

# MEMS FOR MOBILE HANDSETS

## Analysis of the MEMS market in cell phones applications

MEMS FOR MOBILE HANDSET report will help you to:

- Understand the complexity of both the MEMS industry and the handset industry
- Have access to the diffusion rate of MEMS based products in the cell phone industry
- Understand the technical and supply chain challenges which will define the MEMS market in the cell phone industry
- Evaluate the market opportunity for MEMS at the component level up to 2012

## REPORT HIGHLIGHTS

The cell phone industry is currently seen as the biggest growth relay for MEMS devices in the coming years. Few MEMS based sensors and actuators have found the right business model to penetrate the wireless handset market today and over 10 other devices are investigating the opportunity.

For example silicon microphones and FBAR/BAW filters have experienced an incredible growth since their introduction in 2003 and are now entering the maturity stage. While MEMS accelerometers are expected to follow the same evolution, few other MEMS products (micro autofocus, micro zoom, gyroscopes, varicaps, ...) are at the emerging stage (see table below).

Knowles Acoustics booming growth since the first introduction of MEMS microphones in 2003 and the very fast adoption of Avago Technologies FBAR duplexer technology in WCDMA front end modules are representative success stories of the replacement of functions with MEMS based products.

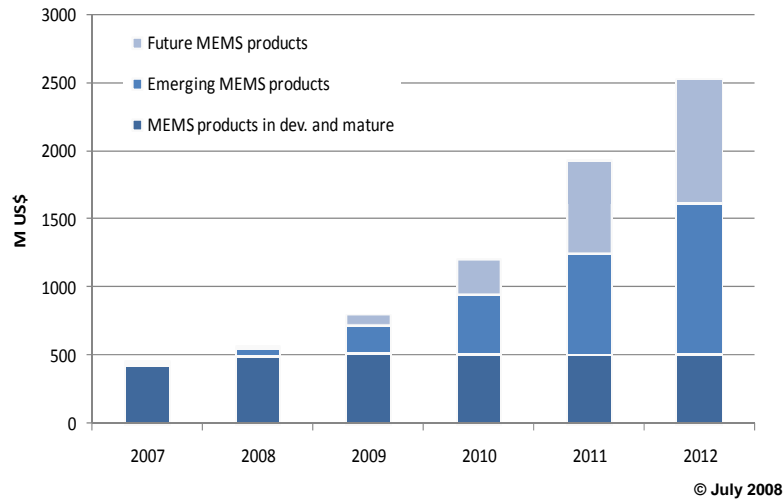
In each of the new potential applications, Yole has analyzed how the leading MEMS companies (Siimpel for micro autofocus, EPCOS and Wispry for Varicaps, STM, ADI, Bosch, Kionix and InvenSense for inertial clusters...) are positioned to benefit from the dynamic of the cell phone industry.

Product	Status of the product introduction
Gyroscope	Emerging
Microdisplay	Emerging
Micro autofocus	Emerging
Micro zoom	Emerging
Pressure sensor	Future
Micromirror	Future
RF switch and varicaps	Future
Oscillators	Future
Micro fuel cells	Future
Accelerometer	In development
Silicon Microphone	Mature
BAW/FBAR filters	Mature



Yole Développement forecast a 40% AAGR growth rate for MEMS components in the cell phone market. 2007 cumulated sales have reach 440M\$ in 2007 for only three MEMS products in cell phone applications (silicon microphones, FBRA/BAW filters, accelerometers). The market opportunity will represent over 2,5B\$ by 2012.

**2007-2012 market forecast for MEMS in cell phone applications**



The growth is coming both from replacement products and new functions. MEMS is expected to be a key innovation driver in the cell phone industry. New features of cell phones are expected to account for 60% of the total MEMS market by 2012.

Additionally, the report focus on the diffusion rate of MEMS in cell phone applications and how companies have reached the 100M\$ sales level (e.g. Knowles Acoustics and Avago Technologies, ...).

