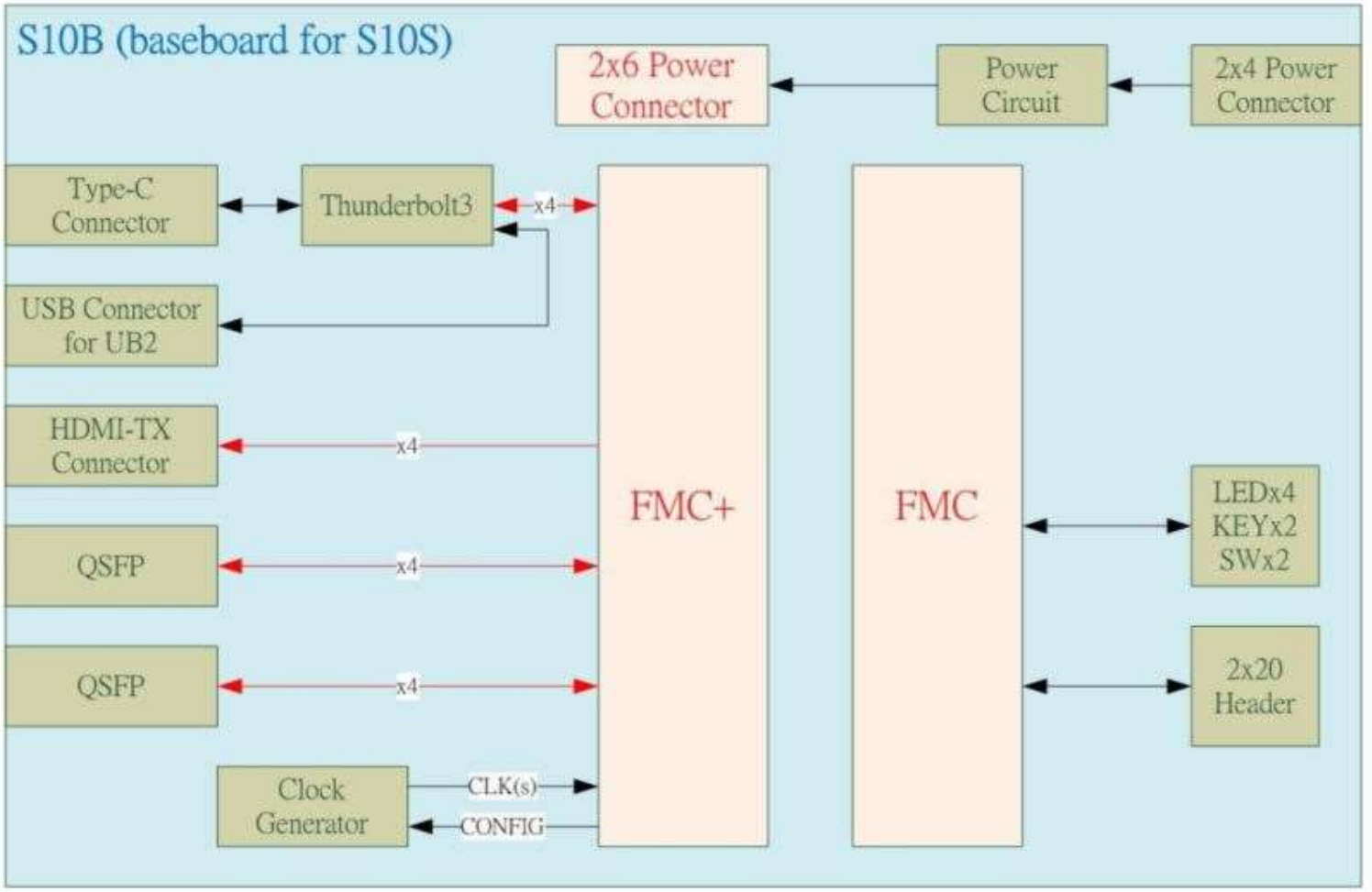
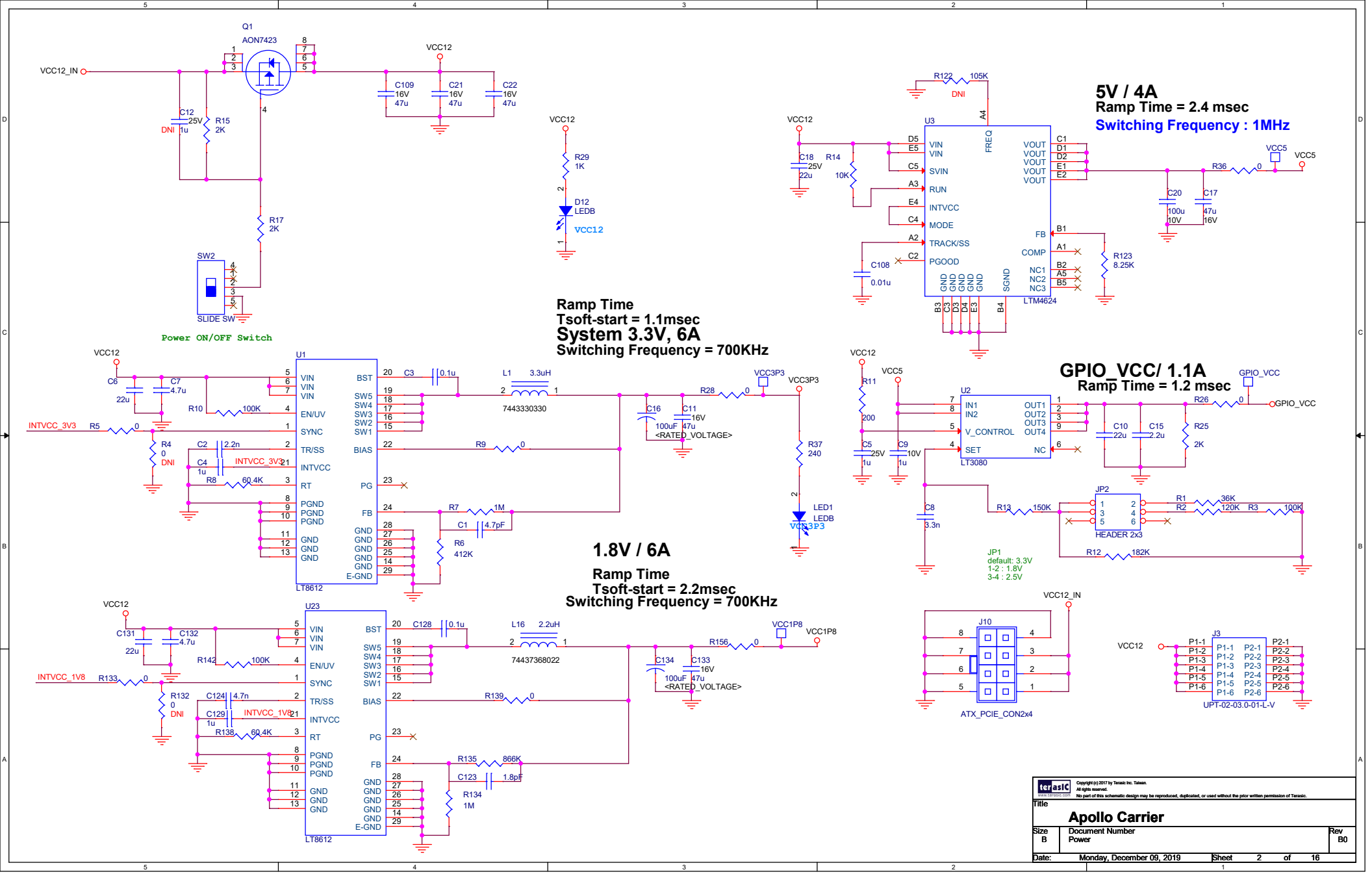


Title: **Apollo Carrier**

Size	Document Number	Rev
B	Block diagram	B0

Date: Monday, December 09, 2019 Sheet 1 of 16



Apollo Carrier

Size B | Document Number: Power | Rev B0

Date: Monday, December 09, 2019 | Sheet 2 of 16

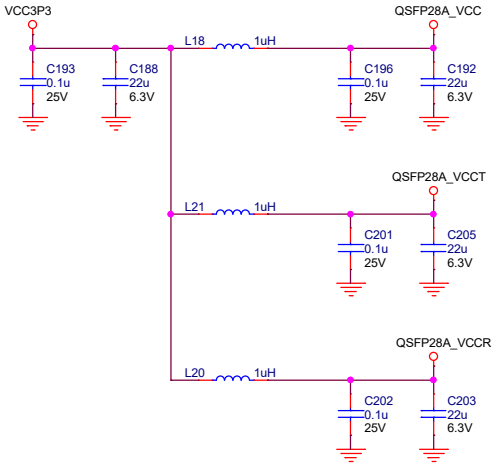
QSFP28 Port A Transceivers

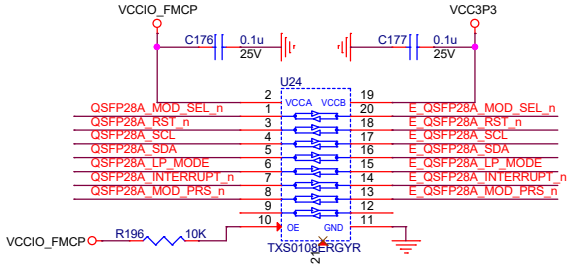
QSFP28A_TX_p[3..0] 15
QSFP28A_TX_n[3..0] 15
QSFP28A_RX_p[3..0] 15
QSFP28A_RX_n[3..0] 15

