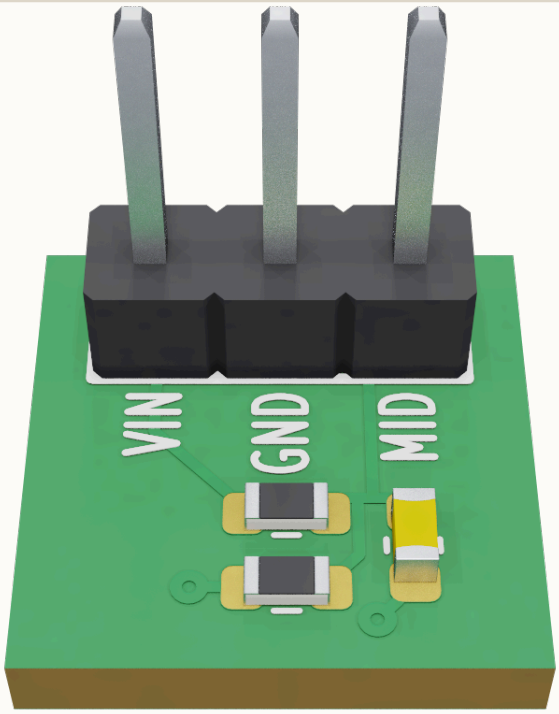
# 11 Ground Plane

11-GROUND-PLANE - rev A - 2026-10-17 - ENGINEERING RELEASE




Assembly view

## Key specifications

| | |
|---|---|
| **Interfaces** | breakout |
| **Outline** | 10.00 x 10.00 mm |
| **PCB** | 2 copper layers, 1.60 mm finished thickness |
| **Fitted parts** | 4 |

## Operating window

| | |
|---|---|
| VIN supply voltage | `12 V` |
| Ambient operating temperature | `0 to 70 °C` |

See Electrical limits for the conditions behind these values, required external loads and contact limits.

## Connector overview

| CONNECTOR | USE | SIGNALS |
|---|---|---|
| J1 | breakout | VIN, GND, MID |

# Electrical limits

Operating conditions and limits for the assembled board

### Recommended operating conditions

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| VIN supply voltage | VIN | Required input supply voltage | 12 | — | 12 | V |
| Ambient operating temperature | TA | Ambient operating range | 0 | — | 70 | °C |

### Electrical characteristics

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| VIN supply current | IIN | [1, 2, 3] | 0 | — | 1.848 | mA |
| Power consumption | P | [4] | — | — | 22.2 | mW |

## How to use these limits

[1] Maximum instantaneous current in the modeled window, drawn by the board itself.

[2] **Contacts:** What an attachment draws through a connector contact adds to this, up to that contact's limit.

[3] **Tolerances:** Calculated across the listed supply ranges and modeled component tolerances.

[4] Worst-case input power the board itself draws across all supply rails.

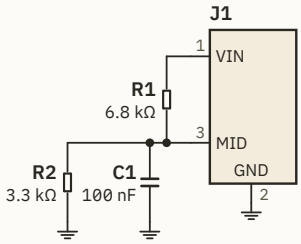
Use only the conditions printed with each value. Component absolute maximum ratings do not automatically apply to the assembled board.

