Table of Contents

1	Title
2	Block Diagram
3	KL46Z MCU
4	OpenSDA INTERFACE
5	I/O Headers and Power Supply

FRDM-KL46Z

Revisions

Rev	Description	Date	Approved
A	Initial version		
AX1	1. As per the new FRDM-KL46 pin assignment xls connections changed. 2. Net changed from SWD_CLKto SWD_CLK_TGTMCU in connector J11.2 3. Net name TSI0_CH9/TSI0_CH10 removed from touch interface. 4. Port name and Arduino functions name Text added to the nets. 5. 5V regulator PAD added 6. separate Accelarometer and Magnetometer sensor Freplaced with FXOS8700CQ 7. PPL Released	07-MAR-13	Luis Puebla Palma
AX2	1. As per the FRDM-KL46 new pinout assignement Rev3.xls connections changed. 2. Port name and Arduino functions name Text changed to the nets as per new pin assignment. 3. Arduino connector Ref des changed as per TRD requirement 4. INT1_MAG net removed 5. Test point added in PTE26	14-MAR-13	Luis Puebla Palma
AX3	1. Magnetometer circuit added with same I2C Bus (I2C0_SCL/SDA) 2. Magnetometer interrupt is connected to Accelerometer interrupt 2 through a 0 ohms resistor. 3. Spare buffer U5B input is pulled low using a 0 ohms res.	25-MAR-13	Luis Puebla Palma
AX4	1. FXOS8700CQ replaced with MMA8451Q. NC Pins wired to make compatible with CRST, RST, RSVD1/2 in FXOS8700CQ 2. DNP 0 ohm resistor added between Inertial sensor 3rd pin and GND. 3. DNP 0 ohms resistor added b/w Inertial sensor 16th pin and PTE26	26-MAR-13	Luis Puebla Palma
B	1. DNP Updated 2. RST_K20D50 renamed to RST_K20D50_B 3. A085 Release	28-MAR-13	Luis Puebla Palma
B1	1. D6 - DNP 2. J7 - MOUNT 3. Schematic title changed to FRDM-KL46Z 4. A085 Release	03-MAY-13	Luis Puebla Palma
C	Changing C17 from 1uF to 0.1uF to fix yield issue	19-JUN-13	Luis Puebla Palma

freescale™

Automotive, Industrial & Multi-market Solutions Group
6501 William Cannon Drive West
Austin, TX 78735-8598

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

ICAP Classification: FCP: FIUO: PUBI: X

Designer: JOHN PAUL FRANKLIN	Drawing Title: FRDM-KL46Z	
Drawn by: JOHN PAUL FRANKLIN	Page Title: TITLE PAGE	
Approved: Luis Puebla Palma	Size C	Document Number SCH-27822 | PDF: SPF-27822 — Rev C
	Date: Wednesday, June 19, 2013	Sheet 1 of 5

