J9
TYPE-C-31-M-12

+5V
C15 10u
C16 100n
B4/A9
A1/B12
S1
FB1
GND
GND

VBUS
GND
SHIELD
SBU1
SBU2
DP1
DP2
DN1
DN2

CC1 A5
CC2 B5
A8
B8
DP A6
B6
DN A7
B7

R29 5.1k
R30 5.1k
GND

USB_DP
USB_DM

D133
1 4 +5V
GND

U16
SPX3819M5
GND
C31 1u
+5V
1 IN OUT 5
2 GND GND
3 EN ADJ 4
GND
+3.3V

+1V1
C23 100n
C29 1u
C25 100n
GND

U17
RP2040

C18 100n
C19 100n
C20 100n
C21 100n
C22 100n
C26 100n
C30 1u
C32 100n
C24 100n
+3.3V

23 DVDD
45 VREG_VOUT
44 VREG_VIN
1 IOVDD
48 USB_VDD
43 ADC_AVDD
57 GND
GND

GPIO0 2 MIDI_TX
GPIO1 3 MIDI_RX
GPIO2 4 SDA
GPIO3 5 SCL
GPIO4 6 TSCREEN_TX
GPIO5 7 TSCREEN_RX
GPIO6 8 SR_IN_LATCH
GPIO7 9 SPI_CLK
GPIO8 11 SR_IN_DATA
GPIO9 12 DEC_DI_A2
GPIO10 13 DEC_DI_A1
GPIO11 14 DEC_DI_A0
GPIO12 15
GPIO13 16
GPIO14 17 MAX7219_DIN
GPIO15 18 MAX7219_LOAD
GPIO16 27
GPIO17 28
GPIO18 29 BTLDR
GPIO19 30 TRAFFIC_OUT
GPIO20 31 TRAFFIC_IN
GPIO21 32
GPIO22 34 MUX_S3
GPIO23 35 MUX_S2
GPIO24 36 MUX_S0
GPIO25 37 MUX_S1
GPIO26_ADC0 38 MUX_SEL0
GPIO27_ADC1 39 MUX_SEL1
GPIO28_ADC2 40 MUX_COMMON
GPIO29_ADC3 41

GND 57

QSPI_CS 56 QSPI_SS
QSPI_CLK 52 QSPI_SCLK
QSPI_IO0 53 QSPI_SD0
QSPI_IO1 55 QSPI_SD1
QSPI_IO2 54 QSPI_SD2
QSPI_IO3 51 QSPI_SD3

GND
U15
W25Q128JVS
C17 100n
+3.3V
R35 10k
+3.3V
R28 1k USB_BOOT

8 VCC CS 1 QSPI_CS
6 CLK 5 QSPI_CLK
4 GND IO0 2 QSPI_IO0
IO1 3 QSPI_IO1
IO2 QSPI_IO2
IO3 7 QSPI_IO3
GND

Y1 12MHz
C27 16p
R31 1k
R34 10k
C28 16p
GND
GND
+3.3V

20 XIN
21 XOUT
26 RUN

SWCLK 24 SWCLK
SWD 25 SWD
GND

USB_DP R32 27 47 USB_DP
USB_DM R33 27 46 USB_DM
19 TESTEN
GND

J11
1 USB_BOOT
2 GND

J10
1 SWD
2 GND
3 SWCLK

Buttons
DEC_DI_A0 DEC_DI_A0
DEC_DI_A1 DEC_DI_A1
DEC_DI_A2 DEC_DI_A2
SR_IN_CLOCK SPI_CLK
SR_IN_LATCH SR_IN_LATCH
SR_IN_DATA SR_IN_DATA