# Schematic

Header 11-GROUND-PLANE

KEY RAIL IN OUT BIDIR PASSIVE 5·p2 BLOCK 5, PAGE 2

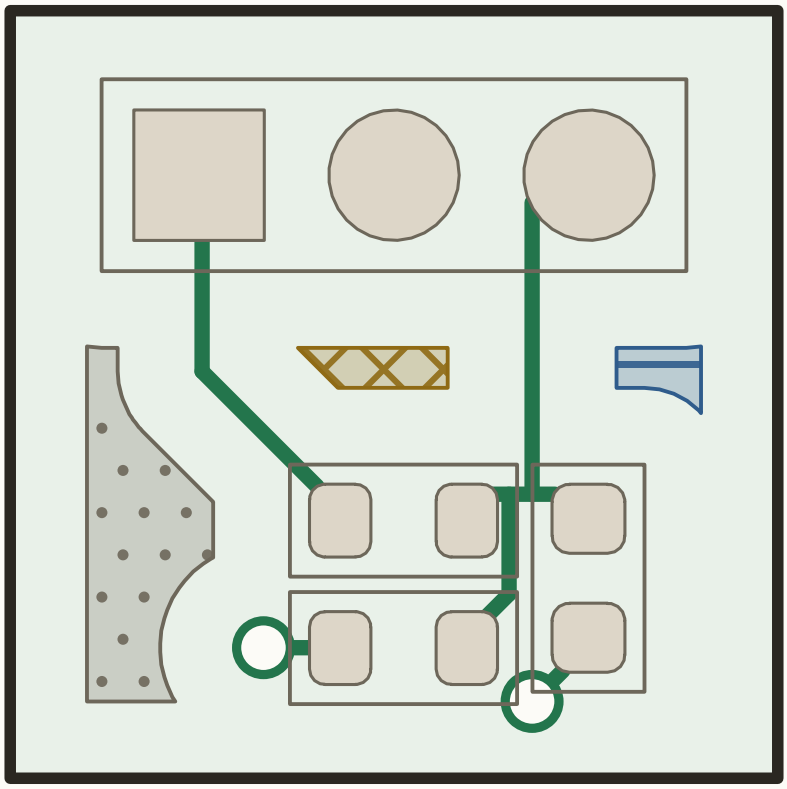
## 1 Header



# Board layout

Copper on both layers, and the board area that no part or track uses

KEY — TOP COPPER — BOTTOM COPPER ▭ PAD ○ VIA



TOP VIEW · BOTTOM COPPER SEEN THROUGH · 10 X 10 MM · LARGE PARTS NAMED

## Unused area

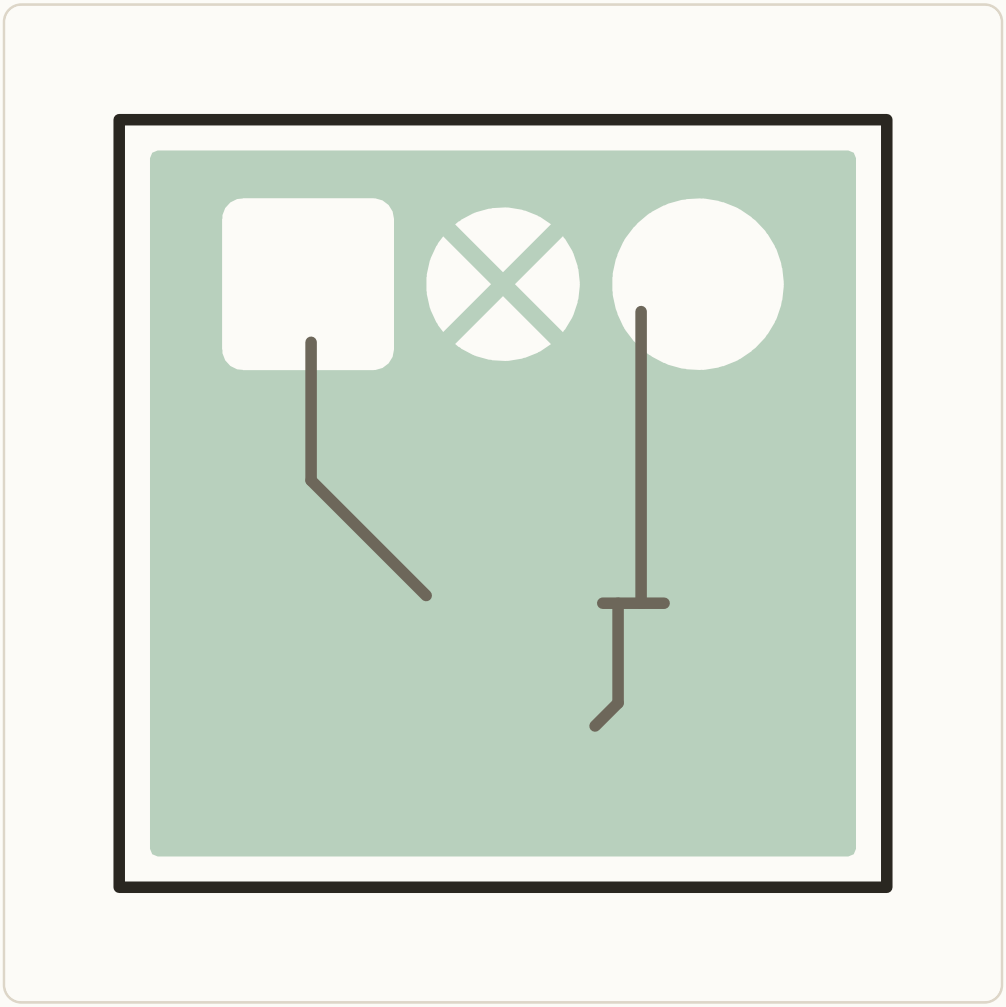
| PATTERN | CAUSE | BOUNDED BY | AREA | OF BOARD |
|---|---|---|---|---|
| | Part gap | between parts | 0.9 mm² | 0.9 % |
| | Connector apron | beside a connector | 0.7 mm² | 0.7 % |
| | Edge margin | between parts and the outline | 4.9 mm² | 4.9 % |
| | Total | at least 1 mm from everything | 6.4 mm² | 6.4 % |

