USB-C
Used exclusively to charge battery.

J1
A9	VBUS_A	VBUS_B	B9
A5	CC1	CC2	B5
A12	GND_A	GND_B	B12
SH1	SHIELD		
SH2	SHIELD		
SH3	SHIELD		
SH4	SHIELD		

10164359-00011LF

R1 5.1k
R2 5.1k
GND
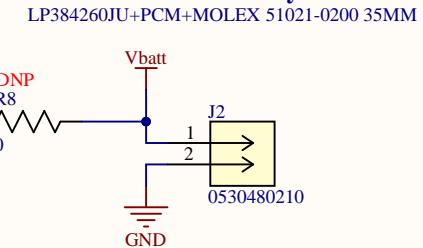
USB-C plug will be placed on edge of
the PCB for access through housing.

DNP
R7 0
+5V
C1 4.7uF 10V
GND

Power Charger

Charging Status
D1
R3 470

U1
4	VDD	VBAT	3
		PROG	5
1	STAT	VSS	2

MCP73831T-2ATI/OT

R4 2k
C2 4.7uF 10V
GND
GND
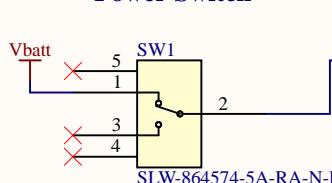
For best thermal performance, add vias from land area of EP
to copper layer on opposite side of PCB
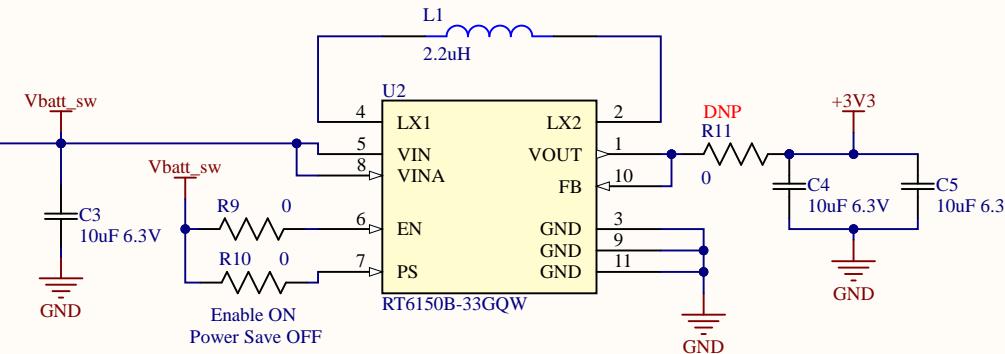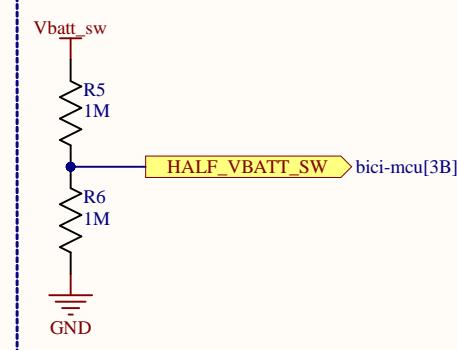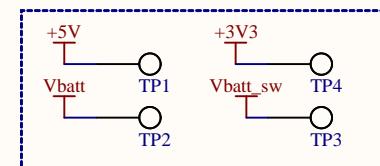
Power charger should be placed close to battery connector.

Li Ion Battery
LP384260JU+PCM+MOLEX 51021-0200 35MM

Vbatt
DNP
R8 0

J2
| 1 | |
| 2 | |

0530480210
GND

Connector will be placed on edge of
the PCB to connect to battery located underneath.

Power Switch

Vbatt
SW1
5	
1	
	2
3	
4	

SLW-864574-5A-RA-N-D

Switch in L position: ON
Switch in R positon: OFF

Switch will be placed on edge of
the PCB for access through housing.

