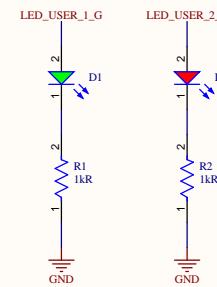
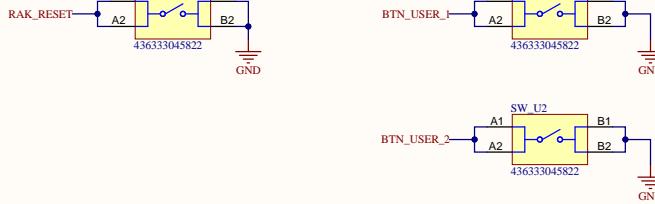
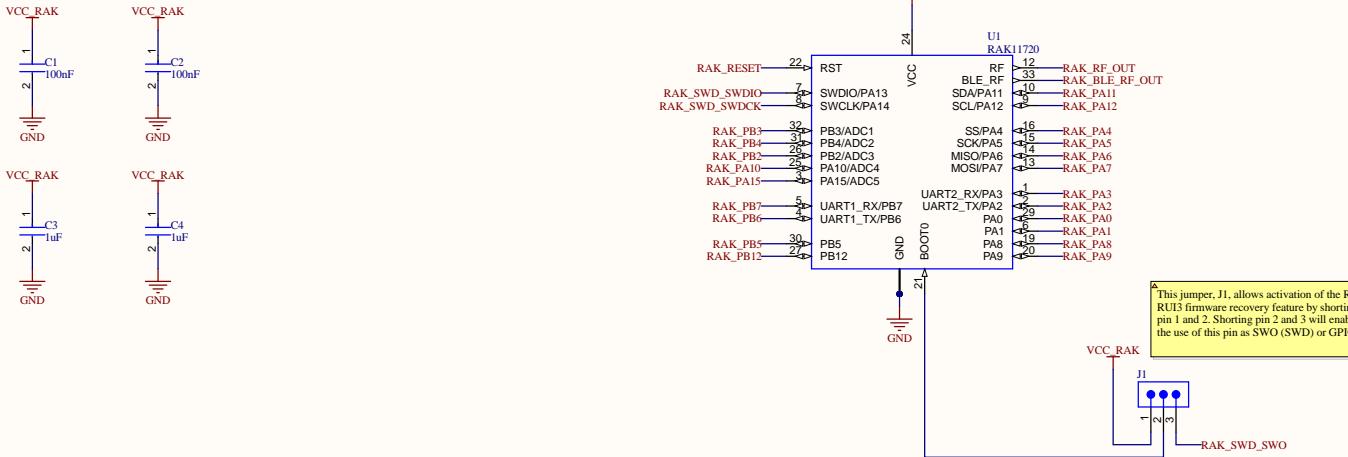


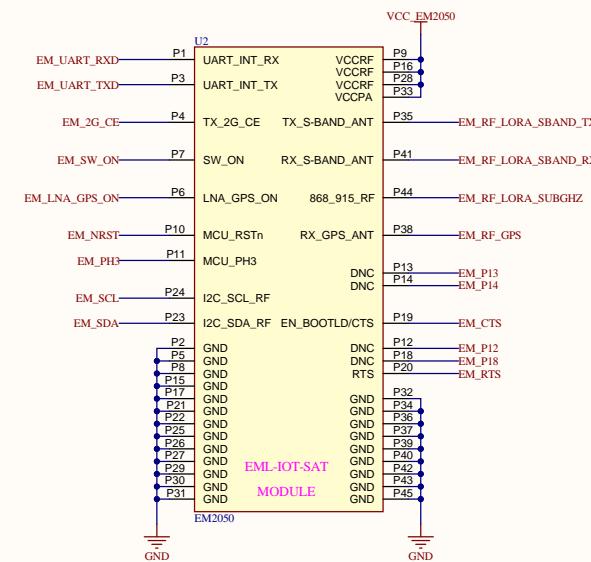
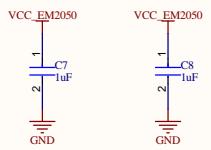
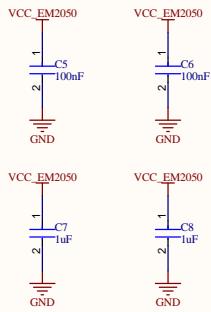
## Pin map