Unused area is board surface at least 1 mm from every part, track and the board edge. A part gap is the only kind a tighter placement can reclaim.

# Ground plane

Ground on B.Cu under the routes on F.Cu

KEY GROUND PLANE OPENING ROUTE ON F.CU



TOP VIEW · B.CU UNDER F.CU

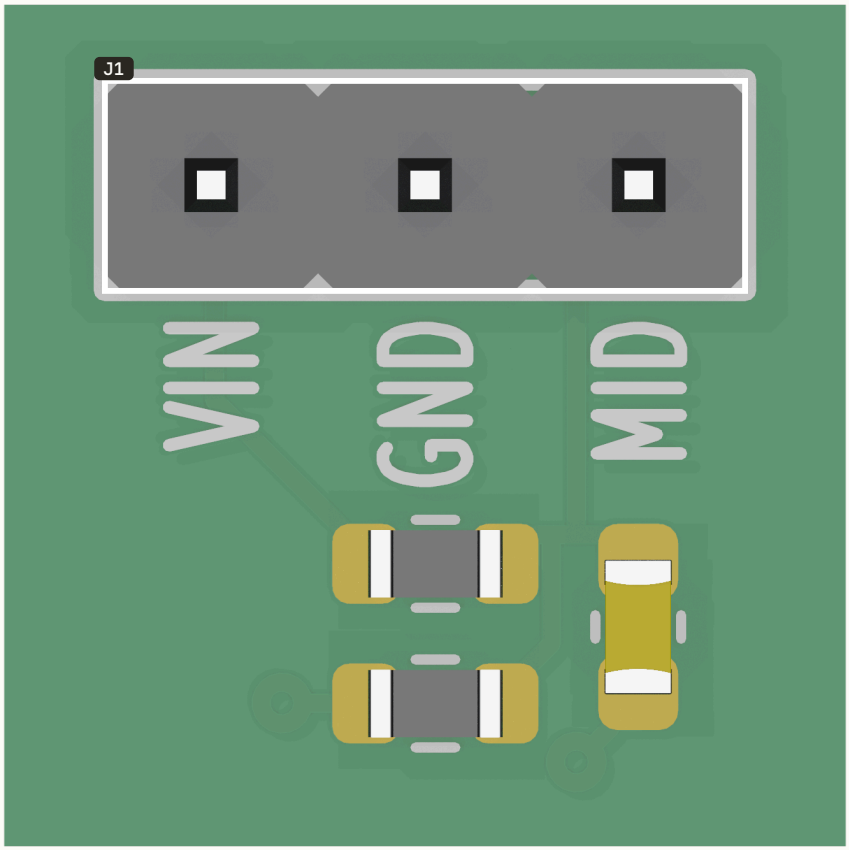
## Return path

| | |
|---|---|
| **Ground plane** | B.Cu, 73 % of the board |
| **Routes on F.Cu** | 10 mm; no return detour of 1 mm or more |

Openings in the plane add under 1 mm to the return path of a route on F.Cu above them; no route on F.Cu crosses a gap that adds more.

# Board connections

Connector and test point locations viewed from the top of the assembled board




TOP VIEW - CONNECTORS AND TEST POINTS MARKED - NOT TO SCALE

Pin schedules and mating-face views are on the following pages.