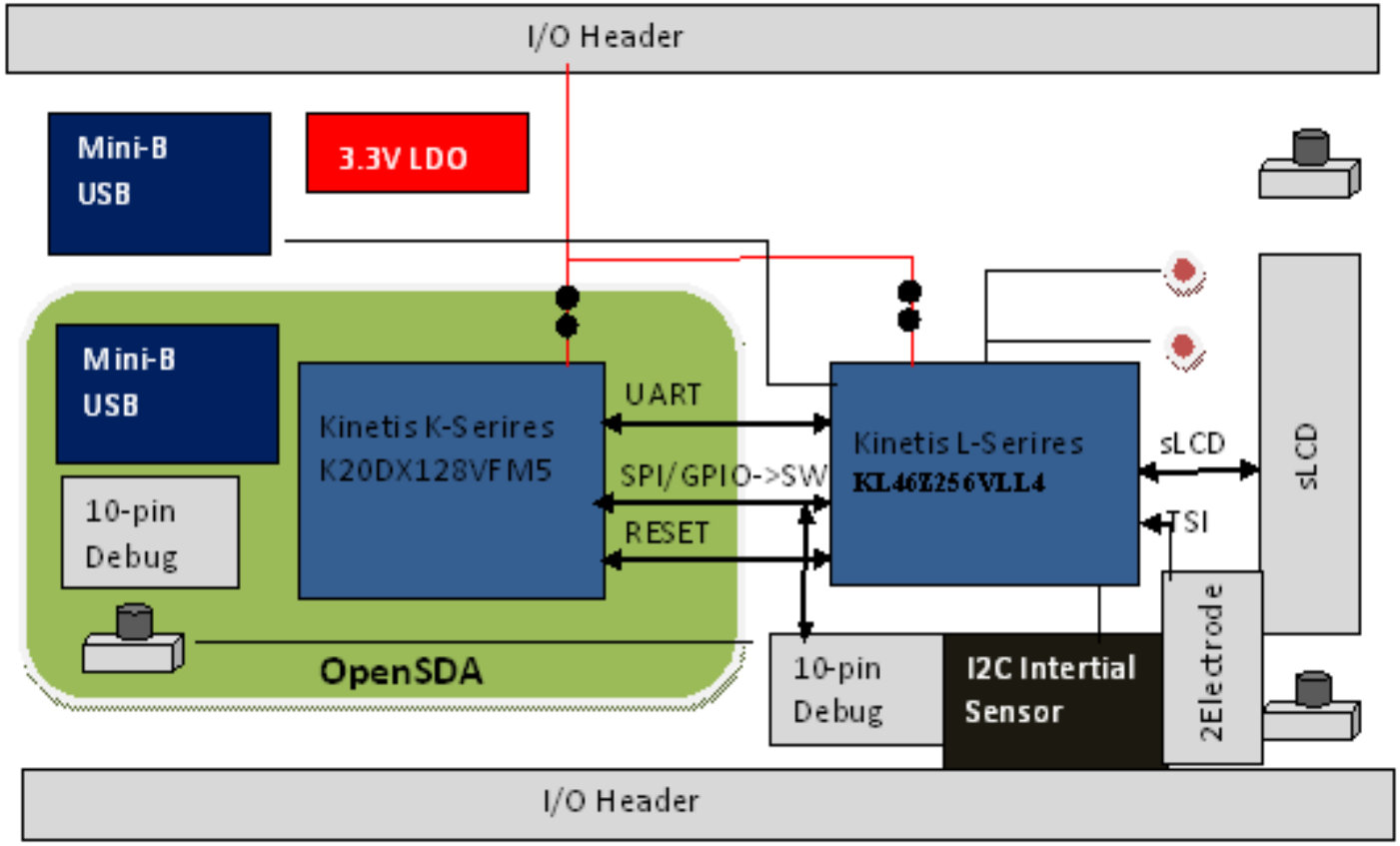
1. Unless Otherwise Specified:
   All resistors are in ohms, 5%, 1/8 Watt
   All capacitors are in uF, 20%, 50V
   All voltages are DC
   All polarized capacitors are aluminum electrolytic

2. Interrupted lines coded with the same letter or letter combinations are electrically connected.

3. Device type number is for reference only. The number varies with the manufacturer.

4. Special signal usage:
   _B Denotes - Active-Low Signal
   <> or [] Denotes - Vectored Signals

5. Interpret diagram in accordance with American National Standards Institute specifications, current revision, with the exception of logic block symbology.



freescale

ICAP Classification:	FCP: ___ FIUO:	PUBI: X
Drawing Title:	FRDM-KL46Z	
Page Title:	BLOCK DIAGRAM	
Size: C	Document Number: SCH-27822 | PDF: SPF-27822	Rev: C
Date: Wednesday, June 19, 2013	Sheet 2 of 5	

KL46Z Decoupling Caps

Push Buttons

SW1 TL1015AF160QG, C1 1.0UF, GND

SW2 TL1015AF160QG, C32 1.0UF, GND

TSI Capacitive/ Touch Interface

E1

Slider_4

TSI_ELECTRODE1

TSI_ELECTRODE2

SWD CONNECTOR

SHORTING HEADER ON BOTTOM LAYER

Jumper is shorted by a cut-trace on bottom layer. Cutting the trace will effectively isolate the on-board MCU from the OpenSDA debug interface.

