

## „FCOS – The Evolution of Chip Card Modules“

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Never stop thinking.

# Packaging Center at a glance

## Regensburg- Burgweinting / Germany

### Volume Production

- ☐ Preassembly
- ☐ Module Assembly
- ☐ Contract Assembly
- ☐ Pre-personalisation

### Quality Development Marketing

**Area:** 2,500m<sup>2</sup>  
**Employees:** 260



## Wuxi / China

### Volume Production

- ☐ Preassembly
- ☐ Module Assembly
- ☐ Contract Assembly

**Area:** 2,000m<sup>2</sup>  
**Employees:** 170



# 15 years of history in Chip Card Packaging

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- **1990** Start module production
- **1995** Chip-on-chip module for Pay-TV application
- **1997** First dual interface module
- **1998** Worldwide thinnest contactless module (MCC2)
- **1999** Establishing Marketing at Packaging Center – onsite support for customers
- **2000** Start mass production in China for local market
- **2001** Successful finalization of Display-on-Card – government research project
- **2002** Thinnest contactless package for chip card controller
- **2003** Installation of card implantation equipment at Packaging Center for customer support
- **2004** establishing thinnest contactless module MFCC1 for 450 µm thin IC Card; production of 3rd billionth module

## Leader in cost/piece and innovation

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### Benchmark cost position

- High volume production at benchmark cost
- Fast transition from Wirebond to Flip Chip on Substrate (FCOS) technology

### Innovation leadership

- Leadsite Regensburg-Burgweinting with integrated marketing/development/quality/production function
- In time ramp of new technologies: ultrathin wafer, NiAu, bumping, Face-to-Face, powder antenna, etc.
- Use synergies with central IC & Packaging Development

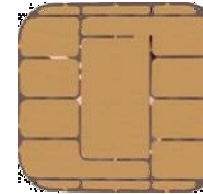
### New opportunities in SEC value chain

- Integrated development with SEC business unit of new opportunities, such as personalization, contactless sub-systems (Epassport pre-lam, RFID inlay), etc.

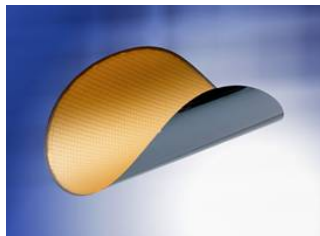
# ...already thinking of future requirements



MFC3.1



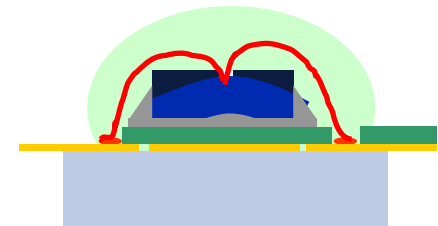
MFC5.6/8



DBG  
ultra thin



Face-to-Face  
early prod. line



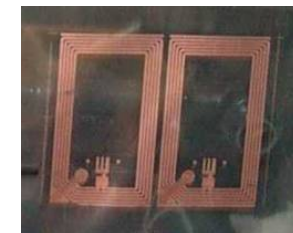
S-Pack



MFCC8  
eD1



ePassport Inlays



# Why FCOS™ ?

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## Market Situation before FCOS

