ARM® Cortex®-M4
32-bit Microcontroller

EVB-I94124ADI
User Manual
I94100 Series

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EVB-I94124ADI USER MANUAL

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1   OVERVIEW

EVB-I94124ADI is the specific development tool for I94100 series. User can use EVB-I94124ADI to develop and verify the application program easily.

EVB-I94124ADI includes two portions. One is I94124ADI evaluation board and the other is Debug Adaptor (Nu-Link-Me). Thus, users do not need other additional ICE or debug equipment.

1.1   Introduction to EVB-I91240ADI Board

EVB-I94124ADI uses the I94124ADI as the target microcontroller. The EVB-I94124ADI board consists of I94124ADI Platform and Nu-Link-Me ICE Bridge. Figure 1-1 shows the EVB-I94124ADI board.

The left portion of this board is the I94124ADI Platform that includes the target chip I94124ADI MCU which embedded ARM$^®$ Cortex$^®$-M4 core with DSP extensions and a Floating Point Unit (FPU) and the other related on-board application parts and connectors.

The right portion of this board is a Nu-Link-Me ICE Bridge based on the SWD (Serial Wire Debug) interface connected with the target chip, allowing user to program the application code to the flash of target chip through the USB port from PC Host.
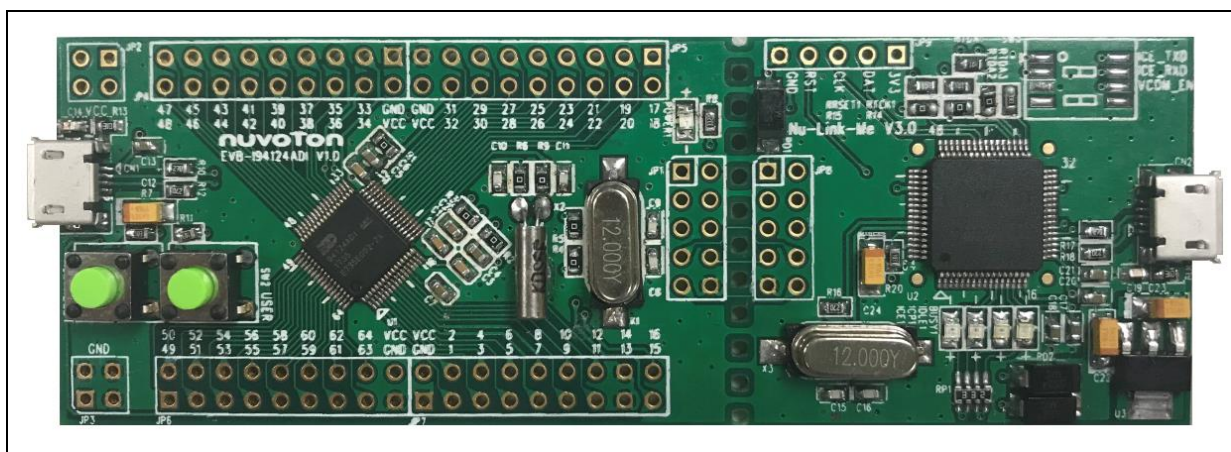
Figure 1-1 EVB-I94124ADI Board

1.2   I94100 Series MCU Features

- I94124ADI in LQFP64 7x7 package
- ARM$^®$ Cortex$^®$-M4 core running up to 200 MHz with DSP extensions and FPU (Floating Point Unit)
- Built-in LDO for wide operating voltage ranged from 1.6 V to 3.6 V
- 512 Kbytes Flash
- 192 Kbytes SRAM
- GPIO
- Peripheral DMA (PDMA)
- Timer
- PWM
- WDT and WWDT

- RTC

- UART

- I^{2}C

- SPI

- I^{2}S

- USB 1.1 Full-Speed Device

- CRC

- ADC

- DMIC

- DPWM

- VAD

1.3 EVB-I94124ADI Board Features

- On board Nu-Link-Me ICE Bridge (Mass storage as USB Disk drive) for drag and drop programming

- I94124 extended interface connectors

- USB 1.1 Full-Speed Device

- Two push-buttons: one is for reset and the other one is for user-defined

- One LEDs: one is for power indication

2 EVB-I94124ADI BOARD OVERVIEW

2.1 Front View

Figure 2-1 shows the main components and connectors from the front side of EVB-I94124ADI board.