Vbatt_sw
C3 10uF 6.3V
GND

Vbatt_sw
R9 0
R10 0

Enable ON
Power Save OFF

Buck-Boost

L1 2.2uH

U2
4	LX1	LX2	2
5	VIN	VOUT	1
8	VINA	FB	10
6	EN	GND	3
		GND	9
7	PS	GND	11

RT6150B-33GQW
GND

DNP
R11 0
+3V3
C4 10uF 6.3V
C5 10uF 6.3V
GND

C3 should be placed as close as possible to Vin.
C4 and C5 should be placed as close as possible to Vout.
L1 should be connected to inductor by wide and short trace.

Low Power Detection

Vbatt_sw
R5 1M
HALF_VBATT_SW bici-mcu[3B]
R6 1M
GND

Test Points

+5V
Vbatt   TP1
TP2

+3V3
Vbatt_sw   TP4
TP3

Title	**Bici: Power Management** Circuitry related to system power and charging.		
Size A	Number		Revision V3
Date:	12/09/2025		Sheet 1 of 5
File:	C:\Users\..\bici-power.SchDoc		Drawn By: Team Bici

Test Points

Test points should be placed close to IMU.

TP101
TP102
TP103
TP104

IMU

U101

Pin	Signal
7	FSYNC
4	INT1/INT
9	INT2
8	VDD
5	VDDIO
6	GND

AP_CS 12 SPI_CS bici-mcu[3B]
AP_SCL/AP_SCLK 13 SPI_CLK bici-mcu[3B]
AP_SDA/AP_SDIO/AP_SDI 14 SPI_MOSI bici-mcu[3B]
AP_SDO/AP_AD0 1 SPI_MISO bici-mcu[3B]

RESV 2
RESV 3
RESV 10
RESV 11

GND

ICM-42670-P

bici-mcu[3C] IMU_INT1

GND

TP105

+3V3

+3V3

C103
10 nF 50V

C103 should be placed as
close as possible to VDDIO pin.

GND   GND

+3V3   +3V3

C101   C102
0.1uF 6.3V   2.2 uF 25 V

GND   GND

C101 and C102 should be placed as close as possible to VDD pin, with C101 closest to pin.