J18 HDR 1X2 TH DNP — KL25_SWD_CLK

J11 HDR 2X5 DNP — SWD_DIO_TGTMCU, SWD_CLK_TGTMCU [4], RST_K20D50_B [4,5]

P3V3_KL46Z, GND

USB

KL46_USB_SHLD

J10 CONN USB MINI-B

TP5 DNP, P5V_KL46Z

L2 330 OHM — P5V_KL46Z_USB

KL46_USB_DN — R10 33 — USB_DM

KL46_USB_DP — R8 33 — USB_DP

KL46_USB_ID — TP9

U3 GSOT05C-GS08

L1 330 OHM

OPTIONAL USB HOST FUNCTIONALITY

P5V_KL46Z, P5V_SDA, KL46_USB_ID, R16 0 DNP, J16 HDR 1X2 TH DNP

POPULATE THESE PARTS FOR USB HOST FUNCTIONALITY

ELECTRICAL PROTECTION IS NOT PROVIDED.

USE IT AT YOUR OWN RISK

7 Segment LCD

DS1 — LCD-S401M16KR

COM0 LCD-01, COM1 LCD-02, COM2 LCD-03, COM3 LCD-04

1D/1E/1G/1F LCD-05, DP1/1C/1B/1A LCD-06, 2D/2E/2G/2F LCD-07, DP2/2C/2B/2A LCD-08, 3D/3E/3G/3F LCD-09, DP3/3C/3B/3A LCD-10, 4D/4E/4G/4F LCD-11, COL/4C/4B/4A LCD-12

LEDs

P3V3

LED1 — R27 330 — D7 LED GREEN

LED2 — R14 330 — D5 LED RED

[4] UART1_RX_TGTMCU, [4] UART1_TX_TGTMCU — R47 1K, R48 1K

[4] SWD_DIO_TGTMCU

EXTAL_8MHZ, XTAL_8MHZ — R31 1.0M, Y1 8MHZ, C28 22PF, C26 22PF

RST_K20D50_B

[4] PTC1_SDA — R24 0 — [5] A5

LED1 — R11 0 — [5] D13

[5] INT1_ACCEL — R41 0

Light_sns [5] a-A2b — R40 0

U4

PTA0/SWD_CLK/TSI0_CH1/TPM0_CH5
PTA1/TSI0_CH2/UART0_RX/TPM2_CH0
PTA2/TSI0_CH3/UART0_TX/TPM2_CH1
PTA3/SWD_DIO/TSI0_CH4/I2C1_SCL/TPM0_CH0
PTA4/NMI/TSI0_CH5/I2C1_SDA/TPM0_CH1
PTA5/USB_CLKIN/TPM0_CH2/I2S0_TX_BCLK
PTA6/TPM0_CH3
PTA7/TPM0_CH4
PTA12/TPM1_CH0/I2S0_TXD0
PTA13/TPM1_CH1/I2S0_TX_FS
PTA14/SPI0_PCS0/UART0_TX/I2S0_RX_BCLK/I2S0_TXD0
PTA15/SPI0_SCK/UART0_RX/I2S0_RXD0
PTA16/SPI0_MOSI/SPI0_MISO/I2S0_RX_FS/I2S0_RXD0
PTA17/SPI0_MISO/SPI0_MOSI/I2S0_MCLK
PTA18/EXTAL0/UART1_RX/TPM_CLKIN0
PTA19/XTAL0/UART1_TX/TPM_CLKIN1/LPTMR0_ALT1
PTA20/RESET