## KEY FEATURES OF THE REPORT

- **11 MEMS products**
- **20+ handset functions**
- **150+ companies listed**
- **Analysis on the complete value chain (Technology, Foundry, IDM, OEMs)**
- **200+ Pages**

“Our customers are challenged by the complexity of the both MEMS and Cell Phone industries” Mathieu Potin says. “Yole objective is to build the bridge between these both world”

- On one hand, MEMS manufacturers are very focused in finding the adapted price, power and size ratio to enter the cell phone application. But they face the challenge of evaluating the diffusion rate of their MEMS product in their business plans.
- One the other hand, wireless handset manufacturers experience very different product development cycle in MEMS than the IC industry. They are therefore very concerned to find the right MEMS partners and have access to a precise product roadmap.

## PUBLICATION DETAILS

- **Reports:** **MEMS for Mobile Handsets**
- **Format:** **Reports are PowerPoint presentation delivered in a pdf® format**
- **Author:** **Mathieu Potin**
- **Publication date:** **October 2008**

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# WHO SHOULD BUY

## **MEMS manufacturers:**

- Evaluate the market, the challenges and the competitors for their product range
- Support a strategic decision to enter or exit the wireless handset industry
- Provide realistic market analysis for MEMS potential in the wireless handset industry

## **Handset manufacturers and operators:**

- Understand the potential of MEMS products to create features for cell phones
- Identify the benefit of MEMS based products over competitive technologies
- Evaluate how MEMS can change the architecture and/or act as a revenue generator  
Get product roadmaps of the MEMS leading players

## **MEMS foundries, equipment & material manufacturers**

- Define the business potential of your customers developing products for the cell phone industry
- Evaluate new business development strategies

## **Financial and strategic investors**

- Understand the MEMS technology, product and challenges in the handset industry
- Evaluate the business opportunity of MEMS in the cell phone industry
- Get historical market development data and diffusion model for MEMS products in cell phone applications

## BIO



Mathieu Potin is responsible of MEMS market research activities at Yole . He is working with Yole for more than 5 years on marketing analysis & research, due diligence and business plan activities. He was granted a master degree of marketing and technology management and a science master degree in semiconductor physics.

# ORDER FORM

Please enter my order for "MEMS4Mobile 2008" report:

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### CONTACT:

David Jourdan, [jourdan@yole.fr](mailto:jourdan@yole.fr),

Tel: +33 (0)472 83 01 90

## About Yole Développement

Our commitment is to facilitate market access for innovative technology, devices, equipment and materials in the disruptive semiconductor businesses. Founded in 1998, Yole Développement is involved in the following fields, with strong leadership worldwide:

- MEMS Devices and Equipment & Materials for MEMS manufacturing
- Compound Semiconductors
- Nanomaterials
- Photovoltaic
- Microfluidics
- 3D IC/TSV & Advanced Packaging

Our services and publications:

- Market research
- Market reports & databases
- Technology analysis
- Magazine Publication Micronews (print version and on line services)
- Strategy consulting
- Exclusive newsletters in MEMS, 3D IC, photovoltaic, compound semi-conductors and microfluidics
- M&A support and due diligence

Yole Développement is the world leader in the analysis of disruptive semiconductor applications and markets. Each day, Yole Développement's team of 20 consultants is in contact with industrial companies, R&D institutes and investors worldwide in order to help them understand the market and technology trends. In its analysis, Yole Développement takes into account the complete value chain including materials, equipment suppliers, device & system manufacturers and end users.

<sup>(1)</sup> Our Terms and Conditions of Sale are available on [www.yole.fr/pagesAn/company/conditions.asp](http://www.yole.fr/pagesAn/company/conditions.asp).

Our prices are subject to change. Please check our new releases and price changes on [www.yole.fr](http://www.yole.fr). The present document is valid 6 months after its publishing date: 1st October 2008.

# Terms and Conditions of Sale

## Definitions:

**"Acceptance"**: Action by which the Buyer accepts the terms and conditions of sale in their entirety. It is done by ticking the box "I accept the conditions".