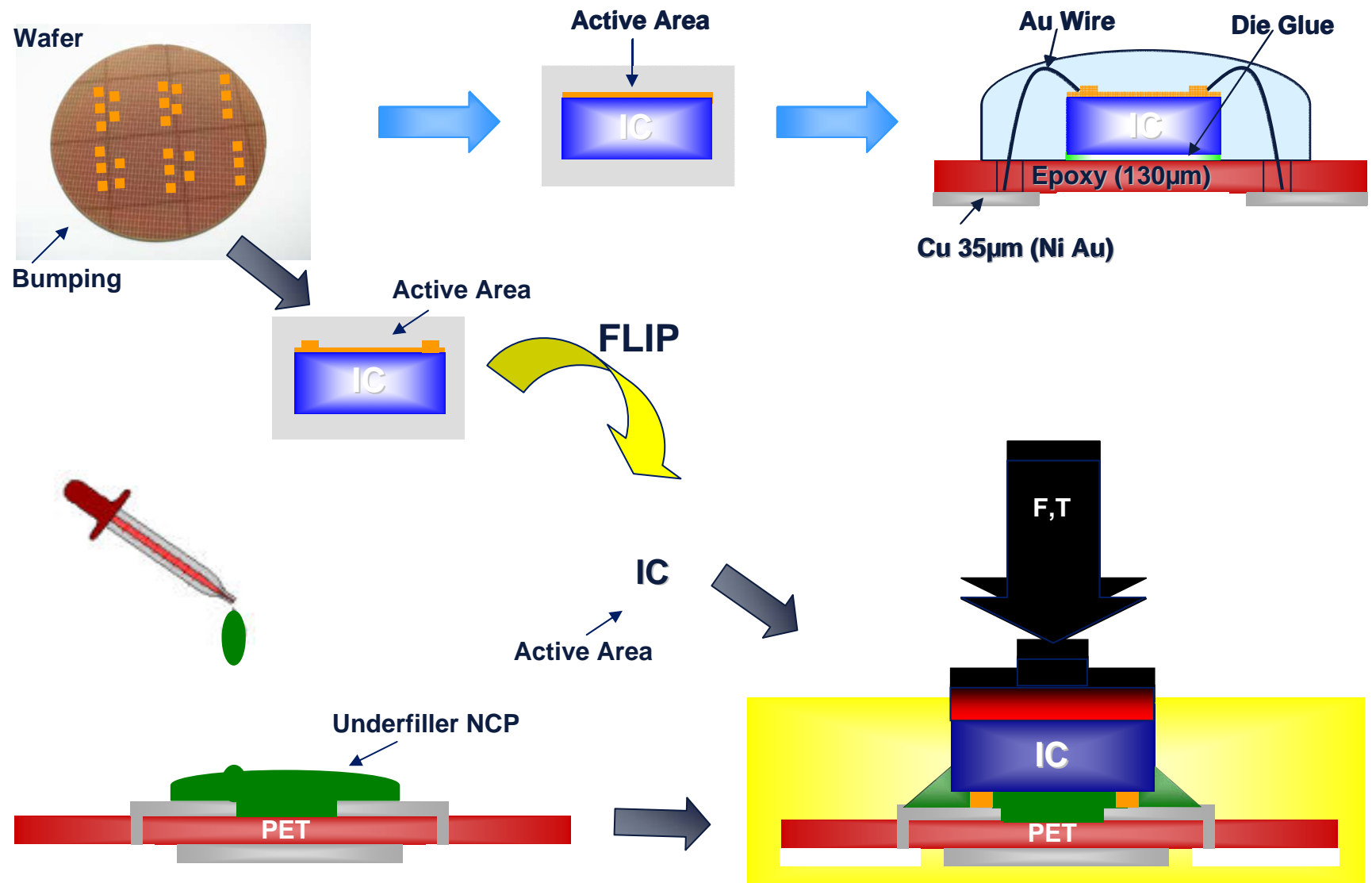
- 2 tape suppliers dominated the chip card market
- Cost of tapes more than 50% of total package costs
- High price pressure due to overcapacity of module manufacturers which tape supplier did not follow
- Increased mechanical and reliability requirements from the market

## Solution

- Enable new source of tape supplier (high volume)
- Change to cheaper material cost of tape
- Adapt process of module assembly to new tape
- Work closely with card manufacturers for integration of new module technology into card



# FCOS vs Wirebonding



## FCOS - Benefits

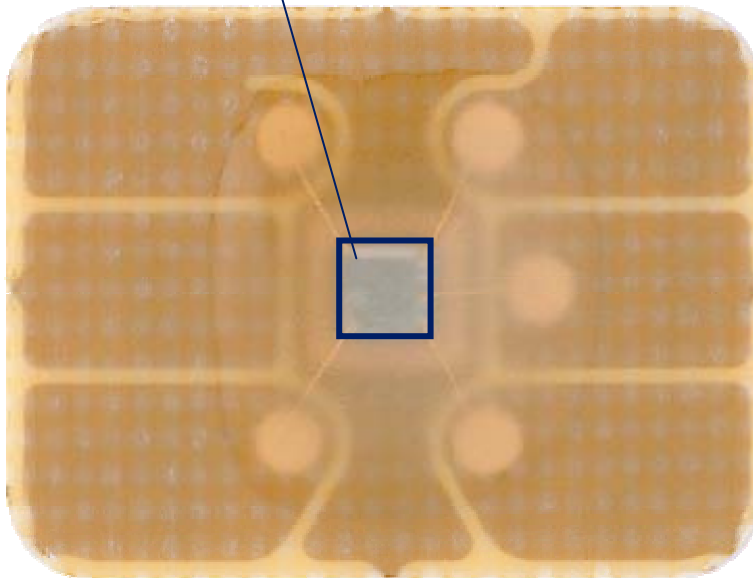
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- Increased temperature cycling by 10
- Improvement for high dynamic bending stress (mailing)
- Increased mechanical reliability for static tests
- High corrosion resistance
- Housing for large IC area
- Increased implanting area
- Green Package
- FIPS (Federal Information Processing Standard) compatibility