DIN MIDI
MIDI_TX MIDI_TX
MIDI_RX MIDI_RX

LEDs
MAX7219_DIN MAX7219_DIN
MAX7219_LOAD MAX7219_LOAD
MAX7219_CLK SPI_CLK

Analog
MUX_COMMON MUX_COMMON
MUX_SEL0 MUX_SEL0
MUX_SEL1 MUX_SEL1
MUX_S0 MUX_S0
MUX_S1 MUX_S1
MUX_S2 MUX_S2
MUX_S3 MUX_S3

Indicators
TRAFFIC_IN TRAFFIC_IN
TRAFFIC_OUT TRAFFIC_OUT

H1 GND
H2 GND
H3 GND
H4 GND

J5
BTLDR 1
GND 2

J6
SDA 1
SCL 2
GND 3
+3.3V 4

J7
GND 1
+3.3V 2

J8
GND 1
+5V 2

J3
GND 1
TSCREEN_RX 2
TSCREEN_TX 3
4

Rows 0-7

SR_IN_CLOCK — SR_IN_CLOCK
SR_IN_LATCH — SR_IN_LATCH
SR_IN_DATA — SR_IN_DATA
SR_IN_DAISY — SR_DAISY_OUT_1

BC_0 — BC_0
BC_1 — BC_1
BC_2 — BC_2
BC_3 — BC_3
BC_4 — BC_4
BC_5 — BC_5
BC_6 — BC_6
BC_7 — BC_7

Rows 8-15

SR_IN_CLOCK — SR_IN_CLOCK
SR_IN_LATCH — SR_IN_LATCH
SR_IN_DATA — SR_DAISY_OUT_1
SR_IN_DAISY — ✕

BC_0 — BC_0
BC_1 — BC_1
BC_2 — BC_2
BC_3 — BC_3
BC_4 — BC_4
BC_5 — BC_5
BC_6 — BC_6
BC_7 — BC_7

C5   +3.3V   U5
100n   74HC138
GND
        16 VCC
        8   GND $\overline{Y0}$ 15 BC_1
                       $\overline{Y1}$ 14 BC_2
DEC_DI_A0 1 A0 $\overline{Y2}$ 13 BC_3
DEC_DI_A1 2 A1 $\overline{Y3}$ 12 BC_4
DEC_DI_A2 3 A2 $\overline{Y4}$ 11 BC_5
           4 E1 $\overline{Y5}$ 10 BC_6
GND   5 E2 $\overline{Y6}$ 9   BC_7
           6 E3 $\overline{Y7}$ 7   BC_0
+3.3V

IH1

BC_0D	1	2		D9	BR_0
BC_0D	3	4		D1	BR_1
BC_0D	5	6		D10	BR_2
BC_0D	7	8		D2	BR_3
BC_0D	9	10		D11	BR_4
BC_0D	11	12		D3	BR_5
BC_0D	13	14		D12	BR_6
BC_0D	15	16		D4	BR_7

IH2

BC_1D	1	2		D25	BR_0
BC_1D	3	4		D17	BR_1
BC_1D	5	6		D26	BR_2
BC_1D	7	8		D18	BR_3
BC_1D	9	10		D27	BR_4
BC_1D	11	12		D19	BR_5
BC_1D	13	14		D28	BR_6
BC_1D	15	16		D20	BR_7

IH3

BC_2D	1	2		D42	BR_0
BC_2D	3	4		D34	BR_1
BC_2D	5	6		D43	BR_2
BC_2D	7	8		D35	BR_3
BC_2D	9	10		D44	BR_4
BC_2D	11	12		D36	BR_5
BC_2D	13	14		D45	BR_6
BC_2D	15	16		D37	BR_7

IH4

BC_3D	1	2		D58	BR_0
BC_3D	3	4		D50	BR_1
BC_3D	5	6		D59	BR_2
BC_3D	7	8		D51	BR_3
BC_3D	9	10		D60	BR_4
BC_3D	11	12		D52	BR_5
BC_3D	13	14		D61	BR_6
BC_3D	15	16		D53	BR_7