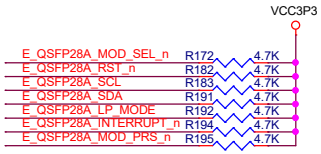
QSFP28A Control Interface

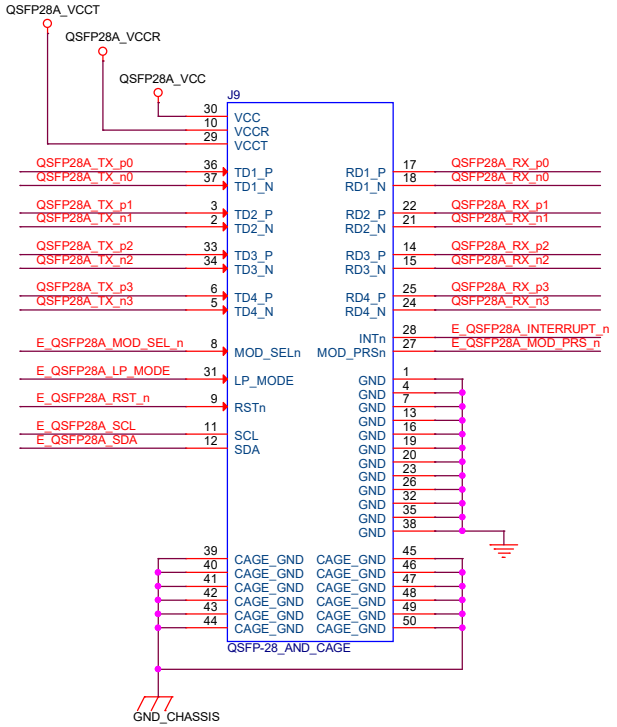
QSFP28A_MOD_SEL_n 14
QSFP28A_RST_n 14
QSFP28A_SCL 14
QSFP28A_SDA 14
QSFP28A_LP_MODE 14
QSFP28A_INTERRUPT_n 14
QSFP28A_MOD_PRS_n 14

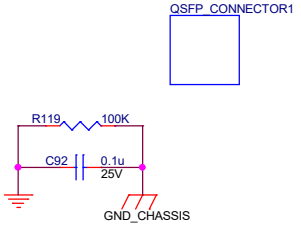
NOTE 1: Bypass Capacitors should be placed as close to the associated 20-pin connector as possible.
NOTE 2: Assuming that the SFP RD 100-ohm termination on the Host Board FPGA device will be implemented via the on-chip termination circuit.
NOTE 3: DC blocking capacitors are in the module for RX and TX.
NOTE 4: 1uH inductors should have a DC Resistance of less than 0.1-ohm.











Title: **Apollo Carrier**

Size	Document Number	Rev
B	QSFP28 Connector Port A	B0

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QSFP28 Port B Transceivers

QSFP28B_TX_p[3..0] 15
QSFP28B_TX_n[3..0] 15
QSFP28B_RX_p[3..0] 15
QSFP28B_RX_n[3..0] 15

QSFP28B Control Interface

QSFP28B_MOD_SEL_n 14
QSFP28B_RST_n 14
QSFP28B_SCL 14
QSFP28B_SDA 14
QSFP28B_LP_MODE 14
QSFP28B_INTERRUPT_n 14
QSFP28B_MOD_PRS_n 14

NOTE 1: Bypass Capacitors should be placed as close to the associated 20-pin connector as possible.
NOTE 2: Assuming that the SFP RD 100-ohm termination on the Host Board FPGA device will be implemented via the on-chip termination circuit.
NOTE 3: DC blocking capacitors are in the module for RX and TX.
NOTE 4: 1uH inductors should have a DC Resistance of less than 0.1-ohm.

VCC3P3
QSFP28B_VCC
L24 1uH
C214 0.1u 25V
C210 22u 6.3V
C216 0.1u 25V
C217 22u 6.3V

QSFP28B_VCCT
L27 1uH
C222 0.1u 25V
C233 22u 6.3V

QSFP28B_VCCR
L25 1uH
C223 0.1u 25V
C224 22u 6.3V

VCCIO_FMCP
VCC3P3
C206 0.1u 25V
C207 0.1u 25V

U28 TXS0108ERGYR

QSFP28B_MOD_SEL_n	1	20	E_QSFP28B_MOD_SEL_n
QSFP28B_RST_n	3	18	E_QSFP28B_RST_n
QSFP28B_SCL	4	17	E_QSFP28B_SCL
QSFP28B_SDA	5	16	E_QSFP28B_SDA
QSFP28B_LP_MODE	6	15	E_QSFP28B_LP_MODE
QSFP28B_INTERRUPT_n	7	14	E_QSFP28B_INTERRUPT_n
QSFP28B_MOD_PRS_n	8	13	E_QSFP28B_MOD_PRS_n

VCCIO_FMCP R217 10K

VCC3P3

E_QSFP28B_MOD_SEL_n	R209	4.7K
E_QSFP28B_RST_n	R210	4.7K
E_QSFP28B_SCL	R211	4.7K
E_QSFP28B_SDA	R213	4.7K
E_QSFP28B_LP_MODE	R214	4.7K
E_QSFP28B_INTERRUPT_n	R215	4.7K
E_QSFP28B_MOD_PRS_n	R218	4.7K

QSFP28B_VCCT
QSFP28B_VCCR
QSFP28B_VCC

J12 QSFP-28_AND_CAGE

		VCC			
		VCCR			
		VCCT			
QSFP28B_TX_p0	36	TD1_P	RD1_P	17	QSFP28B_RX_p0
QSFP28B_TX_n0	37	TD1_N	RD1_N	18	QSFP28B_RX_n0
QSFP28B_TX_p1	3	TD2_P	RD2_P	22	QSFP28B_RX_p1
QSFP28B_TX_n1	2	TD2_N	RD2_N	21	QSFP28B_RX_n1
QSFP28B_TX_p2	33	TD3_P	RD3_P	14	QSFP28B_RX_p2
QSFP28B_TX_n2	34	TD3_N	RD3_N	15	QSFP28B_RX_n2
QSFP28B_TX_p3	6	TD4_P	RD4_P	25	QSFP28B_RX_p3
QSFP28B_TX_n3	5	TD4_N	RD4_N	24	QSFP28B_RX_n3
			INTn	28	E_QSFP28B_INTERRUPT_n
E_QSFP28B_MOD_SEL_n	8	MOD_SELn	MOD_PRSn	27	E_QSFP28B_MOD_PRS_n
E_QSFP28B_LP_MODE	31	LP_MODE			
E_QSFP28B_RST_n	9	RSTn			
E_QSFP28B_SCL	11	SCL			
E_QSFP28B_SDA	12	SDA			
		GND		1	
		GND		4	
		GND		7	
		GND		13	
		GND		16	
		GND		19	
		GND		20	
		GND		23	
		GND		26	
		GND		32	
		GND		35	
		GND		38	
	39	CAGE_GND	CAGE_GND	45	
	40	CAGE_GND	CAGE_GND	46	
	41	CAGE_GND	CAGE_GND	47	
	42	CAGE_GND	CAGE_GND	48	
	43	CAGE_GND	CAGE_GND	49	
	44	CAGE_GND	CAGE_GND	50	

