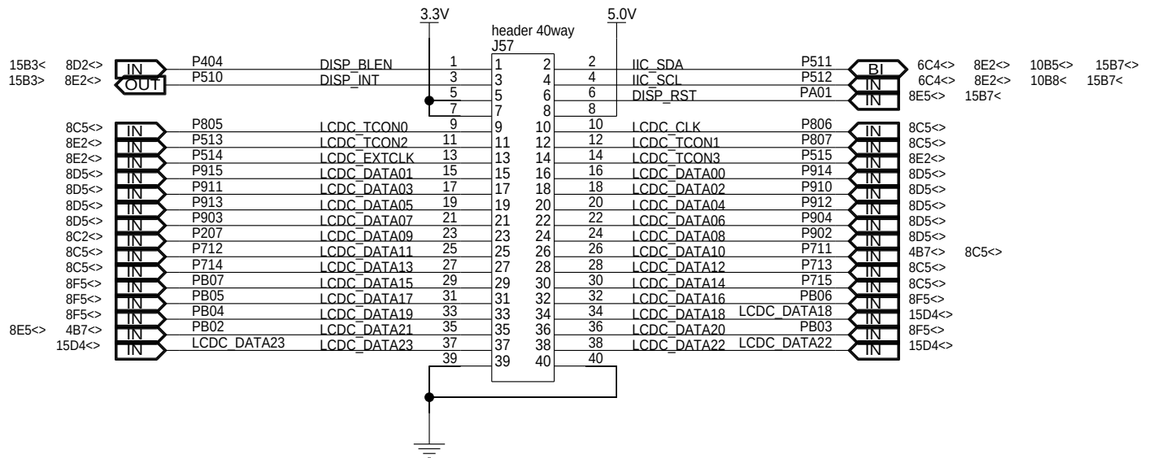


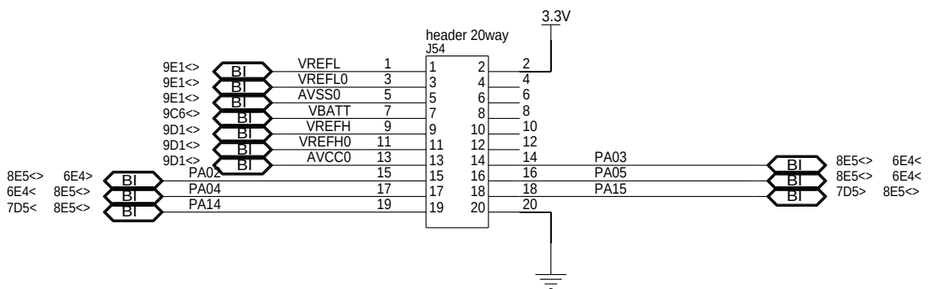












This pin header may be used for a Parallel RGB LCD expansion board.

RENESAS Electronics Europe GmbH

Title: EK-RA8D1
Pin Headers

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RMII Ethernet PHY & Connector

Ethernet Jack

U16 74CBTLV3245BQ
U17 74CBTLV3245BQ
U18 74CBTLV3245BQ
U19 74CBTLV3245BQ
U15 ICS1894-32
J5 RJ45_J0011D21BNL
OSC1 50 MHz Clock Output ECS-1612MV

