Table of Contents

1	TITLE, TOC & REV
2	BLOCK DIAGRAM
3	Main microcontroller
4	Wireless microcontroller
5	Security & Identification
6	Sensors
7	Powers
8	Miscellaneous
9	Interfaces

Revisions

Rev	Description	Date
X1	First Draft	28-Jul-17
A	Release	7-Sept-17
AX1	Schematic update and layout update	21-Nov-17
AX2	Schematic update and layout update	23-Nov-17
AX3	Schematic update and layout update	24-Nov-17
B	Release	28-Nov-17
B1	Release (schematic update only - populate J11)	15-Jan-18
C	Release (schematic update and layout update - swap pin 18 and 19 of J8)	19-Jan-18
CX1	Schematic update and layout update	24-Jan-18
D	Release	1-Feb-18
D1	Release (schematic update only - change R55 value to 1M ohm)	8-Feb-18

SLN-RPK-NODE

(Main Board)

Notes:

- All components and board processes are to be ROHS compliant
- All voltages are DC
- Unless otherwise specified:
  - All resistors are denoted Rx in ohms
  - All capacitors aare denoted Cx in uF
  - All switches are denoted SWx
- Net function indications:
  - Some nets have functions indicated in addition to the net names. The net names are shown in red and the MCU functions associated with the net are shown in blue. If a net has no blue function shown the net name indicates the associated function.

User notes are given throughtout the schematics.

Specific PCB LAYOUT notes are detailed in ITALICS

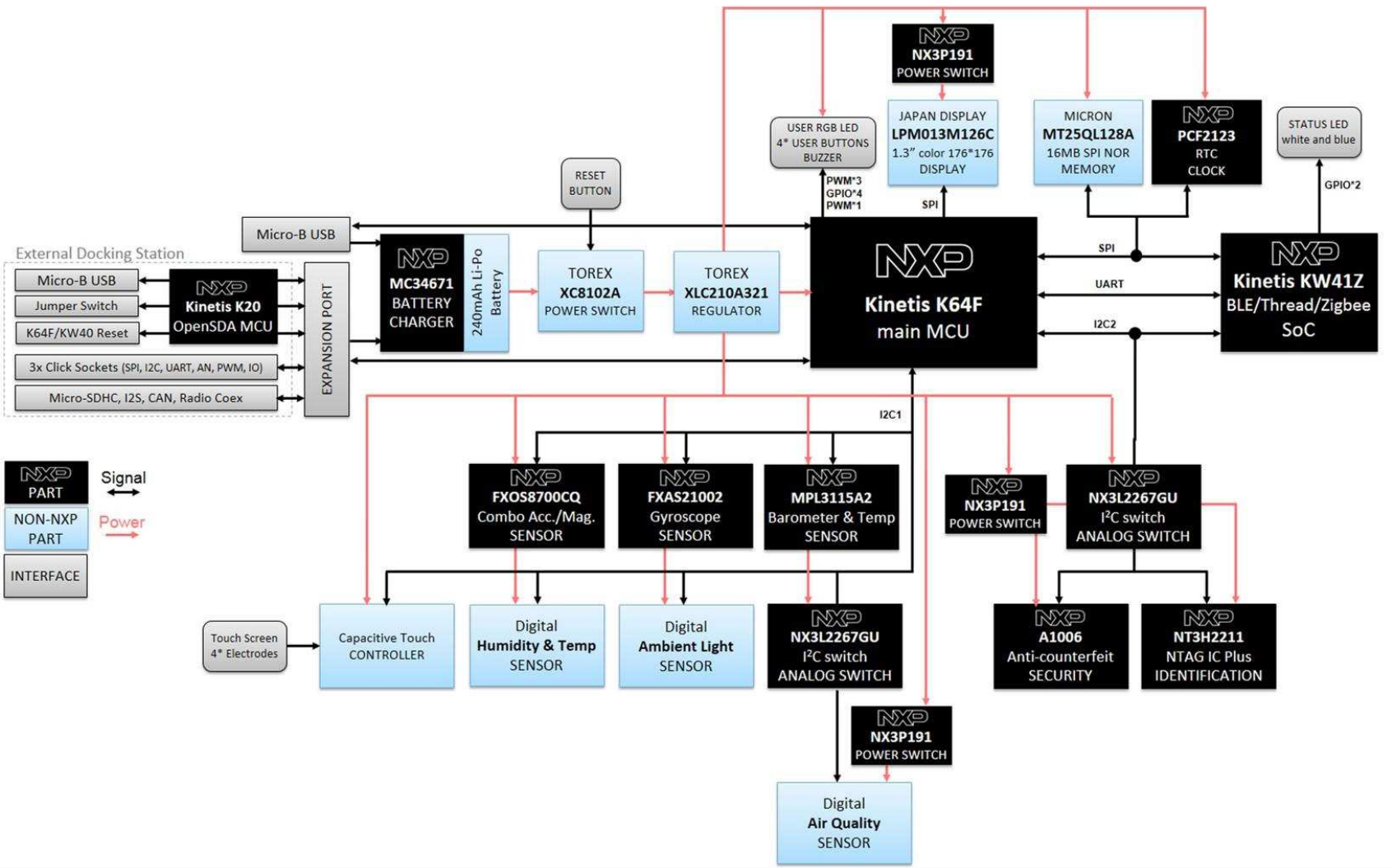
6501 William Cannon Drive West
Austin, TX 78735-8598

This document contains information proprietary to NXP and shall not be used for engineering design, procurement or manufacture in whole or in part without the express written permission of NXP Semiconductors.