PTB0/LLWU_P5/LCD_P0/ADC0_SE8/TSI0_CH0/I2C0_SCL/TPM1_CH0
PTB1/LCD_P1/ADC0_SE9/TSI0_CH6/I2C0_SDA/TPM1_CH1
PTB2/LCD_P2/ADC0_SE12/TSI0_CH7/I2C0_SCL/TPM2_CH0
PTB3/LCD_P3/ADC0_SE13/TSI0_CH8/I2C0_SDA/TPM2_CH1
PTB7/LCD_P7
PTB8/LCD_P8/SPI1_PCS0/EXTRG_IN
PTB9/LCD_P9/SPI1_SCK
PTB10/LCD_P10/SPI1_PCS0
PTB11/LCD_P11/SPI1_SCK
PTB16/LCD_P12/TSI0_CH9/SPI1_MOSI/UART0_RX/TPM_CLKIN0/SPI1_MISO
PTB17/LCD_P13/TSI0_CH10/SPI1_MISO/UART0_TX/TPM_CLKIN1/SPI1_MOSI
PTB18/LCD_P14/TSI0_CH11/TPM2_CH0/I2S0_TX_BCLK
PTB19/LCD_P15/TSI0_CH12/TPM2_CH1/I2S0_TX_FS
PTB20/LCD_P16/CMP0_OUT
PTB21/LCD_P17
PTB22/LCD_P18
PTB23/LCD_P19

PTC0/LCD_P20/ADC0_SE14/TSI0_CH13/EXTRG_IN/AUDIOUSB_SOF_OUT/CMP0_OUT/I2S0_TXD0
PTC1/LLWU_P6/RTC_CLKIN/LCD_P21/ADC0_SE15/TSI0_CH14/I2C1_SCL/TPM0_CH0/I2S0_TXD0
PTC2/LCD_P22/ADC0_SE11/TSI0_CH15/I2C1_SDA/TPM0_CH1/I2S0_TX_FS
PTC3/LLWU_P7/LCD_P23/UART1_RX/TPM0_CH2/CLKOUT/I2S0_TX_BCLK
PTC4/LLWU_P8/LCD_P24/SPI0_PCS0/UART1_TX/TPM0_CH3/I2S0_MCLK
PTC5/LLWU_P9/LCD_P25/SPI0_SCK/LPTMR0_ALT2/I2S0_RXD0/CMP0_OUT
PTC6/LLWU_P10/LCD_P26/CMP0_IN0/SPI0_MOSI/EXTRG_IN/I2S0_RX_BCLK/SPI0_MISO/I2S0_MCLK
PTC7/LCD_P27/CMP0_IN1/SPI0_MISO/AUDIOUSB_SOF_OUT/I2S0_RX_FS/SPI0_MOSI
PTC8/LCD_P28/CMP0_IN2/I2C0_SCL/TPM0_CH4/I2S0_MCLK
PTC9/LCD_P29/CMP0_IN3/I2C0_SDA/TPM0_CH5/I2S0_RX_BCLK
PTC10/LCD_P30/I2C1_SCL/I2S0_RX_FS
PTC11/LCD_P31/I2C1_SDA/I2S0_RXD0
PTC12/LCD_P32/TPM_CLKIN0
PTC13/LCD_P33/TPM_CLKIN1
PTC16/LCD_P36
PTC17/LCD_P37
PTC18/LCD_P38

PTD0/LCD_P40/SPI0_PCS0/TPM0_CH0
PTD1/LCD_P41/ADC0_SE5B/SPI0_SCK/TPM0_CH1
PTD2/LCD_P42/SPI0_MOSI/UART2_RX/TPM0_CH2/SPI0_MISO
PTD3/LCD_P43/SPI0_MISO/UART2_TX/TPM0_CH3/SPI0_MOSI
PTD4/LLWU_P14/LCD_P44/SPI1_PCS0/UART2_RX/TPM0_CH4
PTD5/LCD_P45/ADC0_SE6B/SPI1_SCK/UART2_TX/TPM0_CH5
PTD6/LLWU_P15/LCD_P46/ADC0_SE7B/SPI1_MOSI/UART0_RX/SPI1_MISO
PTD7/LCD_P47/SPI1_MISO/UART0_TX/SPI1_MOSI