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Ethernet

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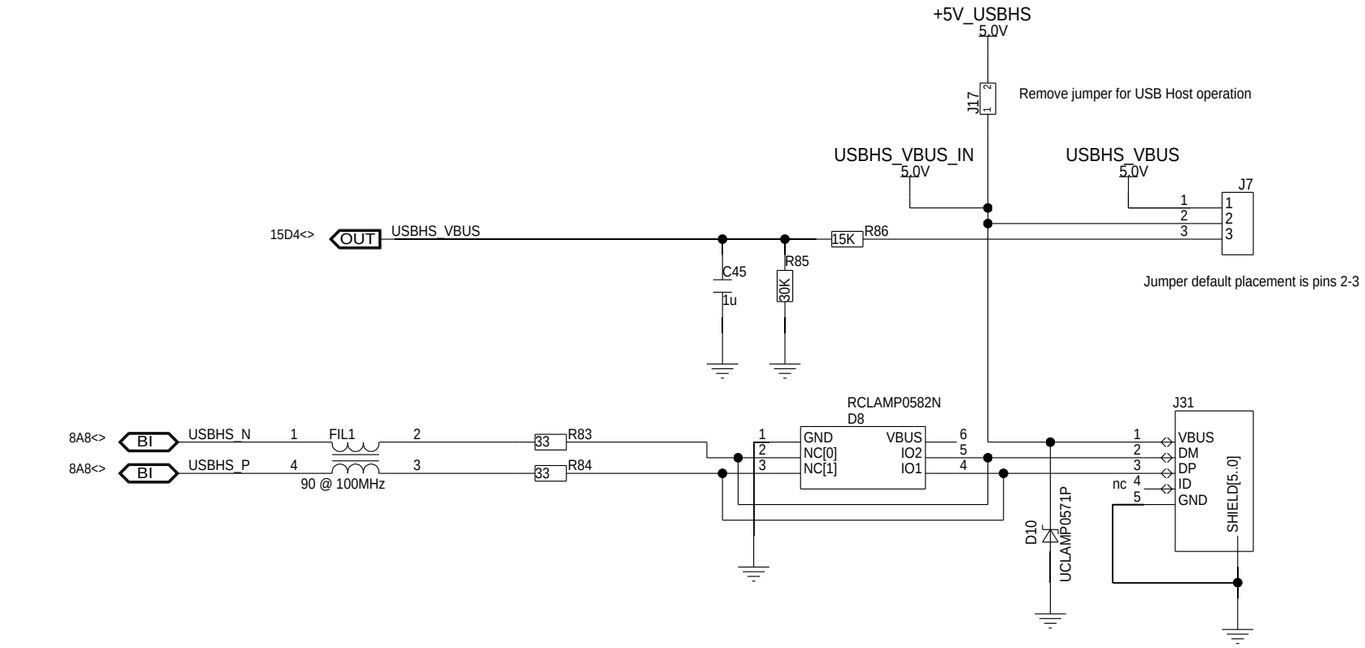
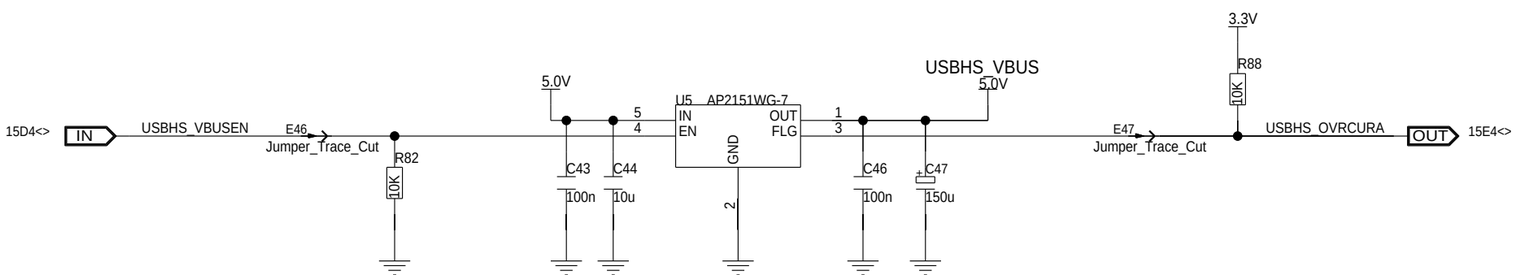
USB HS INTERFACE