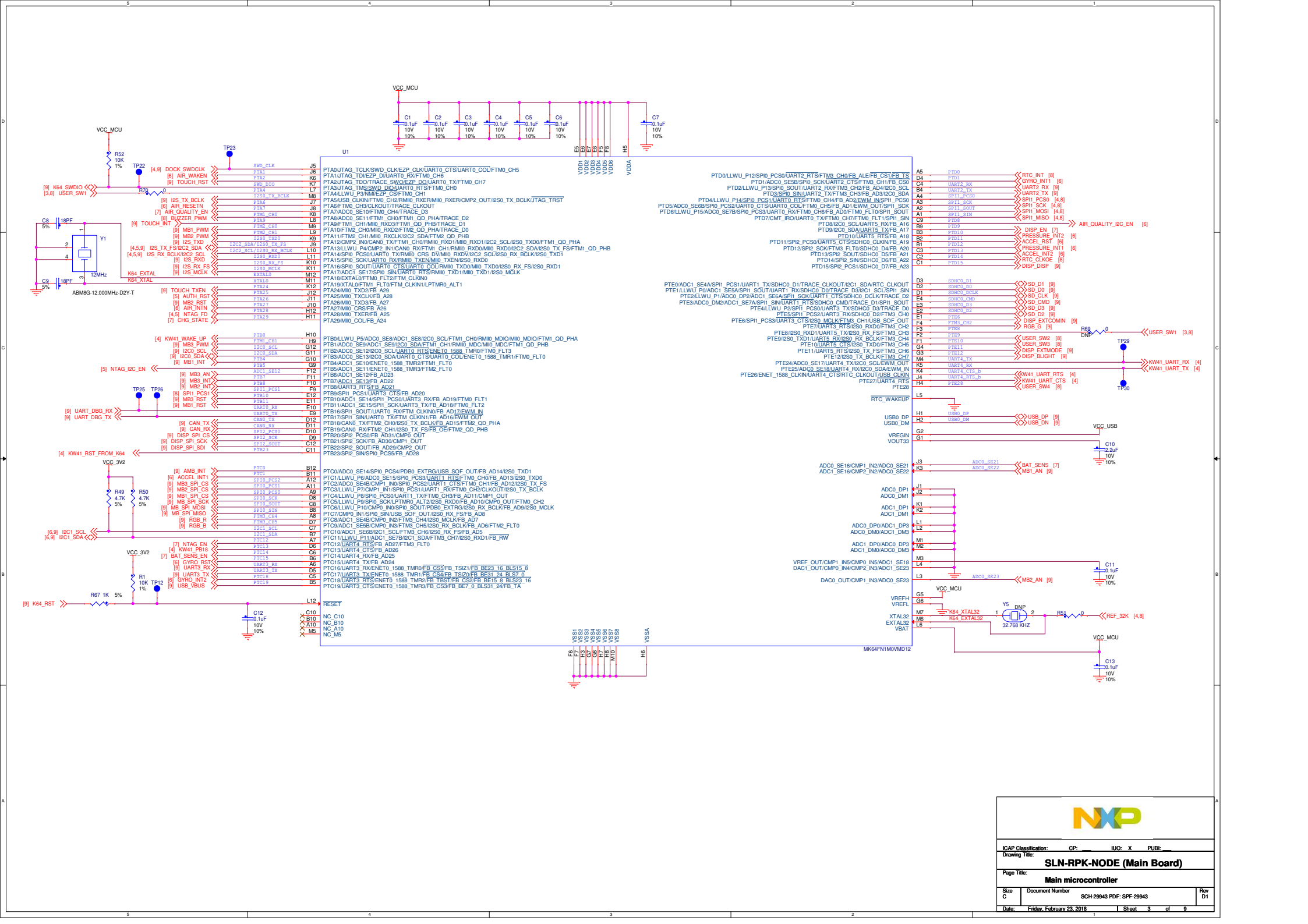
ICAP Classification: CP: IUO: X PUBI:

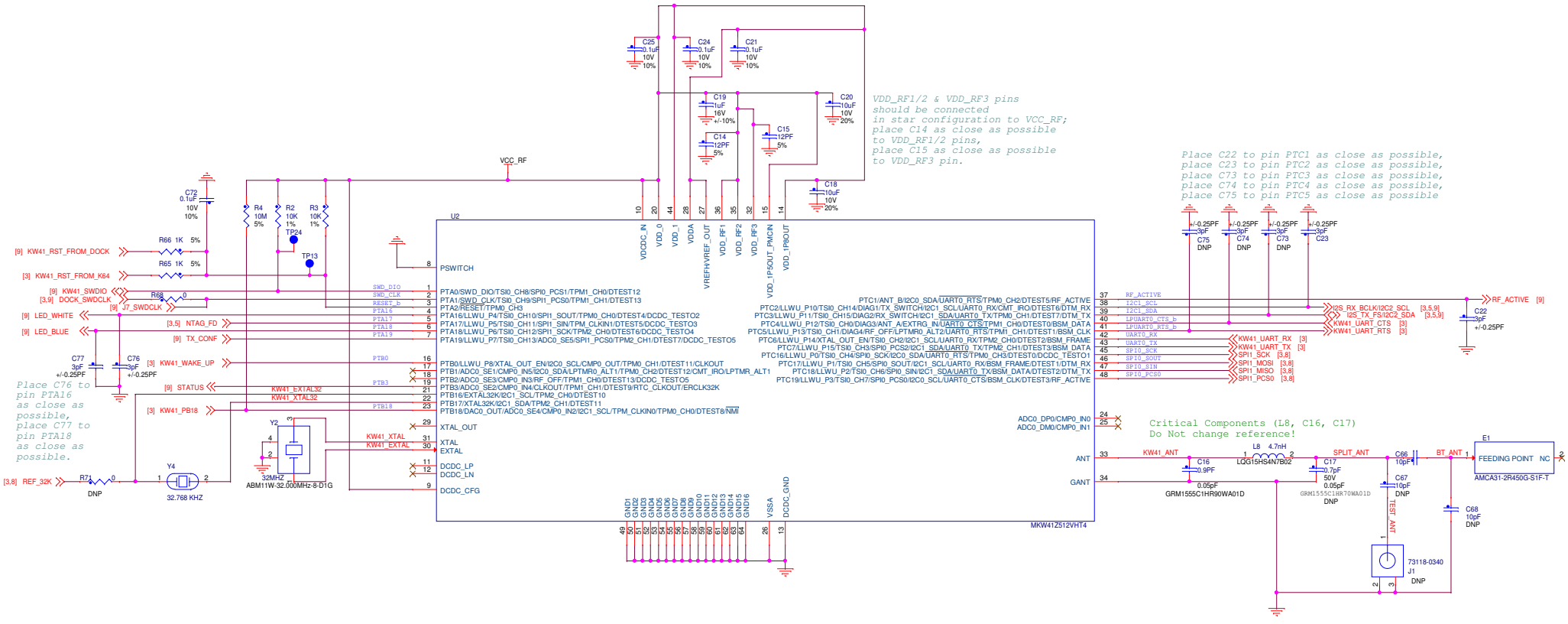
Designer: Jerome Brillant, Vincent Fillatre	Drawing Title: SLN-RPK-NODE (Main Board)	
Drawn by: Jun Qiao	Page Title: TITLE, TOC & REV	
Approved: Gregory Camuzat	Size C	Document Number SCH-29943 PDF: SPF-29943 Rev D1
	Date: Friday, February 23, 2018	Sheet 1 of 9

