

# IFX Day 2007

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## Communications Solutions RF Engine

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Never stop thinking

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- **Product Highlights and Track Record**
- **Mobile Phone Market Development**
- **Cellular Transceiver Product Portfolio**
- **Conclusion**

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- **Product Highlights and Track Record**

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# Extended Market Leadership for Infineon's RF Engine Products



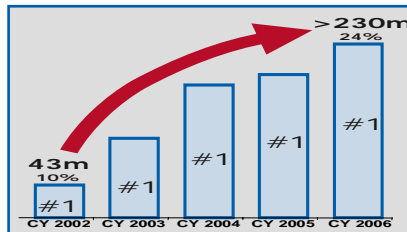
## COM RF Latest Highlights

### Miniaturization



SMARTi PM+ world's smallest EDGE Transceiver (RF Engine <math>< 100 \text{ mm}^2</math>)

### Volume



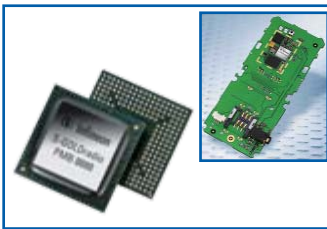
#1 with more than 230 million transceivers shipped in CY 2006

### Multimode



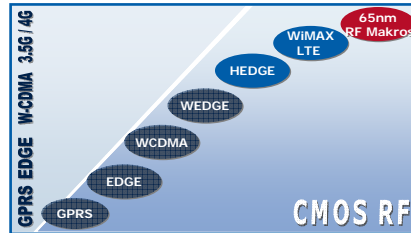
SMARTi UE world's first single-chip HEDGE transceiver with DigRF

### BB+RF integration



E-GOLDvoice in production and S-GOLDradio world's first EDGE single-chip

### CMOS leadership



Complete TRx portfolio in CMOS RF

### Emerging standards



Sampling of SMARTi transceivers for WiMAX and LTE

# COM RF Product Portfolio at a Glance

## SMARTi® Transceivers

- Comprehensive portfolio: GPRS, EDGE, 3G, multi-mode
- Standard products and customized solutions
- Innovation for:
  - Integration
  - Miniaturization
  - Cost reduction

## RF Systems and Engines

- Complete RF Engines and reference designs
- Third party management with all leading RF frontend suppliers



## BAW Filter

- Over 200 million BAW filters shipped
- CDMA / WCDMA duplexer
- Interstage filter
- GSM filter
- GPS filter