IH5

BC_4D	1	2		D13	BR_0
BC_4D	3	4		D5	BR_1
BC_4D	5	6		D14	BR_2
BC_4D	7	8		D6	BR_3
BC_4D	9	10		D15	BR_4
BC_4D	11	12		D7	BR_5
BC_4D	13	14		D16	BR_6
BC_4D	15	16		D8	BR_7

IH6

BC_5D	1	2		D29	BR_0
BC_5D	3	4		D21	BR_1
BC_5D	5	6		D30	BR_2
BC_5D	7	8		D22	BR_3
BC_5D	9	10		D31	BR_4
BC_5D	11	12		D23	BR_5
BC_5D	13	14		D32	BR_6
BC_5D	15	16		D24	BR_7

IH7

BC_6D	1	2		D46	BR_0
BC_6D	3	4		D38	BR_1
BC_6D	5	6		D47	BR_2
BC_6D	7	8		D39	BR_3
BC_6D	9	10		D48	BR_4
BC_6D	11	12		D40	BR_5
BC_6D	13	14		D49	BR_6
BC_6D	15	16		D41	BR_7

IH8

BC_7D	1	2		D62	BR_0
BC_7D	3	4		D54	BR_1
BC_7D	5	6		D63	BR_2
BC_7D	7	8		D55	BR_3
BC_7D	9	10		D64	BR_4
BC_7D	11	12		D56	BR_5
BC_7D	13	14		D65	BR_6
BC_7D	15	16		D57	BR_7

+3.3V

BR_7	R2 4.7k
BR_6	R3 4.7k
BR_5	R4 4.7k
BR_4	R5 4.7k
BR_3	R6 4.7k
BR_2	R7 4.7k
BR_1	R8 4.7k
BR_0	R1 4.7k

C4 100n +3.3V

U4 74HC165

GND	16	VCC			
GND	8	GND	D0	11	BR_3
	15	CE	D1	12	BR_2
SR_IN_LATCHD	1	PL	D2	13	BR_1
SR_IN_CLOCKD	2	CP	D3	14	BR_0
SR_IN_DATAD	9	Q7	D4	3	BR_4
	7	Q7	D5	4	BR_5
SR_IN_DAISYD	10	DS	D6	5	BR_6
			D7	6	BR_7

Sheet: /Buttons/Rows 8-15/
File: Buttons_Rows.kicad_sch
Title:
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IH9
BC_0D 1 2 D66 BR_0
BC_0D 3 4 D74 BR_1
BC_0D 5 6 D67 BR_2
BC_0D 7 8 D75 BR_3
BC_0D 9 10 D68 BR_4
BC_0D 11 12 D76 BR_5
BC_0D 13 14 D69 BR_6
BC_0D 15 16 D77 BR_7

IH11
BC_1D 1 2 D82 BR_0
BC_1D 3 4 D90 BR_1
BC_1D 5 6 D83 BR_2
BC_1D 7 8 D91 BR_3
BC_1D 9 10 D84 BR_4
BC_1D 11 12 D92 BR_5
BC_1D 13 14 D85 BR_6
BC_1D 15 16 D93 BR_7

IH13
BC_2D 1 2 D98 BR_0
BC_2D 3 4 D106 BR_1
BC_2D 5 6 D99 BR_2
BC_2D 7 8 D107 BR_3
BC_2D 9 10 D100 BR_4
BC_2D 11 12 D108 BR_5
BC_2D 13 14 D101 BR_6
BC_2D 15 16 D109 BR_7

IH15
BC_3D 1 2 D114 BR_0
BC_3D 3 4 D122 BR_1
BC_3D 5 6 D115 BR_2
BC_3D 7 8 D123 BR_3
BC_3D 9 10 D116 BR_4
BC_3D 11 12 D124 BR_5
BC_3D 13 14 D117 BR_6
BC_3D 15 16 D125 BR_7