# Connector pinout

Pin numbers are shown as viewed into the mating face

SIGNAL CLASS SIGNAL GROUND

## J1 - breakout




TOP MATING FACE VIEW

| PIN | SIGNAL | DESCRIPTION |
|---|---|---|
| 1 | VIN | VIN signal |
| 2 | GND | Ground reference |
| 3 | MID | MID signal |

# Components on this board

Component identities and supplier codes

IDENTIFICATION VIEWS ARE NOT TO SCALE



**C2937625**
breakout
J1 · QTY 1 · LCSC C2937625

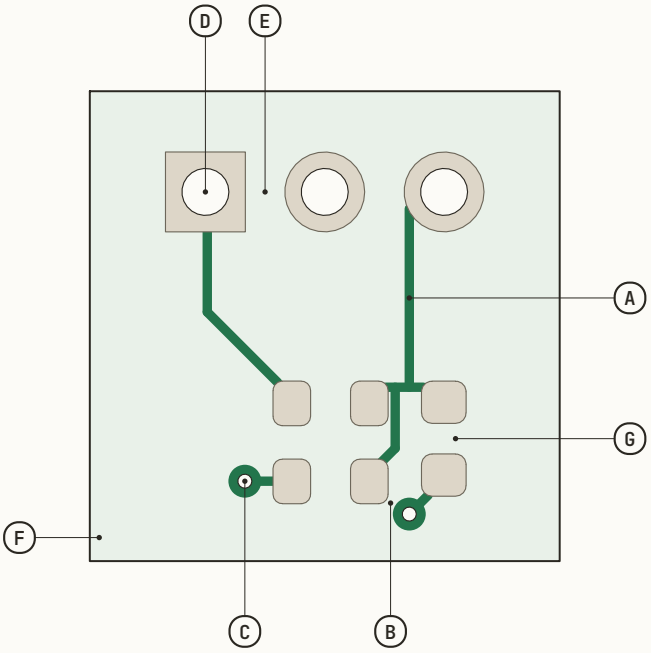
## Passives

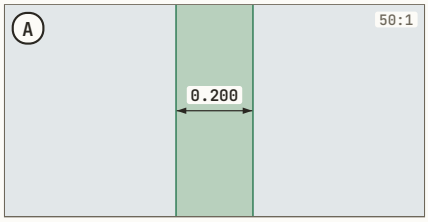
| REFERENCE | VALUE / ROLE | QTY | PART |
|---|---|---|---|
| C1 | 100nF | 1 | C14663 |
| R2 | 3.3k | 1 | C22978 |
| R1 | 6.8k | 1 | C2907055 |

# Manufacturability

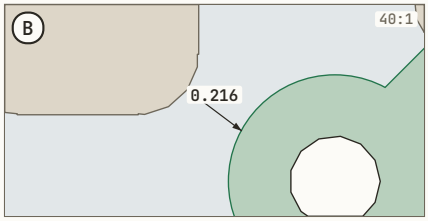
The smallest feature this board asks a fab to make, rule by rule

KEY — TOP COPPER — BOTTOM COPPER — PAD — MASK OPENING

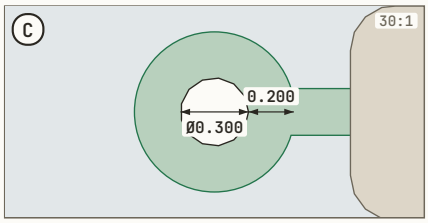


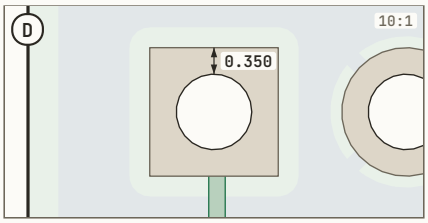

**TRACK WIDTH**
All 8 track segments
Required minimum 0.200; at minimum



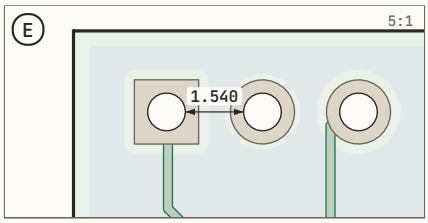

**COPPER TO COPPER, OUTER**
Every outer gap between nets
Required minimum 0.1524; 0.064 above



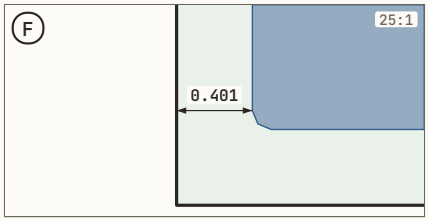

**FINISHED DRILL · VIA RING**
All 5 holes; all 2 vias
Finished drill minimum 0.300; at minimum.
Via ring minimum 0.200; at minimum



