

Amulet Motion Controller Fabrication Document

A

Layer Stack Legend

| Material | Layer | Thickness | Dielectric | Type | Gerber |
|----------|---------------|---------------|-----------------|-------------|--------|
| | F.Paste | | | Paste Mask | |
| | F.Silkscreen | | Direct Printing | Legend | GBR |
| | F.Mask | 0.02mm | Solder Resist | Solder Mask | GBR |
| Copper | L1 (Sig. PWR) | 0.07mm (2oz) | | Signal | GBR |
| Prepreg | L2 (GND) | 0.18mm | FR4_7628 | Dielectric | |
| Copper | L3 (Sig. PWR) | 0.035mm (1oz) | | Plane | GBR |
| Core | | 0.4mm | FR4 | Dielectric | |
| Copper | L4 (Sig. PWR) | 0.035mm (1oz) | | Signal | GBR |
| Core | | 0.4mm | FR4 | Dielectric | |
| Copper | L5 (GND) | 0.035mm (1oz) | | Signal | GBR |
| Prepreg | L6 (Sig. PWR) | 0.07mm (2oz) | FR4_7628 | Dielectric | |
| Copper | B.Mask | 0.02mm | Solder Resist | Plane | GBR |
| | B.Silkscreen | | Direct Printing | Solder Mask | GBR |
| | B.Paste | | | Legend | GBR |
| | | | | Paste Mask | |

Total thickness: 1.66mm

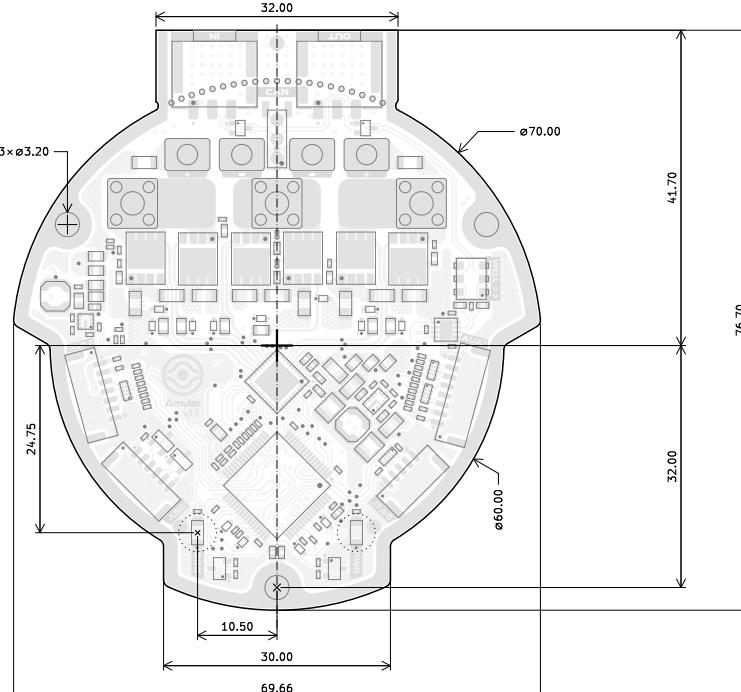
Note: external layer thicknesses are specified after plating

FABRICATION NOTES (UNLESS OTHERWISE SPECIFIED)

- OUTLINE DEFINED IN SEPARATE GERBER FILE WITH "Edge_Cuts.GBR" SUFFIX.
DIMENSIONS OF CIRCUMSIZEZED RECTANGLE SHOWN ON THIS DWG FOR REF ONLY.
- SEE SEPARATE DRILL FILES WITH ".DRL" SUFFIX FOR HOLE LOCATIONS.
SELECTED HOLE LOCATIONS SHOWN ON THIS DWG FOR REF ONLY.
- IMPEDANCE CONTROL REQUIRED.
Microstrip 100-Ohm Differential (L1 ref. L2)
0.2032mm width, 0.28mm spacing
- CONFIRM TRACE WIDTHS AND SPACINGS.
- DESIGN GEOMETRY MINIMUM FEATURE SIZES:

| | |
|------------------|----------|
| TRACE WIDTH | 0.20 mm |
| TRACE TO TRACE | 0.20 mm |
| MIN. HOLE (PTH) | 0.25 mm |
| MIN. HOLE (NPTH) | 0.70 mm |
| ANNUAL RING | 0.15 mm |
| COPPER TO HOLE | 0.254 mm |
| COPPER TO EDGE | 0.25 mm |
| HOLE TO HOLE | 0.254 mm |

