Integration of MEMS components and sensors is not new to the mobile phone industry. For example, FBAR RF filters and silicon microphones have been integrated on our mobile phones since 2002. More recently, MEMS accelerometers have been established as a “must-have” feature for many smartphones and feature-phones. And other types of sensors, like CMOS image sensors, have experienced a large success in the recent years.

But the mobile phone market is changing extremely quickly. It appears that in 2010 we are at a turning point in the history of MEMS & sensors for handsets: the market for MEMS & sensors will experience double digit growth, from $3.55B in 2009 to $7.91B in 2015.

We have identified several factors explaining why MEMS & sensors will experience this tremendous growth over the next few years:

- Share of smartphones is rising faster than ever: 44% of the mobile phones will be smartphones in 2015. Success of smartphones is leading to an increasing amount of MEMS & sensors in mobile phones to provide new features/services to end-users, to reduce cost through more integration or to improve hardware performance
- GPS integration is not limited to high-end phones anymore. Nearly one phone in three will incorporate GPS in 2010. This is an additional driver to integrate motion sensors: when combined with compass, accelerometers or gyroscopes, this enables new services to be deployed
- The RF part of cell phones is currently changing very quickly, with more and more multi-band multi-mode mobile phones. The incoming deployment of new standards (LTE network in particular) has a direct impact on RF components and will open new doors for online services using an increasing amount of sensors

One striking illustration on how quickly things can happen in the mobile phone industry is the recent release of iPhone 4, the first mobile phone to integrate a MEMS gyroscope, followed a few days later by the announcement of InvenSense IPO. The gyroscope business is now expected to boom very quickly: we believe that the gyroscope market for mobile phones will be more than $80M in 2010 already. We believe strongly that the impact of gyroscopes on the user experience will be as high as the accelerometer case. Only 3 years ago the first accelerometers were integrated on mobile phones, at a price level similar to gyroscopes today. Now accelerometers are viewed as commodity products in some platforms and their penetration should be above one third of cell phones in 2010. Total motion sensor market for mobile phone will reach $1.19B in 2015, with a 25.3% CAGR.
Gyrosopes are not predicted to be the only “killer app” in handsets for the years to come. Many other significant changes are also expected:

- While the accelerometer and compass try to offer differentiating features, gyroscopes are now entering the mobile phone business, and efforts are also put on pressure sensors. Combo of motion sensors with an increasing processing part are now in development
- RF filters, variable capacitors and silicon MEMS oscillators should benefit from the changes occurring at the radio-front end level, from the increasing market for duplexers to the LTE impact on multi-mode phones.
- Silicon microphones are being accepted by the handset market. The cost benefit of ECM tends to decrease, and silicon microphones offer many other advantages. The emergence of dual-microphone solutions for ambient noise cancellation is going to push this business.
- Numerous innovative developments in the optical MEMS area are observed. Integrated picoprojectors could make themicromirror market take off, while new microdisplay concepts expect to widely decrease power consumption.
- CMOS image sensors are already a very big business. The battle is intense between the competitors to develop the next key features such as BSI, WLO, autofocus solutions or stabilization.
- Several other emerging sensors have been identified, with the potential to become new killer applications in 5 to 10 years: microspeakers, environmental sensors...

REPORT OUTLINE

- **Worldwide market metrics:**  
  > 2009 – 2015 market (M units/$M) & ASP ($)  
  > 2009 market shares  
  > 150+ companies included in the report  
  > Report is a 330+ slides PowerPoint presentation  
  > Excel datasheet included  
  > 20+ key devices are described: ALS & proximity sensors, BAW filters & duplexers, CMOS image sensors, CO2 & other gas sensors, Digital compass, Fingerprint sensors, Humidity sensors, Liquid sensors, MEMS accelerometers, MEMS autofocus, MEMS energy harvesting, MEMS gyroscopes, MEMS RFID, MEMS variable capacitors, Micro fuel cell, Microdisplays, Micromirrors, Microspeakers, Pressure sensors, Silicon MEMS oscillators, Silicon Microphones, Temperature sensors