PTE0/LCD_P48/SPI1_MISO/UART1_TX/RTC_CLKOUT/CMP0_OUT/I2C1_SCA
PTE1/LCD_P49/SPI1_MOSI/UART1_RX/SPI1_MISO/I2C1_SCL
PTE2/LCD_P50/SPI1_SCK
PTE3/LCD_P51/SPI1_MISO/SPI1_MOSI
PTE4/LCD_P52/SPI1_PCS0
PTE5/LCD_P53
PTE6/LCD_P54/I2S0_MCLK/AUDIOUSB_SOF_OUT
PTE16/LCD_P56/ADC0_DP1/ADC0_SE1/SPI0_PCS0/UART2_TX/TPM_CLKIN0
PTE17/LCD_P56/ADC0_DM1/ADC0_SE5A/SPI0_SCK/UART2_RX/TPM_CLKIN1/LPTMR0_ALT3
PTE18/LCD_P57/ADC0_DP2/ADC0_SE2/SPI0_MOSI/I2C0_SDA/SPI0_MISO
PTE19/LCD_P58/ADC0_DM2/ADC0_SE6A/SPI0_MISO/I2C0_SCL/SPI0_MOSI
PTE20/LCD_P59/ADC0_DP0/ADC0_SE0/TPM1_CH0/UART0_TX
PTE21/LCD_P60/ADC0_DM0/ADC0_SE4A/TPM1_CH1/UART0_RX
PTE22/ADC0_DP3/ADC0_SE3/TPM2_CH0/UART2_TX
PTE23/ADC0_DM3/ADC0_SE7A/TPM2_CH1/UART2_RX
PTE24/TPM0_CH0/I2C0_SCL
PTE25/TPM0_CH1/I2C0_SDA
PTE26/TPM0_CH5/RTC_CLKOUT/USB_CLKIN
PTE29/CMP0_IN5/ADC0_SE4B/TPM0_CH2/TPM_CLKIN0
PTE30/DAC0_OUT/ADC0_SE23/CMP0_IN4/TPM0_CH3/TPM_CLKIN1
PTE31/TPM0_CH4

USB0_DP
USB0_DM

MKL46Z256VLL4

P3V3_KL46Z

VDD1 8, VDD2 30, VDD3 48 — C7 1.0UF, C23 0.1UF, C9 1.0UF, C18 0.1UF, C19 1.0UF, C22 0.1UF, GND

VDDA 22 — C12 0.1UF, GND

VREGIN 13 — KL46Z_REGIN — J7 HDR 1X2 TH — P5V_KL46Z — R13 0 — AREF [5]

VREFH 23 — R17 0, R18 1K DNP, D6 DNP 3.0V

VREFL 24 — C15 0.1UF, GND

CAD NOTE: Place these capacitors near their respective CPU pin (VREFH to VREFL and VDDA to VSSA)