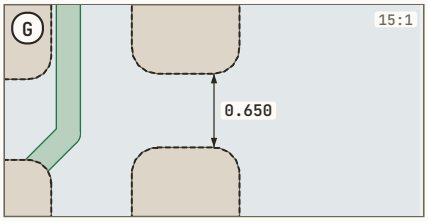

**PTH RING**
All 3 plated leads
Required minimum 0.300; 0.050 above




**HOLE TO HOLE**
All 5 holes, wall to wall
Required minimum 0.300; 1.240 above




**COPPER TO EDGE**
All copper, pours included
Required minimum 0.381; 0.020 above




**MASK WEB**
All 9 top mask openings
Required minimum 0.1016; 0.548 above

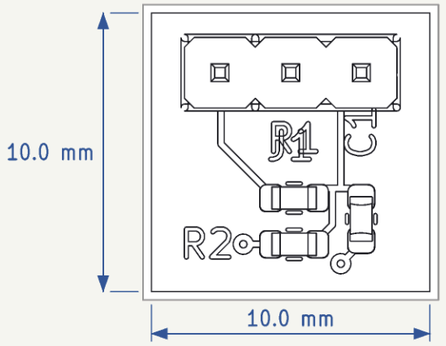
COMPATIBLE FABS

JLCPCB [1] — PCBWay [2] — OSH Park [3] — AISLER [4]

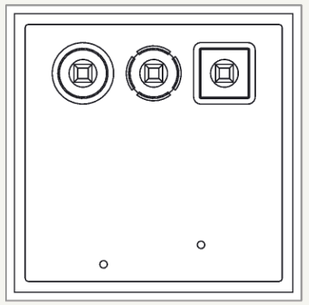
Detail minima use the strictest checked profile. Compatibility means the checked dimensional rules pass.

| LAYERS | THICKNESS | ASPECT RATIO | HOLES | DRILL SIZES |
|---|---|---|---|---|
| 2 | 1.6 mm | 5.3 : 1 | 2 via, 3 PTH | 2, Ø0.300–1.000 |

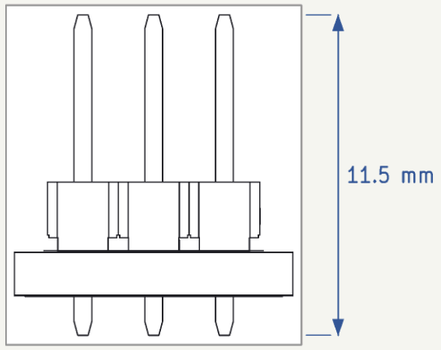
All values in mm. [1] read 2026-08-08 [2] read 2026-08-08 [3] read 2026-08-13 [4] read 2026-08-08