OBJECTIVES OF THE REPORT

- To provide market data on MEMS & sensors for mobile phones: key market metrics & dynamics:  
  > Unit shipments, revenues and average selling price by type of MEMS & sensors  
  > Market shares with detailed breakdown for each player
- To provide application focus on key sensors that are changing the mobile phone industry: new features, technical roadmap, insight about future technology trends & challenges:  
  > Packaging roadmaps (size of the sensors)  
  > Integration roadmaps (multi-sensors, integration of processing...)
- Performance roadmaps with functionalities (e.g. for gyroscopes: from current devices used for stabilization, gaming and user interface to very low-drift gyroscopes used for true pedestrian navigation)
- To provide a deep understanding of MEMS & sensors value chain, infrastructure & players for the handset business:  
  > Exhaustive list of players for each device under consideration  
  > Analysis on who are the key suppliers and emerging players to be considered  
  > What business model is the most successful and how will it evolve?
WHO SHOULD BUY THE REPORT

- MEMS & sensor suppliers
  > Evaluate market potential of future technologies and products for new applicable markets
  > Understand the differentiated value of your products and technologies in this market
  > Identify new business opportunities and partners
  > Monitor and benchmark your competitor’s advancements

- R&D centers
  > Evaluate market potential of future technologies and products for new applicable markets
  > Identify the best candidates for technology transfer

- MEMS & packaging foundries
  > Understand what are the applications that will drive the volumes in 2015
  > Identify new business opportunities and prospects

- Mixed-signal companies & ASIC manufacturers
  > Spot new opportunities and define diversification strategies

- Mobile phone OEMs
  > Evaluate market potential of future technologies and products for new applicable markets
  > Screen potential new suppliers for introducing disruptive features such as low-drift gyroscopes and IMUs, secondary microphones, MEMS oscillator, tunable RF components...
  > Evaluate the benefits of using these new technologies in your end system

- Network operators
  > Understand what will be the future services that can be offered by taking benefit on the new sensors

- Financial & strategic investors
  > Understand the potential of new devices & MEMS technologies such as gyroscopes, RF switches, oscillators, speakers...
  > Get the list of main key players & emerging start-ups of this industry

COMPANY INDEX


BIO

Laurent Robin:
Laurent is in charge of the MEMS & Sensors market research at Yole Developpement. He previously worked at image sensor company e2v Technologies (Grenoble, France). He holds a Physics Engineering degree from the National Institute of Applied Sciences in Toulouse, plus a Master Degree in Technology & Innovation Management from EM Lyon Business School, France.

Jerome Baron:
Jerome is leading the MEMS & Advanced Packaging market research at Yole Developpement. He has been involved in the analysis of the CMOS image sensor industry at the sensor, packaging, assembly & test levels. He is also involved in the research linked to new equipment and materials for image sensor manufacturing. He was granted a Master of Science degree in Nanotechnologies from the National Institute of Applied Sciences in Lyon, France.
ORDER FORM

PLEASE ENTER MY ORDER FOR «MEMS & SENSORS FOR SMARTPHONES» REPORT IN:

- Corporate license: EURO 5,090* instead of 5,990
- Site license: EURO 4,290* instead of 4,990
- Single user license: EURO 3,390* instead of 3,990

*For price in dollars please use the day’s exchange rate  
*For French customer, add 19,6 % for VAT  
*All reports are delivered electronically in PowerPoint format (pdf file)

SHIP TO

Name (Mr/Ms/Dr/Pr):

Job title:

Company:

Address:

City: State:

Postcode/Zip:

Country*:

Telephone: Mobile:

Date: I hereby accept Yole’s Terms and Conditions of Sale

Signature:

BILLING CONTACT

First name: Last name:

Email: Phone:

ABOUT YOLE DÉVELOPPEMENT

Beginning in 1998 with Yole Développement, we have grown to become a group of companies providing market research, technology analysis, strategy consulting, media in addition to finance services. With a solid focus on emerging applications using silicon and/or micro manufacturing Yole Développement group has expanded to include more than 40 associates worldwide covering MEMS and microfluidics, Advanced Packaging, Compound Semiconductors, Power Electronics, LED, and Photovoltaic. The group supports companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to develop their business.