Title	**Bici: IMU** Circuitry related to IMU.		
Size	Number		Revision
A			V3
Date:	12/09/2025	Sheet 2 of 5	
File:	C:\Users\..\bici-imu.SchDoc	Drawn By: Team Bici	
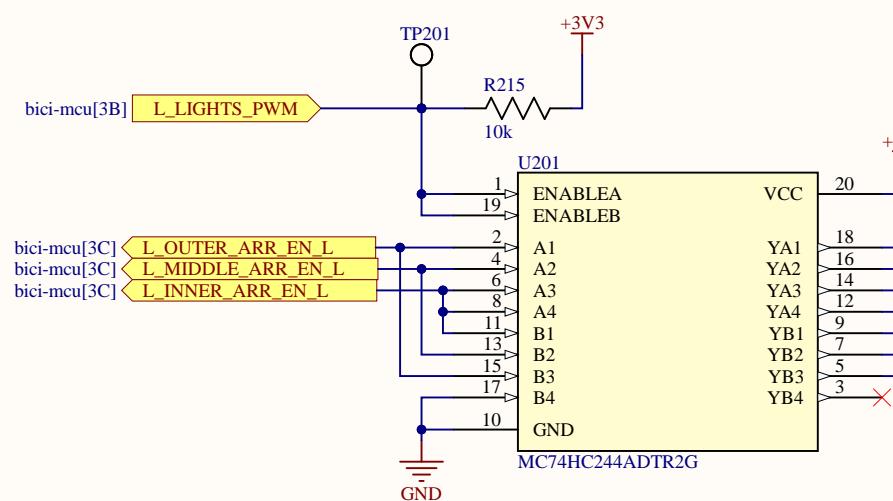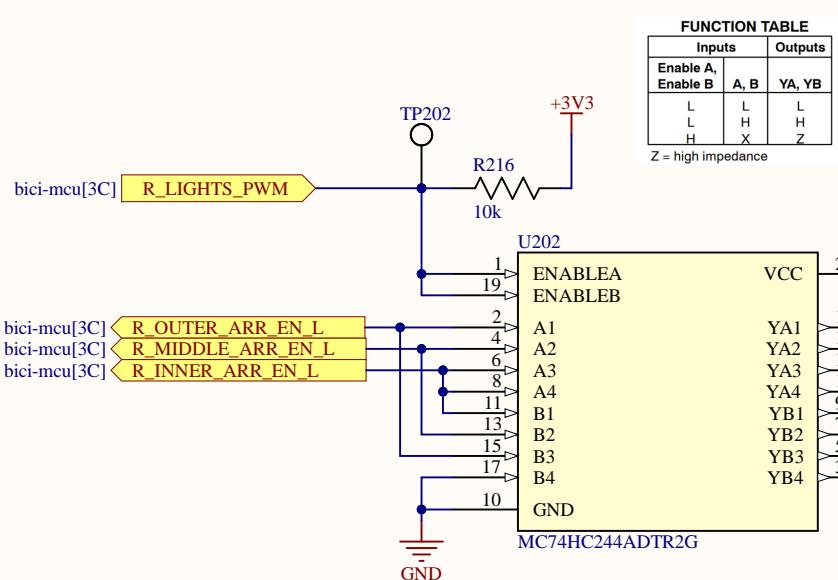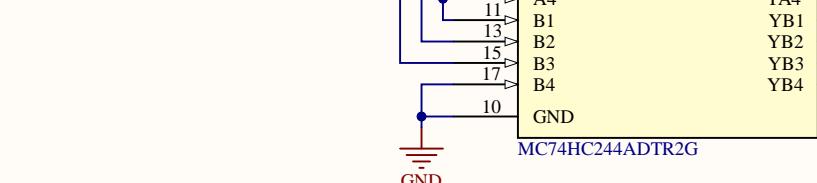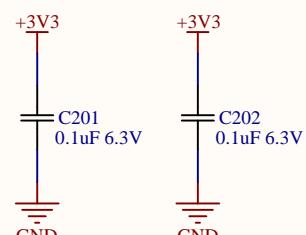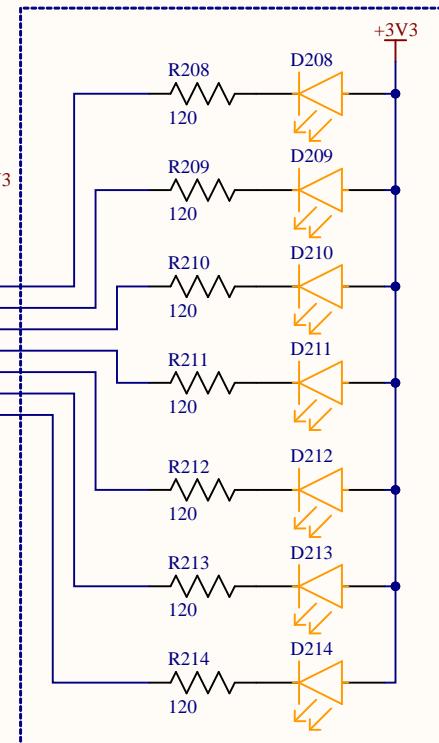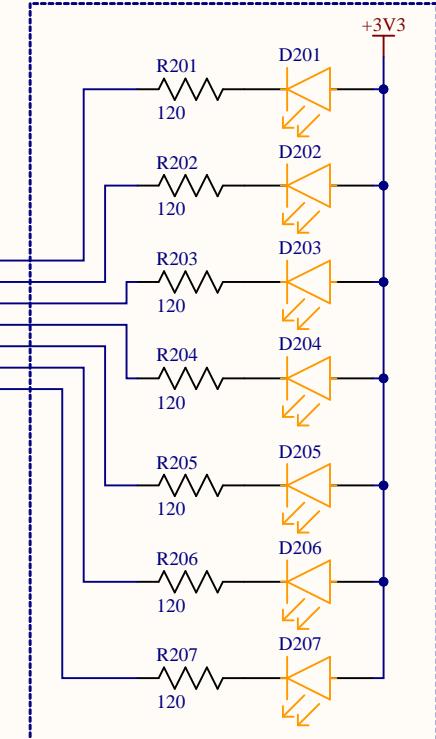
Right Indicator Light Circuit

