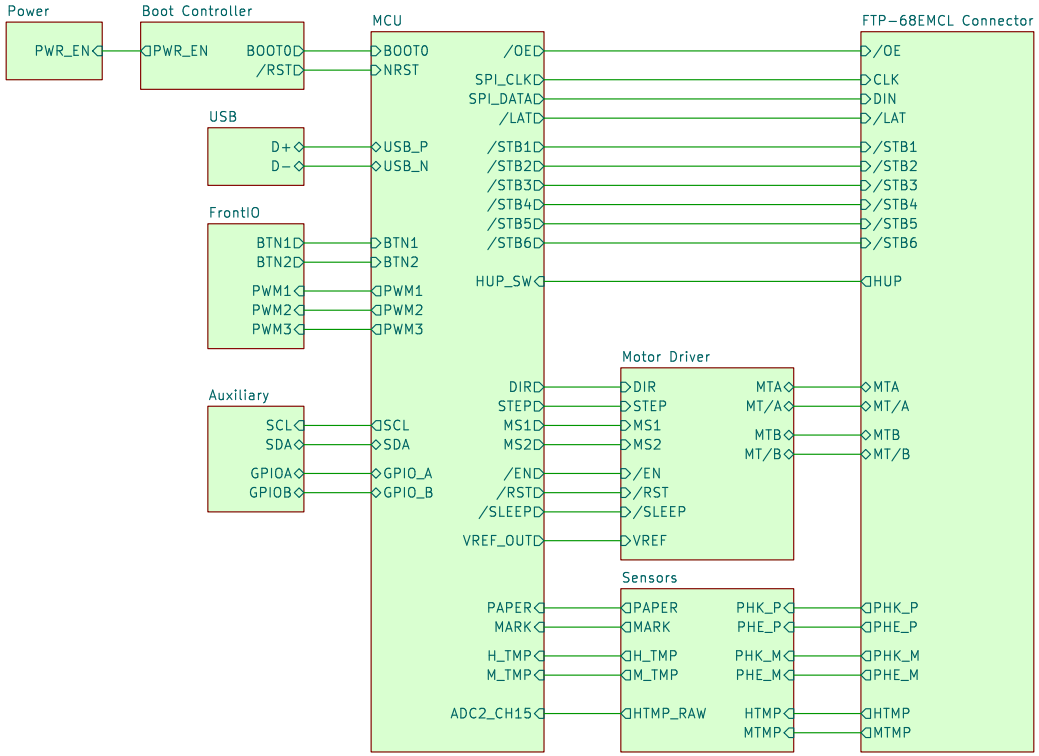


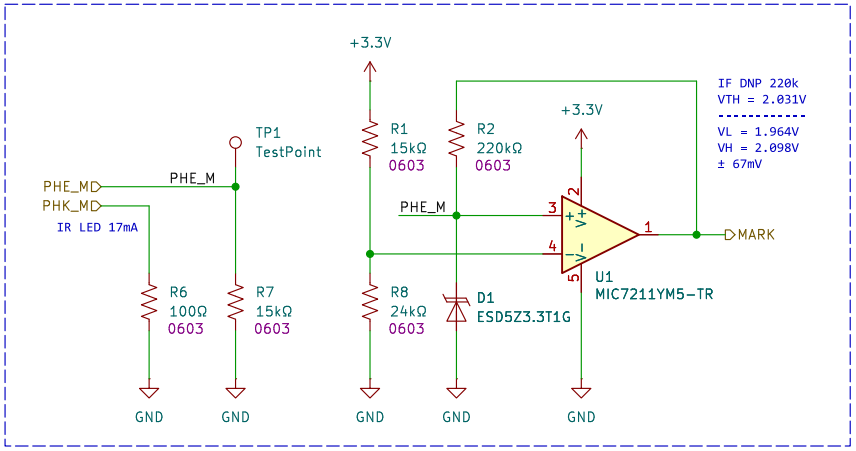
The Lark Project
Designer: HamSlices
Thermal Print Engine