VLL1/LCD_P5/PTC21 77 VLL1
VLL2/LCD_P4/PTC20 76 VLL2
75 VLL3 — TP10, TP12, C14 0.1UF, C16 0.1UF

J12 HDR 1X2 TH DNP — TP23 P3V3_KL46Z

VCAP1/LCD_P39/PTC23 79 VCAP1 — C13 0.1UF
VCAP2/LCD_P6/PTC22 78 VCAP2

TP11

VOUT33 12 — C11 2.2UF, GND

VSS1 9, VSS2 29, VSS3 49, VSS4 74 — GND

VSSA 25 — GND

USB_DP 10, USB_DM 11

freescale

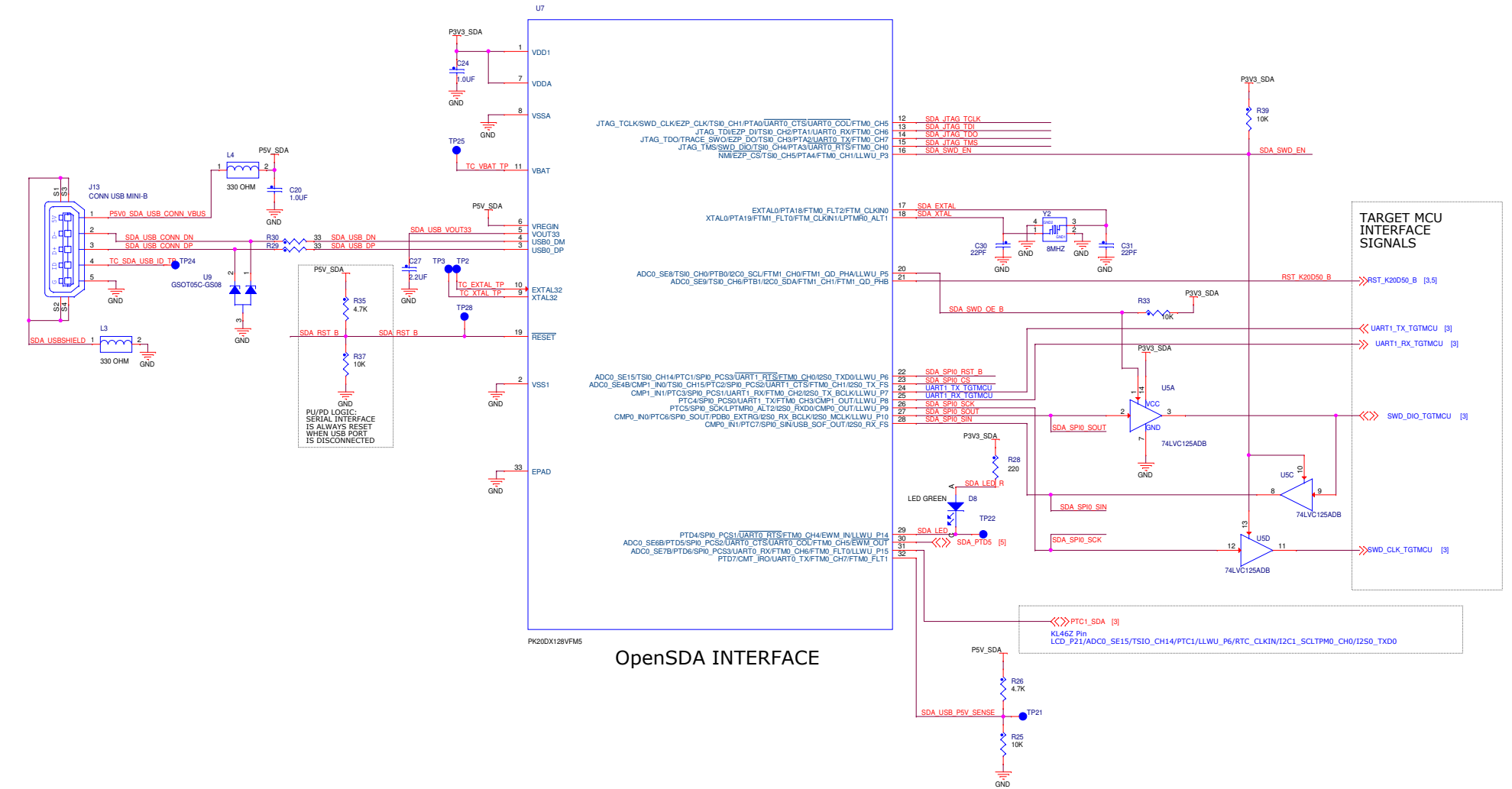
ICAP Classification: FCP: ___ FIUO: PUBI: X

