

RESEARCH ROADMAP

In our group, various related topics on the research of advanced microwave technology, monolithic millimeter-wave integrated circuits (MMIC) design, and development of radio-frequency system-on-package (RF-SoP) integration technologies for multi-Gbps radio link applications are covered, such as Si-based and III-V compound MMIC's design, measurement, modeling, and high-level integration transceivers, integrated passive device (IPD) transmission line and flip chip interconnects characterization, 3D VLSI modeling, passive embedded SoC using novel transmission structures, SoP millimeter-wave passive components by low temperature co-fired ceramics (LTCC) or IPD, EMC design for coupling noise reduction, advanced miniaturized broadband planar antennas design, and smart antennas design in seriously fading environment, thereby achieving main theme of exploring the MMIC, SoP, and smart antenna technologies for civil applications.

Our developed technologies have been successfully applied for millimeter-wave transceiver modules development such as 38-GHz, 40~48-GHz and 60-GHz millimeter-wave modules. By combining a 2.4-GHz video sender, the 38-GHz transceiver module is tested by transmitting the analog NTSC video and audio signal to prove the specifications of each unit module as shown in Fig. 1. The 40-48 GHz modules have also been proven for 1.5-Gbps HDSOI video signal transmitting and display as shown in Fig. 2. We are continuously developing the advanced techniques for microwave/millimeter-wave components and system packaging. Higher frequency such as E-band, W-band and higher level-integration technologies will be explored in the future.

Being the Asian number one and the world top three EM wave research group are our goals. Our mission is to develop innovative and core technologies of microwave and millimeter-wave related area, to establish forward-looking electrical analysis, modeling, measurement, and design technologies for advanced packaging and systems, and to promote the system integration technologies in advanced high-speed wireless communications.

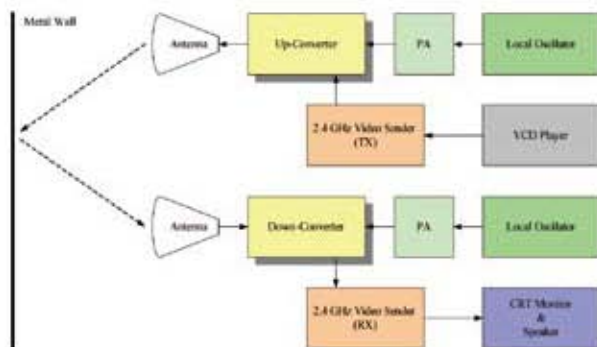


Fig. 1. Testing block diagram of the 38-GHz transmit/receive modules.

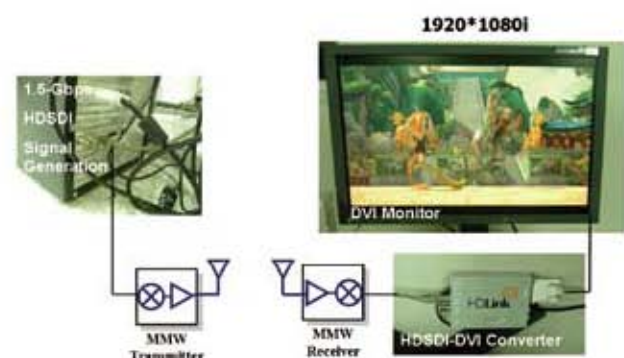


Fig. 2. Millimeter-wave wireless 1.5-Gbps HDSOI video display.