Sheet: /
File: Lark.kicad_sch

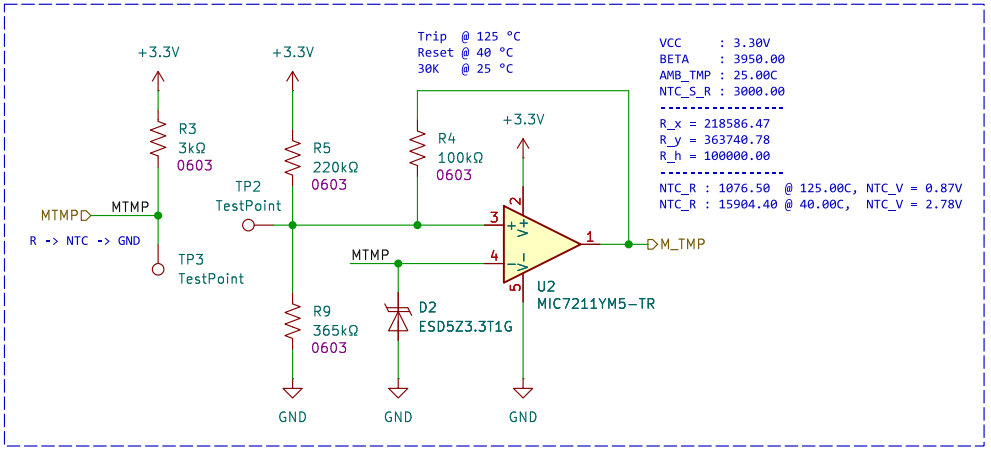
Title: Lark Print Engine

Size: A4	Date: 2025-10-08	**Rev: 01.00.02**
KiCad E.D.A. 9.0.5		Id: 1/13

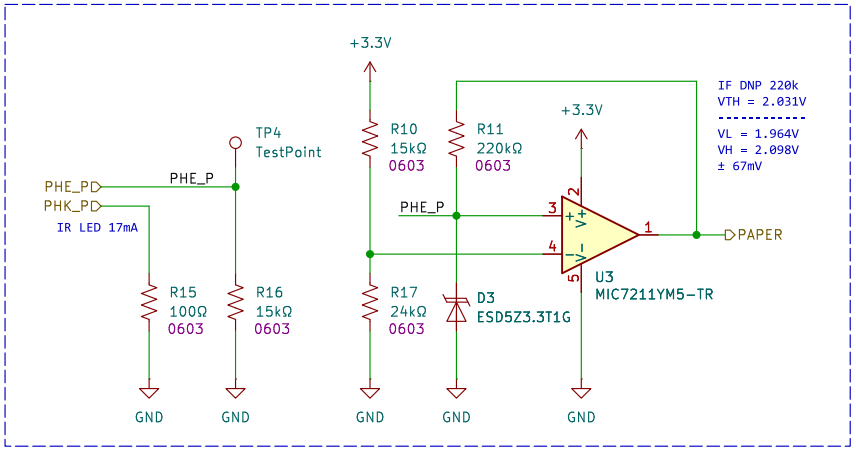
Mark Sensor



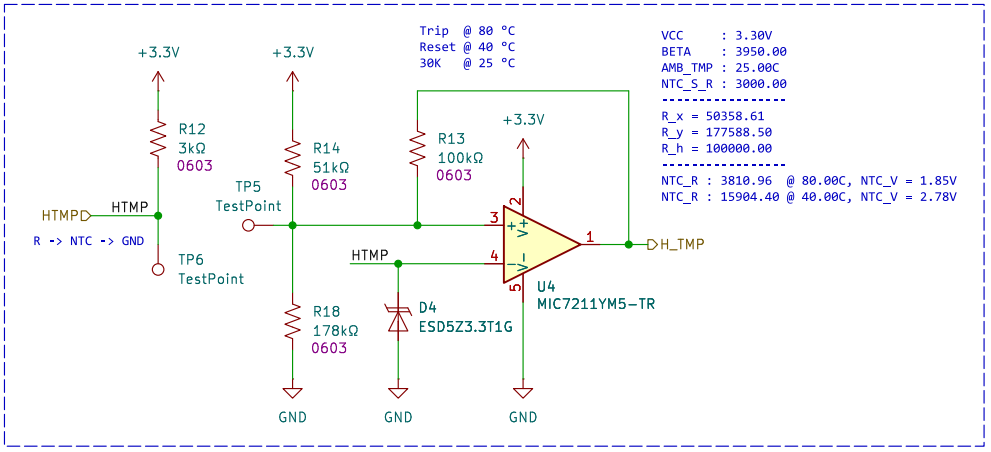
Motor Temperature Sensor



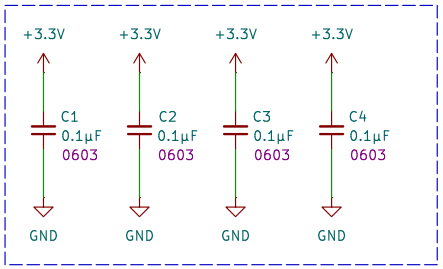
Paper Sensor



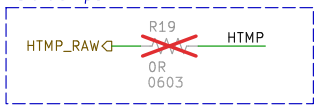
Head Temperature Sensor



Filter Caps



ADC Jumper

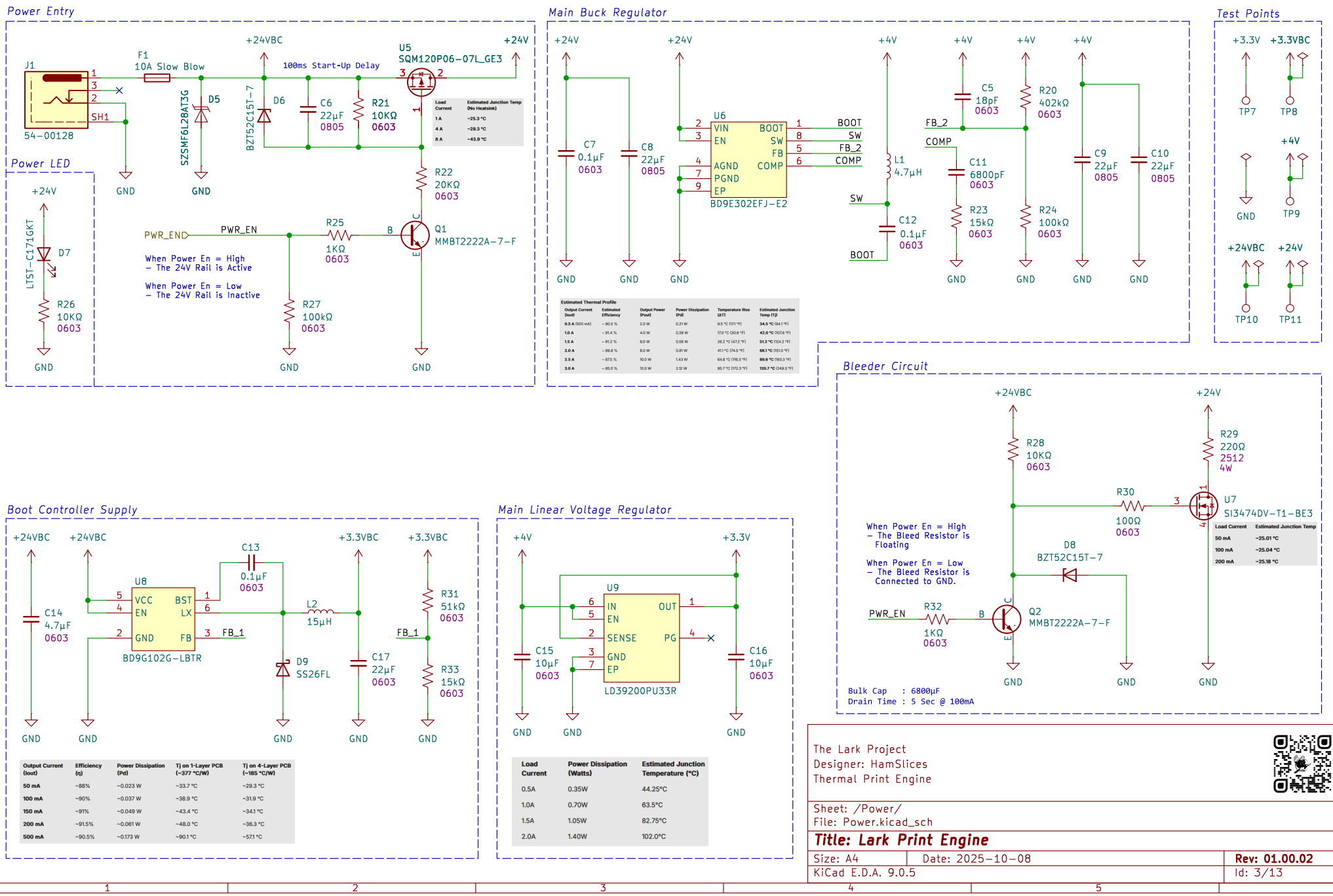


The Lark Project
Designer: HamSlices
Thermal Print Engine

Sheet: /Sensors/
File: Sensors.kicad_sch

Title: Lark Print Engine

Size: A4	Date: 2025-10-08	**Rev: 01.00.02**
KiCad E.D.A. 9.0.5		Id: 2/13


Power Entry
J1
54-00128
F1
10A Slow Blow
SH1
SZSMF6L28AT3G
D5
GND
+24VBC
BZT52C15T-7
D6
100ms Start-Up Delay
C6
22µF
0805
R21
10KΩ
0603
U5
SQM120P06-07L_GE3
+24V
Load Current
Estimated Junction Temp (No Heatsink)
1 A
~25.3 °C
4 A
~29.3 °C
8 A
~43.9 °C
R22
20KΩ
0603
Power LED
+24V
LTST-C171GKT
D7
R26
10KΩ
0603
PWR_END
PWR_EN
R25
1KΩ
0603
Q1
MMBT2222A-7-F
When Power En = High
– The 24V Rail is Active
When Power En = Low
– The 24V Rail is Inactive
R27
100kΩ
0603
Main Buck Regulator
C7
0.1µF
0603
C8
22µF
0805
U6
VIN
EN
AGND
PGND
EP
BOOT
SW
FB
COMP
BD9E302EFJ-E2
BOOT
SW
FB_2
COMP
L1
4.7µH
C12
0.1µF
0603
C5
18pF
0603
R20
402kΩ
0603
C11
6800pF
0603
R23
15kΩ
0603
R24
100kΩ
0603
C9
22µF
0805
C10
22µF
0805
Estimated Thermal Profile
Output Current (Iout)
Estimated Efficiency
Output Power (Pout)
Power Dissipation (Pd)
Temperature Rise (ΔT)
Estimated Junction Temp (Tj)
0.5 A (500 mA)
~ 90.5 %
2.0 W
0.21 W
9.5 °C (17.1 °F)
34.5 °C (94.1 °F)
1.0 A
~ 91.4 %
4.0 W
0.38 W
17.0 °C (30.6 °F)
42.0 °C (107.6 °F)
1.5 A
~ 91.2 %
6.0 W
0.58 W
26.2 °C (47.2 °F)
51.2 °C (124.2 °F)
2.0 A
~ 89.8 %
8.0 W
0.91 W
41.1 °C (74.0 °F)
66.1 °C (151.0 °F)
2.5 A