Top Fabrication (Scale 1:1)



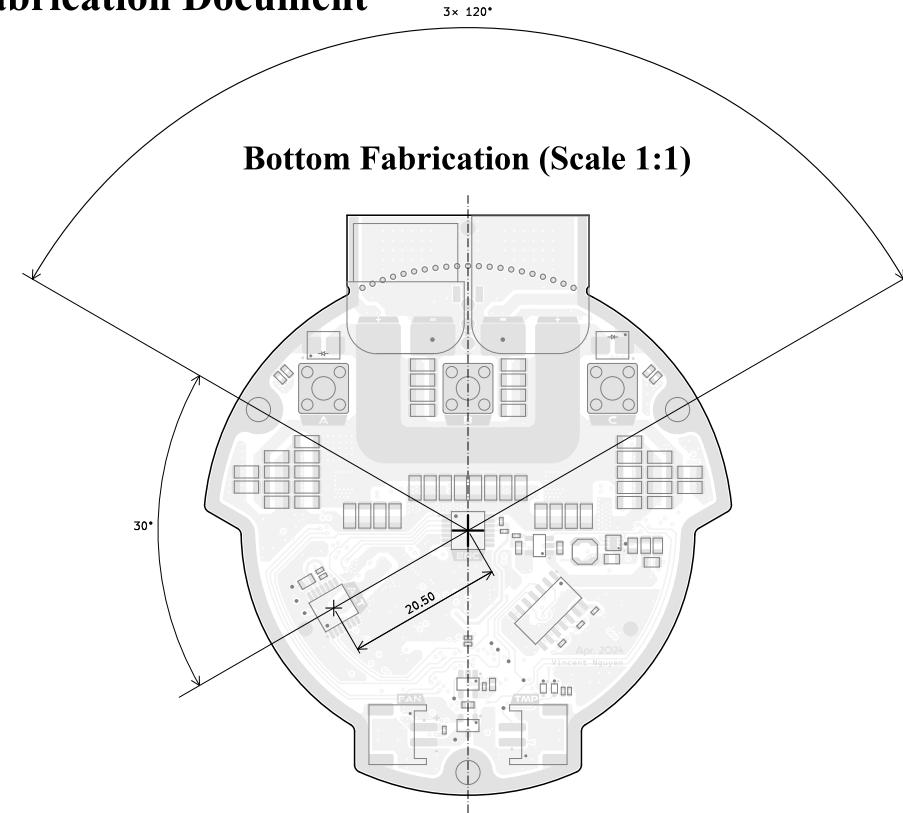
All dimensions are in millimeters unless otherwise specified.

C

D

| | | |
|-----------------------------|-----------------------------|---------------|
| Comments: | Company: | Variant: |
| | EPFL Xplore Research | CHECKED |
| Board Name: | | Project Name: |
| Amulet Motion Controller | | Chienpanzé |
| Sheet Title: | File Name: | Date: |
| Top Fabrication (Scale 1:1) | amulet_controller.kicad_pcb | 2024-04-13 |
| Reviewer: | Revision: | 1.2.0 |
| Sheet Path: | Size: | Sheet: |
| | A4 | 1 of 11 |

Amulet Motion Controller Fabrication Document



All dimensions are in millimeters unless otherwise specified.

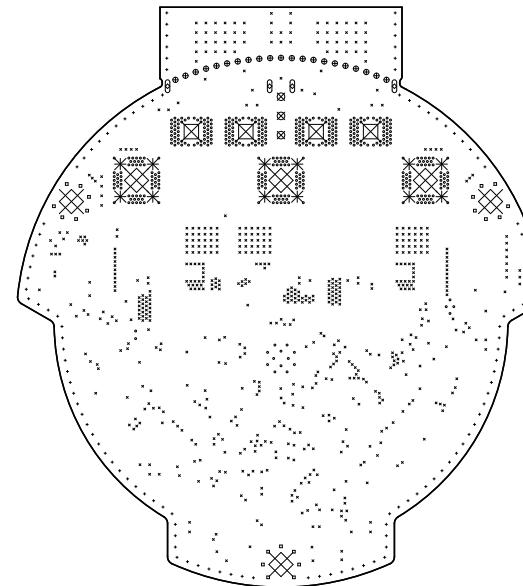
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| | Comments: | Company: EPFL Xplore Research | Variant: CHECKED | Git Hash: ed19ad3 |
| | Board Name: Amulet Motion Controller | | | Project Name: Chienpanzé |
| | Sheet Title: Bottom Fabrication (Scale 1:1) | File Name: amulet_controller.kicad_pcb | Designer: Vincent Nguyen | Date: 2024-04-13 Revision: 1.2.0 |
| | Sheet Path: | | Reviewer: | Size: A4 Sheet: 2 of 11 |