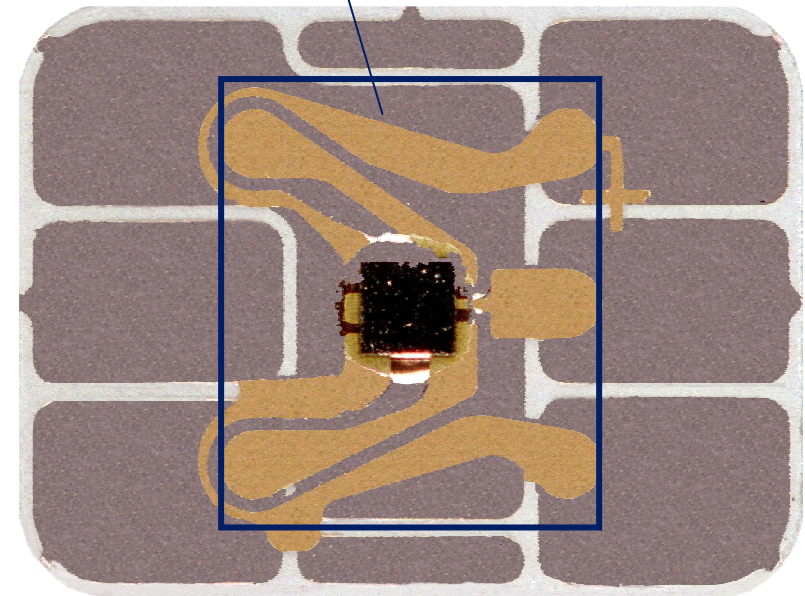
## Max. IC-area: Wirebond vs. FCOS 6-contacts

Max. IC-area:  
1.9 x 1.9 mm



Wirebond 6-contact module

Max. IC-area:  
5.0 x 6.0 mm



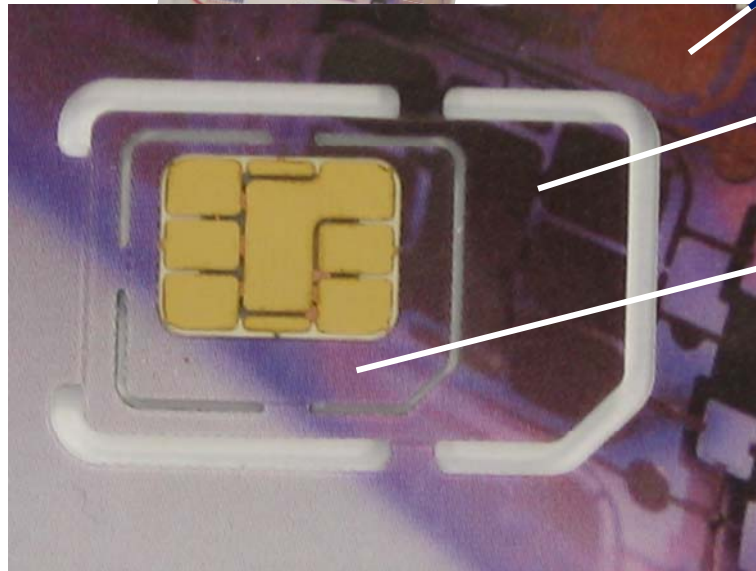
FCOS 6-contact module

## 3<sup>rd</sup> Form Factor



### First Form Factor

(size of a credit card)



### Second Form Factor

(size of a SIM card, current norm for GSM devices)