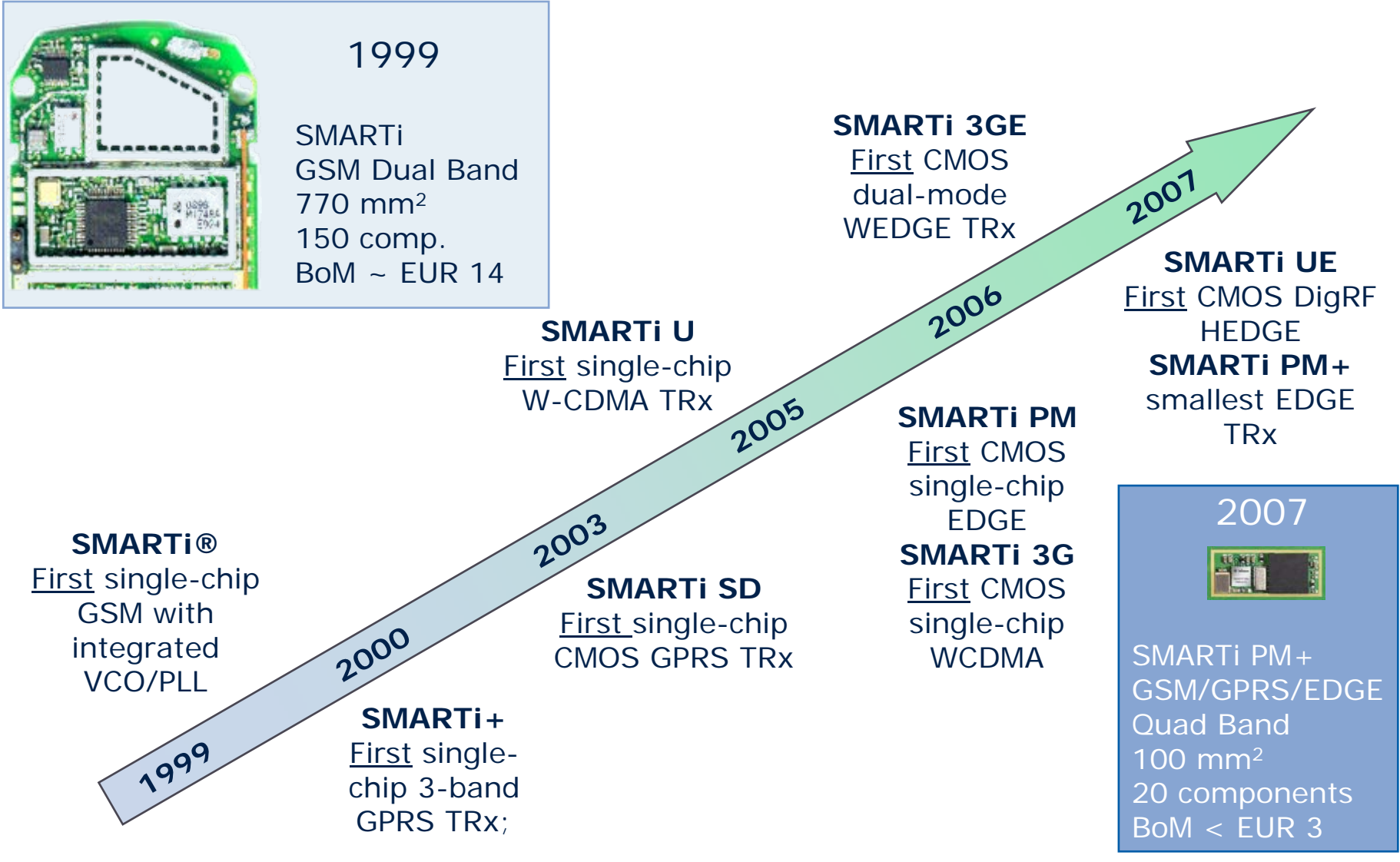


## Emerging Standards

- WiMAX 802.16e transceiver
- LTE transceiver and architecture



# Infineon's Track Record in First-to-Market Cellular Transceivers

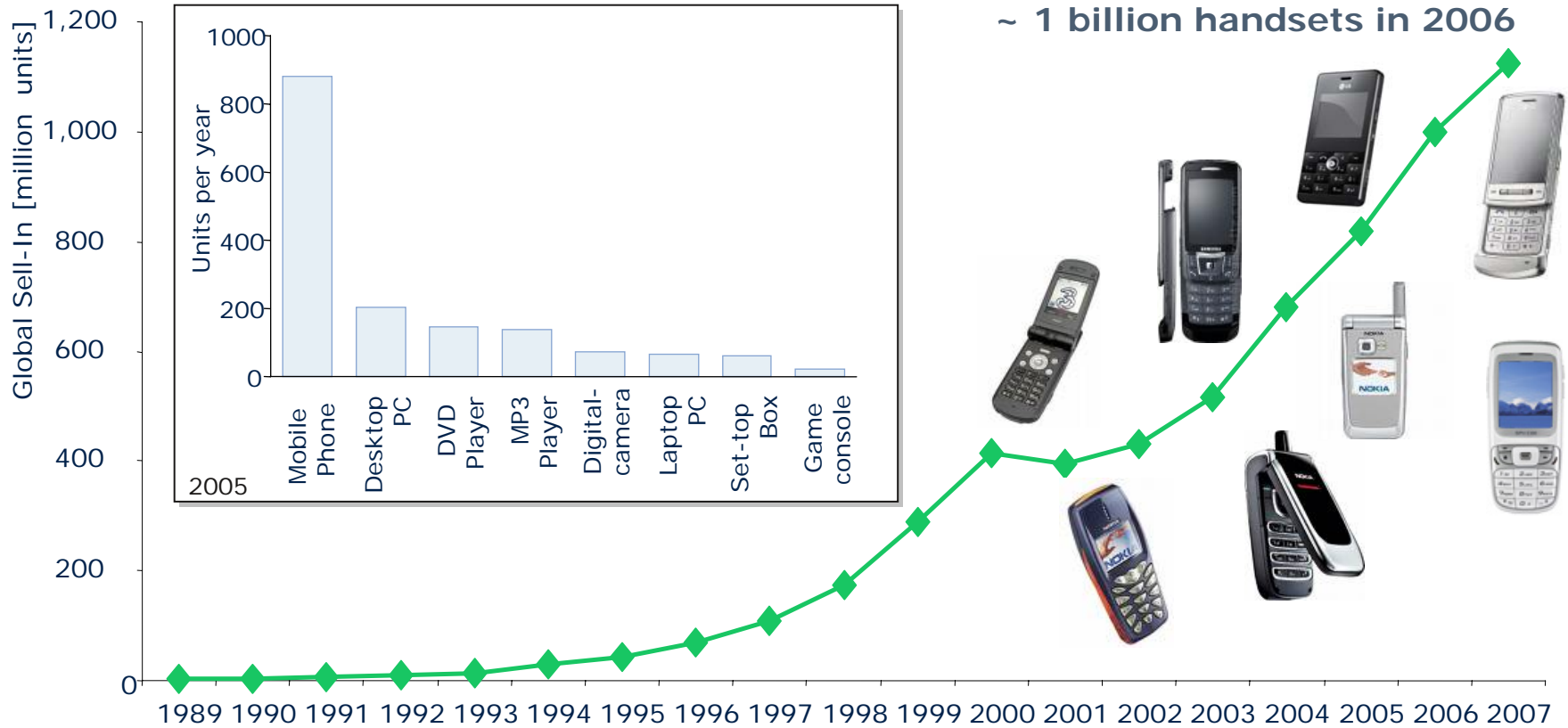


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# The World's Largest Electronic Consumer Market

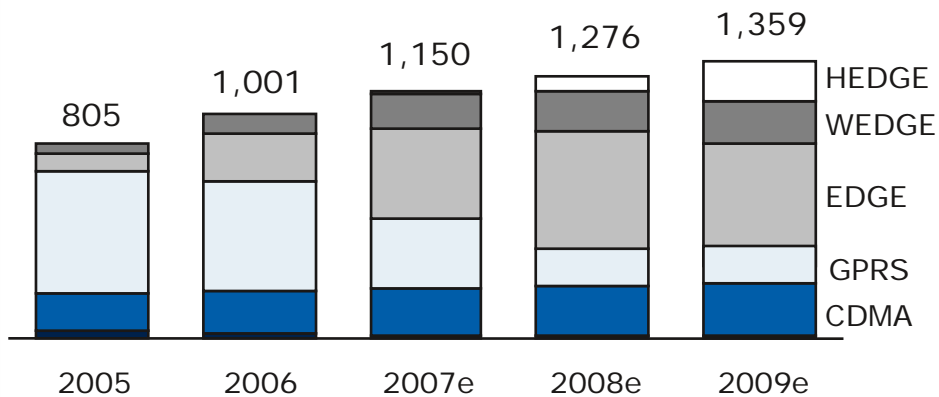


- Mobile phone market is expected to continue its growth path with a CAGR of 8.0% from 2006 to 2010.
- Drivers are new subscribers (ULC) and replacements (EDGE and 3G).

# Multi-mode Operation, High-volumes and Fast Design Cycles are the Challenges for RF

## Market development

Worldwide mobile phone shipments by air interface [m units]



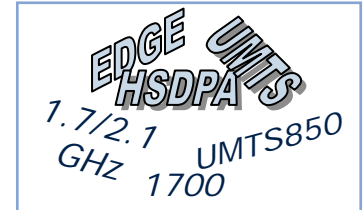
- 3G phones to grow from 52 million in 2005 to 304 million in 2009.
- EDGE phones to grow from 14 million in 2005 to more than 600 million in 2009.

Source: ABI Research, 2006

## RF requirements

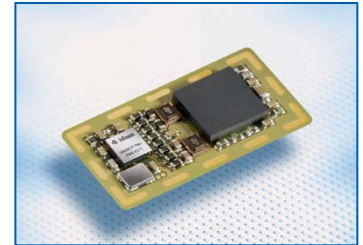
### From GSM to Multimode

- More standards
- Multiple bands
- Optimized power consumption



### Ease of implementation

- Miniaturization and integration
- Fast time-to-market
- Standard digital interfaces - DigRF