IH10
BC_4D 1 2 D70 BR_0
BC_4D 3 4 D78 BR_1
BC_4D 5 6 D71 BR_2
BC_4D 7 8 D79 BR_3
BC_4D 9 10 D72 BR_4
BC_4D 11 12 D80 BR_5
BC_4D 13 14 D73 BR_6
BC_4D 15 16 D81 BR_7

IH12
BC_5D 1 2 D86 BR_0
BC_5D 3 4 D94 BR_1
BC_5D 5 6 D87 BR_2
BC_5D 7 8 D95 BR_3
BC_5D 9 10 D88 BR_4
BC_5D 11 12 D96 BR_5
BC_5D 13 14 D89 BR_6
BC_5D 15 16 D97 BR_7

IH14
BC_6D 1 2 D102 BR_0
BC_6D 3 4 D110 BR_1
BC_6D 5 6 D103 BR_2
BC_6D 7 8 D111 BR_3
BC_6D 9 10 D104 BR_4
BC_6D 11 12 D112 BR_5
BC_6D 13 14 D105 BR_6
BC_6D 15 16 D113 BR_7

IH16
BC_7D 1 2 D118 BR_0
BC_7D 3 4 D126 BR_1
BC_7D 5 6 D119 BR_2
BC_7D 7 8 D127 BR_3
BC_7D 9 10 D120 BR_4
BC_7D 11 12 D128 BR_5
BC_7D 13 14 D121 BR_6
BC_7D 15 16 D129 BR_7

+3.3V
BR_7 R9 4.7k
BR_6 R10 4.7k
BR_5 R11 4.7k
BR_4 R12 4.7k
BR_3 R13 4.7k
BR_2 R14 4.7k
BR_1 R15 4.7k
BR_0 R16 4.7k

C8 100n
U8 74HC165
GND 16 VCC
GND 8 GND
SR_IN_LATCHD 15 CE
SR_IN_CLOCKD 1 PL
SR_IN_DATAD 2 CP
9 Q7
SR_IN_DAISYD 7 Q7
10 DS
D0 11 BR_3
D1 12 BR_2
D2 13 BR_1
D3 14 BR_0
D4 3 BR_4
D5 4 BR_5
D6 5 BR_6
D7 6 BR_7
+3.3V

C10
100n

+3.3V

GND

U10
6N137

8 VCC
5 GND

VE 7
VO 6

+3.3V

R20
4.7k

MIDI_RX

R19
220

2 A
3 C

D33

J2
DIN-5

J1
DIN-5

GND

R17
33

+3.3V

R18
10

MIDI_TX

U9
74HCT125

C9
100n

C7
100n

U6
MAX7219

R26
10k

MAX7219_DIND
MAX7219_LOADD
MAX7219_CLKD

VCC
GND

V+
GND
ISET
DIN
LOAD
CLK
DOUT

SEG_A   14 LED_ROW_1
SEG_B   16 LED_ROW_3
SEG_C   20 LED_ROW_5
SEG_D   23 LED_ROW_8
SEG_E   21 LED_ROW_6
SEG_F   15 LED_ROW_2
SEG_G   17 LED_ROW_4
SEG_DP   22 LED_ROW_7
DIG_0   2 LED_COLUMN_1
DIG_1   11 LED_COLUMN_8
DIG_2   6 LED_COLUMN_4
DIG_3   7 LED_COLUMN_5
DIG_4   3 LED_COLUMN_2
DIG_5   10 LED_COLUMN_7
DIG_6   5 LED_COLUMN_3
DIG_7   8 LED_COLUMN_6

1A 1Y
10E 2Y
2A 3Y
20E 4Y
3A
30E
4A
40E

GND

LED_COLUMN_1 OH1
LED_COLUMN_2 OH2
LED_COLUMN_3 OH3
LED_COLUMN_4 OH4
LED_COLUMN_5 OH5
LED_COLUMN_6 OH6
LED_COLUMN_7 OH7
LED_COLUMN_8 OH8