The following lists components and connectors from the front view:

- Target Chip: I94124ADI (U1)

- Nu-Link-Me ICE Bridge: ICE Controller NUC12SRE3DE (U2), USB connector (CN2) to PC Host

- I94124ADI extended interface connectors (JP4, JP5, JP6 and JP7)

- USB: USB 1.1 Full-Speed Device connector (CN1)

- Push-buttons (SW1, SW2)

- LED (POWER1)

- External power connectors (JP2 and SP3)
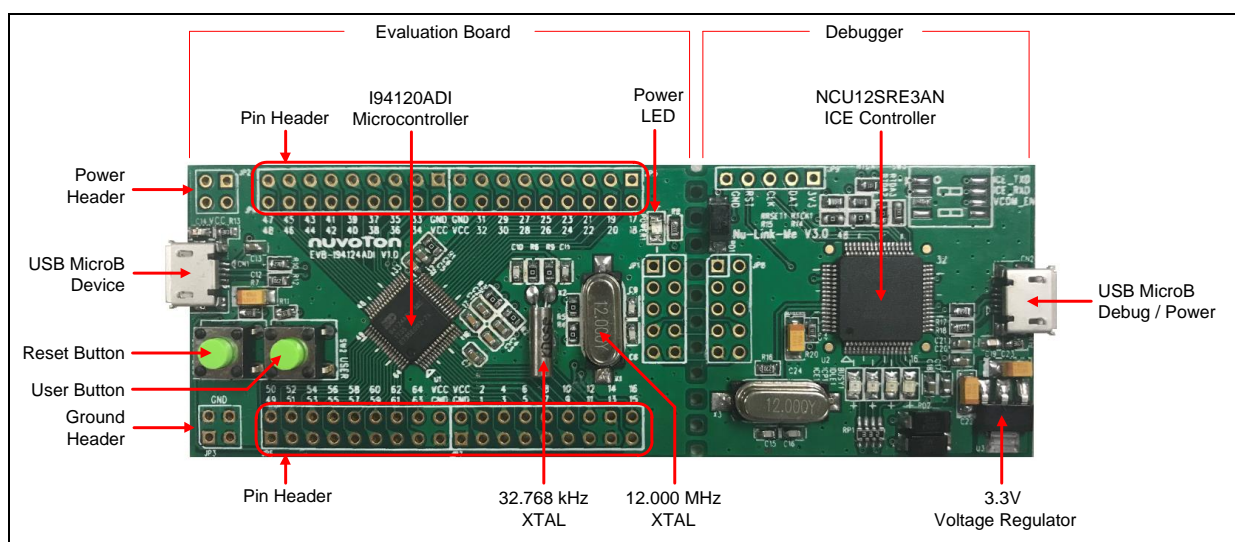
Figure 2-1 Front View of EVB-I94124ADI Board

2.2 Rear View

Figure 2-2 shows the rear side of EVB-I94124ADI board.

Figure 2-2 Rear View of EVB-I94124ADI Board
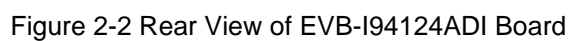
2.3 Power Supply

The EVB-I94124ADI supplied by an external 5 Volt DC power supply connected to Micro USB connectors (CN1 and CN2) or 1.6 Volt to 3.6 Volt DC power supply connected to Pin Header (JP2). On-board reverse current protection diodes will ensure safe operation in case power is provided through both USB connectors at the same time. If the board is powered via a USB connector, it is not recommended to apply an additional power supply to VCC pin header (JP2), because there is no protection against reverse current into the external power supply. Figure 2-3 shows EVB-I94124ADI power supply concept.

Figure 2-3 Power Supply Concept

2.4 Pin Assignment for Extended Connectors

The EVB-I94124ADI provides the I94124ADI target chip on-board and extended connectors (JP4, JP5, JP6 and JP7) for LQFP64-pin. The Figure 2-4 shows the I94124ADI extended connectors. Please note that JP7.2, JP5.18, JP4.2 and JP6.18 can be used to power an external circuit.