### High Volume

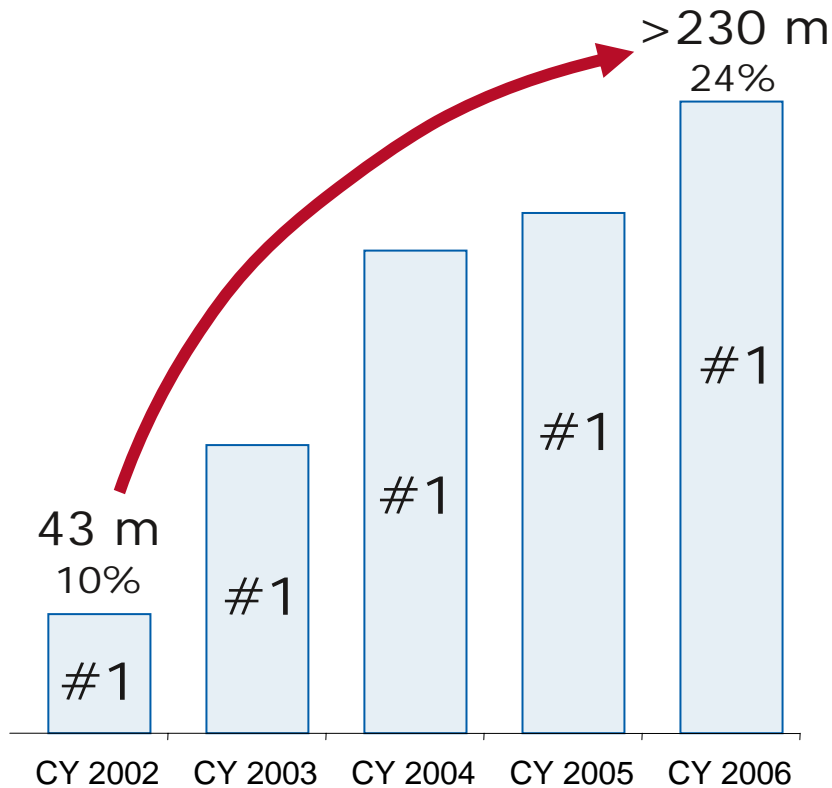
- Best cost position
- Secure and flexible supply



# Infineon RF Transceivers for Cellular Applications - Steady Growth of Market Share



## IFX market share and ranking in RF transceivers



## Major Contributors

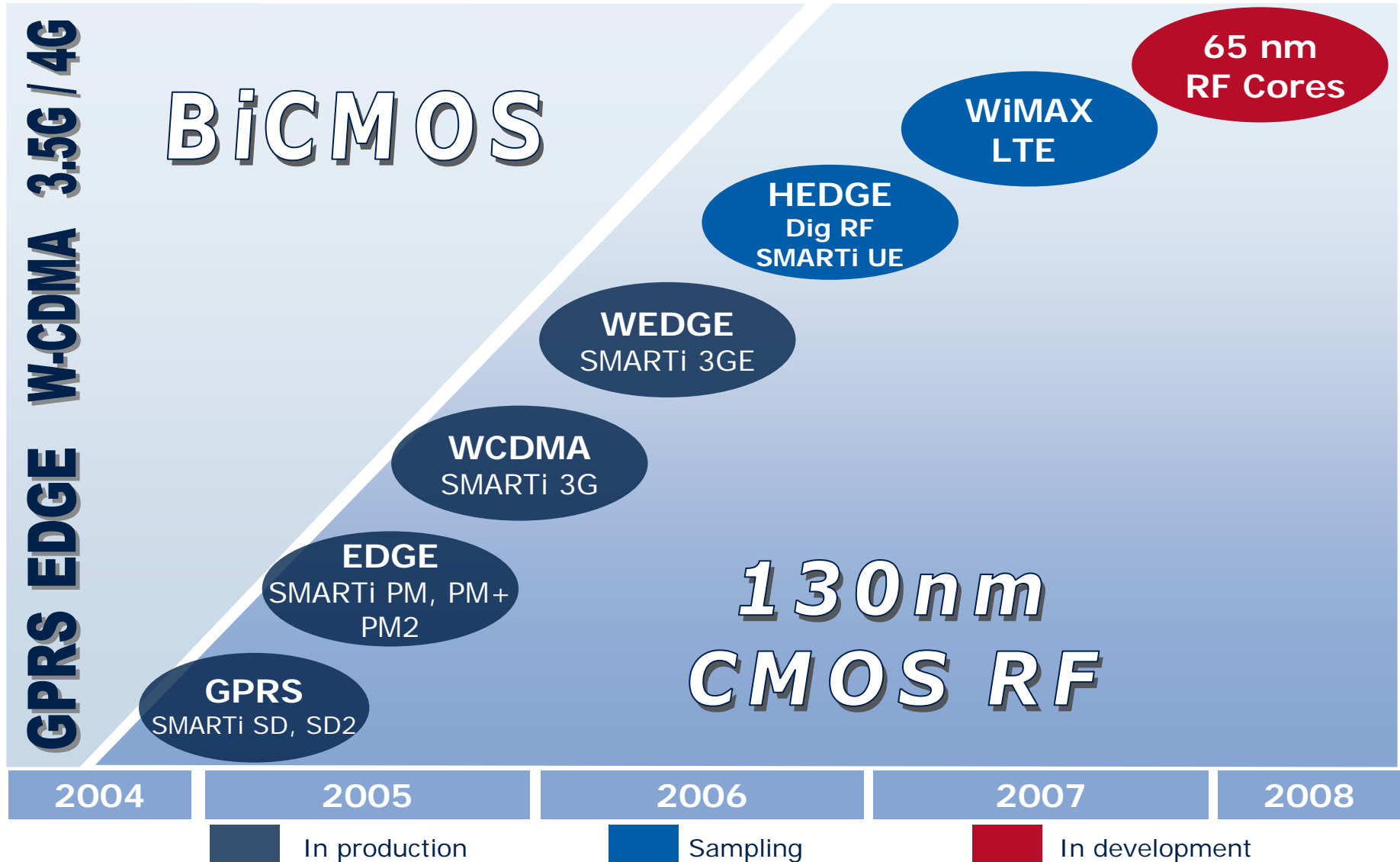
- Successful ramp-up of new RF transceivers for major OEMs.
- CMOS transceiver in volume production since 2004.
- Complete product and roadmap conversion to CMOS technology.
- Leading cost position.
- Excellent RF performance.