Amulet Motion Controller Fabrication Document

A

| Symbol | Count | Hole Size | Plated |
|--------|----------|-----------|----------|
| • | 674 | 0.25mm | Plated |
| • | 438 | 0.25mm | Plated |
| • | 120 | 0.30mm | Plated |
| ▫ | 21 | 0.50mm | Plated |
| ◊ | 4 (slot) | 0.60mm | Plated |
| ☒ | 3 | 1.00mm | Plated |
| ✳ | 12 | 1.50mm | Plated |
| ☒ | 4 | 2.70mm | Plated |
| ☒ | 6 | 3.20mm | Plated |
| ● | 21 | 0.70mm | Unplated |

Drill Drawing Top View (Scale 1:1)



B

C

D

A

B

C

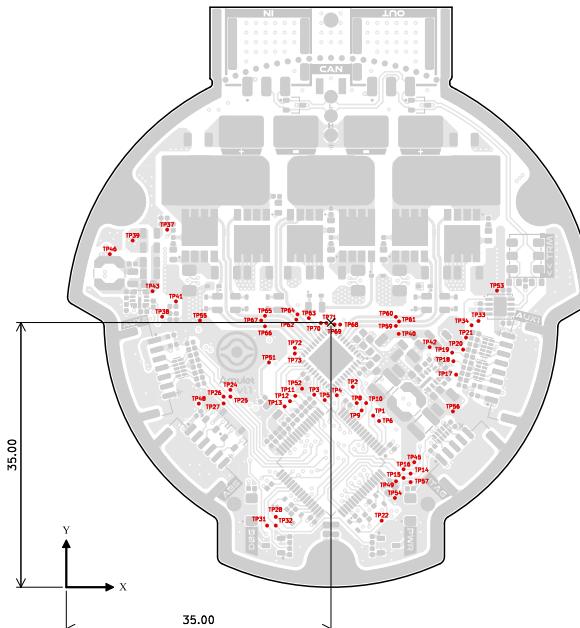
D

| | | | | |
|--|--|---|-----------------------------|--|
| | Comments: | Company: EPFL Xplore Research  | Variant: CHECKED | Git Hash: ed19ad3 |
| | Board Name: Amulet Motion Controller | | | Project Name: Chienpanzé |
| | Sheet Title: Drill Drawing Top View (Scale 1:1) | File Name: amulet_controller.kicad_pcb | Designer: Vincent Nguyen | Date: 2024-04-13 Revision: 1.2.0 |
| | Sheet Path: | | Reviewer: | Size: A4 Sheet: 3 of 11 |