GND_CHASSIS

QSFP_CONNECTOR2

Title: **Apollo Carrier**

Size	Document Number	Rev
B	QSFP28 Connector Port B	B0

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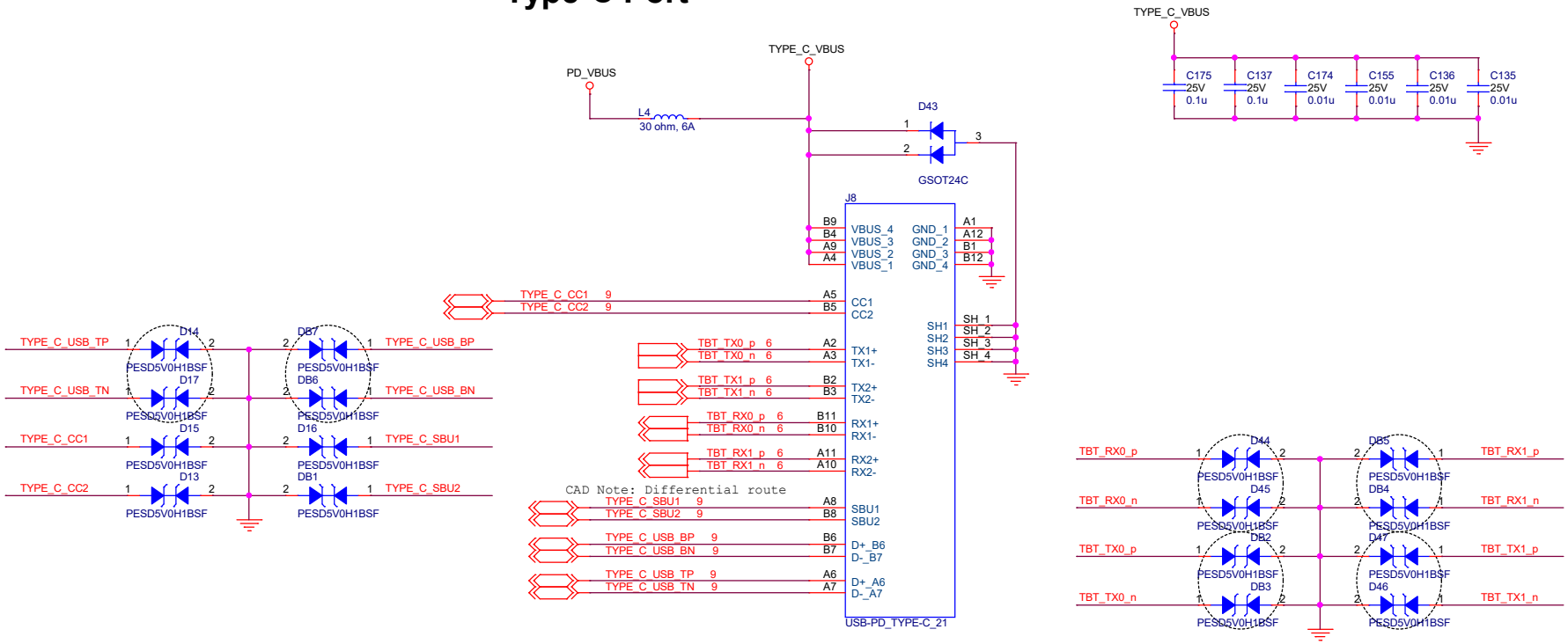
Type-C Port

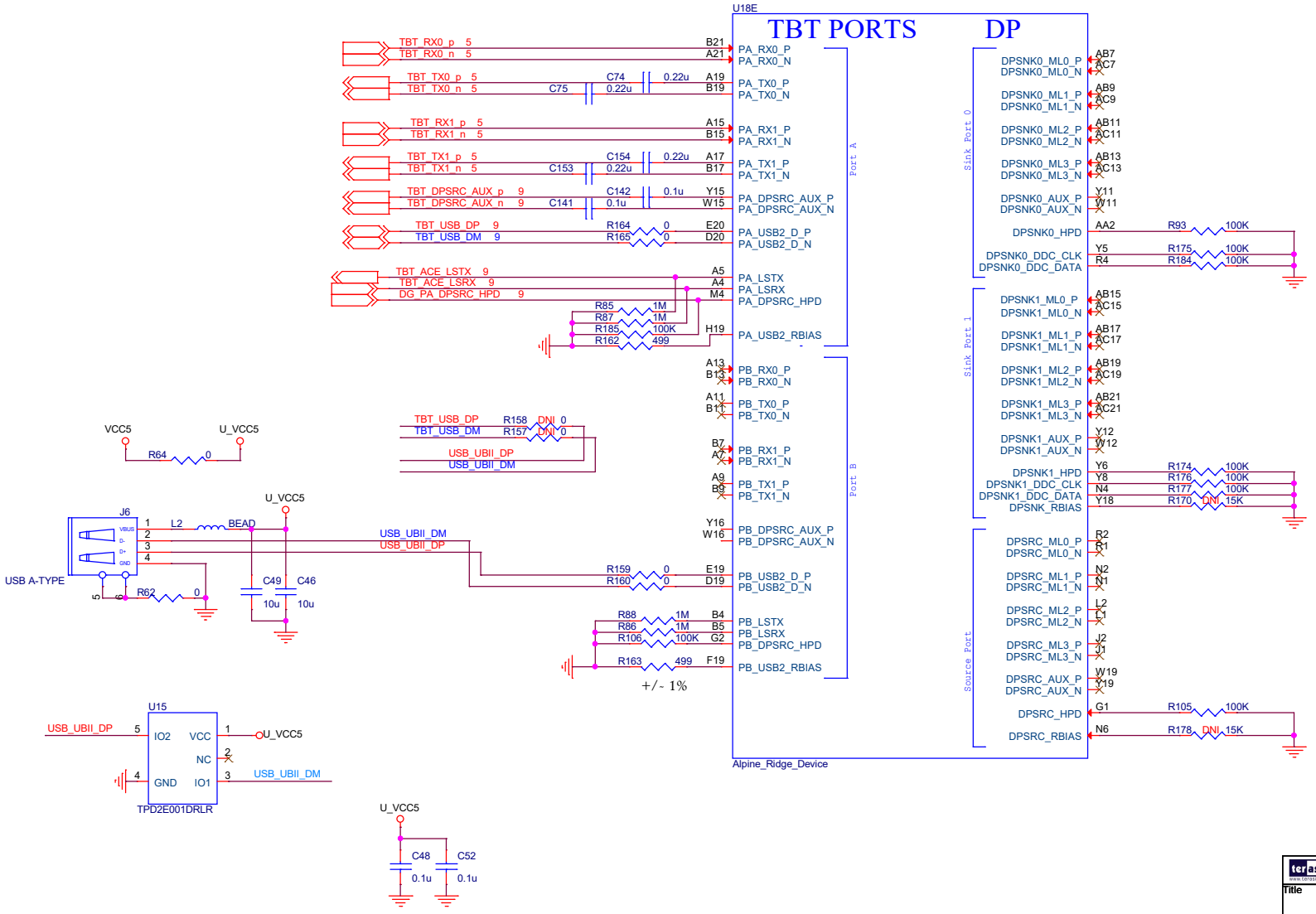


Title: **Apollo Carrier**

Size	Document Number	Rev
B	Type-C Port	B0

Date: Monday, December 09, 2019 Sheet 5 of 16

Alpine Ridge 4C - TBT, USB2



Title: **Apollo Carrier**

Size	Document Number	Rev
B	AR - TBT3 & USB2	B0

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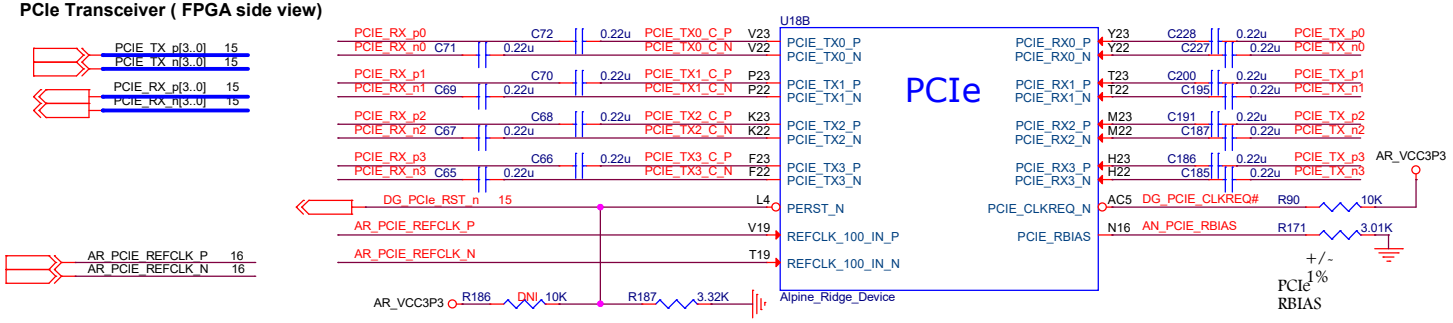
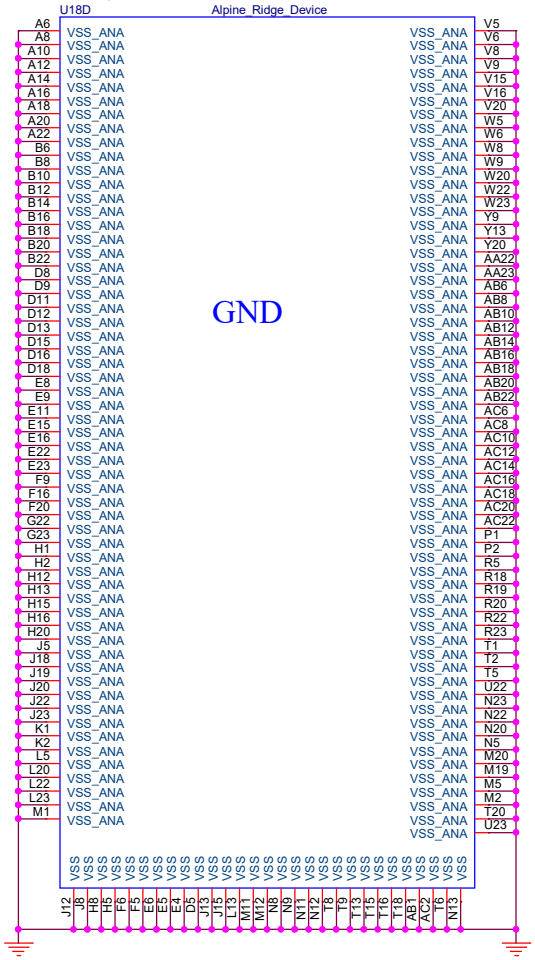
Alpine Ridge 4C - PCIe & GND