→ By end of CY 2007 we will have shipped 1 billion cellular transceivers

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# Comprehensive CMOS RF Transceiver Portfolio: All Wireless Standards in Single CMOS Technology



# Infineon's RF Offering For the Different Requirements of the 3 Cellular Market Segments



## Market Segment / Trend

### 3G / 4G Multimode

- Multi-band transceivers (up to 7 bands).
- Multi-mode solutions (UMTS + EDGE + GPRS).
- Digital RF-to-Baseband interfaces.
- Increasing demand for HSDPA/HSUPA and diversity solutions.

## IFX Product



### 2.5G EDGE

- Cost effective EDGE transceivers.
- High Volume: gaining ~ 40% of cellular market by 2008.
- Trend towards ultra-small RF systems and digital BB/RF interface.



### 2G GSM/GPRS

- Commodity business.
- Lowest customer cost of ownership.
- Trend towards monolithic integration of RF and BB.

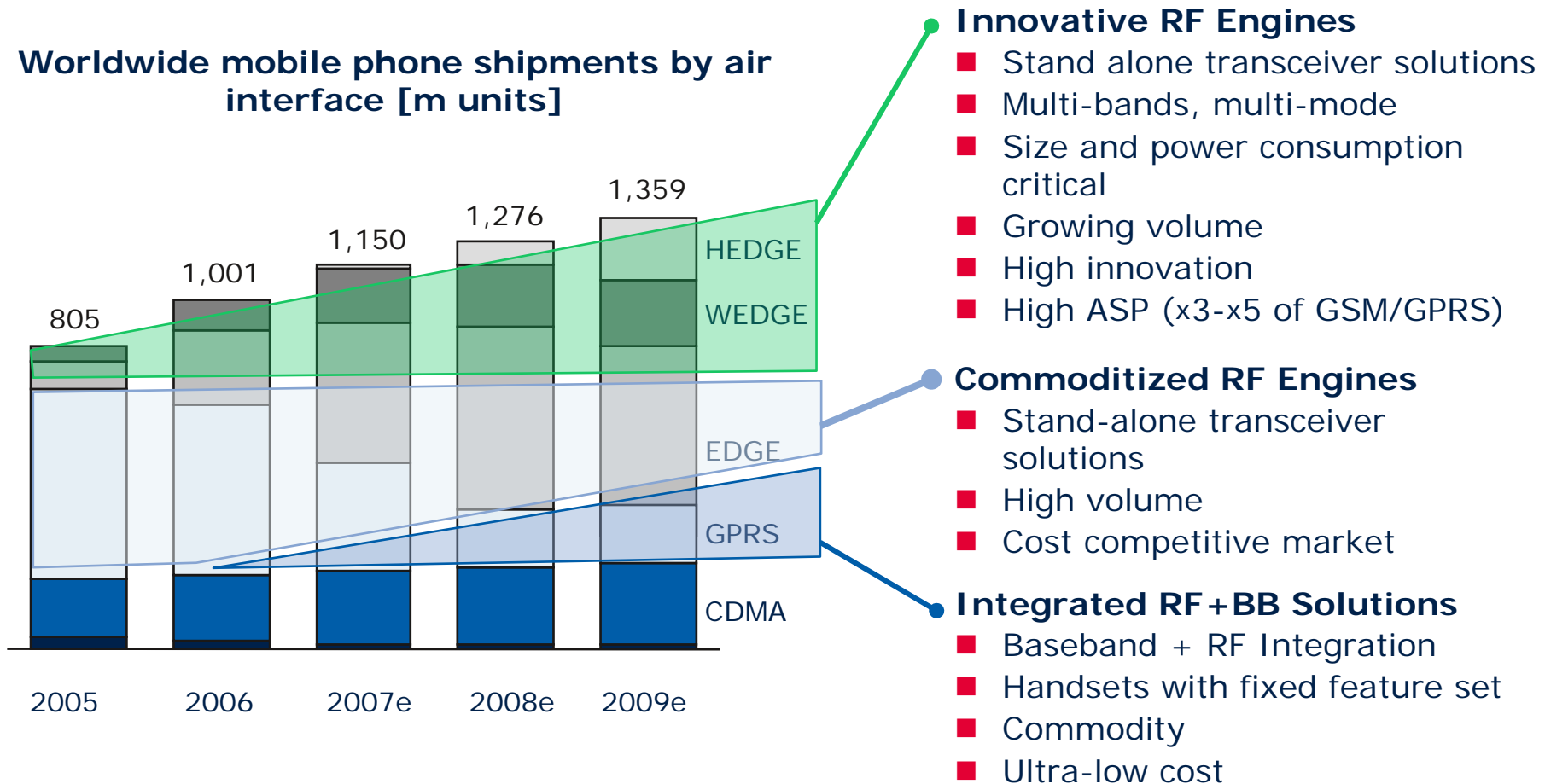


