Smart Watch Schematic

J1 USB_C_Receptacle

Pin	Signal
A4	VBUS
A9	VBUS
B4	VBUS
B9	VBUS
A5	CC1
B5	CC2
A7	D− → USB_D−
B7	D−
A6	D+ → USB_D+
B6	D+
B10	RX1−
B11	RX1+
A3	TX1+
A2	TX1−
A10	RX2−
A11	RX2+
B3	TX2−
B2	TX2+
A8	SBU1
B8	SBU2
A1, B1, B12, A12	SHIELD / GND

USB_VBUS → USB_VBUS

USB 2.0

LCD
NHD-1.8-128160EF-CTXI#-T

Pin	Signal
1	GND
2	IO_VDD
3	VDD
4	CS → LCD_CS
5	RESET → LCD_RESET
6	DC → LCD_DC
7	WR → LCD_WR
8	RD → LCD_RD
9	DB0 → LCD_D0
10	DB1 → LCD_D1
11	DB2 → LCD_D2
12	DB3 → LCD_D3
13	DB4 → LCD_D4
14	DB5 → LCD_D5
15	DB6 → LCD_D6
16	DB7 → LCD_D7
17	LED-A → LCD_LED-A
18	LED-K1
19	LED-K2
20	GND
21	YU → LCD_YU
22	XL → LCD_XL
23	YD → LCD_YD
24	XR → LCD_XR

C1 2pF, C2 0.1uF, C3 2pF, C4 2pF, C5 10uF, C6 2pF

Microcontroller
U2 — PIC32MZ2048EFG064

PIC32_ICSP / J2:
1 MCLR/VPP → MCLR, 2 VDD → VCC, 3 GND, 4 PGD → PGD, 5 PGC → PGC, 6 PGM → PGM
R8 10k, R9 470R

VDD pins: 8, 26, 39, 54, 60
VSS pins: 7, 25, 40, 55, 59
19 AVDD, 20 AVSS
34 USB_VBUS, 35 VUSB_3v3, 36 USB_D− , 37 USB_D+
9 MCLR

PMD0/RE0 58 → LCD_D0
PMD1/RE1 61 → LCD_D1
PMD2/RE2 62 → LCD_D2
PMD3/RE3 63 → LCD_D3
PMD4/RE4 64 → LCD_D4
PMD5/RE5 1 → LCD_D5
PMD6/RE6 2 → LCD_D6
PMD7/RE7 3 → LCD_D7
RD0 46 → INT1_XL
RD1 49
RD2 50 → INT_MAG
RD3 51 → INT2_XL
PMWR/RD4 52 → LCD_WR
PMRD/RD5 53 → LCD_RD
PMCS2/RD9 43 → AMB_LIGHT
RD10 44 → SPI_MISO
PMCS1/RD11 45
PGED/RB0 16 → PGD
PGEC/RB1 15 → PGC
RB2 13 → BT_RESET
RB3 12 → SPI_MOSI
RB4 11 → BT_REQN
RB5 10 → LCD_DC
AN46/RB6 17 → BTN1
AN47/RB7 18 → BTN2
AN48/RB8 21
AN49/RB9 22 → VBAT_SENSE
RB10 23 → LED1
RB11 24 → LED2
RB12 27
RB13 28
RB14 29
RB15 30 → BAT_CE

RF0 56, RF1 57, RF3/USBID 38, RF4 41 → BAT_STAT1, RF5 42 → BAT_STAT2
RG6 4 → SPI_SCK, RG7 5 → MotorPWM, RG8 6 → RGB, RG9/AN11 10 → LCD_LED-A
RC12/OSC1/CLKI 31 → LCD_RESET, RC13/SOSCI 47, RC14/SOSCO 48, RC15/OSC2/CLKO 32

I2C_SDA R17 4k7, I2C_SCL R15 4k7
R16 100k, R18 100k, C35 100nF → +BATT / VBAT_SENSE

Y1 80MHz: C10 7pF, C17 7pF
Y2 32.76kHz: C23 7pF, C28 7pF

Decoupling: C7 10nF, C11 0.1uF, C19 10nF, C24 0.1uF, C8 10nF, C12 0.1uF, C15 10nF, C20 0.1uF, C25 10nF, C27 0.1uF, C9 10nF, C13 0.1uF, C21 10nF, C26 0.1uF, C16 10uF, C22 0.1uF