PCIe Transceiver (FPGA side view)



Alpine Ridge - GND Symbol



Title: **Apollo Carrier**

Size	Document Number	Rev
B	AR - PCIe & GND	B0

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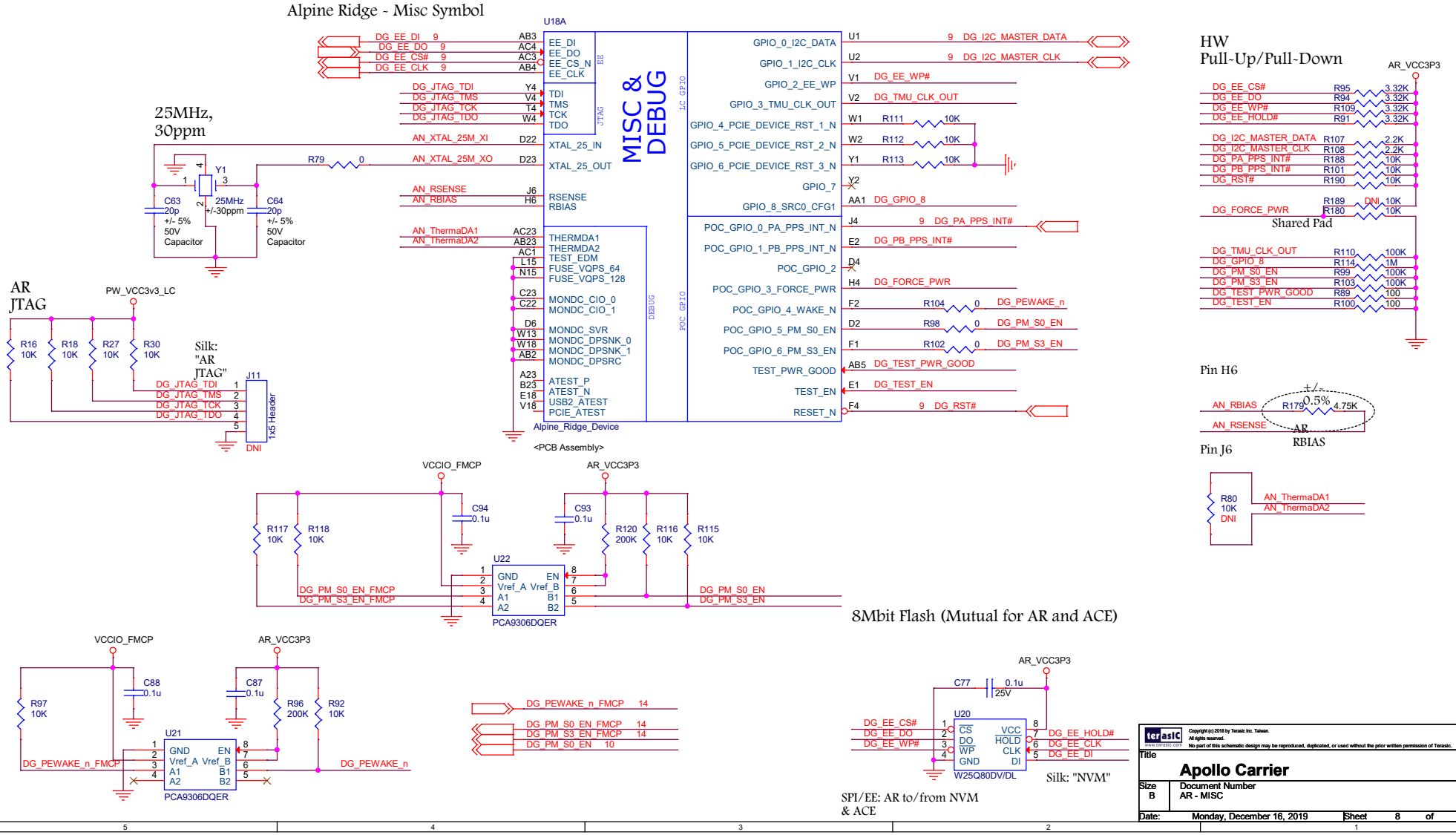
AR - MISC



Title: **Apollo Carrier**

Size	Document Number	Rev
B	AR - MISC	B0

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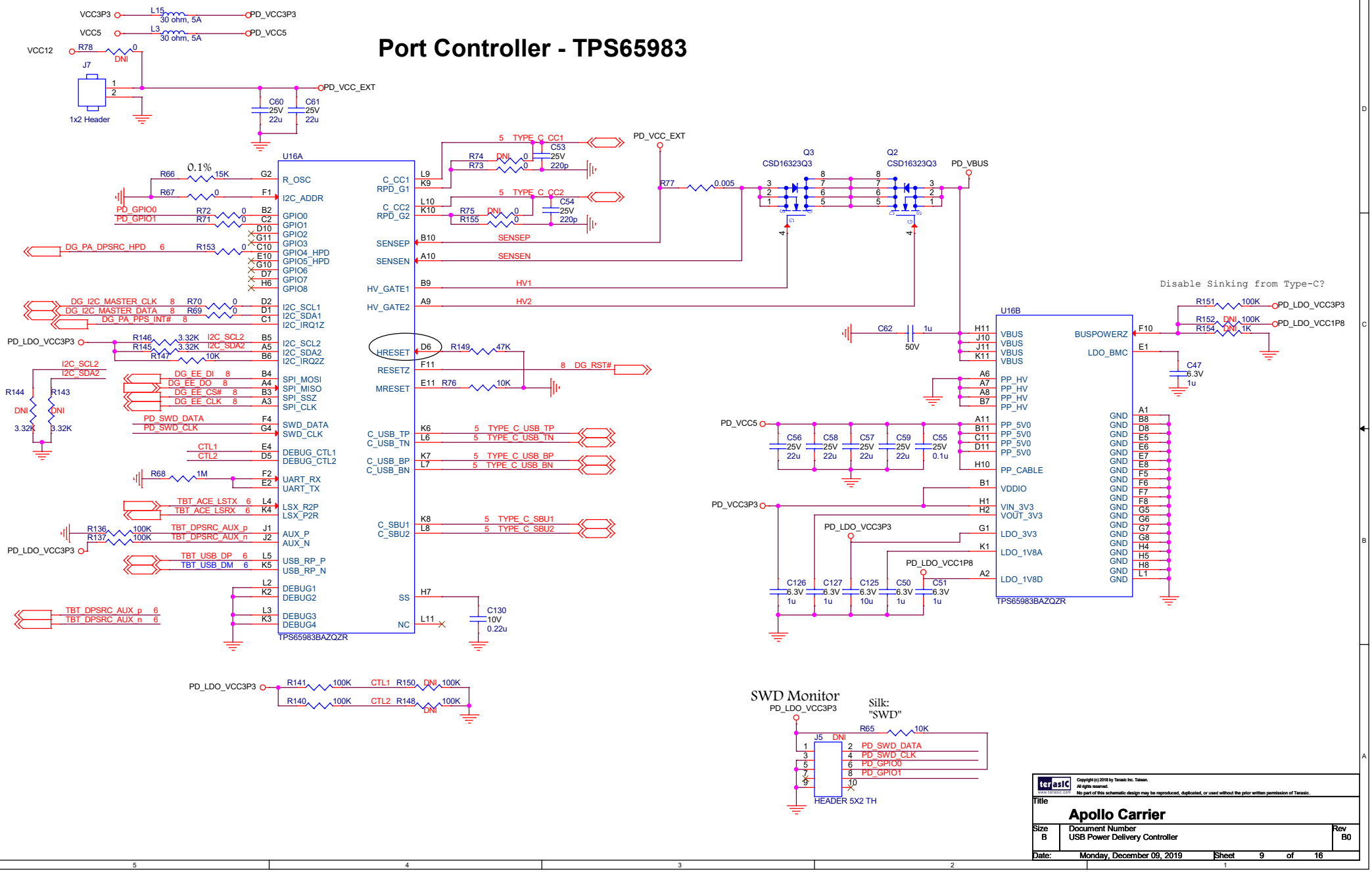
Port Controller - TPS65983