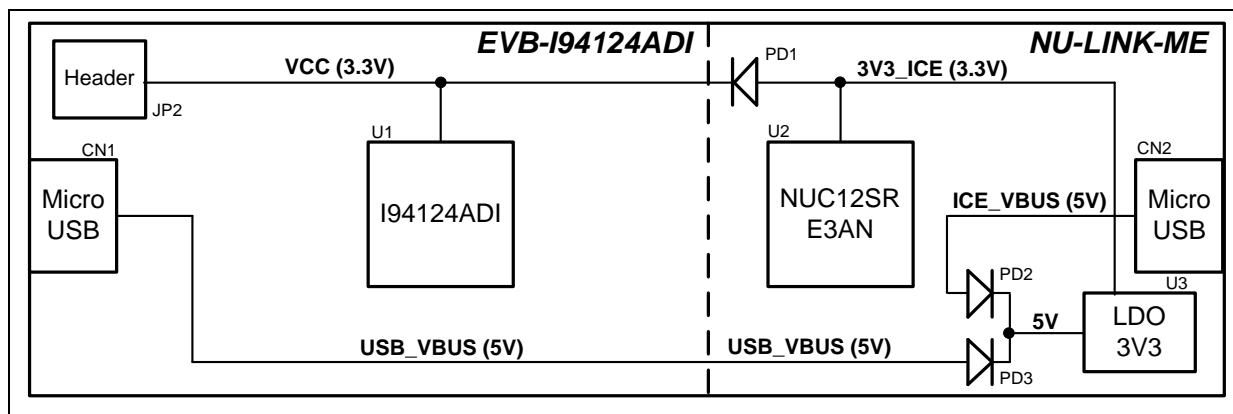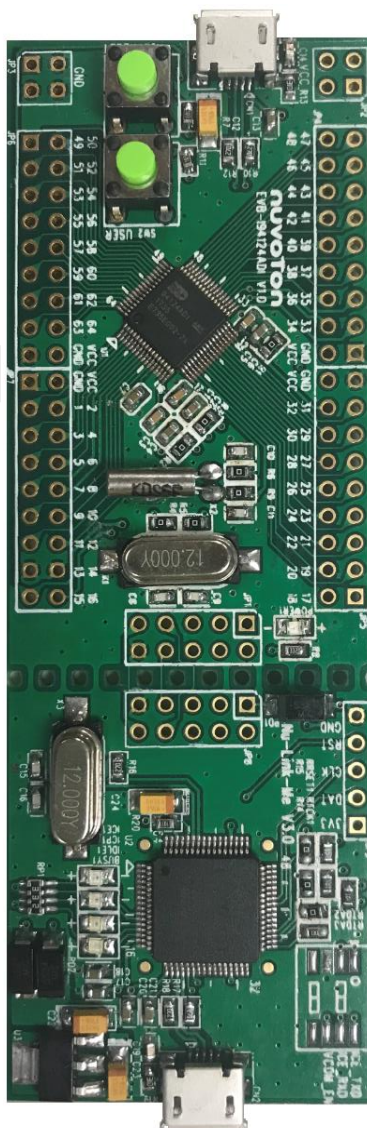| Pin Name	Pin No.	Pin Name	Pin No.
PA.0	49	PA.1	50
PA.2	51	PA.3	52
PA.4	53	PA.5	54
PA.6	55	PA.7	56
PA.8	57	PA.9	58
PA.10	59	PA.11	60
PA.12	61	PA.13	62
PA.14	63	PA.15	64
GND	-	VCC	-
GND	-	VCC	-
PB.0	1	PB.1	2
PB.2	3	PA.3	4
PB.4	5	nRESET	6
PB.5	7	PB.6	8
PB.7	9	PB.8	10
PB.9	11	LDO_CAP	12
VSS	13	AVSS	14
VDD	15	AVDD	16

For power to external circuit

Pin No.	Pin Name	Pin No.	Pin Name
48	PD.15	47	PD.14
46	PD.13	45	PD.9
44	PD.8	43	PD.7
42	PD.6	41	PD.5
40	PD.4	39	PD.3
38	PD.2	37	PD.1
36	PD.0	35	PB.13
34	PB.14	33	PB.15
-	VCC	-	GND
-	VCC	-	GND
32	USB_VDD33	31	PC.14
30	PC.13	29	PC.12
28	PC.11	27	PC.10
26	PC.9	25	PC.8
24	PC.7	23	PC.6
22	PC.5	21	PC.4
20	PC.3	19	PC.2
18	PC.1	17	PC.0