Left Indicator Light Circuit

FUNCTION TABLE

Inputs		Outputs
Enable A, Enable B	A, B	YA, YB
L	L	L
L	H	H
H	X	Z

Z = high impedance

bici-mcu[3B] L_LIGHTS_PWM
bici-mcu[3C] L_OUTER_ARR_EN_L
bici-mcu[3C] L_MIDDLE_ARR_EN_L
bici-mcu[3C] L_INNER_ARR_EN_L

bici-mcu[3C] R_LIGHTS_PWM
bici-mcu[3C] R_OUTER_ARR_EN_L
bici-mcu[3C] R_MIDDLE_ARR_EN_L
bici-mcu[3C] R_INNER_ARR_EN_L

U201 MC74HC244ADTR2G
U202 MC74HC244ADTR2G

R215 10k
R216 10k
TP201
TP202

C201 0.1uF 6.3V
C202 0.1uF 6.3V

C202 should be placed as close as possible to U202 VCC pin.
C201 should be placed as close as possible to U201 VCC pin.

Title: **Bici: Turn Signal Lights**
Circuitry related to light feedback to surrounding cars.

Size	Number		Revision
A			V3
Date:	12/09/2025		Sheet 3 of 5
File:	C:\Users\..\bici-turn-lights.SchDoc		Drawn By: Team Bici
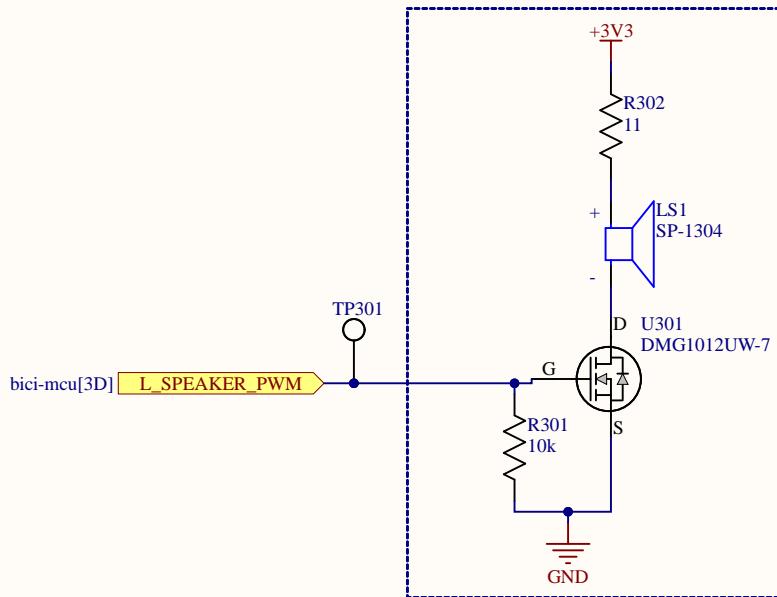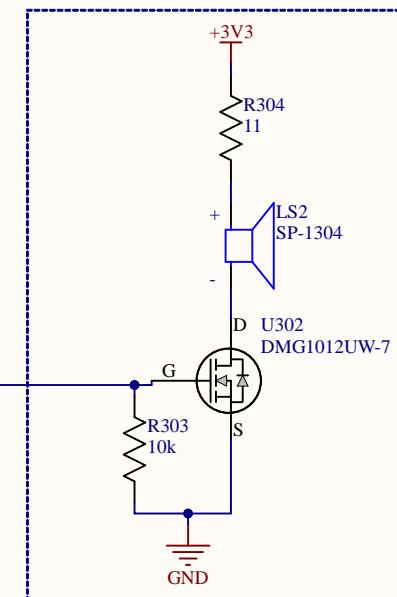
Left Indicator Audio Feedback Circuit