Block Diagram



ICAP Classification:	CP: ___	IUO: X	PUBI: ___
Drawing Title:	SLN-RPK-NODE (Main Board)		
Page Title:	BLOCK DIAGRAM		
Size: C	Document Number: SCH-29943 PDF: SPF-29943		Rev: D1
Date: Friday, February 23, 2018	Sheet 2 of 9		

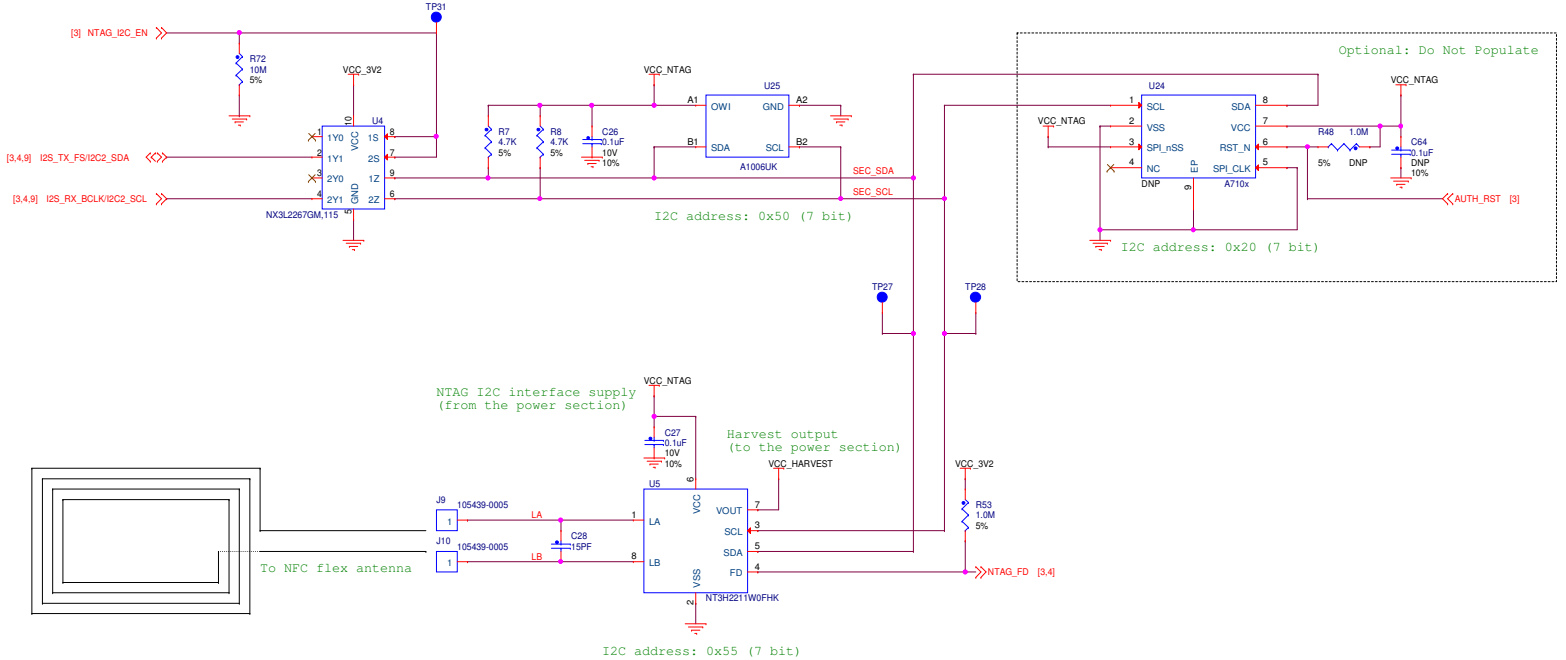

VCC_MCU
C1 0.1uF 10V 10%
C2 0.1uF 10V 10%
C3 0.1uF 10V 10%
C4 0.1uF 10V 10%
C5 0.1uF 10V 10%
C6 0.1uF 10V 10%
C7 0.1uF 10V 10%
U1
MK64FN1M0VMD12
R52 10K 1%
TP22
TP23
R78 0
Y1 12MHz
ABM8G-12.000MHz-D2Y-T
C8 18PF 5%
C9 18PF 5%
R49 4.7K 5%
R50 4.7K 5%
R1 10K 1%
TP12
R67 1K 5%
C12 0.1uF 10V 10%
TP25
TP26
VCC_3V2
PTA0/JTAG_TCLK/SWD_CLK/EZP_CLK/UART0_CTS/UART0_COL/FTM0_CH5
PTA1/JTAG_TDI/EZP_DI/UART0_RX/FTM0_CH6
PTA2/JTAG_TDO/TRACE_SWO/EZP_DO/UART0_TX/FTM0_CH7
PTA3/JTAG_TMS/SWD_DIO/UART0_RTS/FTM0_CH0
PTA4/LLWU_P3/NMI/EZP_CS/FTM0_CH1
PTA5/USB_CLKIN/FTM0_CH2/RMII0_RXER/MII0_RXER/CMP2_OUT/I2S0_TX_BCLK/JTAG_TRST
PTA6/FTM0_CH3/CLKOUT/TRACE_CLKOUT
PTA7/ADC0_SE10/FTM0_CH4/TRACE_D3
PTA8/ADC0_SE11/FTM1_CH0/FTM1_QD_PHA/TRACE_D2
PTA9/FTM1_CH1/MII0_RXD3/FTM1_QD_PHB/TRACE_D1
PTA10/FTM2_CH0/MII0_RXD2/FTM2_QD_PHA/TRACE_D0
PTA11/FTM2_CH1/MII0_RXCLK/I2C2_SDA/FTM2_QD_PHB
PTA12/CMP2_IN0/CAN0_TX/FTM1_CH0/RMII0_RXD1/MII0_RXD1/I2C2_SCL/I2S0_TXD0/FTM1_QD_PHA
PTA13/LLWU_P4/CMP2_IN1/CAN0_RX/FTM1_CH1/RMII0_RXD0/MII0_RXD0/I2C2_SDA/I2S0_TX_FS/FTM1_QD_PHB
PTA14/SPI0_PCS0/UART0_TX/RMII0_CRS_DV/MII0_RXDV/I2C2_SCL/I2S0_RX_BCLK/I2S0_TXD1
PTA15/SPI0_SCK/UART0_RX/RMII0_TXEN/MII0_TXEN/I2S0_RXD0
PTA16/SPI0_SOUT/UART0_CTS/UART0_COL/RMII0_TXD0/MII0_TXD0/I2S0_RX_FS/I2S0_RXD1
PTA17/ADC1_SE17/SPI0_SIN/UART0_RTS/RMII0_TXD1/MII0_TXD1/I2S0_MCLK
PTA18/EXTAL0/FTM0_FLT2/FTM_CLKIN0
PTA19/XTAL0/FTM1_FLT0/FTM_CLKIN1/LPTMR0_ALT1
PTA24/MII0_TXD2/FB_A29
PTA25/MII0_TXCLK/FB_A28
PTA26/MII0_TXD3/FB_A27
PTA27/MII0_CRS/FB_A26
PTA28/MII0_TXER/FB_A25
PTA29/MII0_COL/FB_A24
PTB0/LLWU_P5/ADC0_SE8/ADC1_SE8/I2C0_SCL/FTM1_CH0/RMII0_MDIO/MII0_MDIO/FTM1_QD_PHA
PTB1/ADC0_SE9/ADC1_SE9/I2C0_SDA/FTM1_CH1/RMII0_MDC/MII0_MDC/FTM1_QD_PHB
PTB2/ADC0_SE12/I2C0_SCL/UART0_RTS/ENET0_1588_TMR0/FTM0_FLT3