RAK_PB6	RAK_UART1_TXD	RAK_UART1 is used for programming and debugging purposes.
RAK_PB7	RAK_UART1_RXD	
RAK_PA2	RAK_UART2_TXD	
RAK_PA3	RAK_UART2_RXD	RAK_UART2 is connected to EM2050
RAK_PA11	RAK_I2C_SDA	
RAK_PA12	RAK_I2C_SCL	
RAK_PA4	RAK_SPI_SS	
RAK_PA5	RAK_SPI_SCK	
RAK_PA6	RAK_SPI_MISO	
RAK_PA7	RAK_SPI_MOSI	
RAK_PA15	LED_USER_1_G	
RAK_PA1	LED_USER_2_R	
RAK_PA9	BTN_USER_1	
RAK_PB2	BTN_USER_2	
RAK_PB5	EM_NRST	
RAK_PA0	EM_CTS	

This jumper, J1, allows activation of the RAK113 firmware recovery feature by shorting pins 1 and 2. Shorting pin 2 and 3 will enable the use of this pin as SWO (SWD) or GPIO.







1  
THIS DOCUMENT AND THE DATA DISCLOSED HEREIN OR  
HEREWITH IS THE PROPERTY OF ALTIM LIMITED AND MAY  
BE FREELY DISTRIBUTED IN WHOLE. NO RIGHTS ARE  
RESERVED OR EXPRESS OR IMPLIED WARANTEE GIVEN.

2

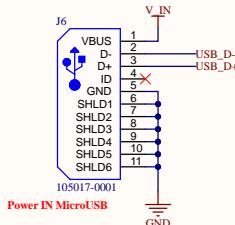
3

4

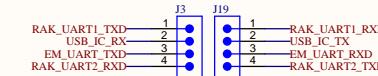
5

6

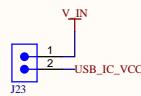
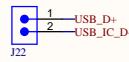
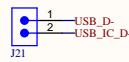
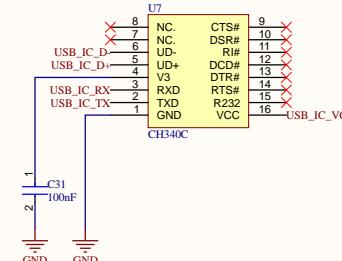
A



[TODO] Placing jumpers on J2 & J3 will enable connections between the RAK11720 and EM2050.  
Removing these jumpers will allow for firmware updates on the EM2050.



B



D

PROJECT NAME	AUTHOR
ApolloEcho_Dev_Kit	mtnguyen
TITLE	
USB_Serial	
Rev. 2.0.0	Date Mar 01, 25
FILE NAME	USB_Serial.SchDoc
SHEET	3 OF 6

1

2

3

4

5

6

1  
THIS DOCUMENT AND THE DATA DISCLOSED HEREIN OR  
HEREWITH IS THE PROPERTY OF ALTRUM LIMITED AND MAY  
BE FREELY DISTRIBUTED IN WHOLE. NO RIGHTS ARE  
RESERVED OR EXPRESS OR IMPLIED WARANTEE GIVEN.

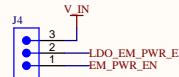
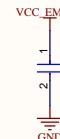
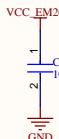
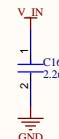
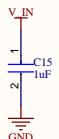
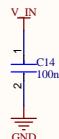
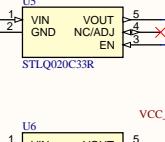
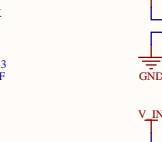
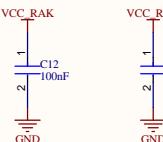
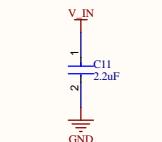
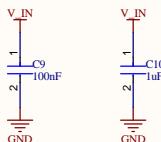
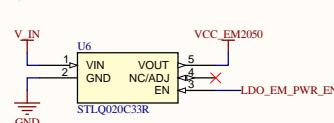
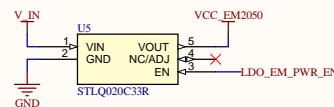
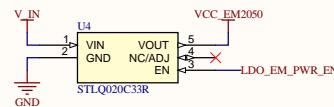
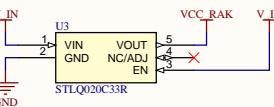
2

3

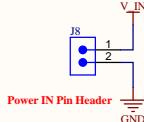
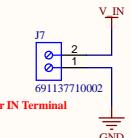
4