Amulet Motion Controller Fabrication Document

| Ref. | Net | X | Y |
|------|-----------------|---------|---------|
| TP1 | MOTOR_ENABLE | 40.5766 | 22.6861 |
| TP2 | MOTOR_HIZ | 37.8754 | 26.4999 |
| TP3 | MOTOR_FAULT | 32.7804 | 25.4599 |
| TP4 | DRV_SCLK | 35.7704 | 25.3799 |
| TP5 | DRV_MISO | 34.1704 | 24.7499 |
| TP6 | DRV_MOSI | 41.3617 | 21.9806 |
| TP8 | PWM_PHASEA | 38.4004 | 24.3499 |
| TP9 | PWM_PHASEB | 39.0504 | 23.3749 |
| TP10 | PWM_PHASEC | 39.6504 | 24.3499 |
| TP11 | SOA | 30.2754 | 25.2999 |
| TP12 | SOB | 29.5754 | 24.5999 |
| TP13 | SOC | 28.8754 | 23.8999 |
| TP14 | SWDIO | 45.5254 | 15.0249 |
| TP15 | SWCLK | 44.6004 | 14.4499 |
| TP16 | NRST | 44.6004 | 15.5999 |
| TP17 | AUX1_A | 51.5477 | 28.1109 |
| TP18 | AUX1_B | 51.1875 | 29.8875 |
| TP19 | AUX1_C | 51.0189 | 31.0189 |
| TP20 | AUX1_D | 52.4750 | 31.4250 |
| TP21 | AUX1_E | 52.8566 | 33.0161 |
| TP22 | AUX1_I2C_PULLUP | 41.7004 | 8.7999 |
| TP24 | AUX2_A | 21.7004 | 26.0999 |
| TP25 | AUX2_B | 21.7004 | 25.1999 |
| TP26 | AUX2_C | 20.8004 | 25.1999 |
| TP27 | AUX2_D | 20.8004 | 24.2999 |
| TP28 | AUX2_I2C_PULLUP | 27.7004 | 9.2999 |
| TP31 | LED_DBG | 26.5504 | 8.1499 |
| TP32 | LED_PWR | 27.7004 | 8.1499 |
| TP33 | FDCAN_RX | 54.5004 | 35.2044 |
| TP34 | FDCAN_TX | 53.5904 | 34.6399 |
| TP37 | SENSE_TEMP_FET | 13.3400 | 47.2800 |
| TP38 | SENSE_VBAT | 12.6749 | 35.7749 |
| TP39 | +VBAT | 8.7754 | 45.8499 |
| TP40 | +VBAT | 43.9504 | 33.4999 |
| TP41 | +VBAT | 14.5004 | 37.7999 |
| TP42 | F_VIN_12V | 48.0504 | 31.7499 |
| TP43 | F_VIN_5V | 11.4004 | 39.1499 |
| TP45 | +12V | 46.0104 | 16.5299 |
| TP46 | +5V | 5.7504 | 44.0499 |
| TP48 | +3V3 | 17.5204 | 24.2799 |
| TP49 | +3V3 | 43.6004 | 13.9999 |
| TP51 | +A3V3 | 26.8004 | 29.7249 |
| TP52 | GND | 31.1750 | 26.2500 |
| TP53 | GND | 56.9504 | 39.2249 |
| TP54 | GND | 43.4504 | 11.7999 |
| TP55 | GND | 17.6754 | 35.2749 |
| TP56 | GND | 51.1232 | 23.2471 |
| TP57 | GND | 45.5254 | 13.8999 |
| TP59 | GHA | 43.5804 | 34.5499 |
| TP60 | GLA | 43.5804 | 35.7499 |
| TP61 | SHA | 44.0004 | 35.1499 |
| TP62 | GHB | 30.4189 | 35.3799 |
| TP63 | GLB | 32.0704 | 35.5799 |
| TP64 | SHB | 30.5675 | 36.0799 |
| TP65 | GHC | 26.2704 | 35.8835 |
| TP66 | GLC | 26.2704 | 34.4999 |
| TP67 | SHC | 25.7704 | 35.2749 |
| TP68 | SA_P | 36.2167 | 34.7396 |
| TP69 | SA_N | 35.4667 | 34.7396 |
| TP70 | SB_P | 33.6511 | 34.9263 |
| TP71 | SB_N | 34.4011 | 34.9263 |
| TP72 | SC_P | 30.2139 | 31.6529 |
| TP73 | SC_N | 30.2139 | 30.9029 |

Top Test Points (Scale 1:1)



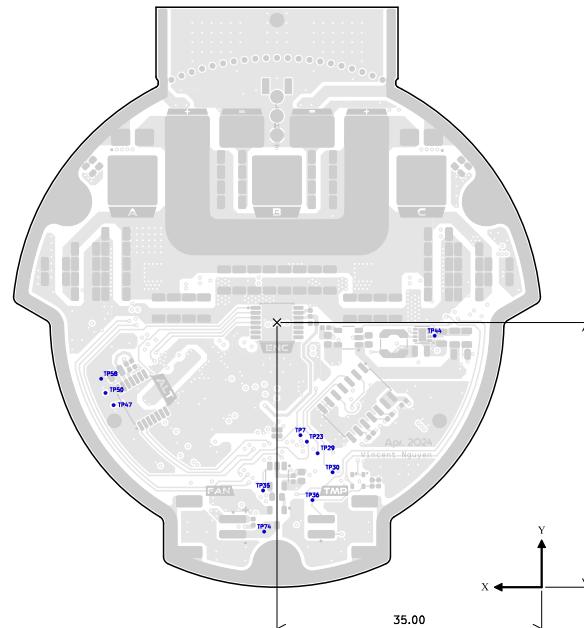
All dimensions are in millimeters unless otherwise specified.