PTB3/I2C0_SDA/UART0_CTS/UART0_COL/ENET0_1588_TMR1/FTM0_FLT0
PTB4/ADC1_SE10/ENET0_1588_TMR2/FTM1_FLT0
PTB5/ADC1_SE11/ENET0_1588_TMR3/FTM2_FLT0
PTB6/ADC1_SE12/FB_AD23
PTB7/ADC1_SE13/FB_AD22
PTB8/UART3_RTS/FB_AD21
PTB9/SPI1_PCS1/UART3_CTS/FB_AD20
PTB10/ADC1_SE14/SPI1_PCS0/UART3_RX/FB_AD19/FTM0_FLT1
PTB11/ADC1_SE15/SPI1_SCK/UART3_TX/FB_AD18/FTM0_FLT2
PTB16/SPI1_SOUT/UART0_RX/FTM_CLKIN0/FB_AD17/EWM_IN
PTB17/SPI1_SIN/UART0_TX/FTM_CLKIN1/FB_AD16/EWM_OUT
PTB18/CAN0_TX/FTM2_CH0/I2S0_TX_BCLK/FB_AD15/FTM2_QD_PHA
PTB19/CAN0_RX/FTM2_CH1/I2S0_TX_FS/FB_OE/FTM2_QD_PHB
PTB20/SPI2_PCS0/FB_AD31/CMP0_OUT
PTB21/SPI2_SCK/FB_AD30/CMP1_OUT
PTB22/SPI2_SOUT/FB_AD29/CMP2_OUT
PTB23/SPI2_SIN/SPI0_PCS5/FB_AD28
PTC0/ADC0_SE14/SPI0_PCS4/PDB0_EXTRG/USB_SOF_OUT/FB_AD14/I2S0_TXD1
PTC1/LLWU_P6/ADC0_SE15/SPI0_PCS3/UART1_RTS/FTM0_CH0/FB_AD13/I2S0_TXD0
PTC2/ADC0_SE4B/CMP1_IN0/SPI0_PCS2/UART1_CTS/FTM0_CH1/FB_AD12/I2S0_TX_FS
PTC3/LLWU_P7/CMP1_IN1/SPI0_PCS1/UART1_RX/FTM0_CH2/CLKOUT/I2S0_TX_BCLK
PTC4/LLWU_P8/SPI0_PCS0/UART1_TX/FTM0_CH3/FB_AD11/CMP1_OUT
PTC5/LLWU_P9/SPI0_SCK/LPTMR0_ALT2/I2S0_RXD0/FB_AD10/CMP0_OUT/FTM0_CH2
PTC6/LLWU_P10/CMP0_IN0/SPI0_SOUT/PDB0_EXTRG/I2S0_RX_BCLK/FB_AD9/I2S0_MCLK
PTC7/CMP0_IN1/SPI0_SIN/USB_SOF_OUT/I2S0_RX_FS/FB_AD8
PTC8/ADC1_SE4B/CMP0_IN2/FTM3_CH4/I2S0_MCLK/FB_AD7
PTC9/ADC1_SE5B/CMP0_IN3/FTM3_CH5/I2S0_RX_BCLK/FB_AD6/FTM2_FLT0
PTC10/ADC1_SE6B/I2C1_SCL/FTM3_CH6/I2S0_RX_FS/FB_AD5
PTC11/LLWU_P11/ADC1_SE7B/I2C1_SDA/FTM3_CH7/I2S0_RXD1/FB_RW
PTC12/UART4_RTS/FB_AD27/FTM3_FLT0
PTC13/UART4_CTS/FB_AD26
PTC14/UART4_RX/FB_AD25
PTC15/UART4_TX/FB_AD24
PTC16/UART3_RX/ENET0_1588_TMR0/FB_CS5/FB_TSIZ1/FB_BE23_16_BLS15_8
PTC17/UART3_TX/ENET0_1588_TMR1/FB_CS4/FB_TSIZ0/FB_BE31_24_BLS7_0
PTC18/UART3_RTS/ENET0_1588_TMR2/FB_TBST/FB_CS2/FB_BE15_8_BLS23_16
PTC19/UART3_CTS/ENET0_1588_TMR3/FB_CS3/FB_BE7_0_BLS31_24/FB_TA
RESET
NC_C10
NC_B10
NC_A10
NC_M5
PTD0/LLWU_P12/SPI0_PCS0/UART2_RTS/FTM3_CH0/FB_ALE/FB_CS1/FB_TS
PTD1/ADC0_SE5B/SPI0_SCK/UART2_CTS/FTM3_CH1/FB_CS0
PTD2/LLWU_P13/SPI0_SOUT/UART2_RX/FTM3_CH2/FB_AD4/I2C0_SCL
