



EURIPIDES FORUM in Graz

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MIDIMU-HD

Mixed Microwave and Digital Multilayer PCB for High Density Applications

Abstract

The **MIDIMU-HD** project is aimed at the development of a new technology making possible the design and manufacture of high density mixed microwave and digital **printed circuit boards** made of multilayer dielectric material. The major innovations include **integrated frequency filters** and other microwave functions coupled with stacked copper-filled microvia and HDI technologies. This new approach will enable significant improvement of the long-term reliability of printed circuit boards, which is a strong demand of end users in professional electronics.

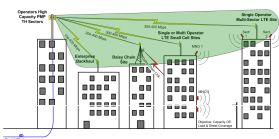
The project will offer an opportunity to develop a highly integrated transceiver module operating in a target bandwidth of **40.5 – 43.5 GHz**, which will allow a major advance in WLAN networks, satellite communications, point-to-point and point-to-multipoint networks, **mobile network (3G, 4G)** applications.

Keywords

Radio Frequency
Printed Circuit Board
40-45 GHz Bandwidth / Wireless Access
Embedded Pass Band Filter / Transmitter
Fine Pitch Components / High Density Interconnect
Dielectric Substrate
Industrial Manufacturing

Fields of Application

The MIDIMU-HD project is dedicated to the development of transmitter modules for microwave Point-to-Multipoint Backhaul applications. The target Wireless Access Networks are designed to provide connection between NTE (Network Terminal Equipment) and Operators Core Networks for the mobile or stationary telecommunication services such as voice, data, or video transmission.



Consortium overview / Complementaries / R&D chain

A consortium has been formed to take benefit of the partners' best complementary skills. The project objective can be fully reached due to the highest competences, background, and complementary skills of the team of partners. All partners have been carefully chosen for the consortium in order to guarantee high synergy level and high probability of success in terms of matching market requirements.

AT&S (Austria) is the largest PCB manufacturer in EUROPE ranking among the largest manufacturers worldwide. **PROTECNO GTID** (France), a partner of Thales for the concept and manufacturing of microwave PCB, is the best complement to AT&S. **PANASONIC** (Austria) has established the production facilities for PCB substrates in the world's key market locations and capitalizes on leading technology to research, develop, and manufacture substrates for multilayer PCBs. **SWEREA IVF** (Sweden) offers support having many years of experience and using well-established test methods for electronics. **LABSTICC** (France) is a modern laboratory dedicated to establishing a standard for developments in the communication field, it has been selected for its background and great experience in frequency filters design. **FLEXTRONICS** (Sweden) is involved in this project to make sure that the assembly and repair of the assembled boards are done in the best possible way to guarantee that the processes are commercially feasible. **THALES Global Services** (France) provides competitive advantages to the consortium by transferring leading edge ideas & skills to the partners; it is involved in MIDIMU-HD project particularly due to the expertise in torsion tests and thermal shock tests with continuous monitoring. **THALES Communication & Security** (France) is in charge of electrical tests, compiling specifications, coordination and links with the operator and equipment suppliers.

Project Objectives

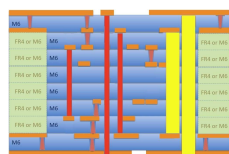
- Development and validation of a substrate material matching the dielectric and loss properties for high frequency application, available in a large range of laminates and prepregs in order to be compatible with multilayer structures.
- Conception and design of a pass band filter for Q-Band (40-44 GHz) on an organic substrate using industrial manufacturing rules.
- Build-up and integration of multilayer PCB for high frequency applications (board integration concept, HDI, fine pitch BGA).
- Combining RF functions (including pass band filter, power amplifier and up-converter), and HDI design on a same organic multilayer PCB.
- Validation of the structure; assembly and repair process development; electrical tests; reliability estimation.
- Cost-effective production and testing of a Tx/Rx test vehicle for LTE node equipment.

Project Solutions / Results

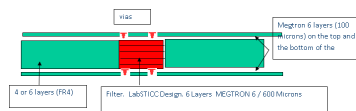
The MIDIMU-HD project has been started in January 2012. The first step of the project, substrate selection, is completed with the recommendation of a resin-based material suitable for upgrading to meet specific electrical requirements.

Specifications are reaching the approval point; the work packages 3 and 4 have been started to specify the frequency filter build-up, HDI interconnection, and integration technologies. The pictures below present the first concepts of filter build-up, filter integration, and HDI interconnection concept.

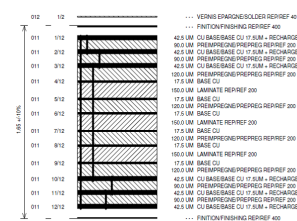
The first test vehicles have been manufactured. They are aimed at the substrate and conductive material validation and production process development.



Frequency filter build-up



Filter integration into multilayer structure



HDI interconnection