Bluetooth
U4 — nRF8001
Y3 16MHz, C40 7pF, C41 7pF, C47 1nF, R21 22k
C36 1uF, C38 100nF, C39 33nF, C44 1uF
ANT1 2.4GHz (2450AT18A100E)
L3 3.9nH, L2 8.2nH, L4 5.6nH, C51 1.8pF, C53 1.2pF, C55 1.5pF, C50 22nF

Pins: 1 VDD, 2 DEC1, 3 DEC2, 5 XL2, 6 XL1, 7 ACTIVE, 8 TXD, 9 VSS → BT_TX
DCC, VSS, RXD, SCK, REQN, AVDD, XC1, XC2, AREF, AVDD, VSS, ANT2, ANT1, VDD_PA, RESET → BT_RESET, VSS, RDYN → BT_RDYN
BT_RX / SPI_SCK, BT_REQN, SPI_MISO, SPI_MOSI

Battery Charge Circuit
U1 — BQ25010
BT1 Battery_Cell, C30 0.1uF
R1 1M, R2 1M, R5 1M, C14 10uF, C18 0.1uF
5 AC, 6 USB, 7 STAT1, 8 STAT2, 11 EN, 9/10/18 VSS
19 SW, 2 FB, 16 BAT/OUT, 17 BAT/OUT, 1 ISET1, 12 ISET2, 13 CE, 14 PG, 20 FPWM
L1 10uH, C32 10uF, C31 0.1uF, C33 23pF, C34 0.15nF, R11 680R, R12 2.2R
BAT_STAT1, BAT_STAT2, BAT_CE, R7 1M, R10 100k
+BATT

Touchscreen Controller
U3 — STMPE811
16 X−, 15 Y+, 14 V_IO, 13 X+
1 Y−/INT → LCD_YD, 2 GND, 3 A0/DO, 4 SCLK → I2C_SCL
R19 10k, C37 0.1uF
5 SDAT, 6 VCC, 7 DATA_IN, 8 IN0
IN3 12, IN2 11, IN1 10, IN1 9
LCD_XR, LCD_YU, LCD_XL
R20 10k, C42 0.1uF, C45 10uF, C43 1uF, C46 0.1uF

Accelerometer/Magnetometer
U5 — LSM303AGR
INT1_XL 12, INT2_XL 11
1 SCL, 2 CS_XL, 3 CS_MAG, 4 SDA
INT_1, INT_2, VDD_IO, VDD, GND, INT_MAG
C52 10uF, C54 0.1uF, C56 0.1uF, C48 220nF, C49 ...
I2C_SCL, I2C_SDA, INT_MAG

Vibration Motor
M1 Motor_DC, Q2 2N7000, D3 100nF, R23 4k7, R22 4k7
MotorPWM

Auxiliary Test Buttons
SW1 SW_Push → BTN1, R3 100k
SW2 SW_Push → BTN2, R4 100k

Ambient Light
Q1 Photo_NPN, C29 0.1uF, R6 10k → AMB_LIGHT

Auxiliary LEDs
LED1 → D1, R13 100k
LED2 → D2, R14 100k
→ GND

Notes
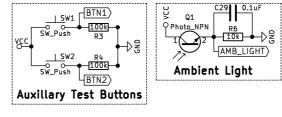VCC = 3.3V (LCD Requires 3.3V)
Ambient Light for screen backlight intensity
Bluetooth LE for phone connection
USB 2.0 over USB C connector
Vibration Motor
Combined Accelerometer and Magnemometer
Test buttons and LEDs for debugging
May change USB-C connector to MicroUSB (easier to solder?)

open source hardware

Jesse Laning

Sheet: /
File: SmartWatch.sch
Title: Smart Watch
Size: A3 | Date: 2017-12-06 | Rev: 1
KiCad E.D.A. kicad 4.0.7 | Id: 1/1