~ 87.5 %
10.0 W
1.43 W
64.6 °C (116.3 °F)
89.6 °C (193.3 °F)
3.0 A
~ 85.0 %
12.0 W
2.12 W
95.7 °C (172.3 °F)
120.7 °C (249.3 °F)
Test Points
+3.3V
+3.3VBC
TP7
TP8
GND
+4V
TP9
+24VBC
+24V
TP10
TP11
Bleeder Circuit
+24VBC
+24V
R28
10KΩ
0603
R29
220Ω
2512
4W
R30
100Ω
0603
U7
SI3474DV-T1-BE3
Load Current
Estimated Junction Temp
50 mA
~25.01 °C
100 mA
~25.04 °C
200 mA
~25.18 °C
When Power En = High
– The Bleed Resistor is Floating
When Power En = Low
– The Bleed Resistor is Connected to GND.
D8
BZT52C15T-7
PWR_EN
R32
1KΩ
0603
Q2
MMBT2222A-7-F
Bulk Cap : 6800µF
Drain Time : 5 Sec @ 100mA
Boot Controller Supply
+24VBC
+24VBC
C13
0.1µF
0603
+3.3VBC
+3.3VBC
U8
VCC
EN
GND
BST
LX
FB
BD9G102G-LBTR
FB_1
L2
15µH
C14
4.7µF
0603
D9
SS26FL
C17
22µF
0603
R31
51kΩ
0603
R33
15kΩ
0603
Output Current (Iout)
Efficiency (η)
Power Dissipation (Pd)
Tj on 1-Layer PCB (~377 °C/W)
Tj on 4-Layer PCB (~185 °C/W)
50 mA
~88%
~0.023 W
~33.7 °C
~29.3 °C
100 mA
~90%
~0.037 W
~38.9 °C
~31.9 °C
150 mA
~91%
~0.049 W
~43.4 °C
~34.1 °C
200 mA
~91.5%
~0.061 W
~48.0 °C
~36.3 °C
500 mA
~90.5%
~0.173 W
~90.1 °C
~57.1 °C
Main Linear Voltage Regulator
+4V
+3.3V
U9
IN
EN
SENSE
GND
EP
OUT
PG
LD39200PU33R
C15
10µF
0603
C16
10µF
0603
Load Current
Power Dissipation (Watts)
Estimated Junction Temperature (°C)
0.5A
0.35W
44.25°C
1.0A
0.70W
63.5°C
1.5A
1.05W
82.75°C
2.0A
1.40W
102.0°C
The Lark Project
Designer: HamSlices
Thermal Print Engine
Sheet: /Power/
File: Power.kicad_sch
Title: Lark Print Engine
Size: A4
Date: 2025-10-08
Rev: 01.00.02
KiCad E.D.A. 9.0.5
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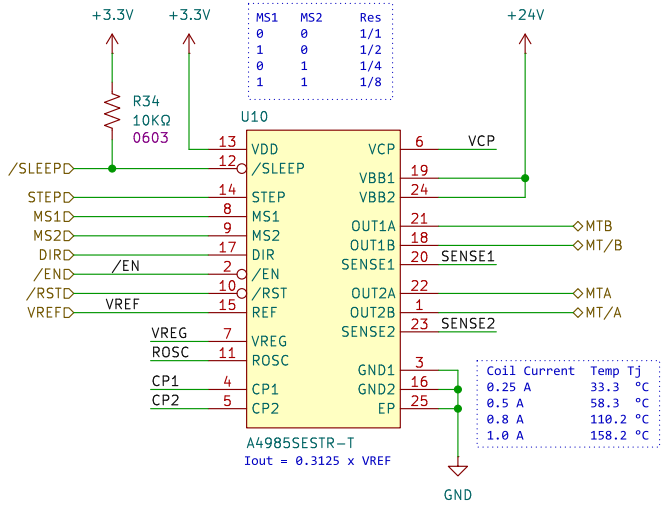
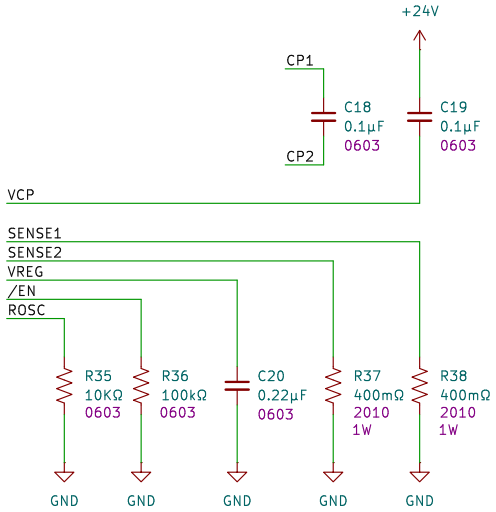
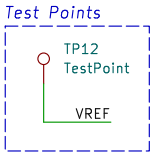
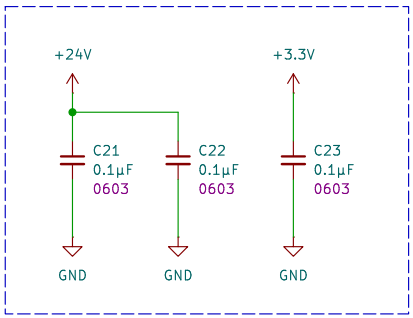
Using a 0.4 Ω (400 mΩ) Sense Resistor
Target Coil Current (ITripMAX) Required VREF Voltage