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| | Comments: | Company: |  EPFL Xplore Research | Variant: | checked | Git Hash: |
| | Board Name: | Amulet Motion Controller | | Project Name: | | |
| | Sheet Title: | File Name: | Designer: | Date: | Revision: | |
| | Top Test Points (Scale 1:1) | amulet_controller.kicad_pcb | Vincent Nguyen | 2024-04-13 | 1.2.0 | |
| | Sheet Path: | Reviewer: | Size: | Sheet: | A4 | 4 of 11 |

Amulet Motion Controller Fabrication Document

| Ref. | Net | X | Y |
|------|----------------|---------|---------|
| TP7 | DRV_CS | 31.9004 | 20.0999 |
| TP23 | POS_SENSOR_CS | 31.0504 | 19.2499 |
| TP29 | RS422_RX | 29.6284 | 17.7083 |
| TP30 | RS422_DE | 27.6504 | 15.1999 |
| TP35 | FAN_CTRL | 36.8394 | 12.7906 |
| TP36 | SENSE_TEMP_MOT | 30.3132 | 11.5244 |
| TP44 | F_VIN_3V3 | 14.1504 | 33.2499 |
| TP47 | +5V | 56.6093 | 24.0781 |
| TP50 | +3V3 | 57.6804 | 25.6899 |
| TP58 | GND | 58.2504 | 27.5649 |
| TP74 | FAN_SW | 36.7004 | 7.3499 |

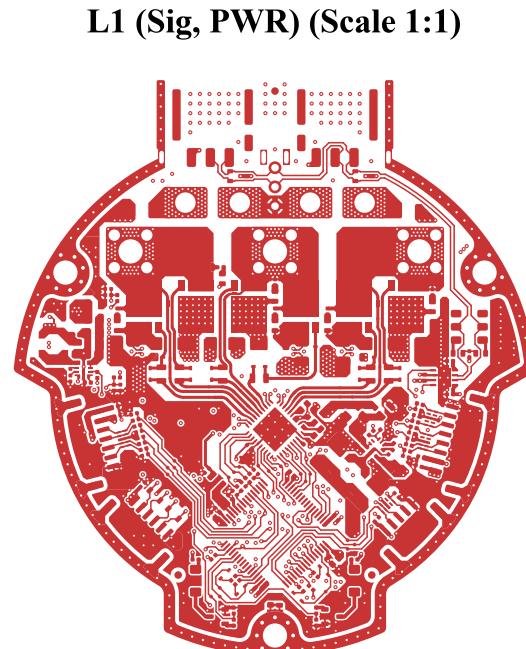
Bottom Test Points (Scale 1:1)



All dimensions are in millimeters unless otherwise specified.

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| | Comments: | Company: EPFL Xplore Research  | Variant: CHECKED | Git Hash: ed19ad3 |
| | Board Name: Amulet Motion Controller | | | Project Name: Chienpanzé |
| | Sheet Title: Bottom Test Points (Scale 1:1) | File Name: amulet_controller.kicad_pcb | Designer: Vincent Nguyen | Date: 2024-04-13 Revision: 1.2.0 |
| | Sheet Path: | | Reviewer: | Size: A4 Sheet: 5 of 11 |

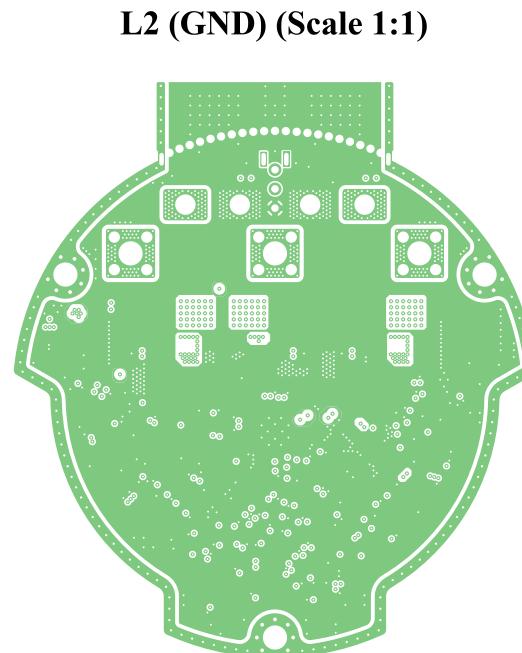
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L1 (Sig, PWR) (Scale 1:1)