CONSULTING

- Market data, market research and marketing analysis
- Technology analysis
- Reverse engineering and reverse costing
- Strategy consulting
- Corporate Finance Advisory (M&A and fund raising)

REPORTS

- Collection of market & technology reports
- Players & market databases
- Manufacturing cost simulation tools
- Component reverse engineering & costing analysis

MEDIA

- Critical news, Bi-weekly: Micronews, the magazine
- In-depth analysis & Quarterly Technology Magazines:
- MEMS Trends– 3D Packaging – PV Manufacturing - Efficiency
- Online disruptive technologies website: www.i-micronews.com
- Exclusive Webcasts
- Live event with Market Briefings

YOLE DÉVELOPPEMENT
Definitions: “Acceptance”: action by which the Buyer accepts the terms and conditions of sale in 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 and any other form of purchase. “Contracting Parties” or “Parties”: The Seller on the one hand and the Buyer on the other hand. “Buyer’s order” means any order placed by the Buyer in writing, directly or indirectly, for the supply of products specified in the order. “ 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 data) 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 Seller’s Product or interpretations thereof. c) any damage, direct or indirect, caused to the Buyer by the loss or alteration of data contained in the Products when these have 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. d) any direct or indirect, caused to the Buyer by the loss or alteration of data contained in the Products when these have been obtained from sources believed to be reliable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such protection of the Seller’s IPR

8. Replacement of Products

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. 4.5 All the Products that the Seller sells may, upon prior notice to the Buyer from time to time be modified by or substituted with similar Products meeting the needs of the Buyer. This modification or substitution shall not lead to the liability of the Seller, provided that the Seller guarantees that the Products supplied conform to the initial Product criteria.

3. Price, invoicing and payment

6. Protection of the Seller’s IPR

5.1 Products shall be delivered to the Buyer at the Buyer’s risk and expense; the risk will only be transferred to the Buyer when the products are at Buyer’s disposal. If the Seller or its suppliers or agents are required to transport the products to the Buyer, the Buyer will be charged for any insurance required or arranged by the Seller and the risk shall pass to the Buyer when the products are delivered to a carrier engaged by the Buyer.

6.6 In the case of a multisite, multilicence, only the employee of the buyer can access the report or the employee of the companies in which the buyer have 100% shares. As a matter of fact the Buyer has the right to use the Products solely for its own internal information purposes. In particular, the Buyer shall therefore not use the Product for purposes such as:

9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and conditions. Courts of Lyon, which shall have exclusive jurisdiction upon such issues.

9. 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 by the Buyer of such delay or cancellation. This may also apply for any other direct or indirect consequential loss that may be borne by the Seller, following this decision.

7.1 If the Buyer cancels the order in whole or in part or postpones the date of mailing, the Buyer shall indemnify the Seller for the entire costs that have been incurred as at the date of notification.

6.3 The Buyer shall be solely responsible towards the Seller of all infringements of this obligation, whether this infringement comes from its employees or any person to whom the Buyer has sent the Product for purposes such as:

8.2 The Seller does not make any warranties, express or implied, including, without limitation, those of saleability and fitness for a particular purpose, with respect to the Products.

4.8 The Seller does not make any warranties, express or implied, including, without limitation, those of saleability and fitness for a particular purpose, with respect to the Products.

7. Termination

7.9 In the context of annual subscriptions, the person of contact shall decide who within the Buyer, shall be entitled to access online the reports on I-micronews.com. In this respect, the Seller will be entitled to invoice interest in arrears based on the annual rate Reff of the BCE + 5 points, in accordance with article L. 441-6 of the French Civil Code.

6.4 In the case where, after examination, it is acknowledged that the Products contain defects, the Seller undertakes to replace the defective products as far as the supplies allow and without replacement is excluded for any event as set out in article 5 below.