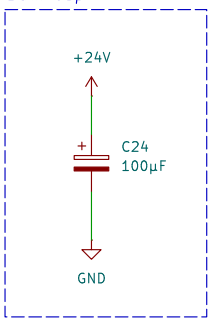
100 mA (0.1 A)	0.33 V
200 mA (0.2 A)	0.66 V
300 mA (0.3 A)	0.99 V
400 mA (0.4 A)	1.32 V
500 mA (0.5 A)	1.65 V
600 mA (0.6 A)	1.98 V
700 mA (0.7 A)	2.31 V
800 mA (0.8 A)	2.64 V
900 mA (0.9 A)	2.97 V
1000 mA (1.0 A)	3.30 V











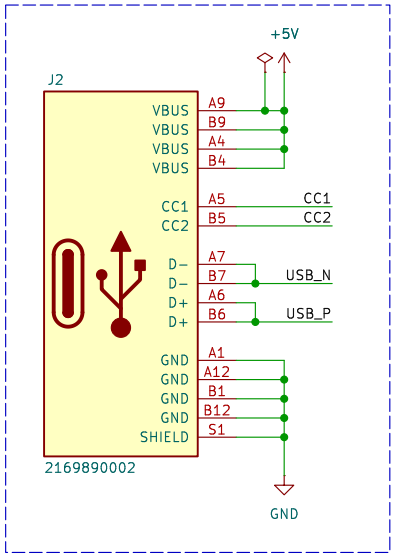
The Lark Project
Designer: HamSlices
Thermal Print Engine

Sheet: /Motor Driver/
File: Motor_Driver.kicad_sch

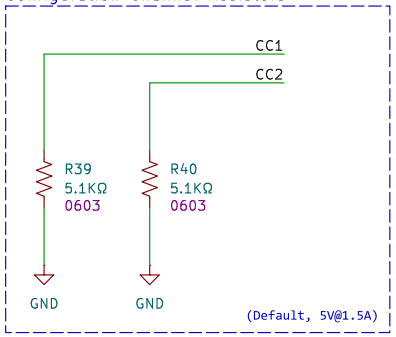
Title: Lark Print Engine

Size: A4	Date: 2025-10-08	**Rev: 01.00.02**
KiCad E.D.A. 9.0.5		Id: 4/13

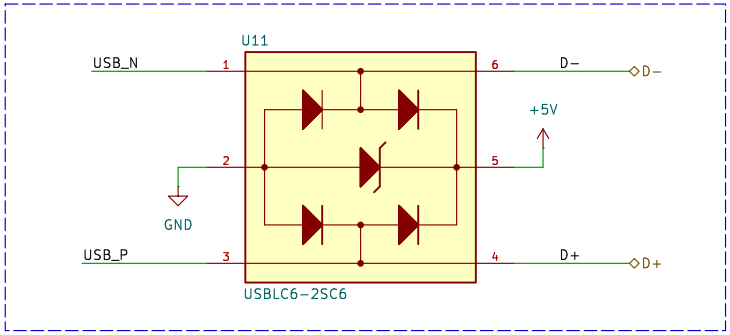
USB-C



Configuration Channel Resistors



Transient Voltage Suppressor

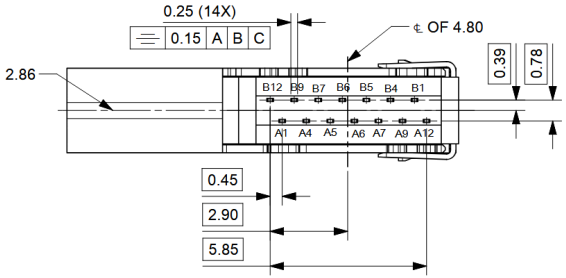


Pinout : 2169890002

USB TYPE-C PIN ASSIGNMENTS

PIN NUMBER	SIGNAL NAME
A1	GND
A4	VBUS
A5	CC1
A6	Dp1
A7	Dn1
A9	VBUS
A12	GND

PIN NUMBER	SIGNAL NAME
B12	GND
B9	VBUS
B7	Dn2
B6	Dp2
B5	CC2
B4	VBUS
B1	GND

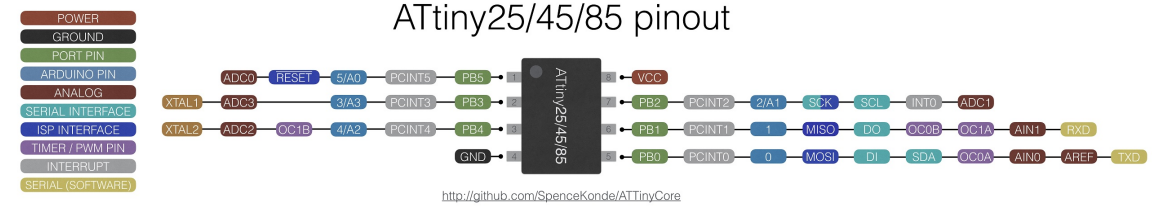


The Lark Project
Designer: HamSlices
Thermal Print Engine

Sheet: /USB/
File: USB.kicad_sch

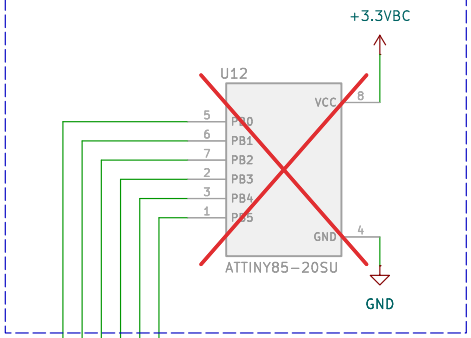
Title: Lark Print Engine

Size: A4	Date: 2025-10-08	**Rev: 01.00.02**
KiCad E.D.A. 9.0.5		Id: 5/13

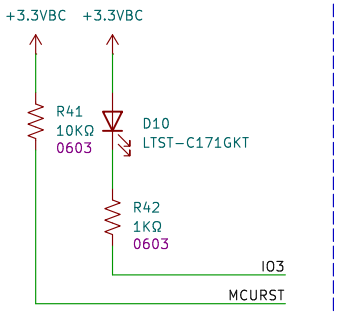


Programmer & Tutorial
- *https://learn.sparkfun.com/tutorials/tiny-avr-programmer-hookup-guide/*
- *https://www.digikey.com/en/products/detail/sparkfun-electronics/11801/5230948*
- *https://tinyurl.com/4sdmahcw*