# Stand-alone TRx and Scalable BB Solutions Driven by 3G Multi-mode and High Tier EDGE



## RF Market Segmentation

Worldwide mobile phone shipments by air interface [m units]



Source: ABI Research, 2006; IFX

# SMARTi PM Enables Best Performing and Most Cost-effective EDGE RF Solutions



## Competitor's EDGE solution shipping today

Front side



Back side



- 55 components
- double side PCB
- ~ 310 mm<sup>2</sup>

## SMARTi PM track record



SGH-D900



SGH-E898



KE850



HTC smart mobility  
Startrek Orange  
"SPV F600",  
Cingular3125



KE820



HTC smart mobility  
T-Mobile  
DASH



Panasonic ideas for life  
Softbank  
705P/706P

## Infineon's EDGE solution shipping today



- 20 components
- **single** side PCB
- ~ **170 mm<sup>2</sup>**

- Smaller form factor ✓
- Lower customer cost of ownership ✓
- Excellent, stable performance ✓

\*Not drawn to scale

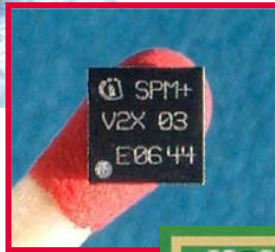
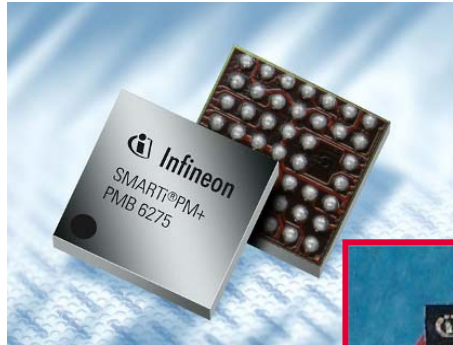