USB HOST POWER SUPPLY
TOTAL CURRENT AVAILABLE IS 500mA MAX

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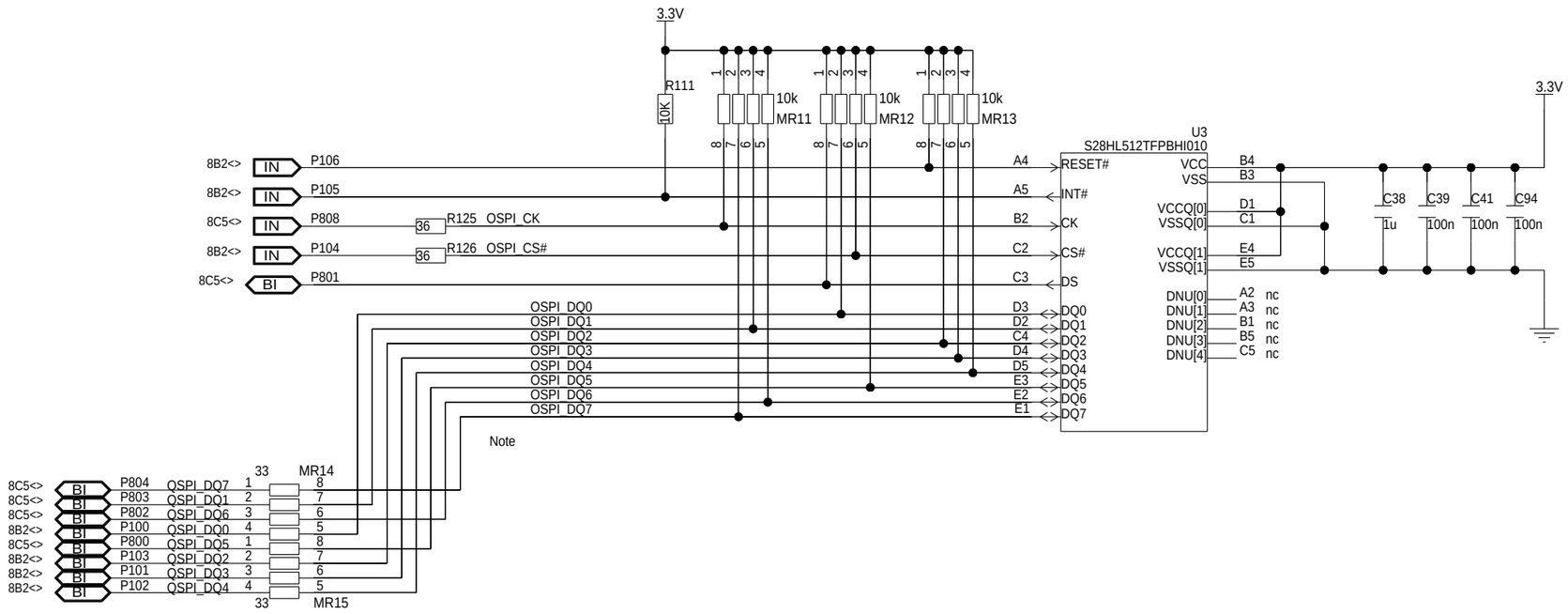
OSPI FLASH