### Third Form Factor (3FF)

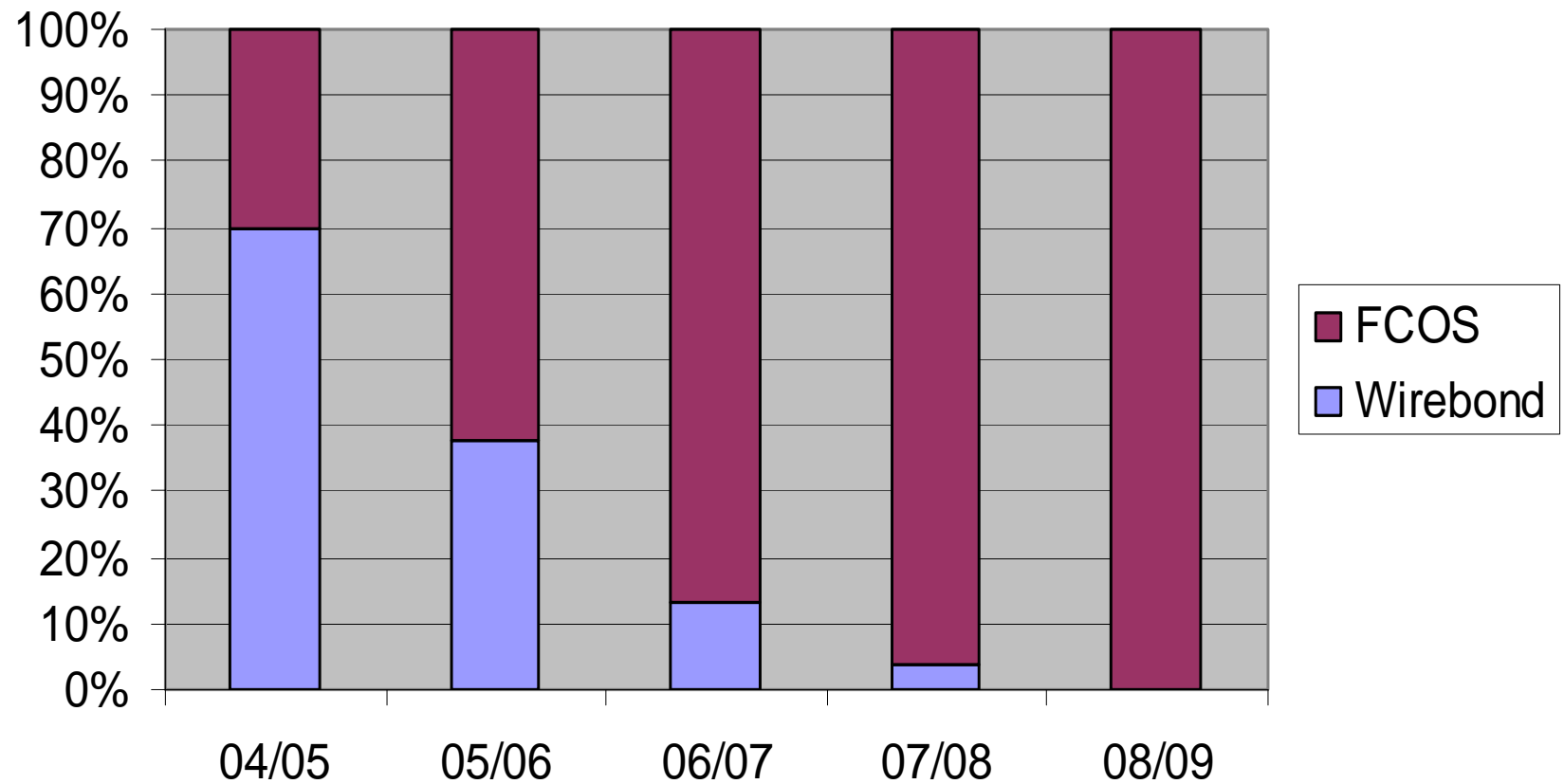
Mini-UICC, half the size of the existing SIM card for use in high-end ultra-slim mobile phones and small devices such as GSM modems, WLAN cards

- allows the design of small terminals (e.g. data transmission only)
- full backwards compatibility
- implementation within a short time frame, main production equipment usable
- can be punched out of the existing plug-in, all three form factors on one card possible

- Punching tool of 6-contact at card manufacturer available
- Max. IC-area: ~30mm<sup>2</sup>
- For GSM application E<sup>2</sup> until ...mm<sup>2</sup> (IFX) will fit in MFC5.6

## FCOS - Ramp

### FCOS vs Wirebond technology



## Successful co-operation: Infineon and G&D

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- **JOINT DEVELOPMENT** with technology leading card manufacturer results in innovative product
- Special **CUSTOMER REQUIREMENTS** have been incorporated into product definition to optimize the usage of the technology's advantages
- **TIME TO MARKET**  
The project development could be finalized efficiently because of the close cooperation and communication between Infineon and G&D as well as tape suppliers (simultaneous engineering)
- **FIRST TIME RIGHT**  
Successful field trial of the new technology right after qualification