| | | | | |
|--|--|---|-----------------------------|--|
| | Comments: | Company: EPFL Xplore Research  | Variant: CHECKED | Git Hash: ed19ad3 |
| | Board Name: Amulet Motion Controller | Project Name: Chienpanzé | | |
| | Sheet Title: L1 (Sig, PWR) (Scale 1:1) | File Name: amulet_controller.kicad_pcb | Designer: Vincent Nguyen | Date: 2024-04-13 Revision: 1.2.0 |
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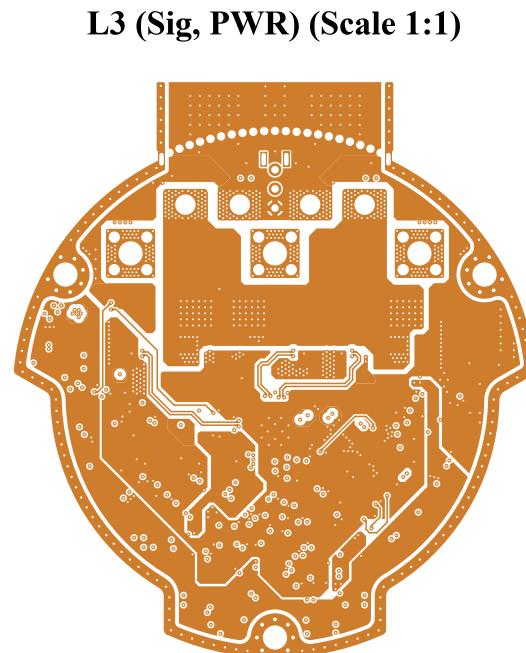
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L2 (GND) (Scale 1:1)

| | | | | |
|--|--|---|-----------------------------|--|
| | Comments: | Company: EPFL Xplore Research  | Variant: CHECKED | Git Hash: ed19ad3 |
| | Board Name: Amulet Motion Controller | Project Name: Chienpanzé | | |
| | Sheet Title: L2 (GND) (Scale 1:1) | File Name: amulet_controller.kicad_pcb | Designer: Vincent Nguyen | Date: 2024-04-13 Revision: 1.2.0 |
| | Sheet Path: | | Reviewer: | Size: A4 Sheet: 7 of 11 |

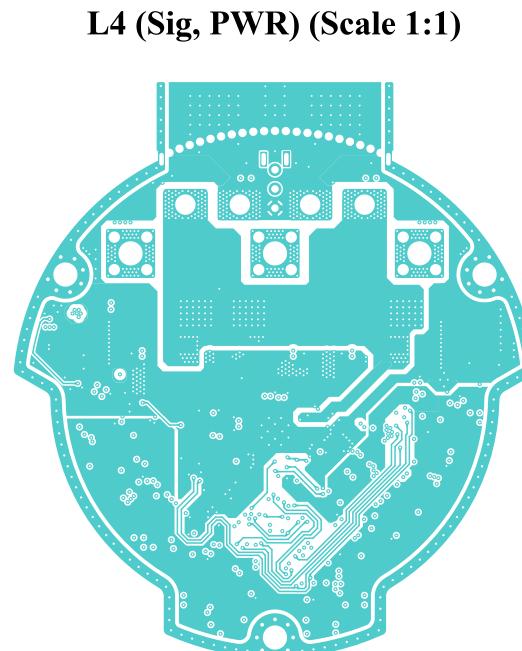
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L3 (Sig, PWR) (Scale 1:1)

| | | | | |
|--|--|---|-----------------------------|----------------------------------|
| | Comments: | Company: EPFL Xplore Research | Variant: CHECKED | Git Hash: ed19ad3 |
| | Board Name: Amulet Motion Controller | Project Name: Chienpanzé | | |
| | Sheet Title: L3 (Sig, PWR) (Scale 1:1) | File Name: amulet_controller.kicad_pcb | Designer: Vincent Nguyen | Date: 2024-04-13 Revision: 1.2.0 |
| | Sheet Path: | | Reviewer: | Size: A4 Sheet: 8 of 11 |