PTD3/SPI0_SIN/UART2_TX/FTM3_CH3/FB_AD3/I2C0_SDA
PTD4/LLWU_P14/SPI0_PCS1/UART0_RTS/FTM0_CH4/FB_AD2/EWM_IN/SPI1_PCS0
PTD5/ADC0_SE6B/SPI0_PCS2/UART0_CTS/UART0_COL/FTM0_CH5/FB_AD1/EWM_OUT/SPI1_SCK
PTD6/LLWU_P15/ADC0_SE7B/SPI0_PCS3/UART0_RX/FTM0_CH6/FB_AD0/FTM0_FLT0/SPI1_SOUT
PTD7/CMT_IRO/UART0_TX/FTM0_CH7/FTM0_FLT1/SPI1_SIN
PTD8/I2C0_SCL/UART5_RX/FB_A16
PTD9/I2C0_SDA/UART5_TX/FB_A17
PTD10/UART5_RTS/FB_A18
PTD11/SPI2_PCS0/UART5_CTS/SDHC0_CLKIN/FB_A19
PTD12/SPI2_SCK/FTM3_FLT0/SDHC0_D4/FB_A20
PTD13/SPI2_SOUT/SDHC0_D5/FB_A21
PTD14/SPI2_SIN/SDHC0_D6/FB_A22
PTD15/SPI2_PCS1/SDHC0_D7/FB_A23
PTE0/ADC1_SE4A/SPI1_PCS1/UART1_TX/SDHC0_D1/TRACE_CLKOUT/I2C1_SDA/RTC_CLKOUT
PTE1/LLWU_P0/ADC1_SE5A/SPI1_SOUT/UART1_RX/SDHC0_D0/TRACE_D3/I2C1_SCL/SPI1_SIN
PTE2/LLWU_P1/ADC0_DP2/ADC1_SE6A/SPI1_SCK/UART1_CTS/SDHC0_DCLK/TRACE_D2
PTE3/ADC0_DM2/ADC1_SE7A/SPI1_SIN/UART1_RTS/SDHC0_CMD/TRACE_D1/SPI1_SOUT
PTE4/LLWU_P2/SPI1_PCS0/UART3_TX/SDHC0_D3/TRACE_D0
PTE5/SPI1_PCS2/UART3_RX/SDHC0_D2/FTM3_CH0
PTE6/SPI1_PCS3/UART3_CTS/I2S0_MCLK/FTM3_CH1/USB_SOF_OUT
PTE7/UART3_RTS/I2S0_RXD0/FTM3_CH2
PTE8/I2S0_RXD1/UART5_TX/I2S0_RX_FS/FTM3_CH3
PTE9/I2S0_TXD1/UART5_RX/I2S0_RX_BCLK/FTM3_CH4
PTE10/UART5_CTS/I2S0_TXD0/FTM3_CH5
PTE11/UART5_RTS/I2S0_TX_FS/FTM3_CH6
PTE12/I2S0_TX_BCLK/FTM3_CH7
PTE24/ADC0_SE17/UART4_TX/I2C0_SCL/EWM_OUT
PTE25/ADC0_SE18/UART4_RX/I2C0_SDA/EWM_IN
PTE26/ENET_1588_CLKIN/UART4_CTS/RTC_CLKOUT/USB_CLKIN
PTE27/UART4_RTS
PTE28
RTC_WAKEUP
USB0_DP
USB0_DM
VREGIN
VOUT33
ADC0_SE16/CMP1_IN2/ADC0_SE21
ADC1_SE16/CMP2_IN2/ADC0_SE22
ADC0_DP1
ADC0_DM1
ADC1_DP1
ADC1_DM1
ADC0_DP0/ADC1_DP3
ADC0_DM0/ADC1_DM3
ADC1_DP0/ADC0_DP3
ADC1_DM0/ADC0_DM3
VREF_OUT/CMP1_IN5/CMP0_IN5/ADC1_SE18
DAC1_OUT/CMP0_IN4/CMP2_IN3/ADC1_SE23
DAC0_OUT/CMP1_IN3/ADC0_SE23
VREFH
VREFL
XTAL32
EXTAL32
VBAT
VDD1
VDD2
VDD3
VDD4
VDD5
VDD6
VDDA
VSS1
VSS2
VSS3
VSS4
VSS5
VSS6
VSS7
VSS8
VSSA
[9] K64_SWDIO
[3,8] USER_SW1
[4,9] DOCK_SWDCLK
[6] AIR_WAKEN
[9] TOUCH_RST
[9] I2S_TX_BCLK
[6] AIR_RESETN
[7] AIR_QUALITY_EN
[8] BUZZER_PWM
[9] TOUCH_INT
[9] MB1_PWM