Title: **Apollo Carrier**

Size	Document Number	Rev
B	USB Power Delivery Controller	B0

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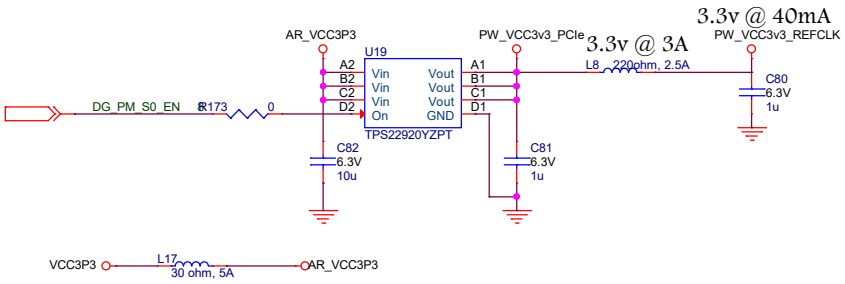
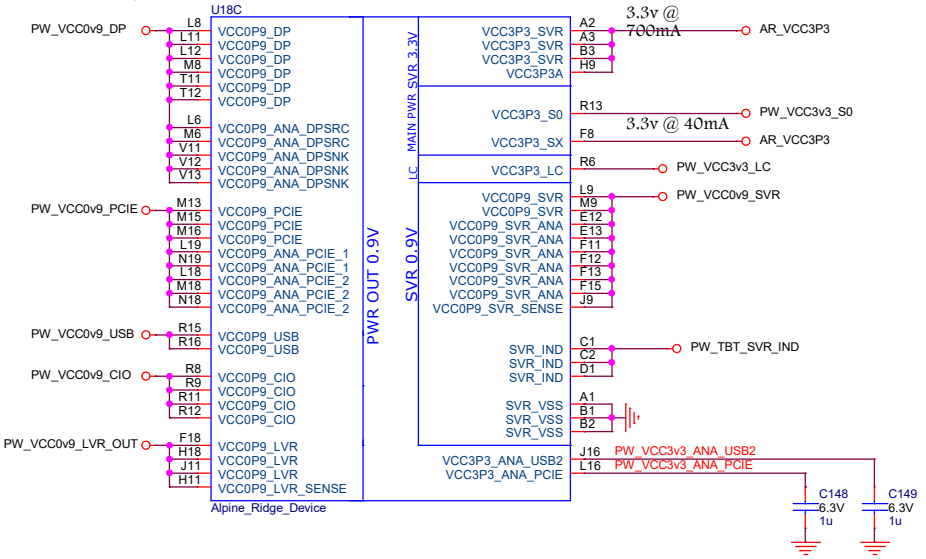
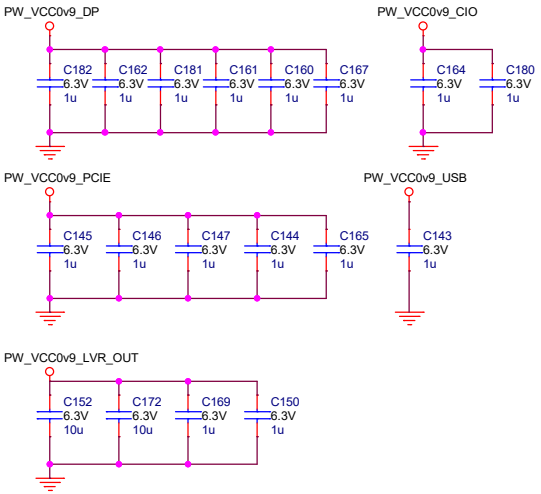
Alpine Ridge 4C - Power Supply



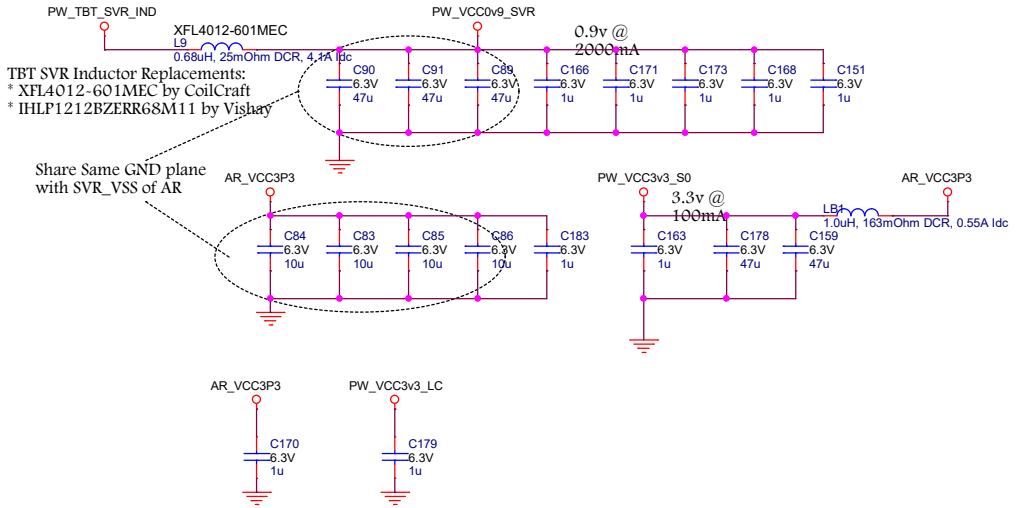
Alpine Ridge - VCC Symbol



Power Supply Decoupling



<PCB Assembly>



Title: **Apollo Carrier**

Size	Document Number	Rev
B	AR - Power	B0

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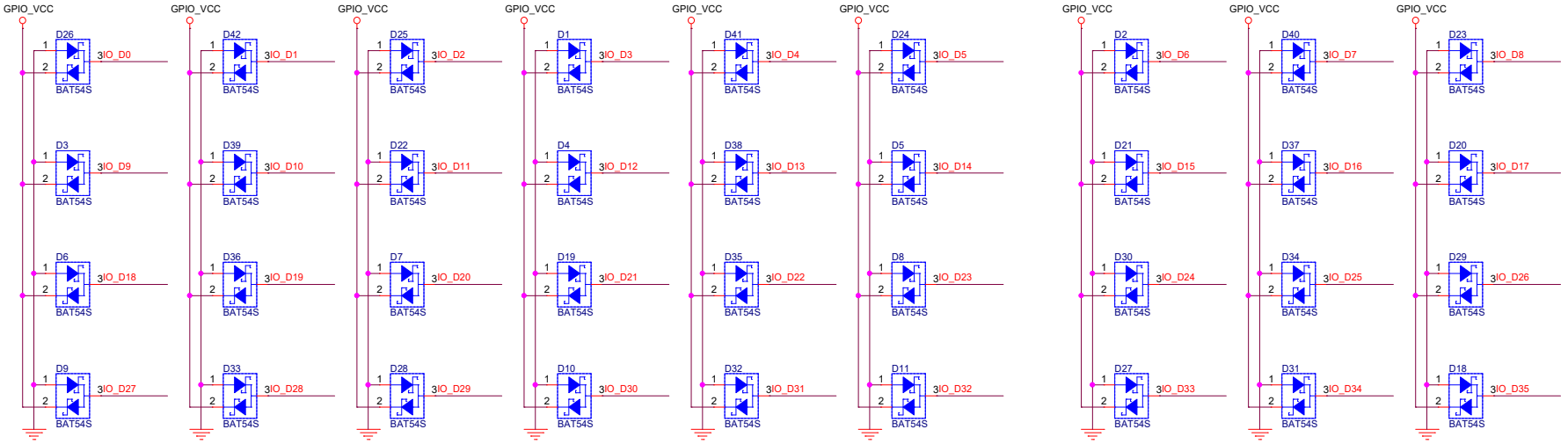
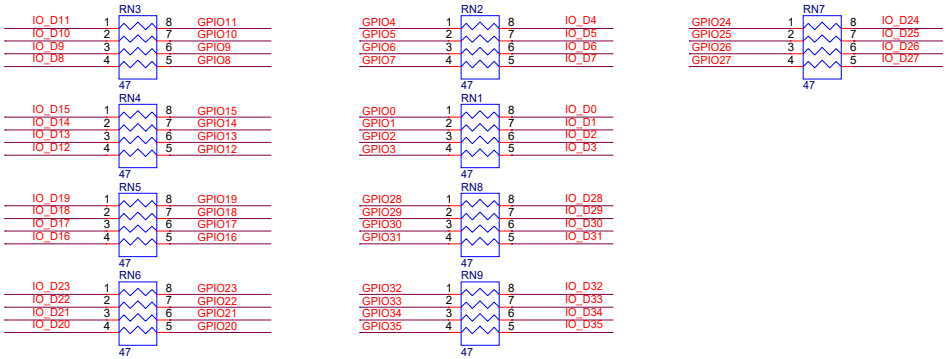
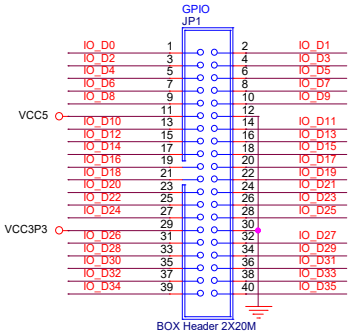
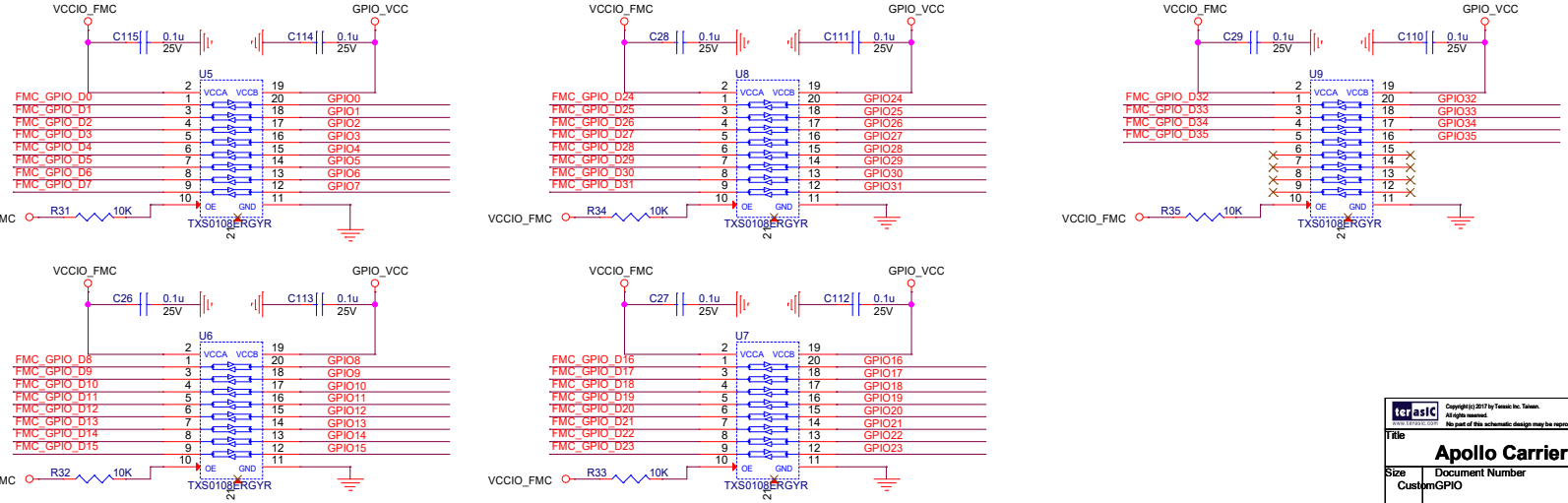
FMC_GPIO_D[35..0] 13