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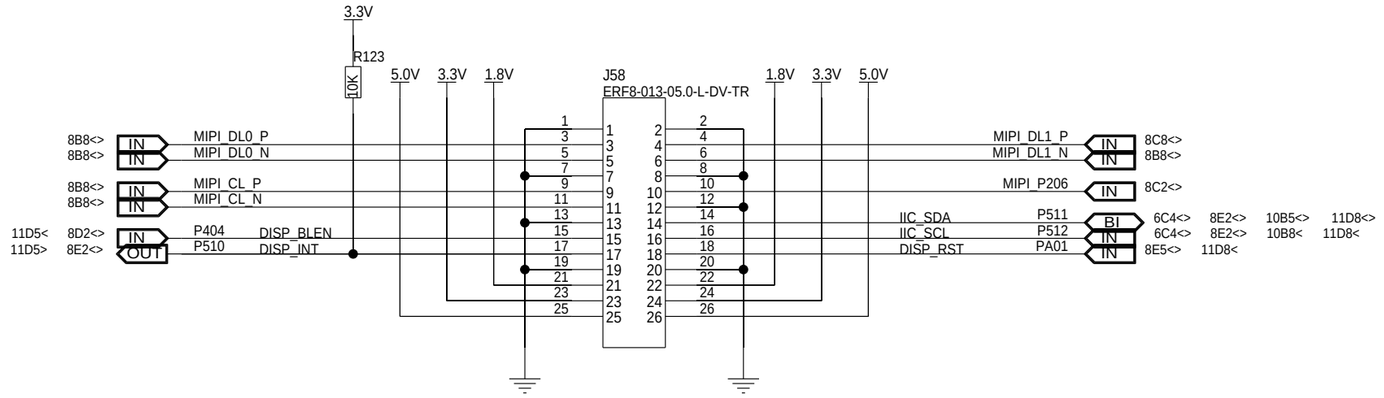
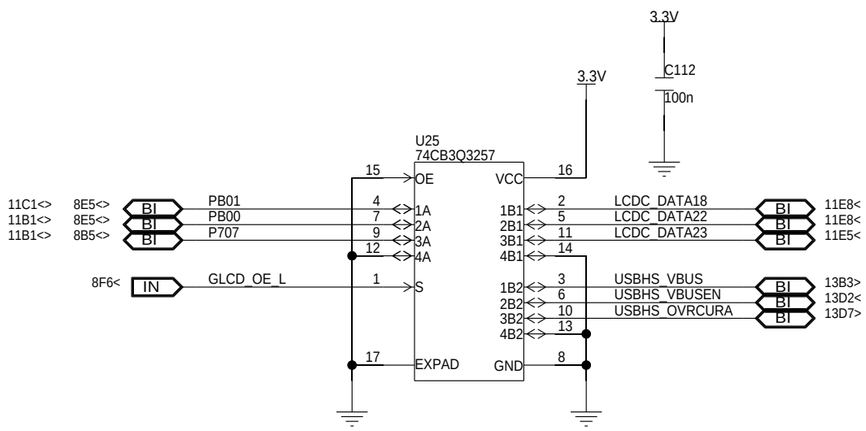
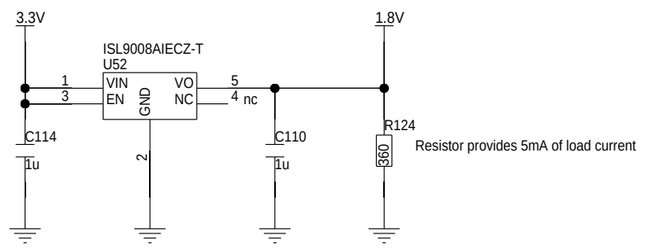
MIPI LCD DISPLAY INTERFACE