[9] MB2_PWM
[9] I2S_TXD
[4,5,9] I2S_TX_FS/I2C2_SDA
[4,5,9] I2S_RX_BCLK/I2C2_SCL
[9] I2S_RXD
[9] I2S_RX_FS
[9] I2S_MCLK
K64_EXTAL
K64_XTAL
[9] TOUCH_TXEN
[5] AUTH_RST
[9] MB2_RST
[9] AIR_INTN
[4,5] NTAG_FD
[7] CHG_STATE
[4] KW41_WAKE_UP
[9] MB3_PWM
[9] I2C0_SCL
[9] I2C0_SDA
[9] MB1_INT
[5] NTAG_I2C_EN
[9] MB3_AN
[9] MB3_INT
[9] MB2_INT
[8] SPI1_PCS1
[9] MB3_RST
[9] MB1_RST
[9] UART_DBG_RX
[9] UART_DBG_TX
[9] CAN_TX
[9] CAN_RX
[9] DISP_SPI_CS
[9] DISP_SPI_SCK
[9] DISP_SPI_SDI
[4] KW41_RST_FROM_K64
[9] AMB_INT
[6] ACCEL_INT1
[9] MB3_SPI_CS
[9] MB2_SPI_CS
[9] MB1_SPI_CS
[9] MB_SPI_SCK
[9] MB_SPI_MOSI
[9] MB_SPI_MISO
[9] RGB_R
[9] RGB_B
[6,9] I2C1_SCL
[6,9] I2C1_SDA
[7] NTAG_EN
[4] KW41_PB18
[7] BAT_SENS_EN
[6] GYRO_RST
[9] UART3_RX
[9] UART3_TX
[6] GYRO_INT2
[9] USB_VBUS
[9] K64_RST
A5 PTD0
D4 PTD1
C4 UART2_RX
B4 UART2_TX
A4 SPI1_PCS0
A3 SPI1_SCK
A2 SPI1_SOUT
A1 SPI1_SIN
C9 PTD8
B9 PTD9
B3 PTD10
B2 PTD11
B1 PTD12
C3 PTD13
C2 PTD14
C1 PTD15
D3 SDHC0_D1
D2 SDHC0_D0
D1 SDHC0_DCLK
E4 SDHC0_CMD
E3 SDHC0_D3
E2 SDHC0_D2
E1 PTE6
F4 FTM3_CH2
F3 PTE8
F2 PTE9
F1 PTE10
G4 PTE11
G3 PTE12
M4 UART4_TX
K5 UART4_RX
K4 UART4_CTS_b
J4 UART4_RTS_b
H4 PTE28
L5
H1 USB0_DP
H2 USB0_DM
G2
G1
J3 ADC0_SE21
K3 ADC0_SE22
J1
J2
K1
K2
L1
L2
M1
M2
M3
L4
L3 ADC0_SE23
G5
G6
M7 K64_XTAL32
M6 K64_EXTAL32
L6
[4,9] RTC_INT
[6] GYRO_INT1
UART2_RX
UART2_TX
SPI1_PCS0
SPI1_SCK
SPI1_MOSI
SPI1_MISO
AIR_QUALITY_I2C_EN
DISP_EN
PRESSURE_INT2
ACCEL_RST
PRESSURE_INT1
ACCEL_INT2
RTC_CLKOE
DISP_DISP
SD_D1
SD_D0
SD_CLK
SD_CMD
SD_D3
SD_D2
DISP_EXTCOMIN
RGB_G
R69 0 DNP
USER_SW1
USER_SW2
USER_SW3
DISP_EXTMODE
DISP_BLIGHT
TP29
TP30
KW41_UART_RX
KW41_UART_TX
KW41_UART_RTS
KW41_UART_CTS
USER_SW4
USB_DP
USB_DN
VCC_USB
C10 2.2uF 10V 10%
BAT_SENS
MB1_AN
C11 0.1uF 10V 10%
MB2_AN
Y5 DNP
32.768 KHZ
R51 0
REF_32K
C13 0.1uF 10V 10%
ICAP Classification: CP: ___ IUO: X PUBI: ___
Drawing Title: SLN-RPK-NODE (Main Board)
Page Title: Main microcontroller
Size C
Document Number SCH-29943 PDF: SPF-29943
Rev D1
Date: Friday, February 23, 2018
Sheet 3 of 9