Title: **Apollo Carrier**

Size	Document Number	Rev
Custom	GPIO	B0

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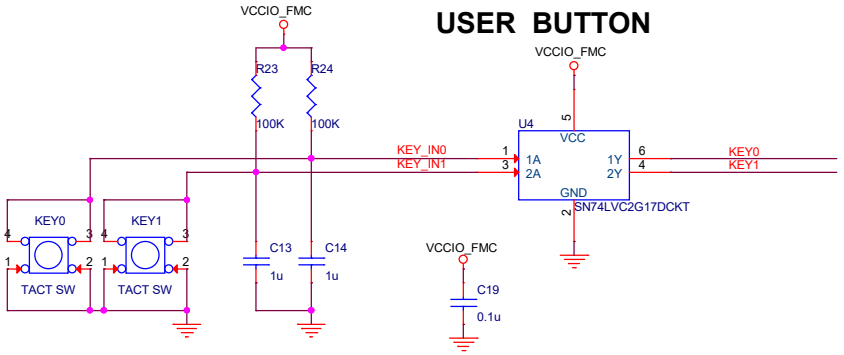
KEY[1..0] 13

SW[1..0] 13

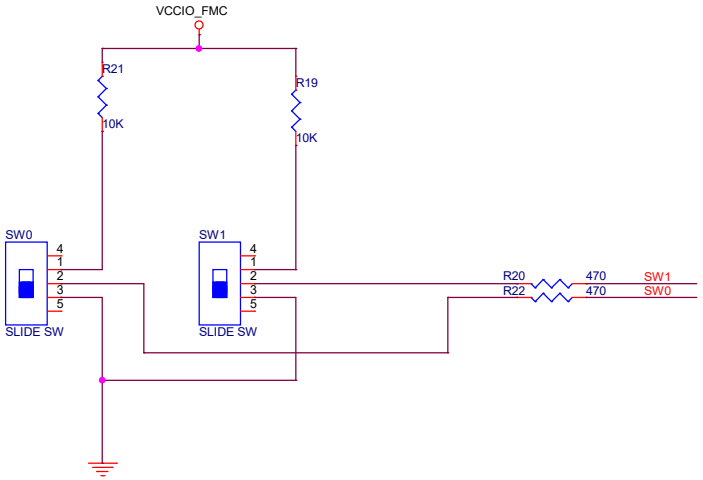
LED

LED[3..0] 13

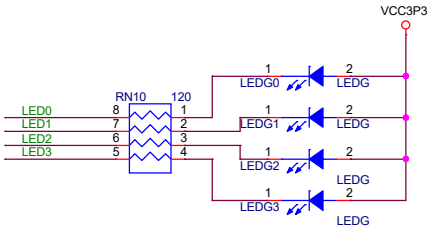
USER BUTTON



SLIDE SWITCH



USER LED



Title: **Apollo Carrier**

Size	Document Number	Rev
B	LED/SW/KEY	B0

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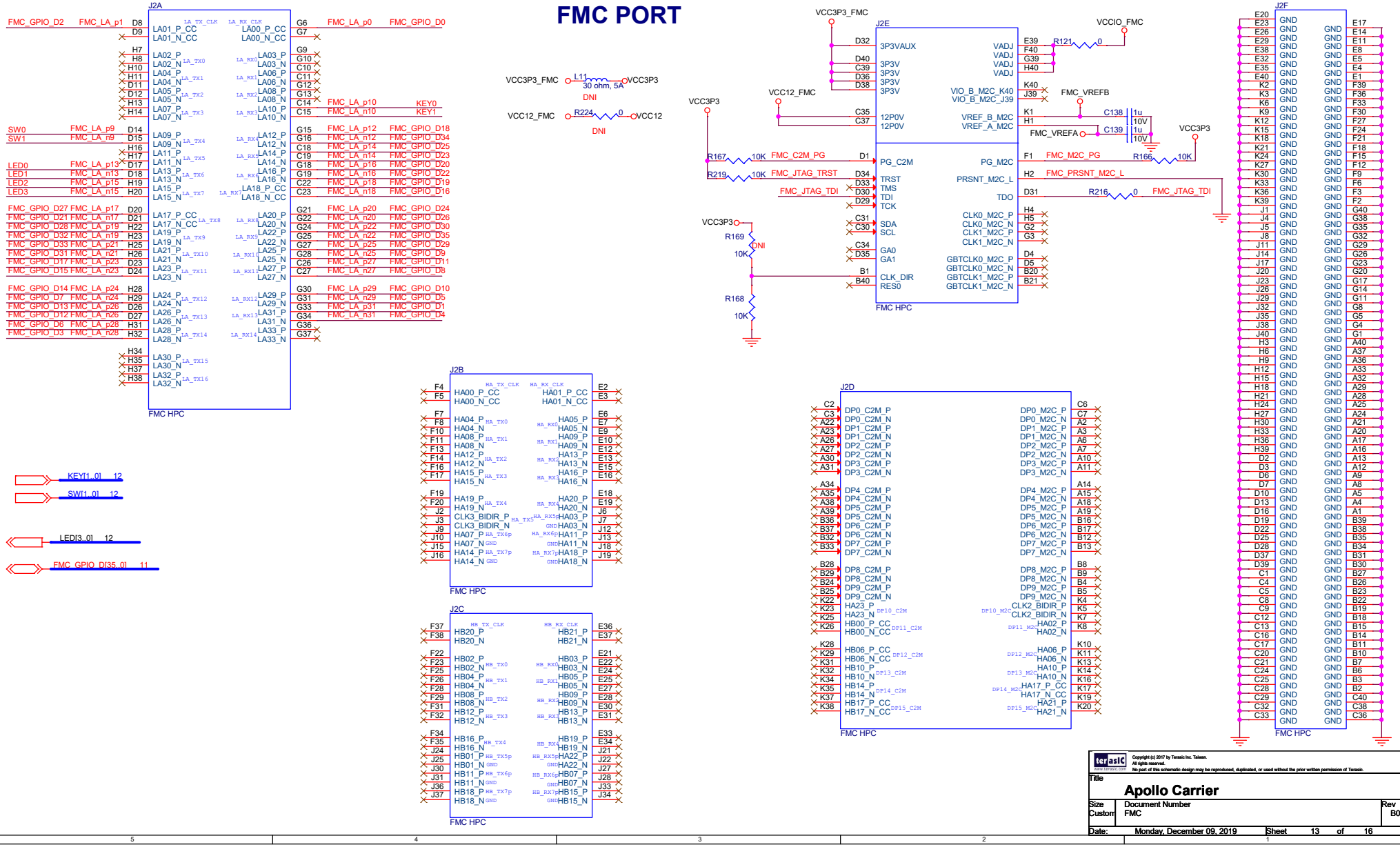
FMC PORT



Title	Apollo Carrier	
Size: Custom	Document Number: FMC	Rev: B0
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FMC+ 1

DG_PM_S0_EN_FMCP 8
DG_PM_S3_EN_FMCP 8
DG_PEWAKE_n_FMCP 8

SI5340A_RST_n 16
SI5340A_OE_n 16

QSFP28A Control Interface

QSFP28A_MOD_SEL_n 3
QSFP28A_RST_n 3
QSFP28A_SCL 3
QSFP28A_SDA 3
QSFP28A_LP_MODE 3
QSFP28A_INTERRUPT_n 3
QSFP28A_MOD_PRS_n 3

QSFP28B Control Interface

QSFP28B_MOD_SEL_n 4
QSFP28B_RST_n 4
QSFP28B_SCL 4
QSFP28B_SDA 4
QSFP28B_LP_MODE 4
QSFP28B_INTERRUPT_n 4
QSFP28B_MOD_PRS_n 4