**"Buyer"**: Any business user (*i.e.* any person acting in the course of its business activities, for its business needs) entering into the following general conditions to the exclusion of consumers acting in their personal interests.

**"Contracting Parties"** or **"Parties"**: The Seller on the one hand and the Buyer on the other hand.

**"Intellectual Property Rights"** ("**IPR**") means any rights held by the Seller in its Products, including any patents, trademarks, registered models, designs, copyrights, inventions, commercial secrets and know-how, technical information, company or trading names and any other intellectual property rights or similar in any part of the world, notwithstanding the fact that they have been registered or not and including any pending registration of one of the above mentioned rights.

**"License"**: For the reports and databases, 3 different licenses are proposed. The buyer has to choose one license:

1. Single user license: *the purchaser is the sole authorized user of the report*
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3. Multi-user, multi-site license: *the report can be used by various users within the same company or group and its subsidiaries (more than 50% share) at a global scale.*

**"Products"**: Depending on the purchase order, reports or database on MEMS, CSC, Optics/MOEMS, Nano, bio... to be bought either on a unit basis or as an annual subscription. (*i.e.* subscription for a period of 12 calendar months). The annual subscription to a package (*i.e.* a global discount based on the number of reports that the Buyer orders or accesses via the service, a global search service on line on I-micronews and a consulting approach), is defined in the order. Reports are established in PowerPoint and delivered on a PDF format and the database may include Excel files.

**"Seller"**: Based in Lyon (France headquarters), Yole Développement is a market research and business development consultancy company, facilitating market access for advanced technology industrial projects. With more than 18 consultants, Yole works worldwide with the key industrial companies, R&D institutes and investors to help them understand the markets and technology trends.

**1. Scope**  
1.1 The Contracting Parties undertake to observe the following general conditions when agreed by the Buyer and the Seller. ANY ADDITIONAL, DIFFERENT, OR CONFLICTING TERMS AND CONDITIONS IN ANY OTHER DOCUMENTS ISSUED BY THE BUYER AT ANY TIME ARE HEREBY OBJECTED TO BY THE SELLER, SHALL BE WHOLLY INAPPLICABLE TO ANY SALE MADE HEREUNDER AND SHALL NOT BE BINDING IN ANY WAY ON THE SELLER.

1.2 This agreement becomes valid and enforceable between the Contracting Parties after clear and non-equivocal consent by any duly authorised person representing the Buyer. For these purposes, the Buyer accepts these conditions of sales when ticking the box "I accept the conditions". This results in acceptance by the Buyer.

1.3 Orders are deemed to be accepted only upon written acceptance and confirmation by the Seller, within [7 days] from the date of order, to be sent either by email or to the Buyer's address. In the absence of any confirmation in writing, orders shall be deemed to have been accepted.

## 2. Mailing of the Products

2.1 Products are sent by email to the Buyer:

- within [1] month from the order for Products already released; or

- within a reasonable time for Products ordered prior to their effective release. In this case, the Seller shall use its best endeavours to inform the Buyer of an indicative release date and the evolution of the work in progress.

2.2 Some weeks prior to the release date the Seller can propose a pre-release discount to the Buyer

The Seller shall by no means be responsible for any delay in respect of article 2.2 above, and including incases where a new event or access to new contradictory information would require for the analyst extra time to compute or compare the data in order to enable the Seller to deliver a high quality Products.

2.3 The mailing of the Product will occur only upon payment by the Buyer, in accordance with the conditions contained in article 3.

2.4 The mailing is operated through electronic meanseither by email via the sales department or automatically online via an email/password. If the Product's electronic delivery format is defective, the Seller undertakes to replace it at no charge to the Buyer provided that it is informed of the defective formatting within 90 days from the date of the original download or receipt of the Product.