# Based on the Success of SMARTi PM the SMARTi PM+ Sets New Standards for Miniaturization



## SMARTi PM+

The world's smallest  
EDGE transceiver



World's smallest  
EDGE solution

**New design-wins at two  
tier-1 OEMs**

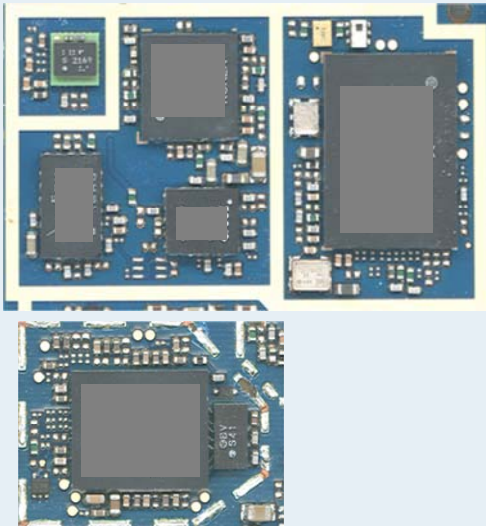
- **Smallest footprint: 3x3 mm<sup>2</sup>**
- **Lowest height: < 1.0 mm**
- **Micro Radio solution < 100 mm<sup>2</sup>**
- **Ramp-up in 2nd half 2007**

# SMARTi 3G and SMARTi 3GE Underline Infineon's Leadership in 3G RF



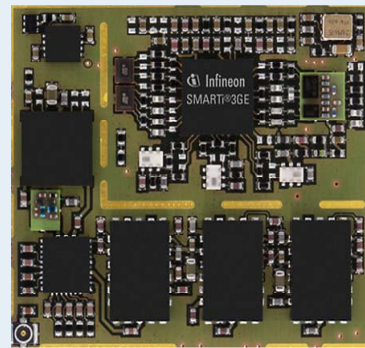
## Competitor

- Dual-band UMTS
- Triple-band EDGE
- 3.2M/s HSDPA
- PCB size: 1162 mm<sup>2</sup>



## SMARTi 3GE

- Triple-band UMTS
- Quad-band EDGE
- 7.2M/s HSDPA
- PCB size: 800 mm<sup>2</sup>



### Multi-band world platform

- -30% components ✓
- -30% footprint ✓
- -30% eBOM ✓

## SMARTi 3GE / 3G track record

### SMARTi 3G



### SMARTi 3GE

Ramp-up with 3 tier-1 OEMs in 2007

Both Chipsets recently in production

# SMARTi UE is the New Benchmark for Multi-mode 3.5G Cellular RF Transceivers



## SMARTi UE

The new benchmark in cellular RF



**World's first single-chip HEDGE RF transceiver with DigRF baseband interface**

- More than 50% reduction of RF PCB area (< 400 mm<sup>2</sup>).
- Lowest component count (< 50 components).
- Integrated analog baseband
- Embedded  $\mu$ Controller enabling simplified programming and fastest factory calibration.
- Covering all UMTS bands worldwide.
- Interoperable with all DigRF Basebands.