For power to external circuit

Figure 2-4 I94124ADI Extended Connectors

Table 2-1 Extended Connector JP7 Interface with I94124ADI GPIO

Header		I94124ADI		Header		I94124ADI	
		Pin No.	Pin Name			Pin No	Pin Name
JP7	JP7.1	-	GND	JP7	JP7.2	-	VCC
	JP7.3	1	PB.0		JP7.4	2	PB.1
	JP7.5	3	PB.2		JP7.6	4	PB.3
	JP7.7	5	PB.4		JP7.8	6	nRESET
	JP7.9	7	PB.5		JP7.10	8	PB.6
	JP7.11	9	PB.7		JP7.12	10	PB.8
	JP7.13	11	PB.9		JP7.14	12	LDO_CAP
	JP7.15	13	VSS		JP7.16	14	AVSS
	JP7.17	15	VDD		JP7.18	16	AVDD

Table 2-2 Extended Connector JP5 Interface with I94124ADI GPIO

Header		I94124ADI		Header		I94124ADI	
		Pin No.	Pin Name			Pin No	Pin Name
JP5	JP5.1	17	PC.0	JP5	JP5.2	18	PC.1
	JP5.3	19	PC.2		JP5.4	20	PC.3
	JP5.5	21	PC.4		JP5.6	22	PC.5
	JP5.7	23	PC.6		JP5.8	24	PC.7
	JP5.9	25	PC.8		JP5.10	26	PC.9
	JP5.11	27	PC.10		JP5.12	28	PC.11
	JP5.13	29	PC.12		JP5.14	30	PC.13
	JP5.15	31	PC.14		JP5.16	32	USB_VDD33
	JP5.17	-	GND		JP5.18	-	VCC

Table 2-3 Extended Connector JP4 Interface with I94124ADI GPIO

Header		I94124ADI		Header		I94124ADI	
		Pin No.	Pin Name			Pin No	Pin Name
JP4	JP4.1	-	GND	JP4	JP4.2	-	VCC
	JP4.3	33	PB.15		JP4.4	34	PB.14
	JP4.5	35	PB.13		JP4.6	36	PD.0
	JP4.7	37	PD.1		JP4.8	38	PD.2
	JP4.9	39	PD.3		JP4.10	40	PD.4
	JP4.11	41	PD.5		JP4.12	42	PD.6
	JP4.13	43	PD.7		JP4.14	44	PD.8
	JP4.15	45	PD.9		JP4.16	46	PD.13
	JP4.17	47	PD.14		JP4.18	48	PD.15

Table 2-4 Extended Connector JP6 Interface with I94124ADI GPIO

Header		I94124ADI		Header		I94124ADI	
		Pin No.	Pin Name			Pin No	Pin Name
JP6	JP6.1	49	PA.0	JP6	JP6.2	50	PA.1
	JP6.3	51	PA.2		JP6.4	52	PA.3
	JP6.5	53	PA.4		JP6.6	54	PA.5
	JP6.7	55	PA.6		JP6.8	56	PA.7
	JP6.9	57	PA.8		JP6.10	58	PA.9
	JP6.11	59	PA.10		JP6.12	60	PA.11
	JP6.13	61	PA.12		JP6.14	62	PA.13
	JP6.15	63	PA.14		JP6.16	64	PA.15
	JP6.17	-	GND		JP6.18	-	VCC

2.5 System Configuration

2.5.1 5V Power Source

- **CN2:** USB connector in Nu-Link-Me to program code and supplies 5V power from PC Host.
- **CN1:** USB 1.1 device connector on EVB-I94124ADI board to supply 5V power from PC Host.

Power Source	Component	Comment
ICE_VBUS	CN2	CN2 supplies the 5V power from PC Host.
USB_VBUS	CN1	CN1 supplies the 5V power from PC Host.

2.5.2 3.3V Power Source

- **JP2:** External power source supplies 1.6V ~ 3.6V to EVB-I94124ADI board.
- **U3:** The voltage regular converts the 5V source to 3.3V and supplies it to EVB-I94124ADI board.

Power Source	Component	Comment
VCC	JP2	JP2 supplies the 1.6V ~ 3.6V power from external power source.
3V3_ICE	U3	U4 convert USB_VBUS or ICE_VBUS to 3.3V and supplies it to I94124ADI platform board.