5

6

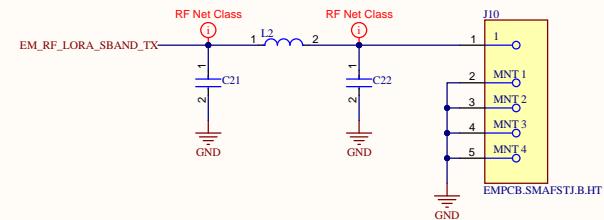
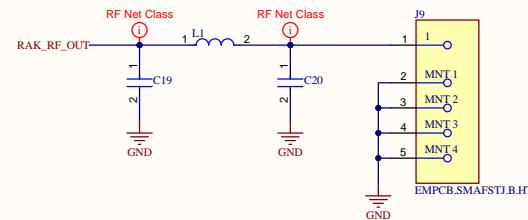


This jumper, J4, is for selecting the  
LDO EM\_PWR\_EN driving source. Shorting  
pin 1 & 2 will allow the RAK11720 to enable  
the power of the EM2050. The EM2050 will  
always be on if pin 2 & 3 are shorted.

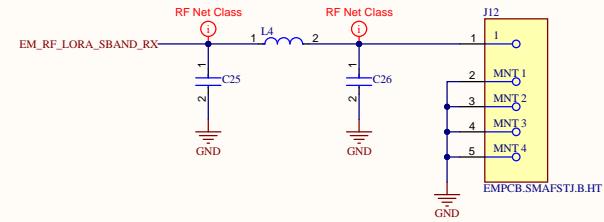
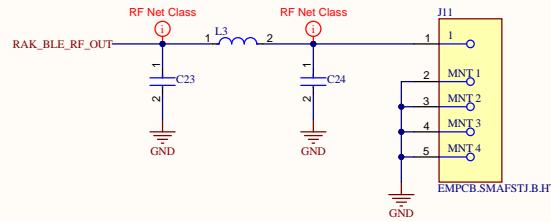


PROJECT NAME	AUTHOR
ApolloEcho_Dev_Kit	mtnguyen
TITLE	
Power	
Rev 2.0.0	Date Mar 01, 25
FILE NAME	Power.SchDoc
SHEET	4 OF 6

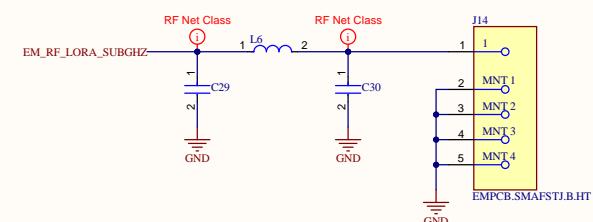
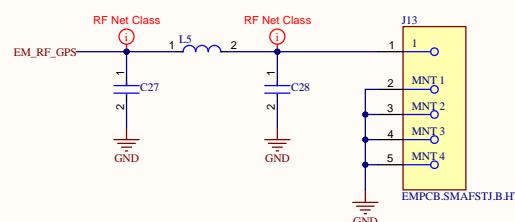
A



B



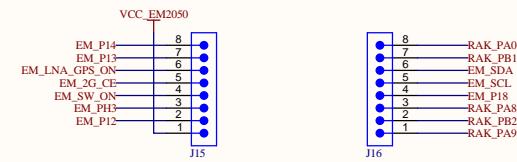
C



D

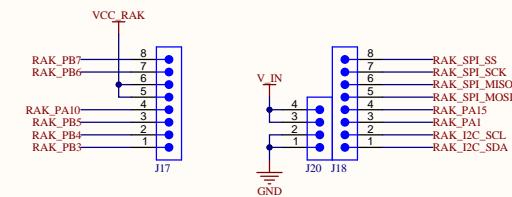
A

A



B

B



C

C

D

D

PROJECT NAME	ApolloEcho_Dev_Kit	AUTHOR	mtnguyen
TITLE	<b>IOs</b>		
Rev	2.0.0	Date	Mar 01, 25
FILE NAME	IOs.SchDoc	SHEET	6 OF 6