Drawing Title: **FRDM-KL46Z**

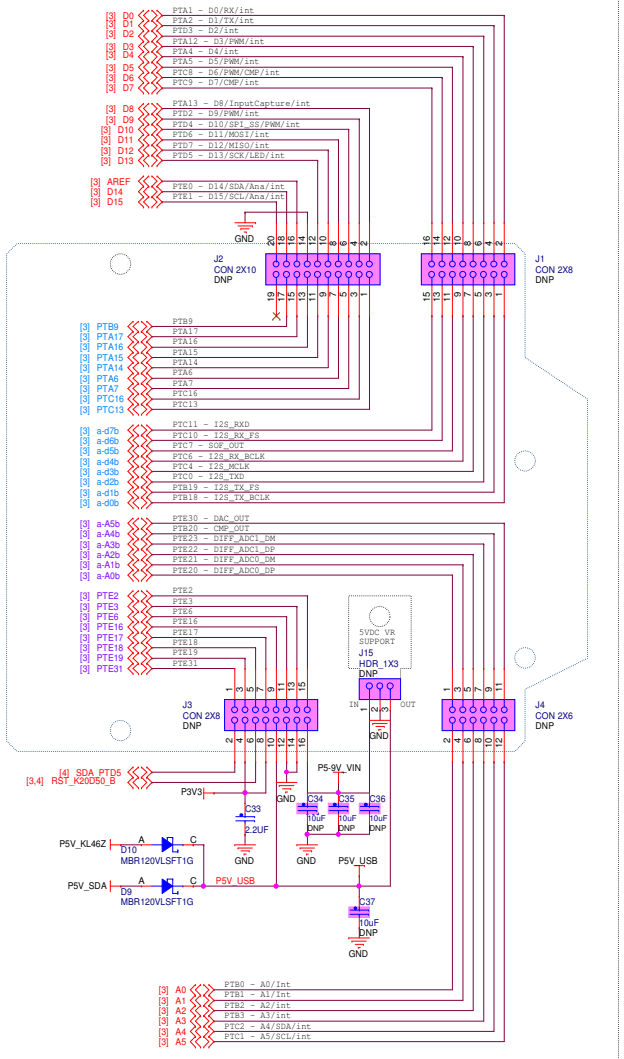
Page Title: **KL46Z MCU**

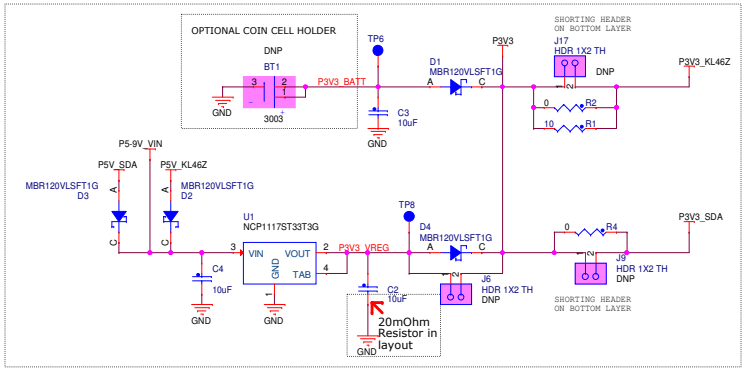
Size C | Document Number SCH-27822 | PDF: SPF-27822 | Rev C

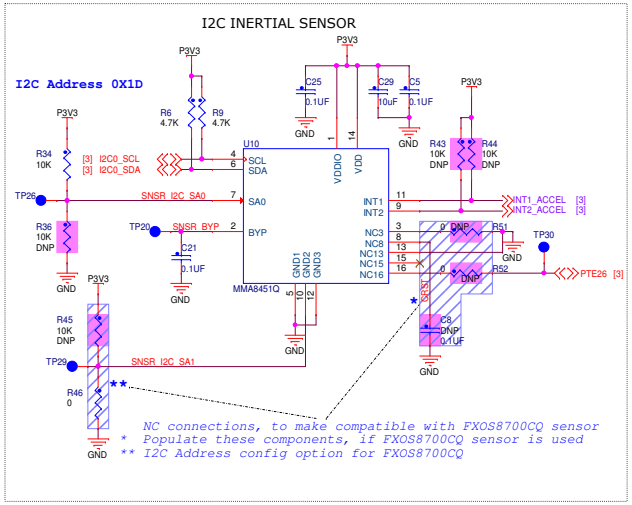
Date: Wednesday, June 19, 2013 | Sheet 3 of 5