Amulet Motion Controller Fabrication Document

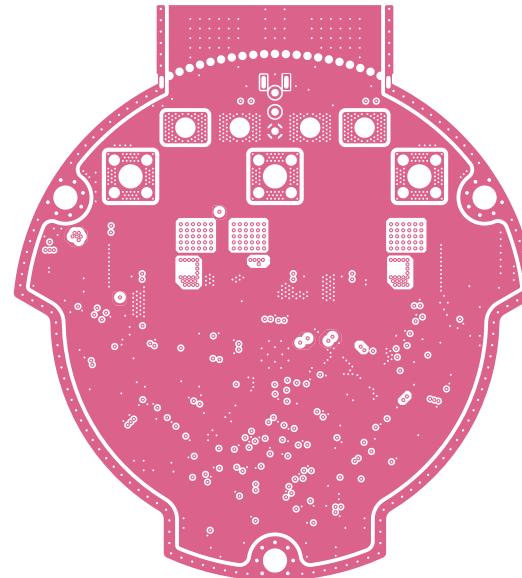


L4 (Sig, PWR) (Scale 1:1)

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|--|--|---|-----------------------------|---|
| | Comments: | Company: EPFL Xplore Research  | Variant: CHECKED | Git Hash: ed19ad3 |
| | Board Name: Amulet Motion Controller | Project Name: Chienpanzé | | |
| | Sheet Title: L4 (Sig, PWR) (Scale 1:1) | File Name: amulet_controller.kicad_pcb | Designer: Vincent Nguyen | Date: 2024-04-13 Revision: 1.2.0 |
| | Sheet Path: | | Reviewer: | Size: A4 Sheet: 9 of 11 |

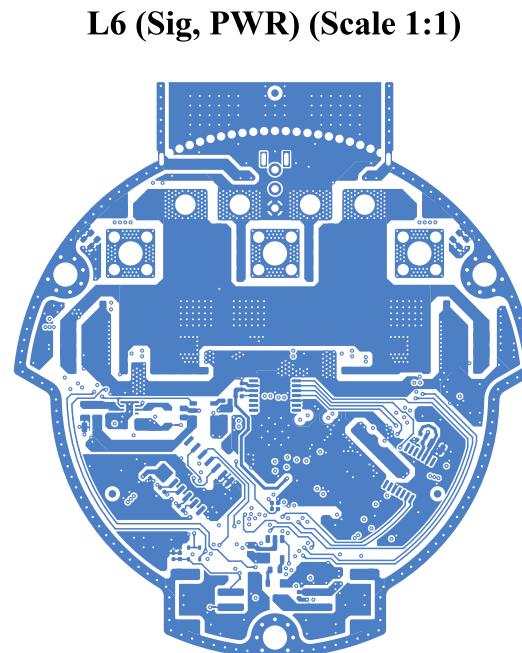
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L5 (GND) (Scale 1:1)



| | | | | |
|--|--|---|-----------------------------|---|
| | Comments: | Company: EPFL Xplore Research  | Variant: CHECKED | Git Hash: ed19ad3 |
| | Board Name: Amulet Motion Controller | Project Name: Chienpanzé | | |
| | Sheet Title: L5 (GND) (Scale 1:1) | File Name: amulet_controller.kicad_pcb | Designer: Vincent Nguyen | Date: 2024-04-13 Revision: 1.2.0 |
| | Sheet Path: | | Reviewer: | Size: A4 Sheet: 10 of 11 |

Amulet Motion Controller Fabrication Document



L6 (Sig, PWR) (Scale 1:1)

| | | | | |
|--|--|---|-----------------------------|---|
| | Comments: | Company: EPFL Xplore Research | Variant: CHECKED | Git Hash: ed19ad3 |
| | Board Name: Amulet Motion Controller | Project Name: Chienpanzé | | |
| | Sheet Title: L6 (Sig, PWR) (Scale 1:1) | File Name: amulet_controller.kicad_pcb | Designer: Vincent Nguyen | Date: 2024-04-13 Revision: 1.2.0 |
| | Sheet Path: | | Reviewer: | Size: A4 Sheet: 11 of 11 |