Comment	Description	Designator	Footprint	LibRef	Quantity	Value	Manufacture	Manufacturer	Manufacturer Packaging1	Manufacturer P/N	Manufacturer Part Number	Manufacturer URL
0402ZD104KAT2A	General Purpose Ceramic Capacitor, 0402, 100nF, 10%, X5R, 15%, 10V	C1, C2, C5, C6, C9, C12, C14, C17, C31	FP-0402-L_1_0_1-W_0_5_0_1-IPC_C	CMP-2008-02878-3	9							
EMK105BJ105KV-F	None	C3, C4, C7, C8, C10, C13, C15, C18	FP-0402-L_1_0_0_05-W_0_5-IPC_A	CMP-14477-000104-2	8							
C1005X5R1A225K050BC	Multilayer Ceramic Capacitors 2.2μF ±10% 10V X5R SMD 0402	C11, C16	FP-C1005-050-0_05-IPC_A	CMP-08246-002709-1	2							
GJM1555C1H5R0CB01D	Multi-Layer Ceramic Capacitor 5pFCOG ±0.25pF 0402 Paper T/R	C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30	FP-GJM155-0_05-MFG	CMP-2008-03860-2	12							
150060VS75000	WURTH ELEKTRONIK-150060VS75000 - LED, Green, SMD, 0603, 30mA, 2V, 570 nm	D1	WL-SMCW_0603_150060x x7500	CMP-1426-00006-7	1							
150060RS75000	LED Low-Power Uni-Color Red 630nm 2V-2-Pin Chip 0603(1608Metric) T/R	D2	WL-SMCW_0603_150060x x7500	CMP-1426-00001-4	1							
61300311121		J1, J4	61300311121	CMP-1502-01062-3	2							
61300411121		J8, J19, J20	61300411121	CMP-1502-01064-3	3							
61300611121		J5	61300611121	CMP-1502-01070-3	1							
105017-0001	Micro-USB B Receptacle, Right Angle, Bottom Mount, Surface Mount, with Solder Tabs, -30 to 85 degC, 5-Pin USB, RoHS, Tape and Reel	J6	USB-MICRO-B_V	CMP-2000-05827-1	1			Molex				<a href="http://www.molex.com/">http://www.molex.com/</a>
691137710002		J7	691137710002	CMP-1502-03324-2	1							
61300211121		J8, J21, J22, J23	61300211121	CMP-1712-00002-6	4							
EMPCB.SMAFSTJB.HT	CONN SMA JACK STR 500HM EDGE MINT	J8, J10, J11, J12, J13, J14	FP-EMPCB_SMAFSTJB_H_T-MFG	CMP-111093-000001-1	6			Taoglas Limited				EMPCB.SMAFSTJB.HT
61300811121		J15, J16, J17, J18	61300811121	CMP-1502-01076-3	4							
LQW15AN2N9D00D	Wire Wound RF Inductor 2.9nH ±0.5nH 750mA 0.07Ω Q0402 (1005)	L1, L2, L3, L4, L5, L6	FP-LQW15AN_00-W0_6-0_1-MFG	CMP-06042-011289-1	6							
RMCF0402FT1K00	1kΩ±1% 0.063W 0402 Thick Film Chip Resistor AEC-Q200 compliant	R1, R2	FP-RMCF0402-IPC_A	CMP-26527-000026-1	2							
436333045822		SW_RST, SW_U1, SW_U2	436333045822	CMP-1464-00001-2	3							
RAK11720	RAK11720 Ambiq Apollo3 Blue SX1262 LoRa Bluetooth Module for LoRaWAN	U1	RAK11720	RAK11720	1							
IOTSATmodule	Echostar Mobile IOT SATModule - Basic version	U2	EM2050	EM2050	1	EM2050		Echostar Mobile Ltd		EM2050		
STLQ020C33R	No Description Available	U3, U4, U5, U6	SOT323-5L_STM	STLQ020C33R	4							
CH340C	USB to Serial CH340 IC	U7	CH340C	CH340C	1							

# Board Stack Report

Stack Up		Layer Stack			
Layer	Board Layer Stack	Name	Material	Thickness	Constant
1	Top Paste				
2	Top Overlay				
3	Top Mask	Solder Resist	0.015mm	3.8	
4	Top Copper	Copper	0.035mm		
5	Dielectric 1	7628	0.200mm	4.6	
6	Plane Layer 1 (Ground)	Copper	0.018mm		
7	Core	FR-4	1.065mm	4.5	
8	Plane Layer 2 (PWR)	Copper	0.018mm		
9	Dielectric 2	7628	0.200mm	4.6	
10	Bottom Copper	Copper	0.035mm		
11	Bottom Mask	Solder Resist	0.015mm	3.8	
12	Bottom Overlay				
13	Bottom Paste				
Height : 1.600mm					