+3V3

R302
11

LS1
SP-1304
+
-
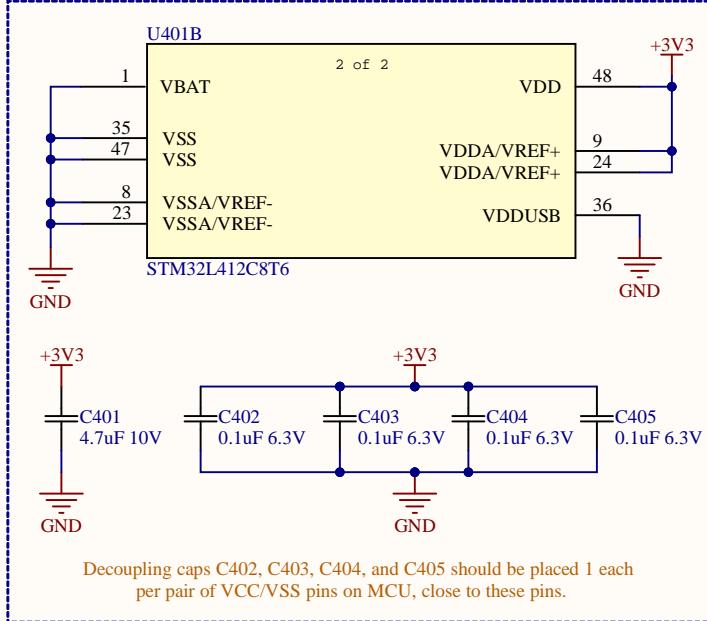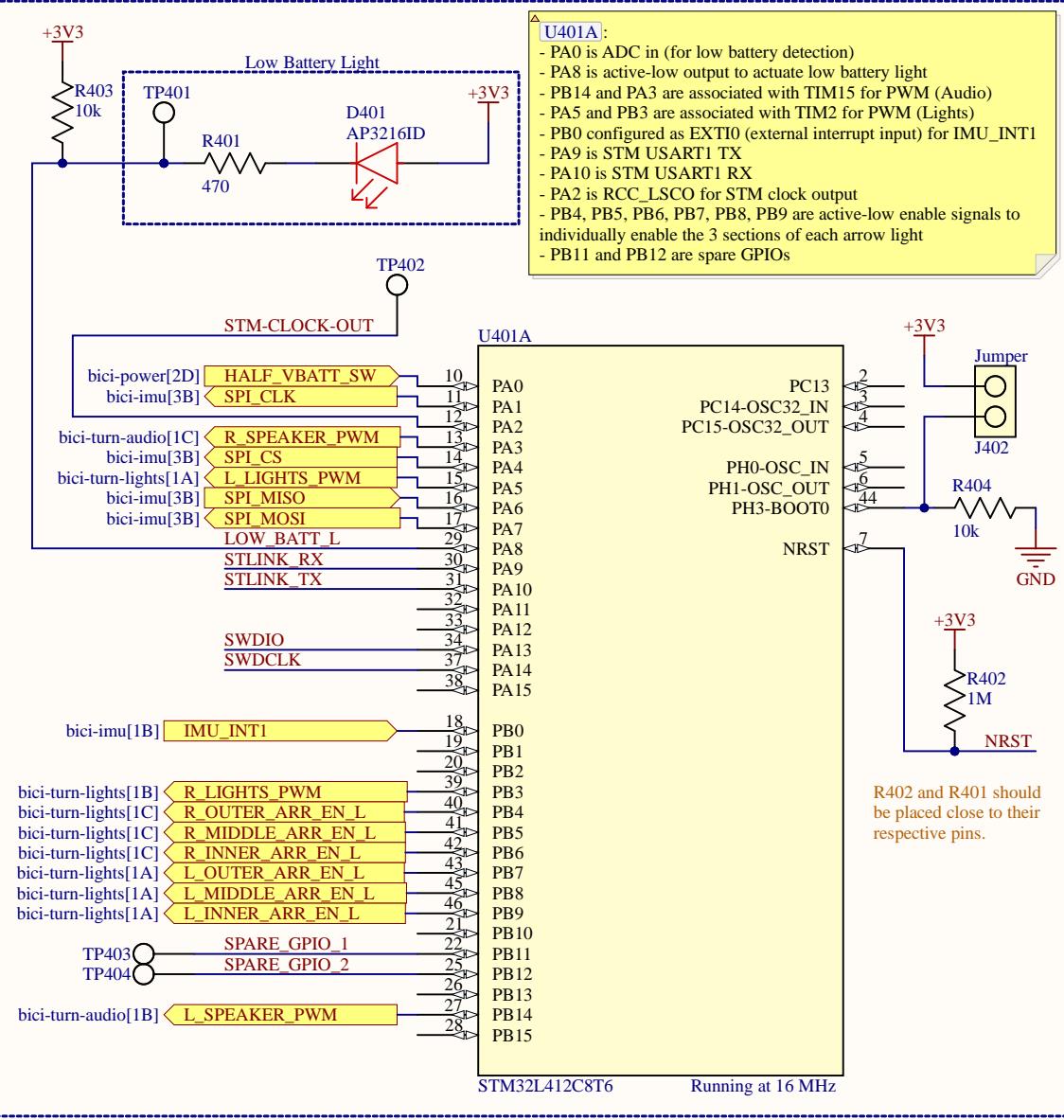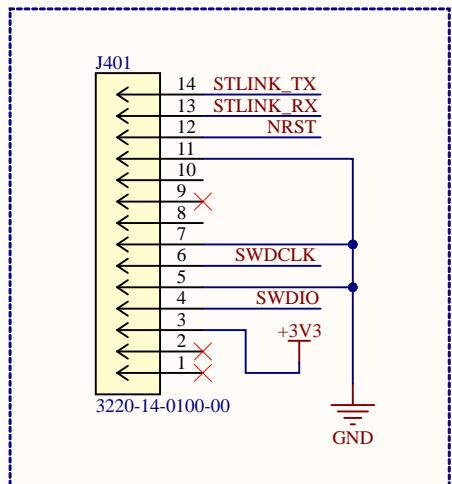
LS1 should be placed at the edge of the PCB on the left arrow point
(to accomodate speaker placement in housing).