9.1 Any dispute arising out of 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.

8.3 The Seller shall not be liable for any delay in performance directly or indirectly caused by or resulting from acts of nature, fire, flood, accident, riot, war, government intervention, embargoes, strikes, labor difficulties, equipment failure, late deliveries by suppliers or other difficulties which are beyond the control, and not the fault of the Seller.

Protection of the Seller’s IPR

6.3 The Buyer shall be solely responsible towards the Seller of all infringements of this obligation, whether this infringement comes from its employees or any person to whom the Buyer has sent the Products and shall personally take care of any related proceedings, and the Buyer shall bear related financial consequences in their entirety.

1. Scope

2. Mailing of the Products

5.2 The payment of the invoice will only be possible by wire transfer, unless the multiple sites organization of the Buyer requires otherwise. The Seller reserves the right to check from time to time the correct use of this password.

4.7 The Seller is the sole party to have the right to license the Seller’s Products to third parties and the Buyer has no right of sub-licensing. Neither the Buyer nor the Buyer’s employees or agents shall be permitted to use the Products for any other purpose than the one mentioned in the delivery letter which upon which, after a period of thirty (30) days without solving the problem, the non-breaching Party shall be entitled to terminate all the pending orders, without being liable for any compensation.

9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and Conditions. - 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. - 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.

1.1 Yole develops a comprehensive set of research products on advanced technology markets including analysis, market reports, and forecasts, among others. The Buyer is a business user entering into the following terms and conditions to the exclusion of any other document 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, to the extent allowed by law, be ignored.

“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 and any other form of purchase. “Contracting Parties” or “Parties”: The Seller on the one hand and the Buyer on the other hand. “Buyer’s order” means any order placed by the Buyer in writing, directly or indirectly, for the supply of products specified in the order. “ 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 Seller’s Product or interpretations thereof. c) any damage, direct or indirect, caused to the Buyer by the loss or alteration of data contained in the Products when these have 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. d) any direct or indirect, caused to the Buyer by the loss or alteration of data contained in the Products when these have been obtained from sources believed to be reliable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such product for purposes such as:

6.6 In the case of a multisite, multilicence, only the employee of the buyer can access the report or the employee of the companies in which the buyer have 100% shares. As a matter of fact the Buyer has the right to use the Products solely for its own internal information purposes. In particular, the Buyer shall therefore not use the Product for purposes such as:

5.1 Products shall be delivered to the Buyer at the Buyer’s risk and expense; the risk will only be transferred to the Buyer when the products are at Buyer’s disposal. If the Seller or its suppliers or agents are required to transport the products to the Buyer, the Buyer will be charged for any insurance required or arranged by the Seller and the risk shall pass to the Buyer when the products are delivered to a carrier engaged by the Buyer.

5.2 The payment of the invoice will only be possible by wire transfer, unless the multiple sites organization of the Buyer requires otherwise. The Seller reserves the right to check from time to time the correct use of this password.

2. Mailing of the Products

5.1 Products shall be delivered to the Buyer at the Buyer’s risk and expense; the risk will only be transferred to the Buyer when the products are at Buyer’s disposal. If the Seller or its suppliers or agents are required to transport the products to the Buyer, the Buyer will be charged for any insurance required or arranged by the Seller and the risk shall pass to the Buyer when the products are delivered to a carrier engaged by the Buyer.

6. Protection of the Seller's IPR

8.2 The Seller does not make any warranties, express or implied, including, without limitation, those of saleability and fitness for a particular purpose, with respect to the Products.

4.5 All the Products that the Seller sells may, upon prior notice to the Buyer from time to time be modified by or substituted with similar Products meeting the needs of the Buyer. This modification or substitution shall not lead to the liability of the Seller, provided that the Seller guarantees that the Products supplied conform to the initial Product criteria.

4.7 The deadlines that the Seller is asked to state for the mailing of the Products are given for information only and are not guaranteed. If such deadlines are not met, it shall not lead to any damages for the Buyer.

9.1 Any dispute arising out of 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.

9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and Conditions.