ICAP Classification:	CP: ___	IUO: X	PUBI: ___
Drawing Title:	SLN-RPK-NODE (Main Board)		
Page Title:	Wireless microcontroller		
Size C	Document Number SCH-29943 PDF: SPF-29943		Rev D1
Date: Friday, February 23, 2018	Sheet 4 of 9		

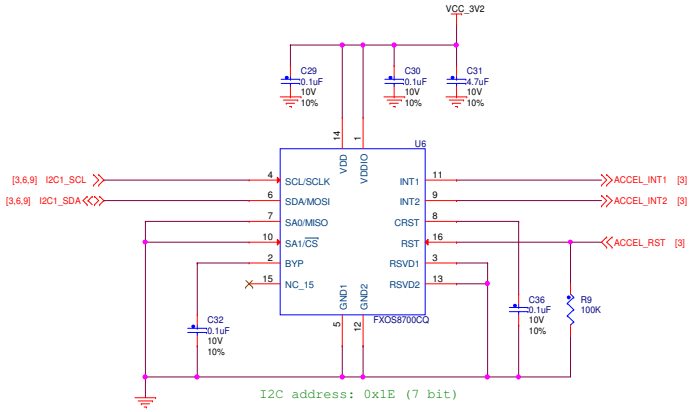
	SEC_SDA	SEC_SCL
NTAG_I2C_EN = 1	I2C2_SDA	I2C2_SCL
NTAG_I2C_EN = 0	High Z	High Z

	VCC_NTAG
NTAG_EN = 1	3.2V
NTAG_EN = 0	0V



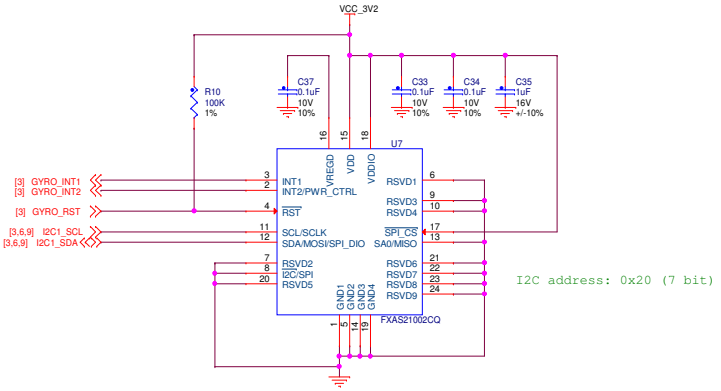
ICAP Classification:	CP: ___ IUO: X PUBI: ___
Drawing Title:	SLN-RPK-NODE (Main Board)
Page Title:	Security & Identification
Size: C	Document Number: SCH-29943 PDF: SPF-29943 Rev: D1
Date: Friday, February 23, 2018	Sheet 5 of 9

ACCELEROMETER AND MAGNETOMETER



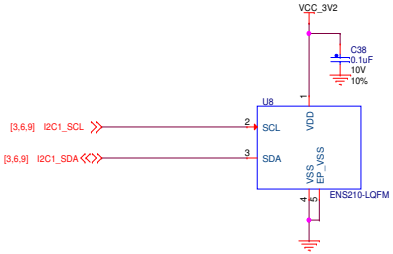
I2C address: 0x1E (7 bit)

GYROSCOPE



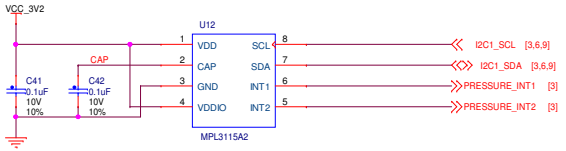
I2C address: 0x20 (7 bit)

HUMIDITY SENSOR



I2C address: 0x43 (7 bit)

ALTIMETER

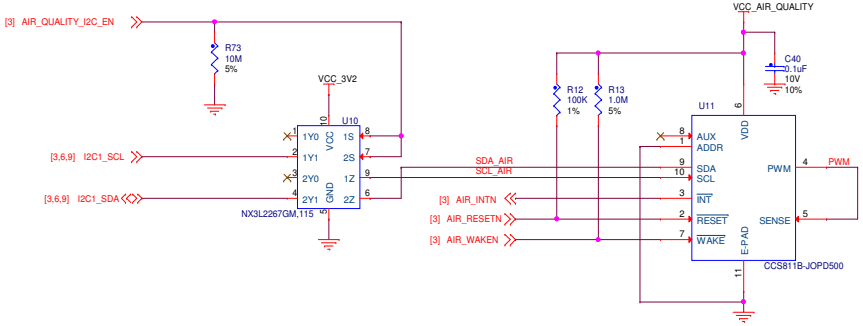


I2C address: 0x60 (7 bit)

GAS SENSOR

	SDA_AIR	SCL_AIR
AIR_QUALITY_I2C_EN = 1	I2C1_SDA	I2C1_SCL
AIR_QUALITY_I2C_EN = 0	High Z	High Z

	VCC_AIR_QUALITY
AIR_QUALITY_EN = 1	3.2V
AIR_QUALITY_EN = 0	0V



I2C address: 0x5A (7 bit)

ICAP Classification: CP: ___ IUO: X PUBI: ___

Drawing Title: **SLN-RPK-NODE (Main Board)**

Page Title: **Sensors**

Size	Document Number	Rev
C	SCH-29943 PDF: SPF-29943	D1

Date: Friday, February 23, 2018 Sheet 6 of 9

VCC_5VEXT from the docking station

VCC_5VEXT decoupling
on the docking station

VCC_USB from USB connector

general load switch

regulator

Load switch to NTAG and A1006 section
NTAG_EN = high -> VCC_NTAG is enabled
NTAG_EN = low -> VCC_NTAG is HZ

Load switch to display section (including backlight)
DISP_EN = high -> VCC_DISP is enabled
DISP_EN = low -> VCC_DISP is HZ