J1A

G6	LA_P0_CC	LA_P16	G18		
G7	LA_N0_CC	LA_N16	G19		
D8	LA_P1_CC	LA_P17_CC	D20		
D9	LA_N1_CC	LA_N17_CC	D21		
H7	LA_P2	LA_P18_CC	C22		
H8	LA_N2	LA_N18_CC	C23	FMCP_LA_n18	DG_PM_S0_EN_FMCP
G9	LA_P3	LA_P19	H22	FMCP_LA_p19	DG_PM_S3_EN_FMCP
G10	LA_N3	LA_N19	H23	FMCP_LA_n19	DG_PEWAKE_n_FMCP
H10	LA_P4	LA_P20	G21		
H11	LA_N4	LA_N20	G22		
D11	LA_P5	LA_P21	H25	FMCP_LA_p21	SI5340A_RST_n
D12	LA_N5	LA_N21	H26	FMCP_LA_n21	SI5340A_OE_n
C10	LA_P6	LA_P22	G24		
C11	LA_N6	LA_N22	G25		
H13	LA_P7	LA_P23	D23		
H14	LA_N7	LA_N23	D24		
G12	LA_P8	LA_P24	H28	FMCP_LA_p24	QSFP28A_MOD_SEL_n
G13	LA_N8	LA_N24	H29	FMCP_LA_n24	QSFP28A_RST_n
D14	LA_P9	LA_P25	G27		
D15	LA_N9	LA_N25	G28		
C14	LA_P10	LA_P26	D26	FMCP_LA_p26	QSFP28A_SCL
C15	LA_N10	LA_N26	D27	FMCP_LA_n26	QSFP28A_SDA
H16	LA_P11	LA_P27	C26		
H17	LA_N11	LA_N27	C27		
G15	LA_P12	LA_P28	H31	FMCP_LA_p28	QSFP28A_LP_MODE
G16	LA_N12	LA_N28	H32	FMCP_LA_n28	QSFP28A_INTERRUPT_n
D17	LA_P13	LA_P29	G30	FMCP_LA_p29	QSFP28A_MOD_PRS_n
D18	LA_N13	LA_N29	G31	FMCP_LA_n29	QSFP28B_MOD_SEL_n
C18	LA_P14	LA_P30	H34	FMCP_LA_p30	QSFP28B_RST_n
C19	LA_N14	LA_N30	H35	FMCP_LA_n30	QSFP28B_SCL
H19	LA_P15	LA_P31	G33	FMCP_LA_p31	QSFP28B_SDA
H20	LA_N15	LA_N31	G34	FMCP_LA_n31	QSFP28B_LP_MODE
		LA_P32	H37	FMCP_LA_p32	QSFP28B_INTERRUPT_n
		LA_N32	H38	FMCP_LA_n32	QSFP28B_MOD_PRS_n
		LA_P33	G36		
		LA_N33	G37		

ASP-184330-01

J1C

K25	HB_P0_CC	HB_P11	J30
K26	HB_N0_CC	HB_N11	J31
J24	HB_P1	HB_P12	F31
J25	HB_N1	HB_N12	F32
F22	HB_P2	HB_P13	E30
F23	HB_N2	HB_N13	E31
E21	HB_P3	HB_P14	K34
E22	HB_N3	HB_N14	K35
F25	HB_P4	HB_P15	J33
F26	HB_N4	HB_N15	J34
E24	HB_P5	HB_P16	F34
E25	HB_N5	HB_N16	F35
K28	HB_P6_CC	HB_P17_CC	K37
K29	HB_N6_CC	HB_N17_CC	K38
J27	HB_P7	HB_P18	J36
J28	HB_N7	HB_N18	J37
F28	HB_P8	HB_P19	E33
F29	HB_N8	HB_N19	E34
E27	HB_P9	HB_P20	F37
E28	HB_N9	HB_N20	F38
K31	HB_P10	HB_P21	E36
K32	HB_N10	HB_N21	E37

ASP-184330-01

J1B

F4	HA_P0_CC	HA_P12	F13
F5	HA_N0_CC	HA_N12	F14
E2	HA_P1_CC	HA_P13	E12
E3	HA_N1_CC	HA_N13	E13
K7	HA_P2	HA_P14	J15
K8	HA_N2	HA_N14	J16
J6	HA_P3	HA_P15	F16
J7	HA_N3	HA_N15	F17
F7	HA_P4	HA_P16	E15
F8	HA_N4	HA_N16	E16
E6	HA_P5	HA_P17_CC	K16
E7	HA_N5	HA_N17_CC	K17
K10	HA_P6	HA_P18	J18
K11	HA_N6	HA_N18	J19
J9	HA_P7	HA_P19	F19
J10	HA_N7	HA_N19	F20
F10	HA_P8	HA_P20	E18
F11	HA_N8	HA_N20	E19
E9	HA_P9	HA_P21	K19
E10	HA_N9	HA_N21	K20
K13	HA_P10	HA_P22	J21
K14	HA_N10	HA_N22	J22
J12	HA_P11	HA_P23	K22
J13	HA_N11	HA_N23	K23

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J1F

E20	GND0				
E23	GND1	GND80	E17		
E26	GND2	GND81	E14		
E29	GND3	GND82	E11		
E38	GND4	GND83	E8		
E32	GND5	GND84	E5		
E35	GND6	GND85	E4		
E40	GND7	GND86	E1		
K2	GND8	GND87	F39		
K3	GND9	GND88	F36		
K6	GND10	GND89	F33		
K9	GND11	GND90	F30		
K12	GND12	GND91	F27		
K15	GND13	GND92	F24		
K18	GND14	GND93	F21		
K21	GND15	GND94	F18		
K24	GND16	GND95	F15		
K27	GND17	GND96	F12		
K30	GND18	GND97	F9		
K33	GND19	GND98	F6		
K36	GND20	GND99	F3		
K39	GND21	GND100	F2		
J1	GND22	GND101	G40		
J4	GND23	GND102	G38		
J5	GND24	GND103	G35		
J8	GND25	GND104	G32		
J11	GND26	GND105	G29		
J14	GND27	GND106	G26		
J17	GND28	GND107	G23		
J20	GND29	GND108	G20		
J23	GND30	GND109	G17		
J26	GND31	GND120	G14		
J29	GND32	GND121	G11		
J32	GND33	GND122	G8		
J35	GND34	GND123	G5		
J38	GND35	GND124	G4		
J40	GND36	GND125	G1		
H3	GND37	GND126	A40	M1	
H6	GND38	GND127	A37	M4	
H9	GND39	GND128	A36	M5	
H12	GND40	GND129	A33	M8	
H15	GND41	GND130	A32	M9	
H18	GND42	GND131	A29	M12	
H21	GND43	GND132	A28	M13	
H24	GND44	GND133	A25	M16	
H27	GND45	GND134	A24	M17	
H30	GND46	GND135	A21	M20	
H33	GND47	GND136	A20	M21	
H36	GND48	GND137	A17	M24	
H39	GND49	GND138	A16	M25	
D2	GND50	GND139	A13	M28	
D3	GND51	GND140	A12	M29	
D6	GND52	GND141	A9	M32	
D7	GND53	GND142	A8	M33	
D10	GND54	GND143	A5	M36	
D13	GND55	GND144	A4	M37	
D16	GND56	GND145	A1	M40	
D19	GND57	GND146	B39	L2	
D22	GND58	GND147	B38	L3	
D25	GND59	GND148	B35	L6	
D28	GND60	GND149	B34	L7	
D37	GND61	GND150	B31	L10	
D39	GND62	GND151	B30	L11	
C1	GND63	GND152	B27	L14	
C4	GND64	GND153	B26	L15	
C5	GND65	GND154	B23	L18	
C8	GND66	GND155	B22	L19	
C9	GND67	GND156	B19	L22	
C12	GND68	GND157	B18	L23	
C13	GND69	GND158	B15	L26	
C16	GND70	GND159	B14	L27	
C17	GND71	GND110	B11	L30	
C20	GND72	GND111	B10	L31	
C21	GND73	GND112	B7	L34	
C24	GND74	GND113	B6	L35	
C25	GND75	GND114	B3	L38	
C28	GND76	GND115	B2	L39	
C29	GND77	GND116	C40		
C32	GND78	GND117	C38		
C33	GND79	GND118	C36		

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J1G

GND119	GND199	Y1
GND160	GND200	Y4
GND161	GND201	Y5
GND162	GND202	Y8
GND163	GND203	Y9
GND164	GND204	Y12
GND165	GND205	Y13
GND166	GND206	Y16
GND167	GND207	Y17
GND168	GND208	Y20
GND169	GND209	Y21
GND170	GND210	Y24
GND171	GND211	Y25
GND172	GND212	Y28
GND173	GND213	Y29
GND174	GND214	Y32
GND175	GND215	Y33
GND176	GND216	Y36
GND177	GND217	Y37
GND178	GND218	Y40
GND179	GND219	Z2
GND180	GND220	Z3
GND181	GND221	Z6
GND182	GND222	Z7
GND183	GND223	Z10
GND184	GND224	Z11
GND185	GND225	Z14
GND186	GND226	Z15
GND187	GND227	Z18
GND188	GND228	Z19
GND189	GND229	Z22
GND190	GND230	Z23
GND191	GND231	Z26
GND192	GND232	Z27
GND193	GND233	Z30
GND194	GND234	Z31
GND195	GND235	Z34
GND196	GND236	Z35
GND197	GND237	Z38
GND198	GND238	Z39