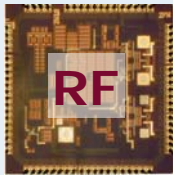
**New design-win at tier-1 OEM**

# 65 nm CMOS Solutions Will Pave the Way for Cost, Size and Performance Improvements in '08



2003

Stand-alone transceiver

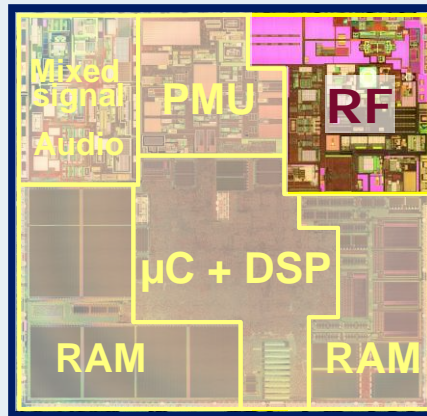


130 nm RF CMOS

Infineon is the leading company in RF CMOS design

2006

Baseband with integrated RF



130 nm RF CMOS

Infineon is the leading company in baseband + RF integration

2008

RF transceiver cores for stand alone TRx and leading BB/radios

**65 nm CMOS**

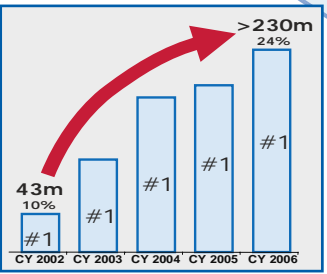
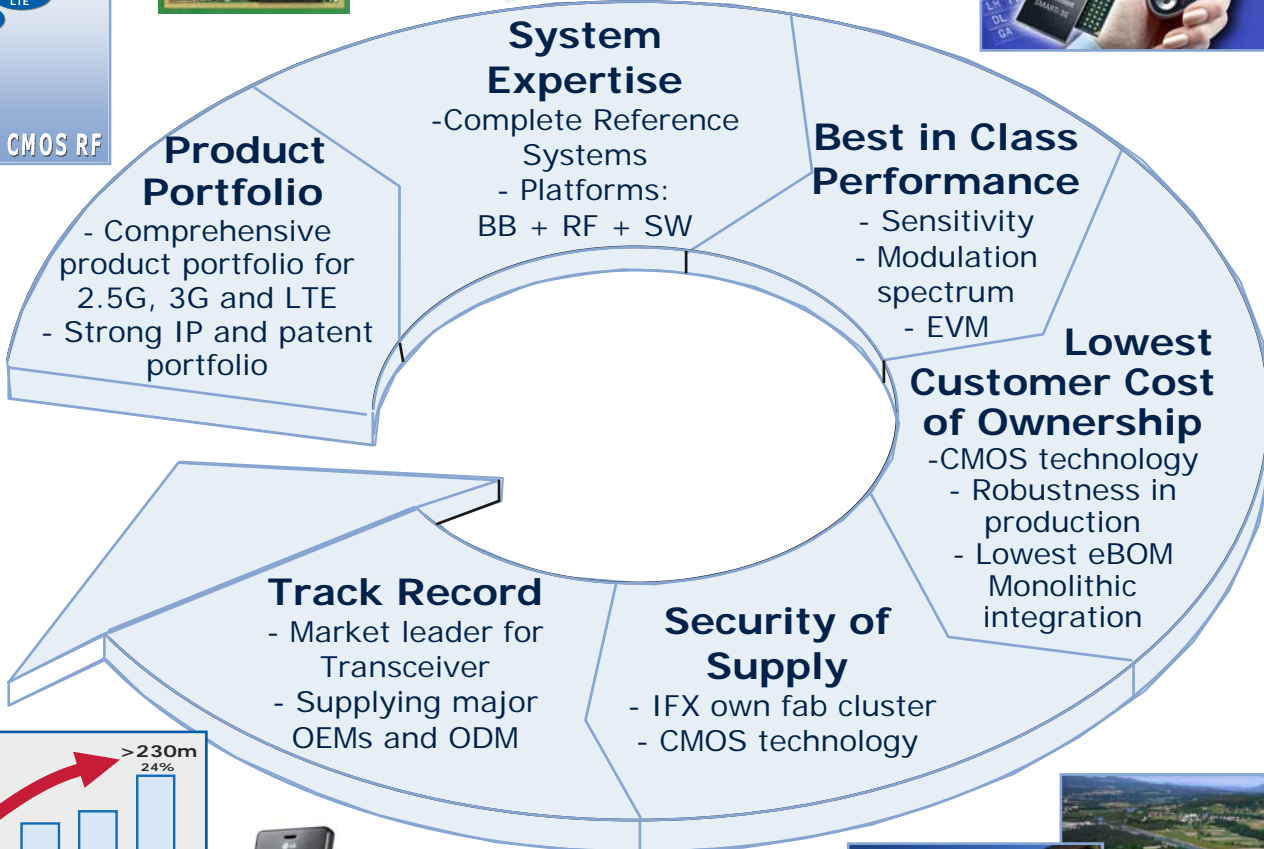
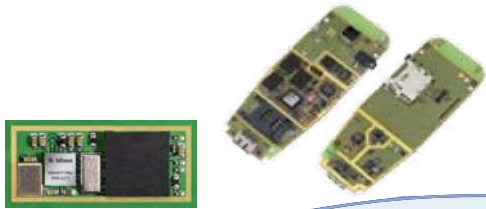
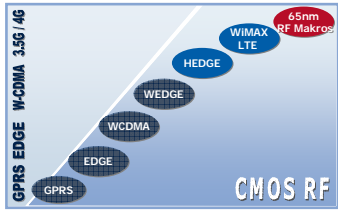


- 95% digital signal processing in receive path
- Fully digital transmit path
- No compromises in RF performance
- Plain vanilla CMOS technology

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# Infineon's Cellular Transceiver Products: What Differentiates Us From Competition



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