

MK5CBV1 – THEO-P173

Layout used when certifying the FCC modular approvals.

The MK5CBV1 was used in the validation and certification of the THEO-P173 (FKA - MK5 Module)

This PCB is a 12 layer 1.6mm thick PCB that was intended to provide a host platform to the radio module to allow stack and application development and testing.

The main area of consideration when attempting to design your PCB to house the THEO-P173 is to ensure good RF performance of the module.

PCB material = Isola 370HR

FAKRA connector used = Rosenberger 59S2AQ-40MT5-Z

Main points to try to achieve are:

1. Try and match a 50R line to the width of the THEO-P173 RF output pad.
2. Try and minimise length of trace. 5G9 losses in low quality substrates can be high.
3. Try and minimise impedance transition/mismatch on your chosen FAKRA or other connector pad design.

As can be seen on the excerpts of our MK5CBV1 PCB we have achieved this by removing Cu from several Internal layers (L1, L2) to allow the thicker RF trace to be used to best match RF pads and connector footprints. RF trace on Top Layer to Reference Ground on L3 internal. Please see stackup details below for details of those layers.

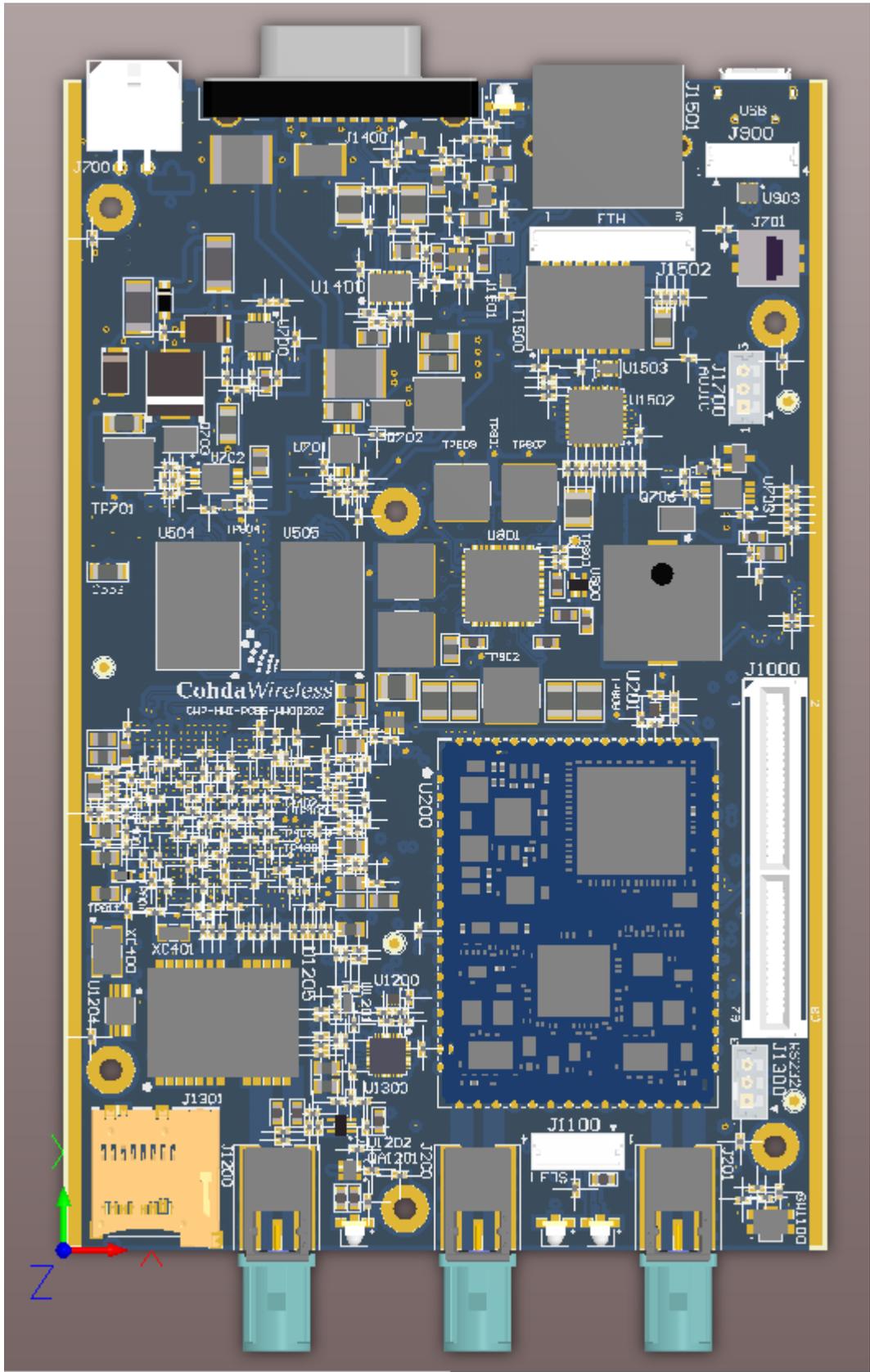


Figure 1Top View MK5CBV1

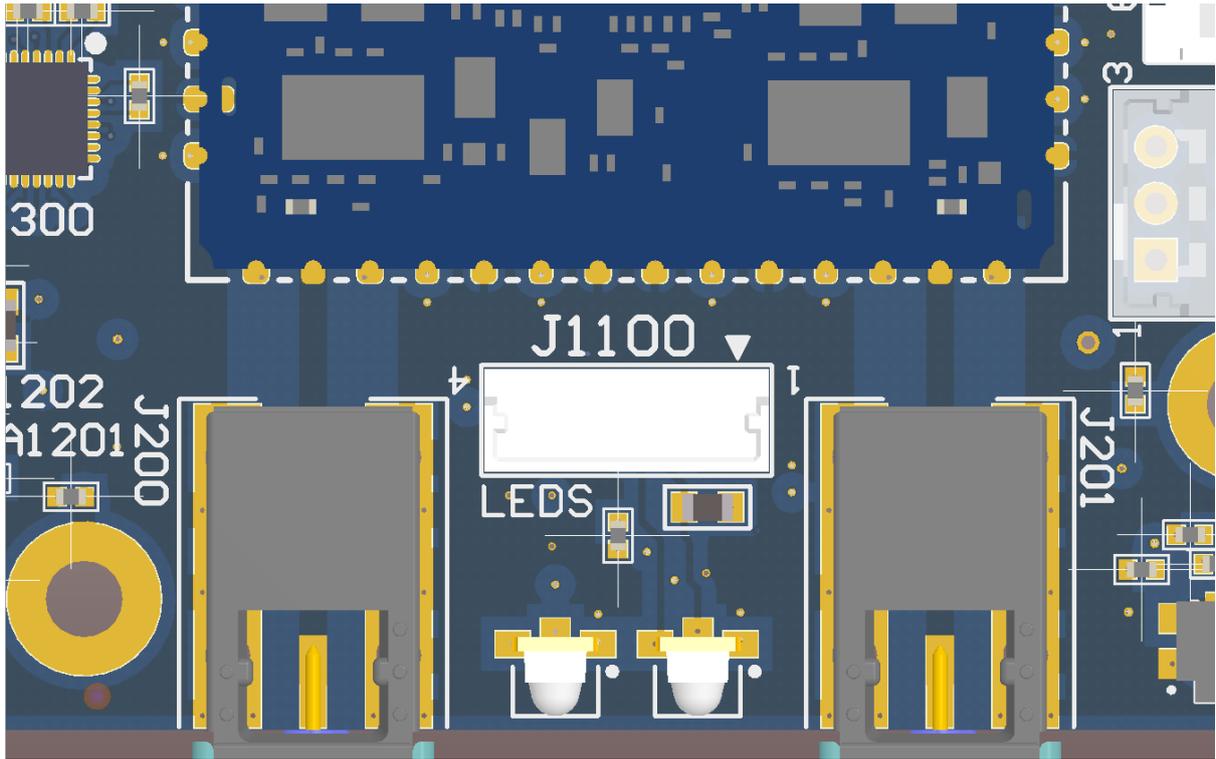


Figure 2 3D Top View of RF Section

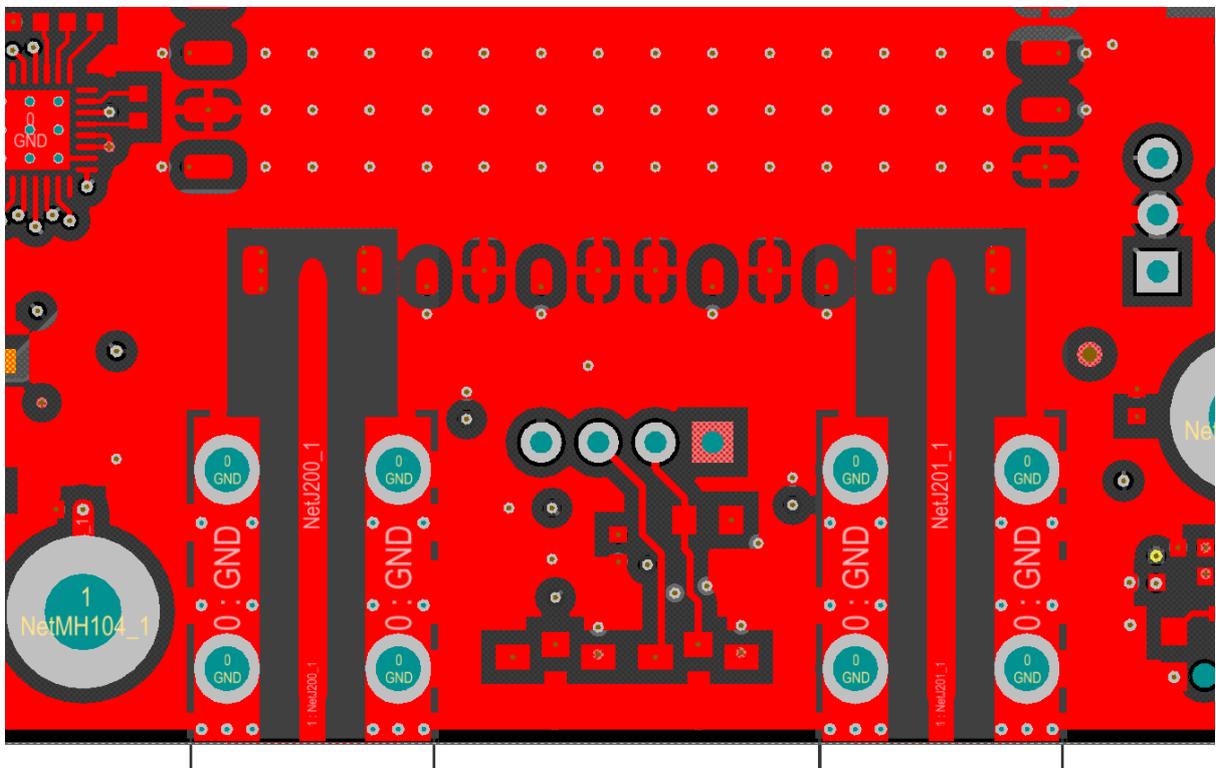


Figure 3 TOP Layer

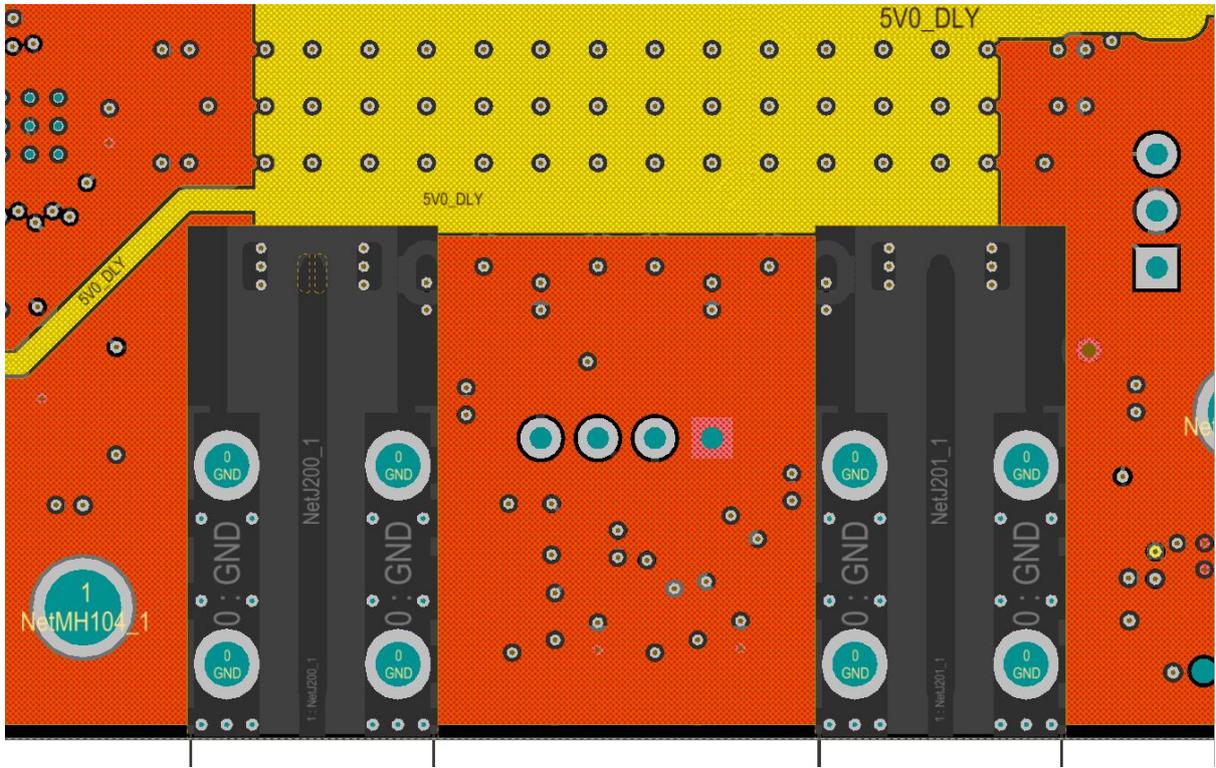


Figure 4 Layer 1 Internal

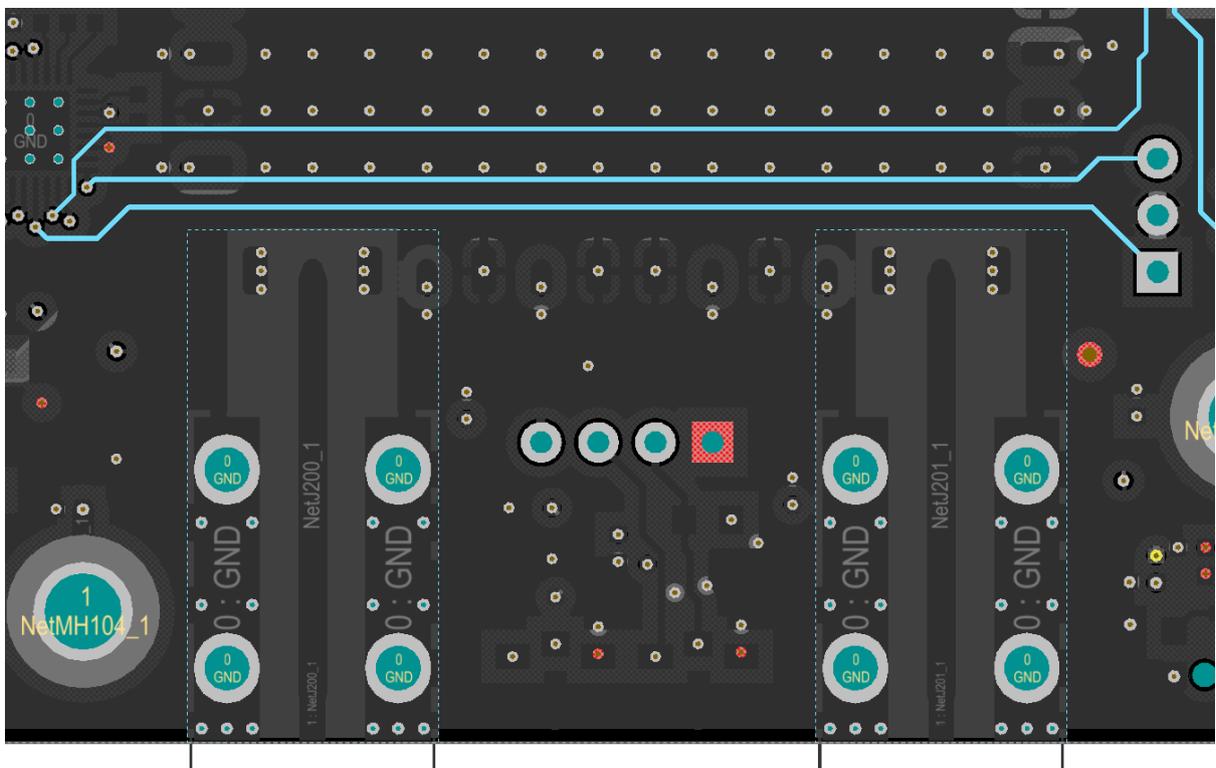


Figure 5 Layer 2 Internal - NOTE plane cutouts under connector and trace

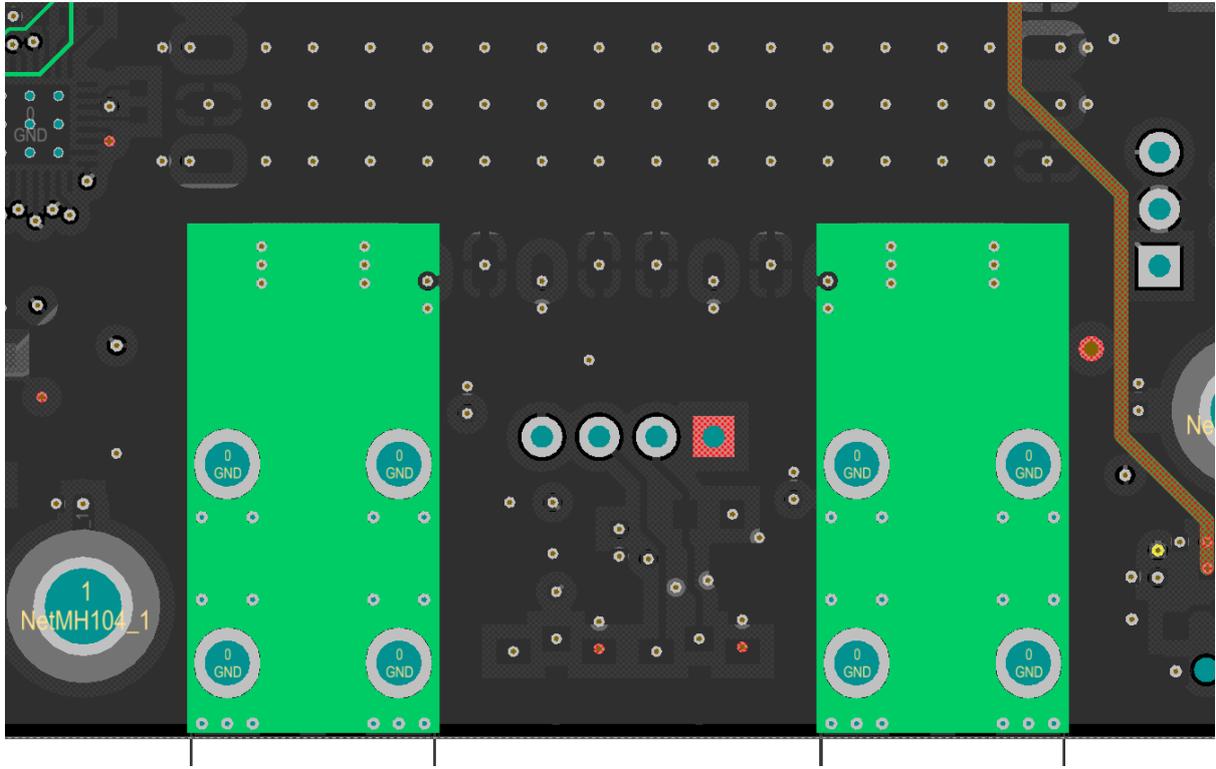