TP301

bici-mcu[3D] L_SPEAKER_PWM

D U301
DMG1012UW-7
G

R301
10k

S

GND

Right Indicator Audio Feedback Circuit

+3V3

R304
11

LS2
SP-1304
+
-

LS2 should be placed at the edge of the PCB on the right arrow point
(to accomodate speaker placement in housing).

TP302

bici-mcu[3B] R_SPEAKER_PWM

D U302
DMG1012UW-7
G

R303
10k

S

GND

| Title	**Bici: Turn Signal Audio** Circuitry related to audio feedback to user.		
Size A	Number		Revision V3
Date:	12/09/2025	Sheet 4 of 5	
File:	C:\Users\..\bici-turn-audio.SchDoc	Drawn By: Team Bici	

STM Power

U401B

2 of 2

Pin	Signal
1	VBAT
35, 47	VSS
8, 23	VSSA/VREF-

VDD — 48 — +3V3
VDDA/VREF+ — 9
VDDA/VREF+ — 24
VDDUSB — 36 — GND

GND

STM32L412C8T6

+3V3

C401 4.7uF 10V
C402 0.1uF 6.3V
C403 0.1uF 6.3V
C404 0.1uF 6.3V
C405 0.1uF 6.3V

GND   +3V3   GND

Decoupling caps C402, C403, C404, and C405 should be placed 1 each per pair of VCC/VSS pins on MCU, close to these pins.