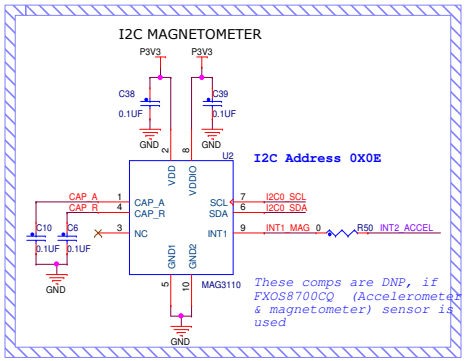

U7
PK20DX128VFM5
OpenSDA INTERFACE
J13
CONN USB MINI-B
U9
GSOT05C-GS08
L4
330 OHM
L3
330 OHM
C20
1.0UF
C24
1.0UF
C27
2.2UF
C30
22PF
C31
22PF
Y2
8MHZ
R30
33
R29
33
R35
4.7K
R37
10K
R39
10K
R33
10K
R28
220
R26
4.7K
R25
10K
D8
LED GREEN
U5A
U5C
U5D
74LVC125ADB
PU/PD LOGIC:
SERIAL INTERFACE
IS ALWAYS RESET
WHEN USB PORT
IS DISCONNECTED
TARGET MCU
INTERFACE
SIGNALS
P3V3_SDA
P5V_SDA
SDA_USB_CONN_VBUS
SDA_USB_CONN_DN
SDA_USB_CONN_DP
TC_SDA_USB_ID_TP
SDA_USBSHIELD
SDA_USB_DN
SDA_USB_DP
SDA_USB_VOUT33
TC_EXTAL_TP
TC_XTAL_TP
TC_VBAT_TP
SDA_RST_B
SDA_JTAG_TCLK
SDA_JTAG_TDI
SDA_JTAG_TDO
SDA_JTAG_TMS
SDA_SWD_EN
SDA_SWD_OE_B
SDA_EXTAL
SDA_XTAL
SDA_SPI0_RST_B
SDA_SPI0_CS
UART1_TX_TGTMCU
UART1_RX_TGTMCU
SDA_SPI0_SCK
SDA_SPI0_SOUT
SDA_SPI0_SIN
SDA_LED
SDA_PTD5
RST_K20D50_B
SWD_DIO_TGTMCU
SWD_CLK_TGTMCU
PTC1_SDA
KL46Z Pin
LCD_P21/ADC0_SE15/TSIO_CH14/PTC1/LLWU_P6/RTC_CLKIN/I2C1_SCLTPM0_CH0/I2S0_TXD0
SDA_USB_P5V_SENSE
SPARE 74HC125 buffer
TARGET RESET AND BOOTLOADER
PUSH BUTTON
SPI FLASH MEMORY
OpenSDA INTERFACE JTAG CONNECTOR
SUBASSEMBLY_S08
DNP
HDR 2X5
freescale
ICAP Classification:
FCP:
FIUO:
PUBI: X
Drawing Title:
FRDM-KL46Z
Page Title:
OpenSDA interface
Size
C
Document Number
SCH-27822 | PDF: SPF-27822
Rev
C
Date:
Wednesday, June 19, 2013
Sheet
4
of
5

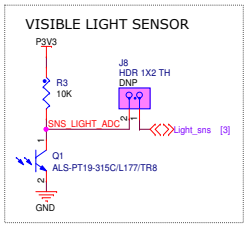
ARDUINO HEADERS

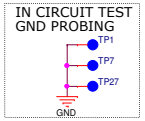


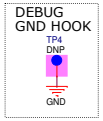












freescale

ICAP Classification:	FCP: ___	FIUO:	PUBI: X

Drawing Title: **FRDM-KL46Z**

Page Title: **I/O Headers and Power Supply**

Size	Document Number	Rev
C	SCH-27822 | PDF: SPF-27822	C

Date: Wednesday, June 19, 2013 | Sheet 5 of 5