Load switch to air quality sensor
AIR_QUALITY_EN = high -> VCC_AIR_QUALITY is enabled
AIR_QUALITY_EN = low -> VCC_AIR_QUALITY is HZ

battery charger

R19: 1% tolerance to guaranty 5% current charge accuracy

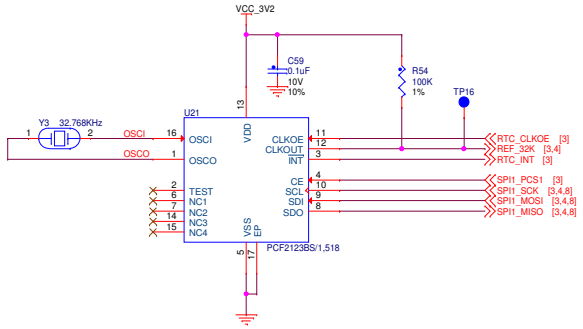
Battery level monitoring
BAT_SENS_EN = high -> sense enabled
BAT_SENS_EN = low or HZ -> sense disabled

To K64 core

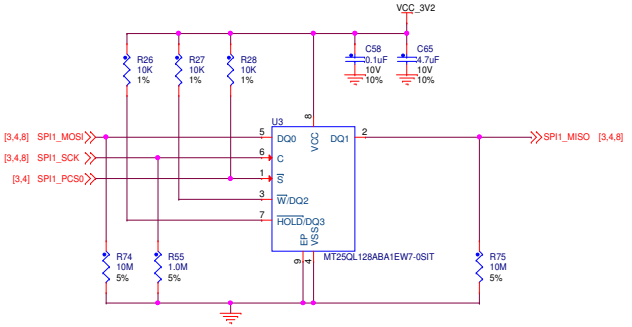
To KW41 core

ICAP Classification:	CP: ___	IUO: X	PUBI: ___
Drawing Title:	SLN-RPK-NODE (Main Board)		
Page Title:	Powers		
Size C	Document Number SCH-29943 PDF: SPF-29943		Rev D1
Date: Friday, February 23, 2018	Sheet 7 of 9		

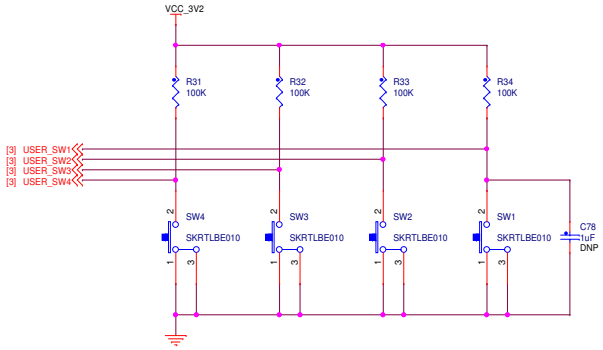
RTC



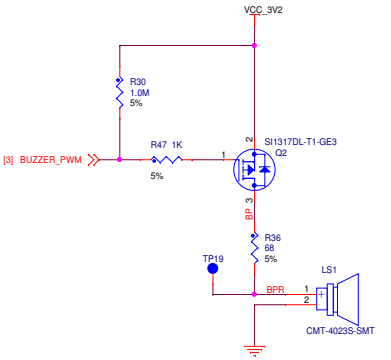
FLASH



USER BUTTONS

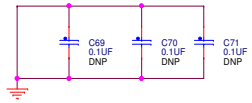


BUZZER

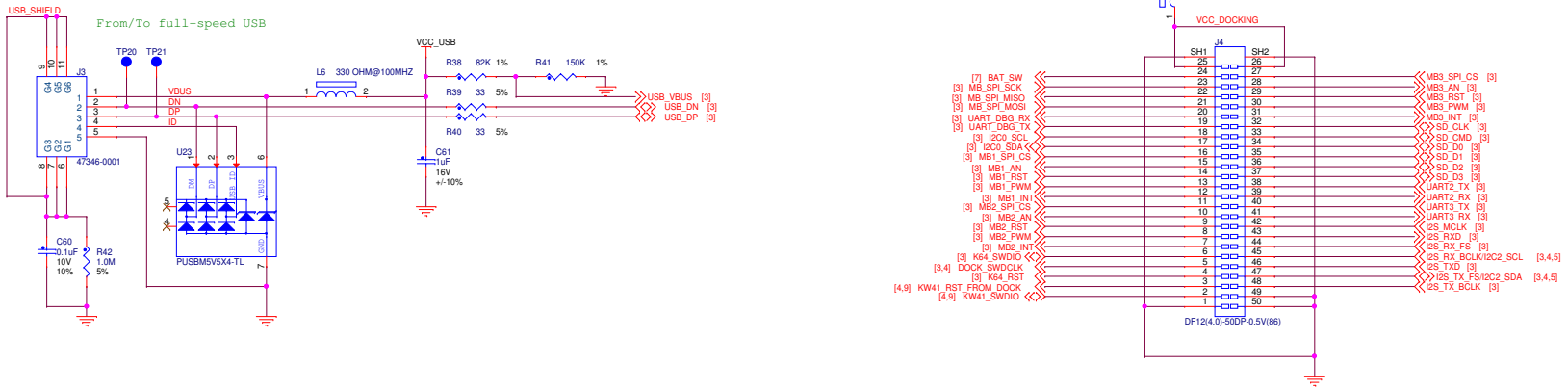


4KHz/50% duty cycle PWM

FOR MECHANICAL USE



ICAP Classification:	CP: ___ IUO: X PUBI: ___	
Drawing Title:	**SLN-RPK-NODE (Main Board)**	
Page Title:	**Miscellaneous**	
Size C	Document Number SCH-29943 PDF: SPF-29943	Rev D1
Date: Friday, February 23, 2018	Sheet 8 of 9	



ICAP Classification: CP: ___ IUO: X PUBI: ___

Drawing Title: **SLN-RPK-NODE (Main Board)**

Page Title: **Interfaces**

Size	Document Number	Rev
C	SCH-29943 PDF: SPF-29943	D1

Date: Friday, February 23, 2018 Sheet 9 of 9