Regulator provides up to 150 mA of continuous output current



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LCD DISPLAY INTERFACE

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SDRAM

3.3V

C42 C49 C63 C74 C75
100n 100n 100n 100n 100n

8F6< IN SDRAM_OE_L

U20 74CBTLV3245BQ
U21 74CBTLV3245BQ
U22 74CBTLV3245BQ
U23 74CBTLV3245BQ
U24 74CBTLV3245BQ

12B2> 8C2<>	P300	MCU A01/DQM3	SDRAM_A0	SDRAM_R_A0	SDRAM_A8	SDRAM_R_A8	SDRAM_D0
12B2< 8C2<> 7D1<>	P306	MCU A07	SDRAM_A6	SDRAM_R_A6	SDRAM_A9	SDRAM_R_A9	SDRAM_D1
12A2<> 8C2<> 7D1<>	P307	MCU A08	SDRAM_A7	SDRAM_R_A7	SDRAM_A10	SDRAM_R_A10	SDRAM_D2
12C2> 8C2<>	P303	MCU A04	SDRAM_A3	SDRAM_R_A3	SDRAM_A11	SDRAM_R_A11	SDRAM_D3
12A2> 8C2<>	P301	MCU A02	SDRAM_A1		SDRAM_A12	SDRAM_R_A12	SDRAM_D4
12A2> 8C2<>	P302	MCU A03	SDRAM_A2	SDRAM_R_A1	SDRAM_BA0	SDRAM_R_BA0	SDRAM_D5
12A2< 8C2<> 7D1<>	P305	MCU A06	SDRAM_A5	SDRAM_R_A5	SDRAM_BA1	SDRAM_R_BA1	SDRAM_D6
12A2< 8C2<> 7D1<>	P304	MCU A05	SDRAM_A4	SDRAM_R_A4			SDRAM_D7
12A2< 7D1< 8C2<>	P308	MCU A09					SDRAM_D8
8C2<>	P309	MCU A10					SDRAM_D9
8C2<>	P310	MCU A11					SDRAM_D10
8D2<>	P311	MCU A12					SDRAM_D11
8D2<>	P312	MCU A13					SDRAM_D12
8D5<>	P905	MCU A14					SDRAM_D13
8D5<>	P906	MCU A15					SDRAM_D14
							SDRAM_D15
8A5<>	P601	MCU DQ00					
8A5<>	P602	MCU DQ01					
8A5<>	P603	MCU DQ02					
8A5<>	P604	MCU DQ03					
8A5<>	P605	MCU DQ04					
8A5<>	P606	MCU DQ05					
8A5<>	P607	MCU DQ06					
8D5<>	PA00	MCU DQ07					
6B2< 8B5<>	P609	MCU DQ08					
8B5<> 6B2>	P610	MCU DQ09					
6B2< 8B5<>	P611	MCU DQ10					
6B2< 8B5<>	P612	MCU DQ11					
8B5<> 6B2>	P613	MCU DQ12					
8B5<> 6B2<>	P614	MCU DQ13					
8B5<> 6B2<>	P615	MCU DQ14					
8E5<>	PA08	MCU DQ15					
8B2<>	P113	MCU CKE	SDRAM_CKE				
8E5<>	PA09	MCU SDCLK	SDRAM_SDCLK				
12B2> 8B2<>	P112	MCU A00/DQM1	SDRAM_DQM1				
8E5<>	PA10	MCU DQM0	SDRAM_DQM0				
12B2> 8B2<>	P114	MCU WE	SDRAM_WE				
8D5<>	P909	MCU CAS	SDRAM_CAS				
8D5<>	P908	MCU RAS	SDRAM_RAS				
8B2<>	P115	MCU SDCS	SDRAM_CS				

R6 0 (NC, EXPAD)
R7 0 (NC, EXPAD)
R8 0 (NC, EXPAD)
R11 0 (NC, EXPAD)
R19 0

MR1 MR2 MR3 MR4 33

3.3V

MR5 MR6 MR7 MR8 MR9 4.7k

U27 IS42S16320F-6BLI_x16

A0	H7	A0	
A1	H8	A1	
A2	J8	A2	
A3	J7	A3	
A4	J3	A4	
A5	J2	A5	
A6	H3	A6	
A7	H2	A7	
A8	H1	A8	
A9	G3	A9	
A10	H9	A10	
A11	G2	A11	
A12	G1	A12	
DQ0	A8	DQ0	
DQ1	B9	DQ1	
DQ2	B8	DQ2	
DQ3	C9	DQ3	
DQ4	C8	DQ4	
DQ5	D9	DQ5	
DQ6	D8	DQ6	
DQ7	E9	DQ7	
DQ8	E1	DQ8	
DQ9	D2	DQ9	
DQ10	D1	DQ10	
DQ11	C2	DQ11	
DQ12	C1	DQ12	
DQ13	B2	DQ13	
DQ14	B1	DQ14	
DQ15	A2	DQ15	
A13	G7	BA0	
A14	G8	BA1	
CKE	F3	CKE	
SDCLK	F2	CLK	
DQM1	F1	DQMH	
DQM0	E8	DQML	
WE	F9	WE	
CAS	F7	CAS	
RAS	F8	RAS	
SDCS	G9	CS	
		NC	E2

VDDQ[0]	A7	
VSSQ[0]	A3	
VDDQ[1]	B3	
VSSQ[1]	B7	
VDDQ[2]	C7	
VSSQ[2]	C3	
VDDQ[3]	D3	
VSSQ[3]	D7	
VDD[0]	E7	
VSS[0]	A1	
VDD[1]	J9	
VSS[1]	E3	
VDD[2]	A9	
VSS[2]	J1	

3.3V

C76 C77 C78 C79 C80 C81 C82 C83
100n 100n 100n 100n 100n 100n 100n 10u

Note

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