Programming/Debugging Connector

J401

Pin	Signal
14	STLINK_TX
13	STLINK_RX
12	NRST
11	
10	
9	✗
8	
7	
6	SWDCLK
5	
4	SWDIO
3	
2	✗
1	✗

+3V3

3220-14-0100-00

GND

STM I/O

+3V3
R403 10k

Low Battery Light

TP401
R401 470
D401 AP3216ID
+3V3

TP402

STM-CLOCK-OUT

U401A :
- PA0 is ADC in (for low battery detection)
- PA8 is active-low output to actuate low battery light
- PB14 and PA3 are associated with TIM15 for PWM (Audio)
- PA5 and PB3 are associated with TIM2 for PWM (Lights)
- PB0 configured as EXTI0 (external interrupt input) for IMU_INT1
- PA9 is STM USART1 TX
- PA10 is STM USART1 RX
- PA2 is RCC_LSCO for STM clock output
- PB4, PB5, PB6, PB7, PB8, PB9 are active-low enable signals to individually enable the 3 sections of each arrow light
- PB11 and PB12 are spare GPIOs

U401A

Signal	Net	Pin	Port
bici-power[2D]	HALF_VBATT_SW	10	PA0
bici-imu[3B]	SPI_CLK	11	PA1
		12	PA2
bici-turn-audio[1C]	R_SPEAKER_PWM	13	PA3
bici-imu[3B]	SPI_CS	14	PA4
bici-turn-lights[1A]	L_LIGHTS_PWM	15	PA5
bici-imu[3B]	SPI_MISO	16	PA6
bici-imu[3B]	SPI_MOSI	17	PA7
	LOW_BATT_L	29	PA8
	STLINK_RX	30	PA9
	STLINK_TX	31	PA10
		32	PA11
		33	PA12
	SWDIO	34	PA13
	SWDCLK	37	PA14
		38	PA15
bici-imu[1B]	IMU_INT1	18	PB0
		19	PB1
		20	PB2
bici-turn-lights[1B]	R_LIGHTS_PWM	39	PB3
bici-turn-lights[1C]	R_OUTER_ARR_EN_L	40	PB4
bici-turn-lights[1C]	R_MIDDLE_ARR_EN_L	41	PB5
bici-turn-lights[1C]	R_INNER_ARR_EN_L	42	PB6
bici-turn-lights[1A]	L_OUTER_ARR_EN_L	43	PB7
bici-turn-lights[1A]	L_MIDDLE_ARR_EN_L	45	PB8
bici-turn-lights[1A]	L_INNER_ARR_EN_L	46	PB9
		21	PB10
TP403	SPARE_GPIO_1	22	PB11
TP404	SPARE_GPIO_2	25	PB12
		26	PB13
bici-turn-audio[1B]	L_SPEAKER_PWM	27	PB14
		28	PB15

+3V3
Jumper

PC13 — 2
PC14-OSC32_IN — 3
PC15-OSC32_OUT — 4

J402

PH0-OSC_IN — 5
PH1-OSC_OUT — 6
PH3-BOOT0 — 44

R404 10k

NRST — 7

GND

+3V3
R402 1M
NRST

R402 and R401 should be placed close to their respective pins.

STM32L412C8T6   Running at 16 MHz

Title	**Bici: MCU** Circuitry related to embedded MCU.		
Size A	Number		Revision V3
Date:	12/09/2025	Sheet 5 of 5	
File:	C:\Users\..\bici-mcu.SchDoc	Drawn By:	Team Bici

J1

SW1

D201

D208

D402 Low Battery

D202

D209

D203

D1 Charging

D210

D204

D211

D201

U101

D205

D212

D206

D213

D207

D214

J2

C201 C202 R214 R213 R212 R211 R210 U202 R209 R216 R207 TP202 R208 R206 R205 R204 R203 U201 R202 R215 R201 TP201

R303 U302 TP302 R304 R301 U301 TP301 R302

R6 TP2 TP3 TP1 TP4 R5 R10 C3 R9 C4 C5 R11 U2 L1 R3 R4 C2 R1 R2 C1 R8 U1 R7

TP404 TP403 J401 R402 R404 J402 C401 C402 C403 C404 C405 U401 TP402 R401 R403 TP401

C101 C102 C103 TP105 TP104 TP103 TP102 TP101