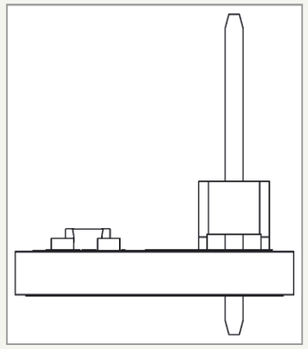

TOP VIEW



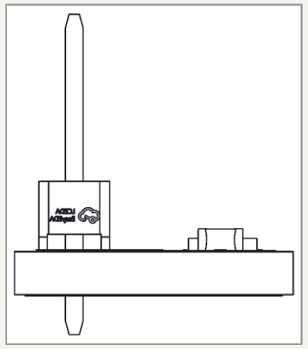
BOTTOM VIEW



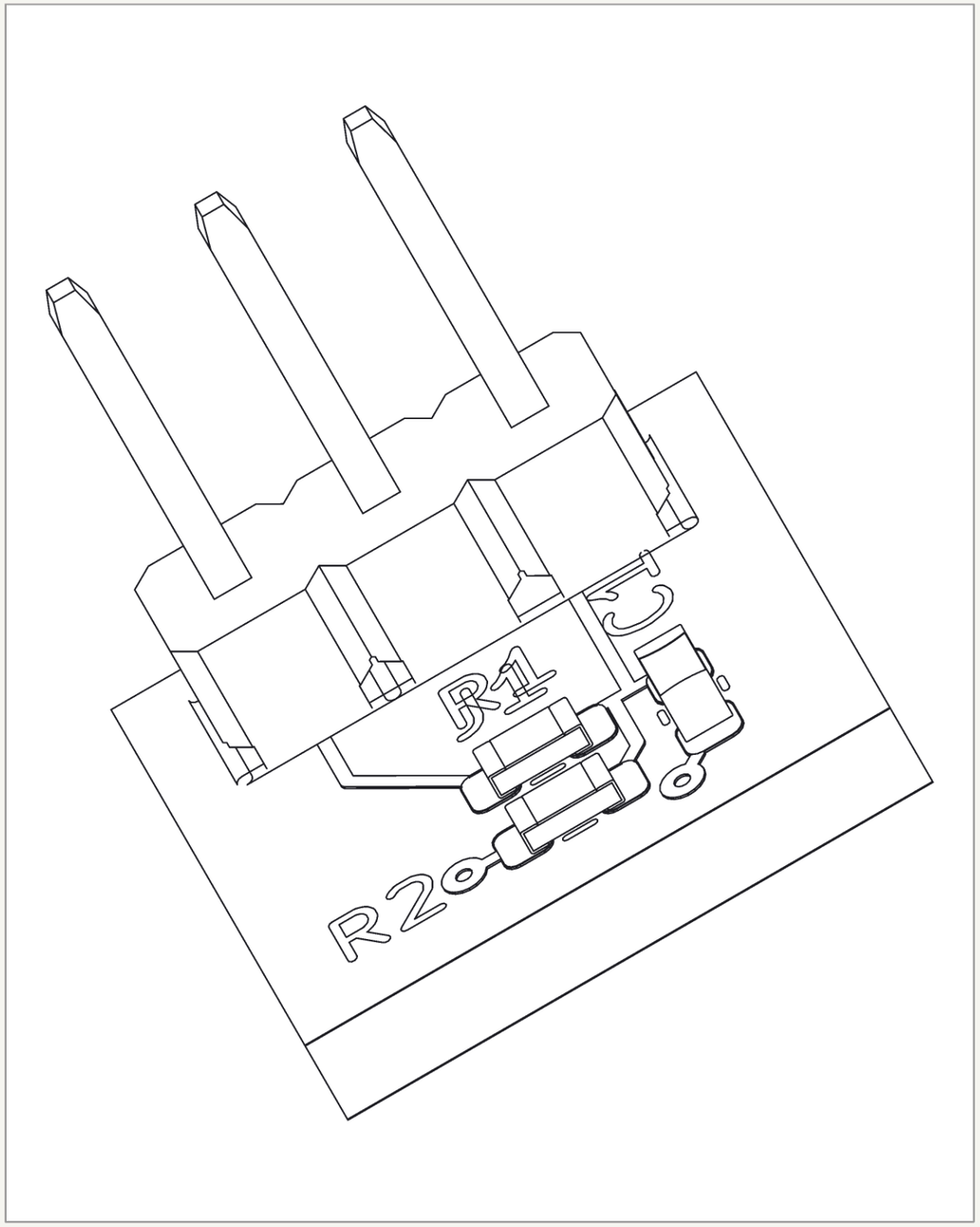

FRONT VIEW (Y)



LEFT VIEW (X)



RIGHT VIEW (X)




ISOMETRIC – NTS

| | |
|---|---|
| TITLE<br>11 Ground Plane assembly | DWG NO.<br>11-GROUND-PLANE |
| REV<br>A | DATE<br>2026-10-17 |
| OVERALL<br>10.0 x 10.0 x 11.5 mm | MATERIAL<br>FR-4, 1.60 mm |
| PROJECTION<br>REFERENCE VIEWS | SCALE<br>NTS |
| UNITS<br>mm | SHEET<br>1 OF 1 |