2.5.3 USB Connectors

- **CN2:** USB connector (ICE) in Nu-Link-Me that connects to a PC's USB Host port to program code and supply power.
- **CN1:** USB 1.1 connector on EVB-I94124ADI board for USB device application use.

2.5.4 Extended Connectors

- **JP4, JP5, JP6 and JP7:** Extended connectors interface pins on the EVB-I94124ADI board.

2.5.5 Push-Buttons

- **SW1:** Reset button to reset the target chip on EVB-I94124ADI board.
- **SW2:** Only for application use. User defined.

2.5.6 LED

- **POWER1:** The power LED indicates that the EVB-I94124ADI board is powered.

2.5.7   Power Connectors

- **JP2:** VCC (Range: 1.6V to 3.6V) connectors on the EVB-I94124ADI board.
- **JP3:** GND connectors on the EVB-I94124ADI board.

2.5.8   Clock Source

- **X1:** 12 MHz crystal. (By removing resistor R4 and R5, the crystal can be disconnected from PB.5 and PB.6)
- **X2:** 32.768 kHz crystal. (By removing resistor R6 and R9, the crystal can be disconnected from PC.0 and PC.1)

2.5.9   ICE Bridge Connector

- **JP1:** ICE bridge connector on EVB-I94124ADI board side.
- **JP8:** ICE bridge connector on NU-LINK-ME board side.

2.5.10   Others

- **JP9:** Reserved.
- **SW3:** Reserved.

2.6 Components Placement

Figure 2-5 and Figure 2-6 show the front and rear placement of EVB-I94124ADI board.
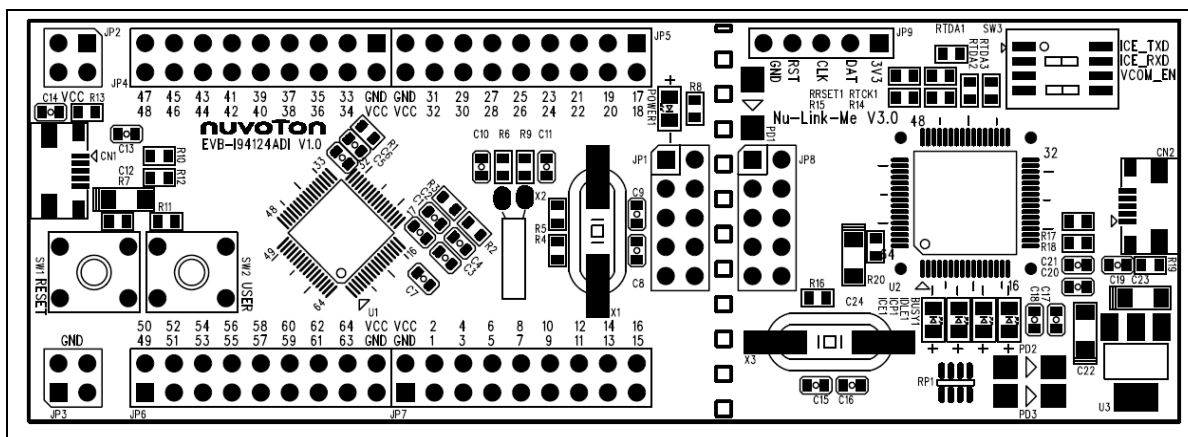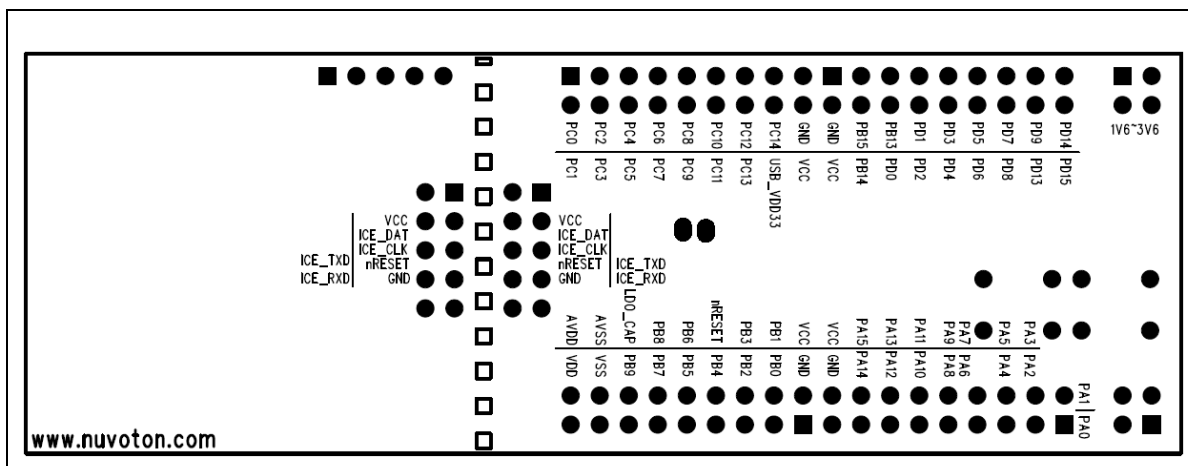