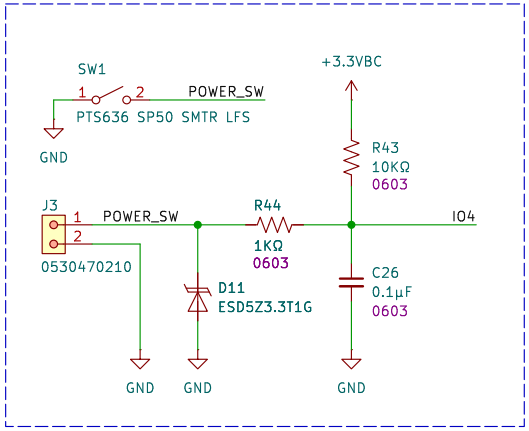
SMD Variant



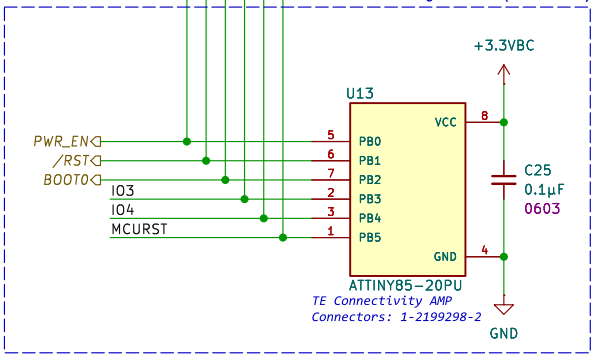
Indicator & Reset pull-up



Power Switch



Through Hole (socketed)



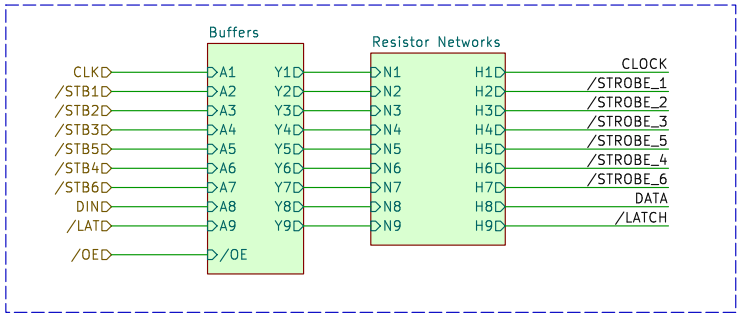
The Lark Project
Designer: HamSlices
Thermal Print Engine

Sheet: /Boot Controller/
File: Boot_Controller.kicad_sch

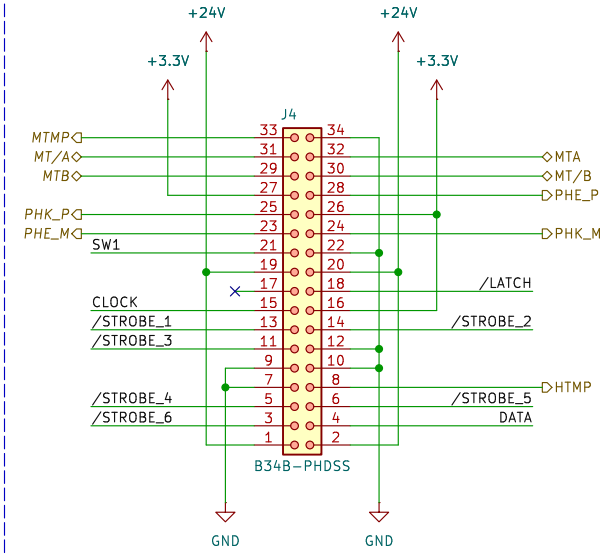
Title: Lark Print Engine

Size: A4	Date: 2025-10-08	**Rev: 01.00.02**
KiCad E.D.A. 9.0.5		Id: 6/13

Line Drivers & R-Newtworks



Mech Connector

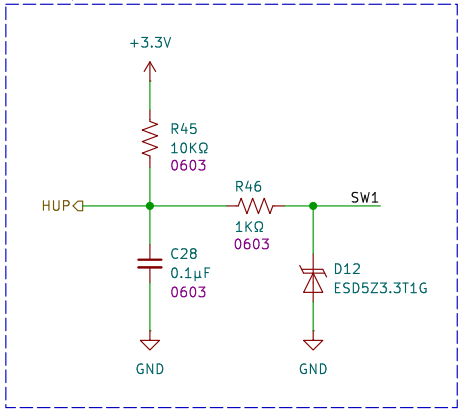


Mating Connector

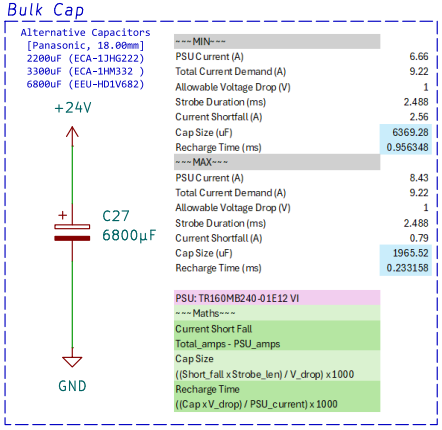
FTP-68EMCL101/151/112/162

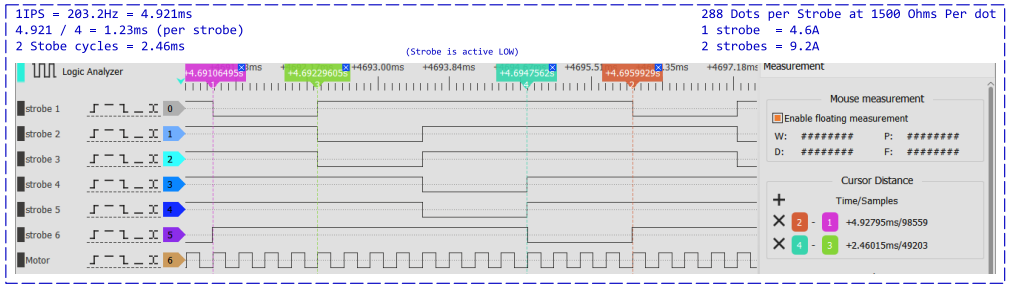
No	Signal	I/O	No	Signal	I/O
1	MTMP	I	18	/LAT	I
2	GND	-	19	CLK	I
3	MT_/A	I	20	VDD	I
4	MT_A	I	21	/STB1	I
5	MT_B	I	22	/STB2	I
6	MT_/B	I	23	/STB3	I
7	VSEN	I	24	GND	-
8	PHE	O	25	GND	-
9	PHK	O	26	GND	-
10	VSEN	I	27	GND	-
11	PHE	O	28	HTMP	O
12	PHK	O	29	/STB4	I
13	HUP	O	30	/STB5	I
14	GND	-	31	/STB6	I
15	VH	I	32	DI	I
16	VH	I	33	VH	I
17	DO	O	34	VH	I