LED_ROW_1
LED_ROW_2
LED_ROW_3
LED_ROW_4
LED_ROW_5
LED_ROW_6
LED_ROW_7
LED_ROW_8

Sheet: /LEDs/
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Multiplexer 1
MUX_COMMON — MUX_COMMON_1
MUX_S0 — MUX_S0_5V
MUX_S1 — MUX_S1_5V
MUX_S2 — MUX_S2_5V
MUX_S3 — MUX_S3_5V

Multiplexer 2
MUX_COMMON — MUX_COMMON_2
MUX_S0 — MUX_S0_5V
MUX_S1 — MUX_S1_5V
MUX_S2 — MUX_S2_5V
MUX_S3 — MUX_S3_5V

Multiplexer 3
MUX_COMMON — MUX_COMMON_3
MUX_S0 — MUX_S0_5V
MUX_S1 — MUX_S1_5V
MUX_S2 — MUX_S2_5V
MUX_S3 — MUX_S3_5V

Multiplexer 4
MUX_COMMON — MUX_COMMON_4
MUX_S0 — MUX_S0_5V
MUX_S1 — MUX_S1_5V
MUX_S2 — MUX_S2_5V
MUX_S3 — MUX_S3_5V

+5V
U14
SPX3819M5
GND
C14
1u
IN   OUT
GND
EN   ADJ
+3.3VADC
GND

C11
100n
+5V
U11E
74HCT125
GND
VCC   GND
GND

C12
100n
+5V
U12E
74HCT125
GND
VCC   GND
GND

C35
100n
+5V
GND
U11A
74HCT125
MUX_SEL0
GND
U18
4051
VCC
VEE
GND
E
S0
S1
S2
COM
Y0   MUX_COMMON_2
Y1   MUX_COMMON_3
Y2   MUX_COMMON_4
Y3   MUX_COMMON_1
Y4
Y5
Y6
Y7
GND

U11B
74HCT125
MUX_SEL1
GND
MUX_COMMOND

U12A
74HCT125
MUX_S3
MUX_S3_5V
GND

U12B
74HCT125
MUX_S2
MUX_S2_5V
GND

U12C
74HCT125
MUX_S1
MUX_S1_5V
GND

U12D
74HCT125
MUX_S0
MUX_S0_5V
GND

Sheet: /Analog/
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C1 +5V
100n
GND

U1
74HC4067

24	VCC
12	GND
15	E
10	S0 (MUX_S0D)
11	S1 (MUX_S1D)
14	S2 (MUX_S2D)
13	S3 (MUX_S3D)
1	COM (MUX_COMMOND)

Y0 — 9 A_IN_0
Y1 — 8 A_IN_1
Y2 — 7 A_IN_2
Y3 — 6 A_IN_3
Y4 — 5 A_IN_4
Y5 — 4 A_IN_5
Y6 — 3 A_IN_6
Y7 — 2 A_IN_7
Y8 — 23 A_IN_8
Y9 — 22 A_IN_9
Y10 — 21 A_IN_10
Y11 — 20 A_IN_11
Y12 — 19 A_IN_12
Y13 — 18 A_IN_13
Y14 — 17 A_IN_14
Y15 — 16 A_IN_15

GND — AH1A 3x08 (pins 1–8)
GND — AH2A 3x08 (pins 1–8)