2.4 The person receiving the Products on behalf of the Buyer shall immediately verify the quality of the Products and their conformity to the order. Any claim for apparent defects or for non-conformity shall be sent in writing to the Seller within 8 days of receipt of the Products. For this purpose, the Buyer agrees to produce sufficient evidence of such defects. .

2.5 No return of Products shall be accepted without prior information to the Seller, even in case of delayed delivery. Any Product returned to the Seller without providing prior information to the Seller as required under article 2.5 shall remain at the Buyer's risk.

## 3. Price, invoicing and payment

3.1 Prices are given in the orders corresponding to each Product sold on a unit basis or corresponding to annual subscriptions. They are expressed to be inclusive of all taxes. The prices may be reevaluated from time to time. The effective price is deemed to be the one applicable at the time of the order.

3.2 Yole may offer a pre release discount for the companies willing to acquire in the future the specific report and agreeing on the fact that the report may be release later than the anticipated release date. In exchange to this uncertainty, the company will get a discount that can vary from 15% to 10%.

3.3 Payments due by the Buyer shall be sent by cheque payable to Yole Développement, credit card or by electronic transfer to the following account:

HSBC, 1 place de la Bourse 69002 Lyon France  
Bank code: 30056  
Branch code: 200 1565 87  
BIC or SWIFT c00170  
Account n°: 0170 ode: CCFRFRPP  
IBAN: FR76 3005 6001 7001 7020 0156 587

To ensure the payments, the Seller reserves the right to request down payments from the Buyer. In this case, the need of down payments will be mentioned on the order.

3.3 Payment is due by the Buyer to the Seller within 30 days from invoice date, except in the case of a particular written agreement. If the Buyer fails to pay within this time and fails to contact the Seller, the latter shall be entitled to invoice interest in arrears based on the annual rate Refi of the "BCE" + 7 points, in accordance with article L. 441-6 of the French Commercial Code.

3.4 In the event of termination of the contract, or of misconduct, during the contract, the Seller will have the right to invoice at the stage in progress, and to take legal action for damages.

## 4. Liabilities

4.1 The Buyer or any other individual or legal person acting on its behalf, being a business user buying the Products for its business activities, shall be solely responsible for choosing the Products and for the use and interpretations he makes of the documents it purchases, of the results he obtains, and of the advice and acts it deduces thereof.

4.2 The Seller shall only be liable for (i) direct and (ii) foreseeable pecuniary loss, caused by the Products or arising from a material breach of this agreement

4.3 In no event shall the Seller be liable for:

- a) damages of any kind, including without limitation, incidental or consequential damages (including, but not limited to, damages for loss of profits, business interruption and loss of programs or information) arising out of the use of or inability to use the Seller's website or the Products, or any information provided on the website, or in the Products;
- b) any claim attributable to errors, omissions or other inaccuracies in the Product or interpretations thereof.

4.4 All the information contained in the Products has been obtained from sources believed to be reliable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such information, which cannot be guaranteed to be free from errors.

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4.6 In the case where, after inspection, it is acknowledged that the Products contain defects, the Seller undertakes to replace the defective products as far as the supplies allow and without indemnities or compensation of any kind for labor costs, delays, loss caused or any other reason. The replacement is guaranteed for a maximum of two months starting from the delivery date. Any replacement is excluded for any event as set out in article 5 below.

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## 8. Miscellaneous

All the provisions of these Terms and Conditions are for the benefit of the Seller itself, but also for its licensors, employees and agents. Each of them is entitled to assert and enforce those provisions against the Buyer.

Any notices under these Terms and Conditions shall be given in writing. They shall be effective upon receipt by the other Party.

The Seller may, from time to time, update these Terms and Conditions and the Buyer, is deemed to have accepted the latest version of these terms and conditions, provided they have been communicated to him in due time.

## 9. Governing law and jurisdiction

9.1 Any dispute arising out or linked to these Terms and Conditions or to any contract (orders) entered into in application of these Terms and Conditions shall be settled by the French Commercial Courts of Lyon, which shall have exclusive jurisdiction upon such issues.

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