Figure 2-5 Front Placement

Figure 2-6 Rear Placement

3 EVB-I94124ADI SCHEMATICS

This chapter contains the schematics for I94124ADI and Nu-Link-Me (On-board Debugger).

3.1 I94124ADI

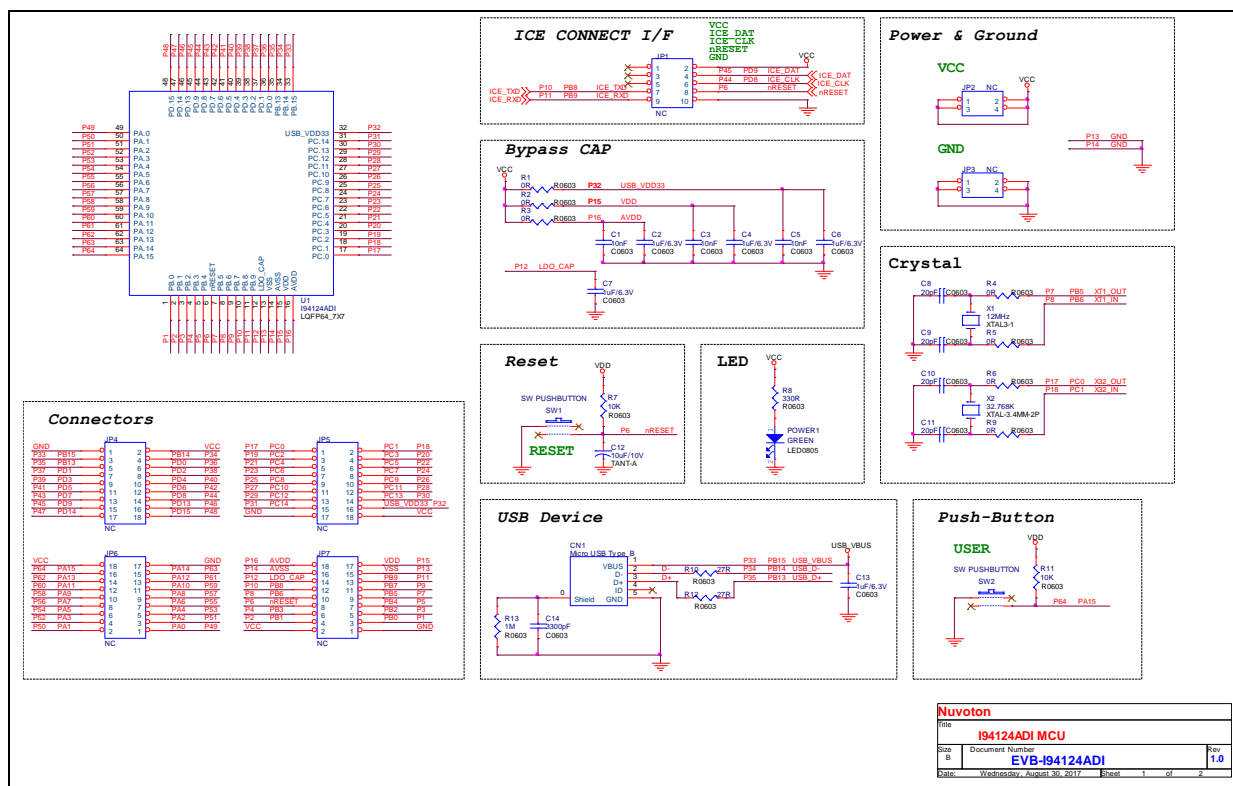Figure 3-1 shows the I94124ADI, Pin Headers, Buttons and LED.

