

FAB\$ and LAB\$S

Sanan IC: Helping People Chase Their Dreams



Sanan Integrated Circuit (Sanan IC) built China's first 6-in. compound semiconductor platform wafer fab to offer foundry services for RF, photonics and power electronics applications. Founded as Xiamen Sanan Integrated Circuit Company in 2014 and funded with a 3 billion RMB (\$500 million) capital investment, Sanan IC built a wafer fab on a 180,000 square meter site in the Xiamen Torch high-tech industrial district located in the Fujian province. Risk production began in October 2015, and Sanan began marketing to designers outside China in August 2018. With more than 90 percent of the equipment fully automated, the fab's GaAs capacity, among other process technologies, is 4,000 wafers per month, which can scale up rapidly as market demand grows.

Sanan IC provides MOCVD epitaxial wafers, wafer processing and wafer probe testing. The foundry has qualified three GaAs MMIC processes for RF/microwave applications—HBT, PHEMT and BiHEMT—complementing these with integrated passive device (IPD) and PIN diode processes. The 2 μm HBT node comprises five versions, each optimized for specific performance parameters: linearity, power-added efficiency, current gain, phase noise, ruggedness and operating voltage.

The PHEMT processes can be fabricated with 0.5, 0.25, 0.15 and 0.1 μm gate lengths, each with several versions for specific applications. The 0.5 μm process uses depletion mode (D-mode) FETs optimized for RF switching. Four, 0.25 μm versions offer a mix of D-mode and enhancement mode (E-mode) devices that can be used to design low noise amplifiers (LNA), power amplifiers (PA) and switches, with the option to add

integrated logic. Four options are also offered with the 0.15 μm gate process, again a mix of E- and D-mode devices to address higher frequency LNA, PA and switch designs with on-chip logic. The devices have f_t values from 64 to 85 GHz; to minimize gate length variation, the 0.15 and 0.1 μm gates are defined with e-beam lithography.

Sanan's BiHEMT process combines HBT and PHEMT transistors on a single MMIC, typically using the HBT device for a PA and the PHEMT for an LNA or switch. Two E-mode PHEMTs are available, with 0.25 and 0.5 μm gate lengths. The IPD process integrates passive circuits of resistors, capacitors and inductors. Sanan has also developed a GaN-Si process, which complements its SiC Schottky barrier diode and SiC MOSFET processes for power electronics.

To aid designers, the foundry offers process design kits (PDK) and design support for Keysight's Advanced Design System (ADS) software. Once a design is complete, Sanan uses a five-step process for design rule checking before releasing the customer's design for mask fabrication and wafer processing. Sanan's quality management system is certified to both ISO9001:2015 and IATF16949:2016 for automotive, and its information system meets the ISO27001:2013 certification for information security management.

Paraphrasing a Chinese expression, the world is full of people chasing dreams. Sanan's vision is to enable those dreams through wireless communication, lifting the constraints of space and time.

www.sanan-ic.com