Head Up Switch



Bulk Cap





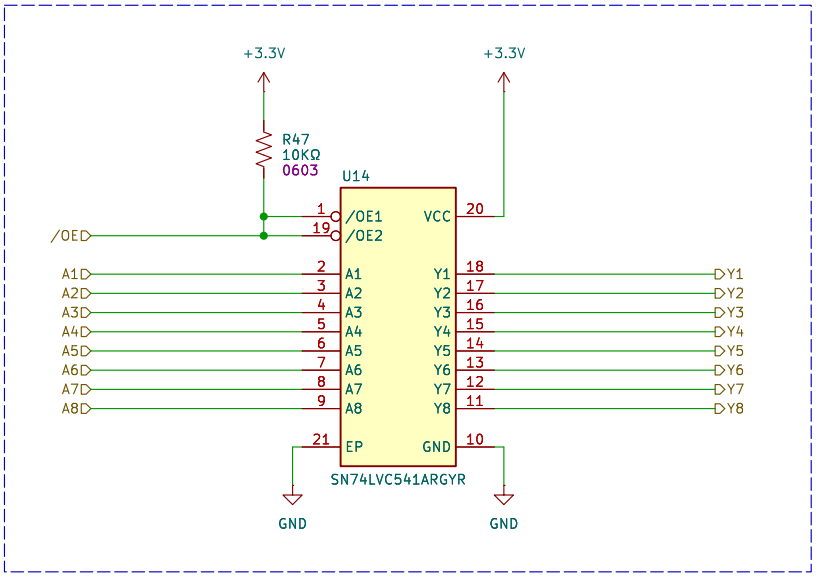
The Lark Project
Designer: HamSlices
Thermal Print Engine

Sheet: /FTP-68EMCL Connector/
File: FTP-68EMCL_Connector.kicad_sch

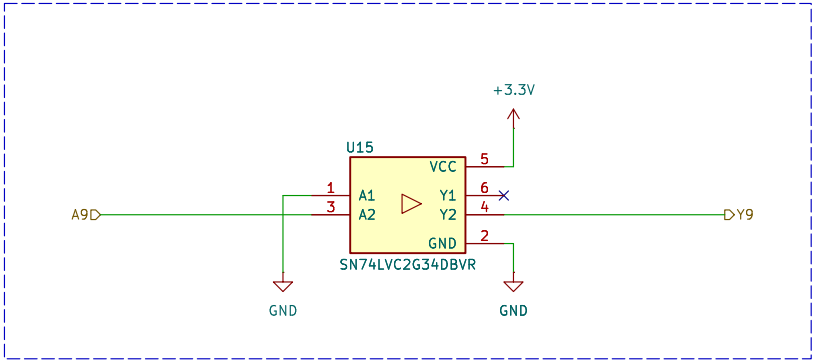
Title: Lark Print Engine

Size: A4	Date: 2025-10-08	**Rev: 01.00.02**
KiCad E.D.A. 9.0.5		Id: 7/13

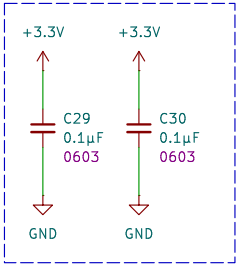
Strobe / Data / Clock, Line Driver



Latch, Line Driver



Filter Caps

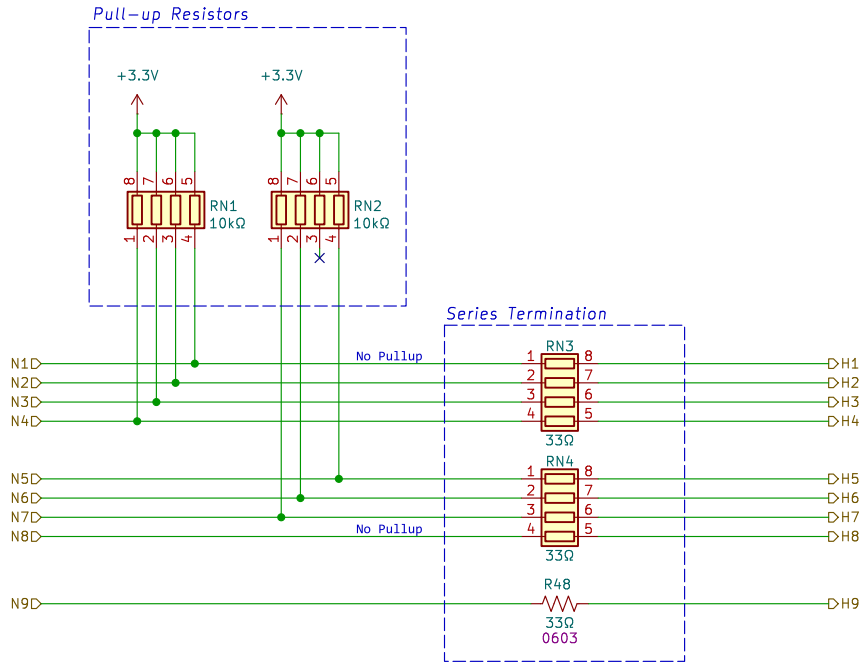


The Lark Project
Designer: HamSlices
Thermal Print Engine

Sheet: /FTP-68EMCL Connector/Buffers/
File: Buffers.kicad_sch

Title: Lark Print Engine

Size: A4	Date: 2025-10-08	**Rev: 01.00.02**
KiCad E.D.A. 9.0.5		Id: 8/13



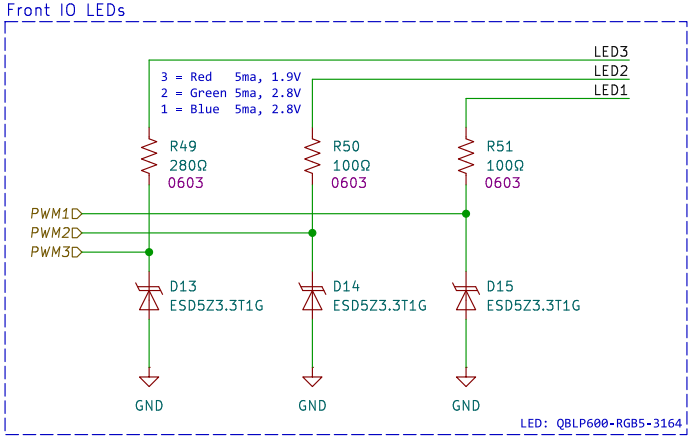
The Lark Project
Designer: HamSlices
Thermal Print Engine

