Knowles SPM0408 - MEMS Microphone
Reverse costing analysis
by System Plus Consulting

Analyze the cost of projects at the R&D level
Enhance the negotiation power of purchasing managers
Benchmark competitor's products

System Plus Consulting is proud to publish the reverse costing report of the MEMS Microphone SPM0408HE5H supplied by Knowles Acoustics.

Mostly used in cell phones, the Knowles MEMS microphones have been shipped at more than 1 billion units since their introduction. They use a specific surface mount designed FR4 type package, containing 2 separate dies: a capacitive MEMS microphone and an ASIC for signal amplification. Since the last generation, several changes have been realized like the use of Deep Reactive Ion Etching for the MEMS cavity instead of traditional KOH etching.

This report provides complete teardown of the MEMS microphone with:

- Detailed photos
- Material analysis
- Schematic assembly description
- Manufacturing Process Flow
- In-depth economical analysis
- Manufacturing cost breakdown
- Selling price estimation

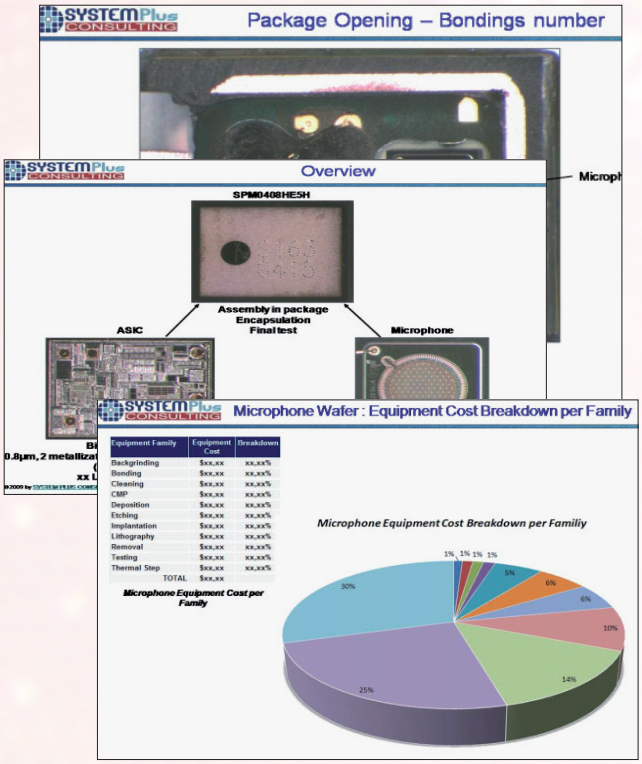


TABLE OF CONTENTS

Glossary

Overview/Introduction p4
- Executive Summary
- Reverse Costing Methodology

Knowles Company Profile p8
- Product Range
- Manufacturing Units
- Business Model

Physical analysis p12
- Synthesis of the Physical Analysis
- Physical Analysis Methodology
- Package Characteristics & Markings
- Package X-Ray
- Package Top Cover
- Package Composition
- Package Opening & Bonding Number
- ASIC Markings
- ASIC Dimensions
- ASIC Minimal Dimension and Metal Layers
- ASIC Transistor Details
- ASIC Process Characteristics
- Microphone Markings
- Microphone Details
- Microphone Dimensions
- Microphone Structure
- Microphone Cross-Section
- Microphone process characteristics

Manufacturing Process Flow p46
- Overview
- ASIC Process Flow
- Microphone Process Flow
- Description of the Wafer Fabrication Units

Cost Analysis p51
- Synthesis of the Cost Analysis
- Main Steps of Economic Analysis
- Yields Explanation
- ASIC Wafer Cost Hypothesis
- Asic Wafer Cost
- ASIC Probe & Dicing cost
- ASIC Die Cost
- Microphone Wafer Cost Hypothesis
- Microphone Wafer Cost
- Microphone Wafer Cost Breakdown per Steps
- Microphone Wafer : Equipment Cost Breakdown
- Microphone Wafer : Equipment Cost per Family
- Microphone Wafer : Material Cost Breakdown
- Microphone Wafer : Material Cost per Family
- Microphone Probe & Dicing Cost
- Microphone Die cost
- SPM0408 Packaging Cost Hypothesis
- SPM0408 Packaging Cost
- SPM0408 Packaging Cost per Steps
- SPM0408 Final Test Cost
- SPM0408 Component Manufacturing Cost
- Yield Synthesis
- SPM0408 Cost Analysis Evolution

Estimated Manufacturer Price Analysis p76
- Supply Chain Analysis
- Manufacturers ratios
- Estimated manufacturer Price

Conclusion

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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

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- ☐ Technology analysis
- ☐ Strategy consulting
- ☐ M&A support and due diligence
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- ☐ Market reports & Database

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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.
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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.

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2.1 Products are sent by email to the Buyer:
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- 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.

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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.

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4.1The 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.
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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 shall not lead to the liability of the Seller, provided that the Seller ensures the substituted Product is similar to the Product initially ordered.
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.
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
or cancellation of the orders, except for non acceptable delays exceeding [4] months from the stated deadline, without information from the Seller.In such case only, the Buyer shall be entitled to ask for a reimbursement of its first down payment to the exclusion of any further damages.
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. Although the Seller shall take reasonable steps to screen Products for infection of viruses, worms, Trojan horses or other codes containing contaminating or destructive properties before making the Products available, the Seller cannot guarantee that any Product will be free from infection.

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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.

6. Protection of the Seller's IPR

6.1 All the IPR attached to the Products are and remain the property of the Seller and are protected under French and international copyright law and conventions.
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7.2 In the event of breach by one Party under these conditions or the order, the non-breaching Party may send a notification to the other by recorded delivery letter 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.

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.

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