Figure 6 Layer 3 Internal - Ground Reference for RF

Layer Name	Type	Material	Thickness (mm)	Dielectric Material	Dielectric Constant	Pullback (mm)	Orientation	Coverlay Expansion
Top Overlay	Overlay							
Top Solder	Solder Mask/Co...	Surface Material	0.0127	Solder Resist	4.71			0
L1 - TOP (with pl...	Signal	Copper	0.0508				Top	
Dielectric1	Dielectric	Prepreg	0.09398	370HR	4.34			
L2 - GND Plane1	Internal Plane	Copper	0.01524			0.508		
Dielectric2	Dielectric	Core	0.0889	370HR	4.4			
L3 - PWR pours	Signal	Copper	0.01524				Not Allowed	
Dielectric3	Dielectric	Prepreg	0.07874	370HR	4.07			
L4 - SIG (Horizo...	Signal	Copper	0.01524				Not Allowed	
Dielectric4	Dielectric	Core	0.254	370HR	4.64			
L5 - SIG (Vertical)	Signal	Copper	0.01524				Not Allowed	
Dielectric5	Dielectric	Prepreg	0.07874	370HR	4.07			
L6 - PWR Pours	Signal	Copper	0.01524				Not Allowed	
Dielectric6	Dielectric	Core	0.0889	370HR	4.4			
L7 - GND Pours	Signal	Copper	0.01524				Not Allowed	
Dielectric7	Dielectric	Prepreg	0.07874	370HR	4.07			
L8 - SIG (Horizo...	Signal	Copper	0.01524				Not Allowed	
Dielectric8	Dielectric	Core	0.254	370HR	4.64			
L9 - SIG (Vertical)	Signal	Copper	0.01524				Not Allowed	
Dielectric9	Dielectric	Prepreg	0.07874	370HR	4.07			
L10 - PWR Pours	Signal	Copper	0.01524				Not Allowed	
Dielectric10	Dielectric	Core	0.0889	370HR	4.4			
L11 - GND Plane 2	Internal Plane	Copper	0.01524			0.508		
Dielectric11	Dielectric	Prepreg	0.09398	370HR	4.34			
L12 - BOTTOM (...)	Signal	Copper	0.0508				Bottom	
Bottom Solder	Solder Mask/Co...	Surface Material	0.0127	Solder Resist	4.71			0
Bottom Overlay	Overlay							

Figure 7 Stackup details of the MK5CBV1