Sheet: /FTP-68EMCL Connector/Resistor Networks/
File: Resistor_Networks.kicad_sch

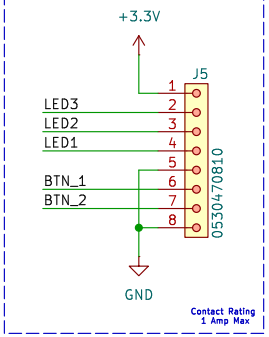
Title: Lark Print Engine

Size: A4	Date: 2025-10-08	**Rev: 01.00.02**
KiCad E.D.A. 9.0.5		Id: 9/13

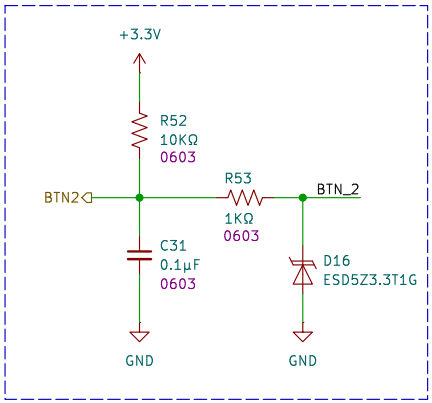
Front IO LEDs



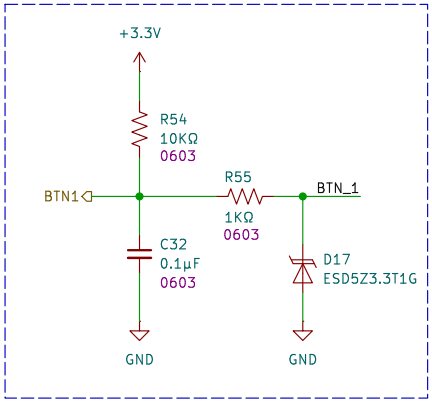
Front IO Connector



Front IO Button 2



Front IO Button 1



The Lark Project
Designer: HamSlices
Thermal Print Engine

Sheet: /FrontIO/
File: FrontIO.kicad_sch

Title: Lark Print Engine

Size: A4	Date: 2025-10-08	**Rev: 01.00.02**
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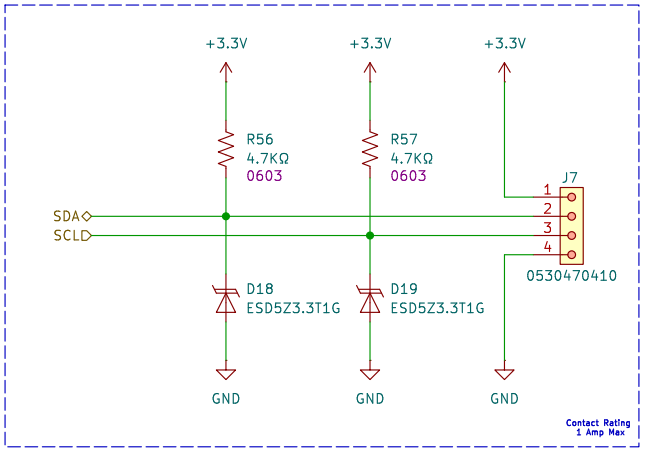
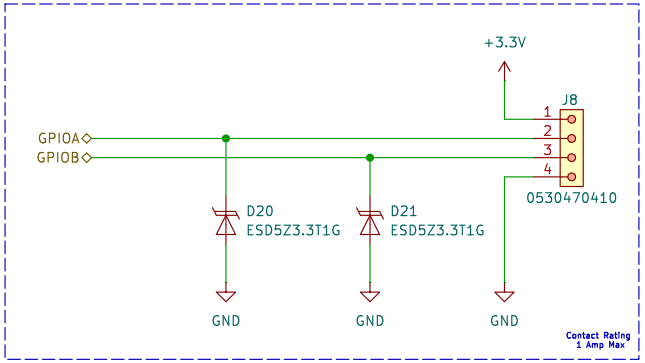
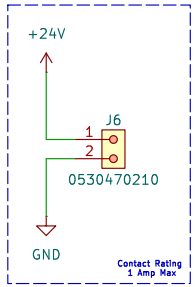
I2C Breakout



GPIO A&B Breakout



FAN 24V Power



- Recomended Fan -
Sunon Fans
MF50152V1-1000U-A99
50mm x 50mm x 15.00mm
24V, 1.01 Watts