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Title: **Apollo Carrier**

Size	Document Number	Rev
B	FMC+ 1	B0

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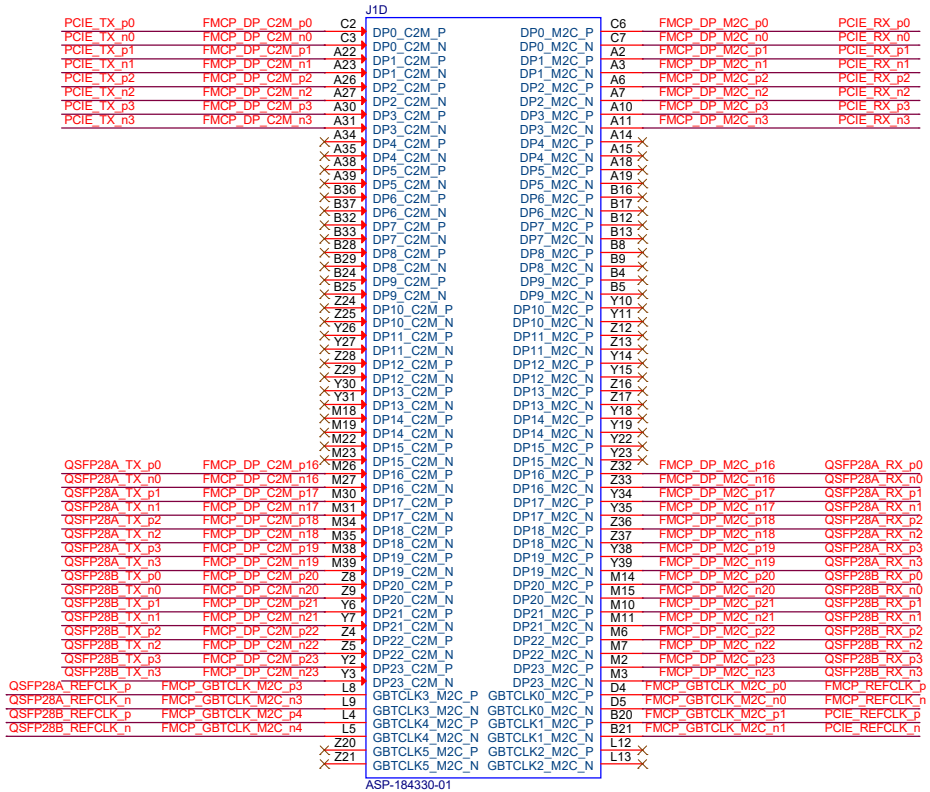
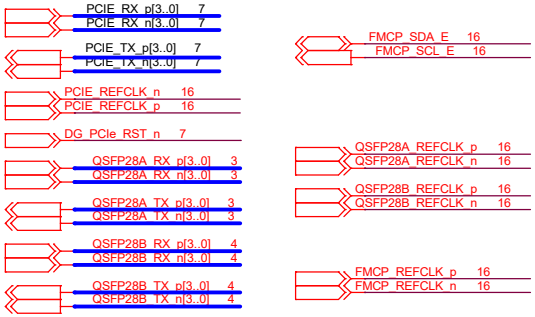
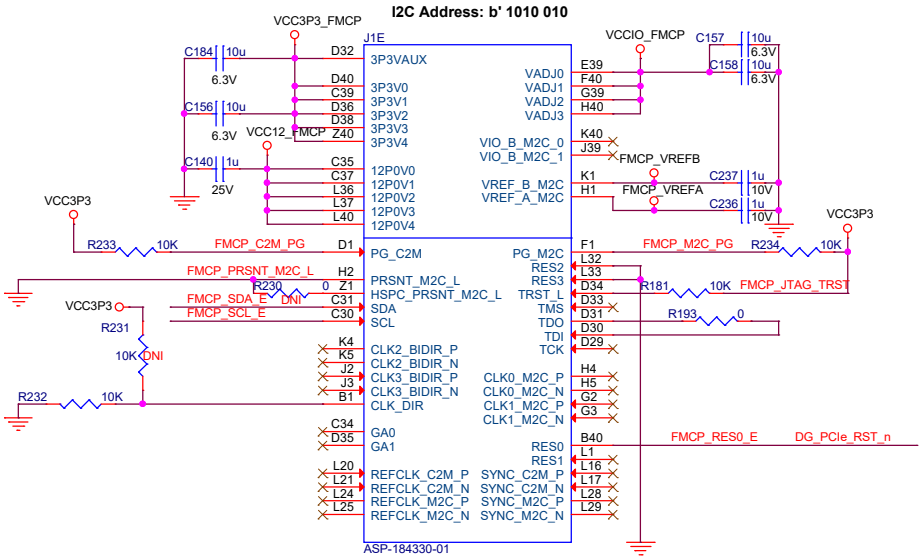
FMC+ 2







Title: **Apollo Carrier**

Size	Document Number	Rev
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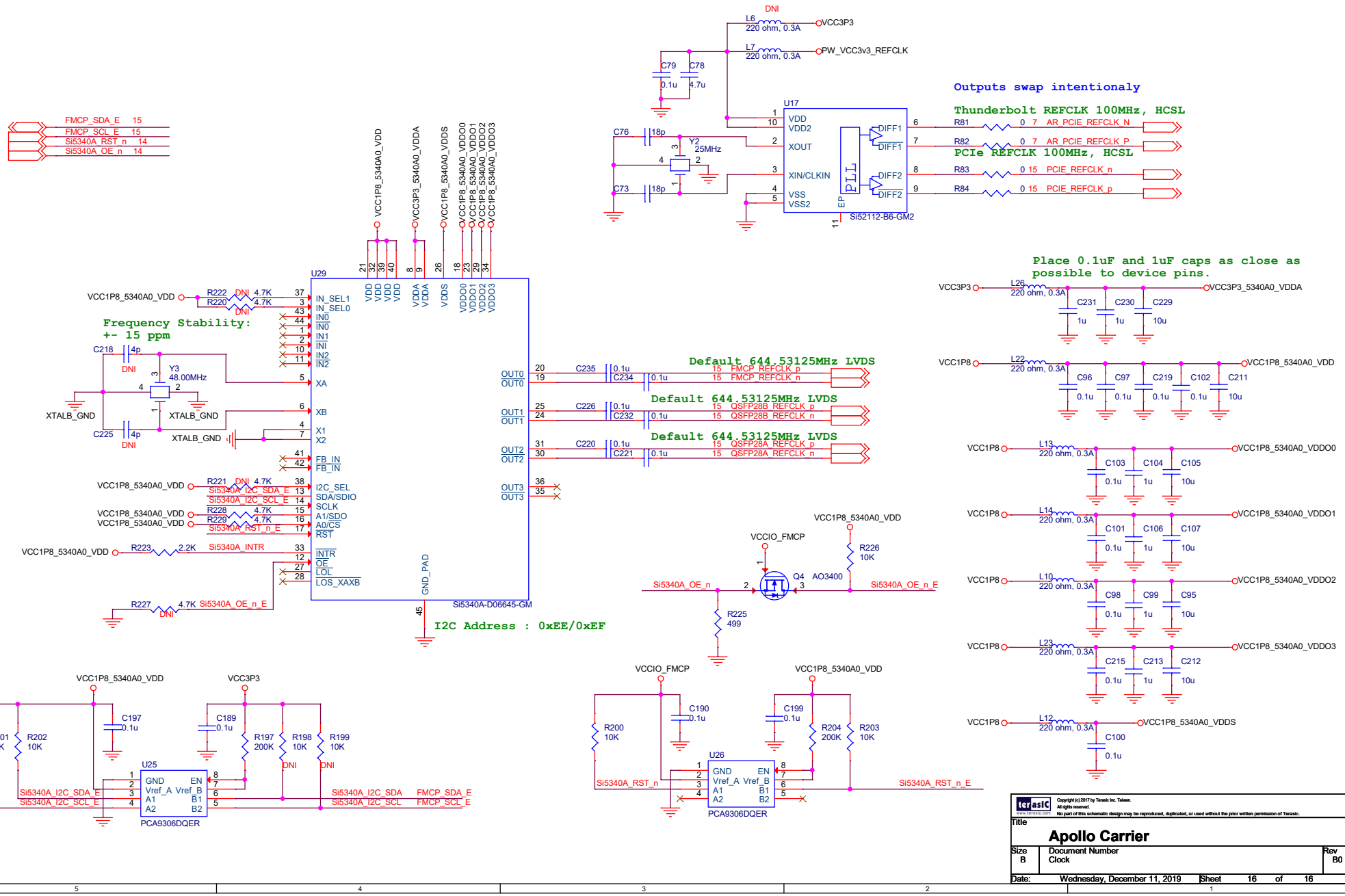

Title	Apollo Carrier		
Size B	Document Number Clock		Rev B0
Date: Wednesday, December 11, 2019	Sheet 16 of 16		