Figure 3-1 I94124ADI Circuit

3.2 Nu-Link-Me

Figure 3-2 shows the Nu-Link-Me circuit, which is a USB-to-SWD bridge used to program code to the target chip.
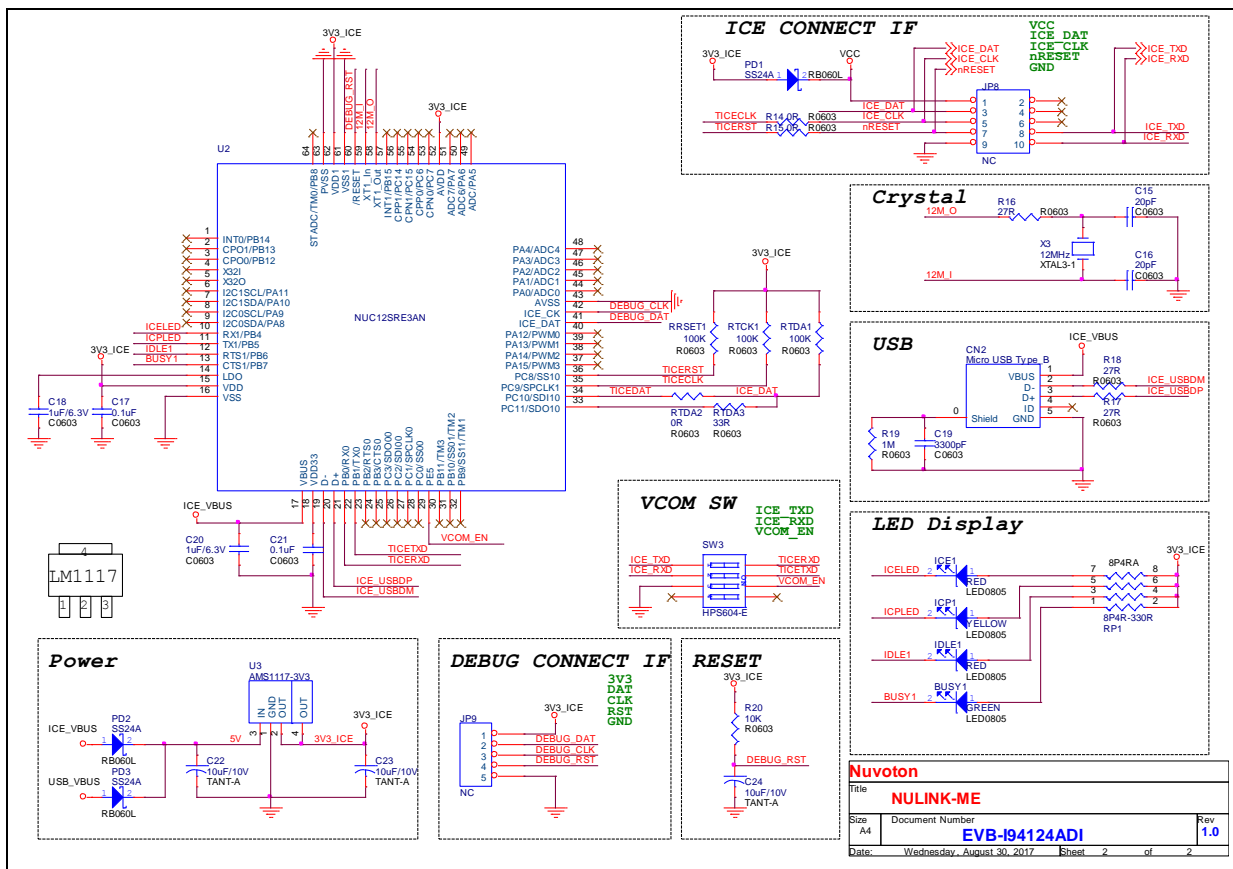

Figure 3-2 Nu-Link-Me Circuit

4   REVISION HISTORY

Date	Revision	Description
2017.08.30	1.0	1. Initially issued.

Important Notice

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All Insecure Usage shall be made at customer's risk, and in the event that third parties lay claims to Nuvoton as a result of customer's Insecure Usage, customer shall indemnify the damages and liabilities thus incurred by Nuvoton.

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