The Lark Project
Designer: HamSlices
Thermal Print Engine

Sheet: /Auxiliary/
File: Auxiliary.kicad_sch

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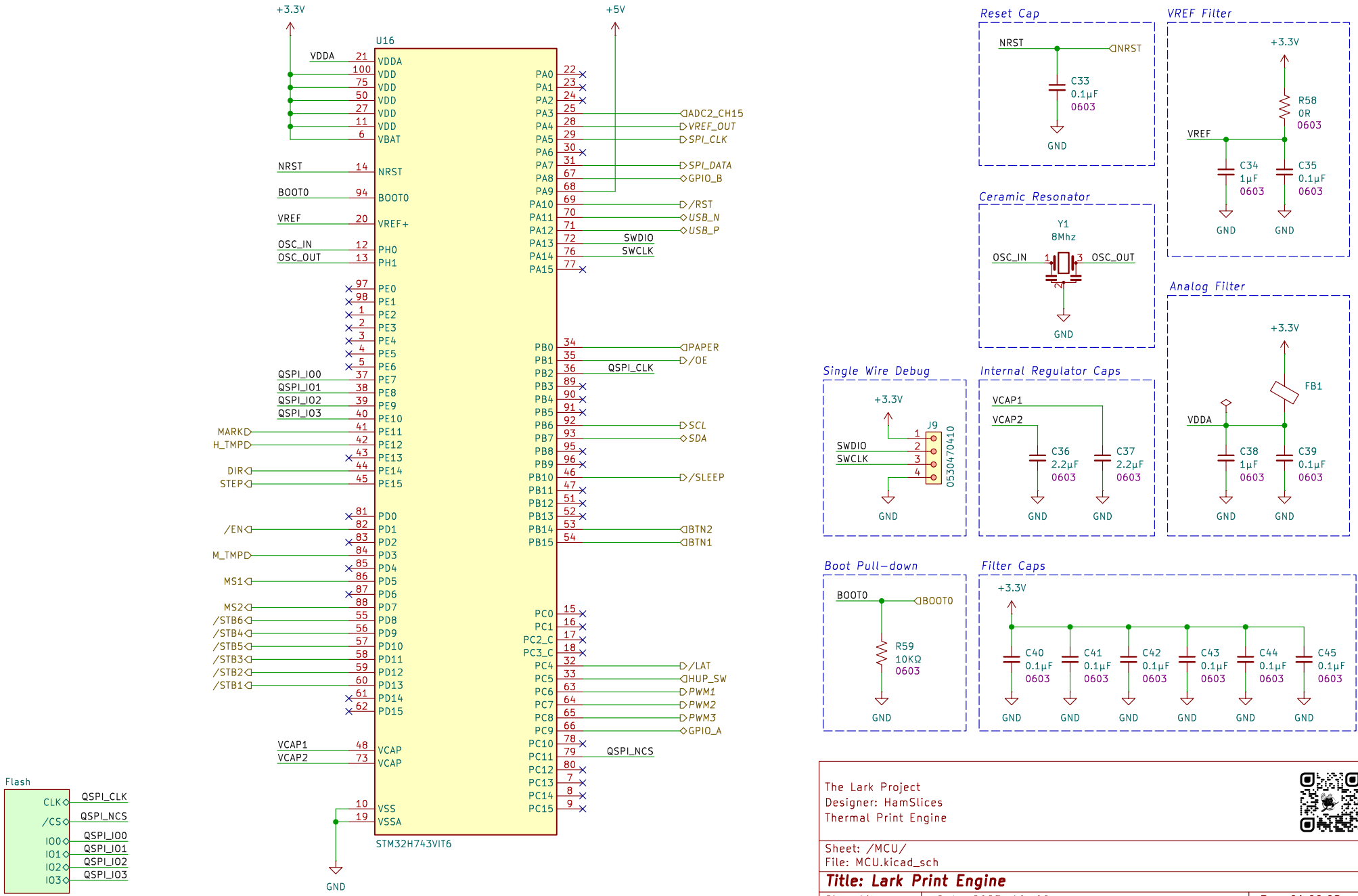
+3.3V
+5V
U16
VDDA 21
VDD 100
VDD 75
VDD 50
VDD 27
VDD 11
VDD 6
VBAT
NRST 14
NRST
BOOT0 94
BOOT0
VREF 20
VREF+
OSC_IN 12
OSC_OUT 13
PH0
PH1
PE0 97
PE1 98
PE2 1
PE3 2
PE4 3
PE5 4
PE6 5
PE7 37
PE8 38
PE9 39
PE10 40
PE11 41
PE12 42
PE13 43
PE14 44
PE15 45
PD0 81
PD1 82
PD2 83
PD3 84
PD4 85
PD5 86
PD6 87
PD7 88
PD8 55
PD9 56
PD10 57
PD11 58
PD12 59
PD13 60
PD14 61
PD15 62
VCAP1 48
VCAP2 73
VCAP
VCAP
VSS 10
VSSA 19
STM32H743VIT6
PA0 22
PA1 23
PA2 24
PA3 25
PA4 28
PA5 29
PA6 30
PA7 31
PA8 67
PA9 68
PA10 69
PA11 70
PA12 71
PA13 72
PA14 76
PA15 77
PB0 34
PB1 35
PB2 36
PB3 89
PB4 90
PB5 91
PB6 92
PB7 93
PB8 95
PB9 96
PB10 46
PB11 47
PB12 51
PB13 52
PB14 53
PB15 54
PC0 15
PC1 16
PC2_C 17
PC3_C 18
PC4 32
PC5 33
PC6 63
PC7 64
PC8 65
PC9 66
PC10 78
PC11 79
PC12 80
PC13 7
PC14 8
PC15 9
ADC2_CH15
VREF_OUT
SPI_CLK
SPI_DATA
GPIO_B
/RST
USB_N
USB_P
SWDIO
SWCLK
PAPER
/OE
QSPI_CLK
SCL
SDA
/SLEEP
BTN2
BTN1
/LAT
HUP_SW
PWM1
PWM2
PWM3
GPIO_A
QSPI_NCS
QSPI_IO0
QSPI_IO1
QSPI_IO2
QSPI_IO3
MARK
H_TMP
DIR
STEP
/EN
M_TMP
MS1
MS2
/STB6
/STB4
/STB5
/STB3
/STB2
/STB1
GND
Flash
CLK
/CS
IO0
IO1
IO2
IO3
QSPI_CLK
QSPI_NCS
QSPI_IO0
QSPI_IO1
QSPI_IO2
QSPI_IO3
Reset Cap
NRST
NRST
C33
0.1µF
0603
GND
VREF Filter
+3.3V
R58
0R
0603
VREF
C34
1µF
0603
C35
0.1µF
0603
GND
GND
Ceramic Resonator
Y1
8Mhz
OSC_IN
OSC_OUT
GND
Analog Filter
+3.3V
FB1
VDDA
C38
1µF
0603
C39
0.1µF
0603
GND
GND
Single Wire Debug
+3.3V
J9
SWDIO
SWCLK
0530470410
GND
Internal Regulator Caps
VCAP1
VCAP2
C36
2.2µF
0603
C37
2.2µF
0603
GND
GND
Boot Pull-down
BOOT0
BOOT0
R59
10KΩ
0603
GND
Filter Caps
+3.3V
C40
0.1µF
0603
C41
0.1µF
0603
C42
0.1µF
0603
C43
0.1µF
0603
C44
0.1µF
0603
C45
0.1µF
0603
GND
GND
GND
GND
GND
GND
The Lark Project
Designer: HamSlices
Thermal Print Engine
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Title: Lark Print Engine
Size: A4
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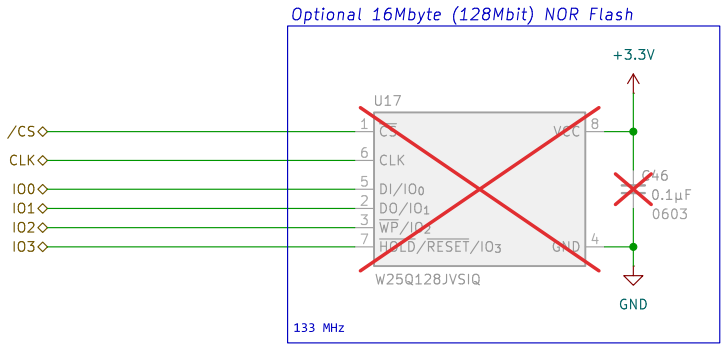

The Lark Project
Designer: HamSlices
Thermal Print Engine

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File: Flash.kicad_sch

Title: Lark Print Engine

Size: A4	Date: 2025-10-08	**Rev: 01.00.02**
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