AH1B 3x08:
A_IN_15 — 9
A_IN_14 — 10
A_IN_13 — 11
A_IN_12 — 12
A_IN_11 — 13
A_IN_10 — 14
A_IN_9 — 15
A_IN_8 — 16

AH2B 3x08:
A_IN_0 — 9
A_IN_1 — 10
A_IN_2 — 11
A_IN_3 — 12
A_IN_4 — 13
A_IN_5 — 14
A_IN_6 — 15
A_IN_7 — 16

AH1C 3x08:
+3.3VADC — 17
18, 19, 20, 21, 22, 23, 24

AH2C 3x08:
+3.3VADC — 17
18, 19, 20, 21, 22, 23, 24

U2
74HC4067

VCC	24	
GND	12	
E	15	
S0	10	MUX_S0D
S1	11	MUX_S1D
S2	14	MUX_S2D
S3	13	MUX_S3D
COM	1	MUX_COMMOND

Y0	9	A_IN_0
Y1	8	A_IN_1
Y2	7	A_IN_2
Y3	6	A_IN_3
Y4	5	A_IN_4
Y5	4	A_IN_5
Y6	3	A_IN_6
Y7	2	A_IN_7
Y8	23	A_IN_8
Y9	22	A_IN_9
Y10	21	A_IN_10
Y11	20	A_IN_11
Y12	19	A_IN_12
Y13	18	A_IN_13
Y14	17	A_IN_14
Y15	16	A_IN_15

C2
100n
+5V

AH3A
3x08

AH3B
3x08

A_IN_15 9
A_IN_14 10
A_IN_13 11
A_IN_12 12
A_IN_11 13
A_IN_10 14
A_IN_9 15
A_IN_8 16

AH3C
3x08

+3.3VADC 17

AH4A
3x08

AH4B
3x08

A_IN_0 9
A_IN_1 10
A_IN_2 11
A_IN_3 12
A_IN_4 13
A_IN_5 14
A_IN_6 15
A_IN_7 16

AH4C
3x08

+3.3VADC 17

U7
74HC4067

24	VCC	
12	GND	
15	E	
10	S0	MUX_S0D
11	S1	MUX_S1D
14	S2	MUX_S2D
13	S3	MUX_S3D
1	COM	MUX_COMMOND

Y0	9	A_IN_0
Y1	8	A_IN_1
Y2	7	A_IN_2
Y3	6	A_IN_3
Y4	5	A_IN_4
Y5	4	A_IN_5
Y6	3	A_IN_6
Y7	2	A_IN_7
Y8	23	A_IN_8
Y9	22	A_IN_9
Y10	21	A_IN_10
Y11	20	A_IN_11
Y12	19	A_IN_12
Y13	18	A_IN_13
Y14	17	A_IN_14
Y15	16	A_IN_15

C6
100n
+5V
GND

AH5A 3x08
AH6A 3x08
AH5B 3x08
AH6B 3x08
AH5C 3x08
AH6C 3x08

+3.3VADC

C3
100n
+5V
GND
U3
74HC4067

VCC 24
GND 12
E 15
MUX_S0D 10 S0
MUX_S1D 11 S1
MUX_S2D 14 S2
MUX_S3D 13 S3
MUX_COMMOND 1 COM

Y0 9 A_IN_0
Y1 8 A_IN_1
Y2 7 A_IN_2
Y3 6 A_IN_3
Y4 5 A_IN_4
Y5 4 A_IN_5
Y6 3 A_IN_6
Y7 2 A_IN_7
Y8 23 A_IN_8
Y9 22 A_IN_9
Y10 21 A_IN_10
Y11 20 A_IN_11
Y12 19 A_IN_12
Y13 18 A_IN_13
Y14 17 A_IN_14
Y15 16 A_IN_15

GND
AH7A
3x08
1
2
3
4
5
6
7
8

GND
AH8A
3x08
1
2
3
4
5
6
7
8

AH7B
3x08
A_IN_15 9
A_IN_14 10
A_IN_13 11
A_IN_12 12
A_IN_11 13
A_IN_10 14
A_IN_9 15
A_IN_8 16

AH8B
3x08
A_IN_0 9
A_IN_1 10
A_IN_2 11
A_IN_3 12
A_IN_4 13
A_IN_5 14
A_IN_6 15
A_IN_7 16

+3.3VADC
AH7C
3x08
17
18
19
20
21
22
23
24

+3.3VADC
AH8C
3x08
17
18
19
20
21
22
23
24

+5V

R23
1k

D130

GND

TRAFFIC_IN

R25
680

D131

GND

TRAFFIC_OUT

R27
1k

D132

GND

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