

# Discera DSC8002 MEMS Oscillator

Reverse Costing Analysis – December 2010

## Physical Analysis of the Device Step by Step Reconstruction of the Process Flow Cost of Manufacturing and Estimation of Selling Price

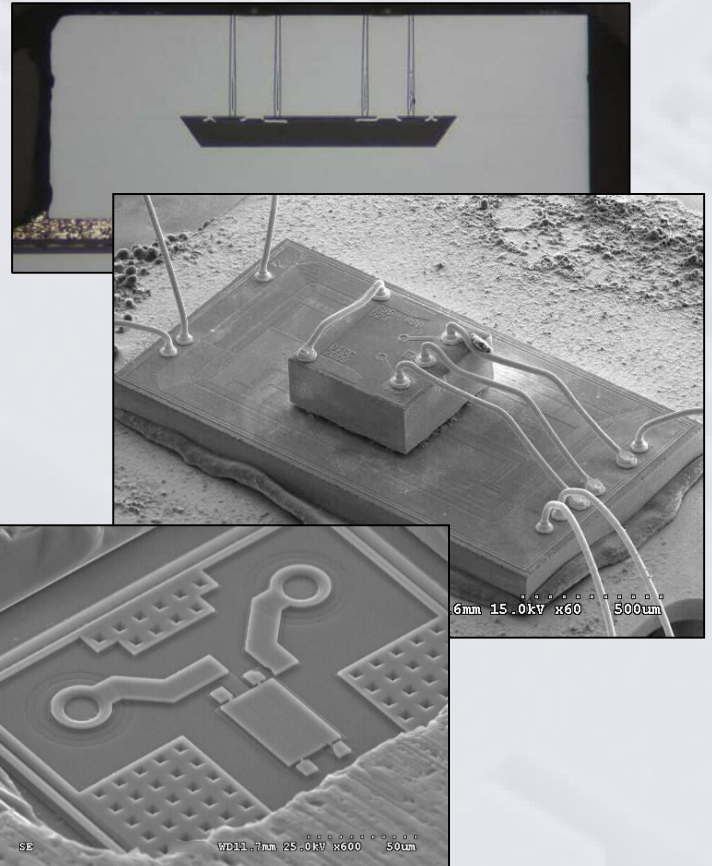
System Plus Consulting is proud to publish the reverse costing report of the new generation of MEMS oscillator supplied by Discera.

The DSC8002 is a programmable CMOS oscillator incorporating a Silicon MEMS resonator. Thanks to the TSV technology of Silex Microsystems (TSI™, Through Silicon Insulator), this new generation of Discera wafer-level packaged MEMS resonator achieves an area of ~0.3mm<sup>2</sup>.

The DSC8002 is available in industry standard packages (2.5 x 2.0 x 0.85 mm, 3.2 x 2.5 x 0.85 mm, 5.0 x 3.2 x 0.85 mm and 7.0 x 5.0 x 0.85 mm) and can replace standard crystal oscillators.

This report provides complete teardown of the MEMS oscillator with:

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



### TABLE OF CONTENTS

<b>Glossary</b>		<b>Manufacturing Process Flow</b>	<b>P57</b>
<b>Overview/Introduction</b>	<b>P4</b>	• Overview	
• Executive Summary		• MEMS Process Flow	
• Reverse Costing Methodology		• Description of the Wafer Fabrication Units	
<b>Discera Company Profile</b>	<b>P6</b>	<b>Cost Analysis</b>	<b>P67</b>
• Product Range		• Synthesis of the Cost Analysis	
• Business Model		• Main Steps of Economic Analysis	
<b>Physical analysis</b>	<b>P11</b>	• Supply Chain Analysis	
• Physical Analysis Methodology		• Manufacturers financial ratios	
• Package Characteristics & Markings		• Yields Explanation	
• Package Opening		• Yields Hypotheses	
• Package Cross-Section		• ASIC Front-End Cost	
• ASIC – Dimensions		• ASIC Back-End 0 Cost (Probe Test and Dicing)	
• ASIC – Markings		• ASIC Die Cost (Front End + Back End 0)	
• ASIC – Optical Views		• MEMS Front-End Cost	
• ASIC – Delayering		• MEMS Front-End Cost per Process Steps	
• ASIC – Cross-Section		• MEMS Front-End : Equipment Cost per Family	
• ASIC Process Characteristics		• MEMS Front-End : Material Cost per Family	
• MEMS – Dimensions & Markings		• MEMS Back-End 0 Cost (Probe Test and Dicing)	
• MEMS – Cap Opening		• MEMS Die Cost (Front End + Back End 0)	
• MEMS – Resonator		• Back-End 1 : Packaging Cost	
• MEMS – Cap		• Back-End 1 : Final Test Cost	
• MEMS – Cross-Section		• DSC8002 Component Cost (FE + BE 0 + BE 1)	
• MEMS Process Characteristics		<b>Estimated Manufacturer Price Analysis</b>	<b>P94</b>
• Comparison with Previous Generation		<b>Conclusion</b>	<b>P98</b>

Distributed by

Performed by

# ORDER FORM

Please enter my order for "Discera DSC8002" Teardown & Reverse Costing Analysis:

SP10050

Corporate license price:

EUR 1,990\*

\*For price in dollars please use the day's exchange rate

\*All reports are delivered electronically in pdf format

\*For French customer, add 20% for VAT

## SHIP TO

Name (Mr/Ms/Dr/Pr):

Job Title:

Company:

Address:

City: State:

Postcode/Zip:

Country\*:

\*VAT ID Number for EU members:

Tel:

Email:

Date:

Signature :

## PAYMENT

DELIVERY on receipt of payment:

By credit card:

Number: \_\_\_\_\_ Expiration date: \_\_/\_\_/

Card Verification Value: \_\_\_\_\_

By bank transfer:

HSBC – CAE- Le Terminal -2 rue du Charron- 44800 St Herblain France

BIC code : CCFRFRPP

In EUR

Bank code : 30056 - Branch code : 00955 - Account : 09550003234

IBAN : FR76 3005 6009 5509 5500 0323 439

In USD

Bank code : 30056 - Branch code : 00955 - Account : 09550003247

IBAN : FR76 3005 6009 5509 5500 0324 797

Return order by:

FAX: +33 (0)253 55 10 59

MAIL: SYSTEM PLUS CONSULTING

21 rue La Noue Bras de Fer

44200 Nantes – France

Contact:

[sales@systemplus.fr](mailto:sales@systemplus.fr) - Tel: +33 (0)240 18 09 16

## BILLING CONTACT

First Name: .....

Email:.....

Last Name: .....

Phone:.....

Our prices are subject to change. Please check our new releases and price changes on [www.systemplus.fr](http://www.systemplus.fr)

## ABOUT SYSTEM PLUS CONSULTING

System Plus Consulting is specialized in the **cost analysis** of electronics from **semiconductor devices** to **electronic systems**. Around this main line System Plus Consulting developed a complete range of services and costing tools to provide **in-depth production cost studies** and estimation of the **objective selling price** of the product.

### COSTING SERVICES

- ✓ **On demand Reverse Costing studies** are performed on ICs, ASICs, MEMs, Power Devices, ECUs, electronic boards and full electronic systems
- ✓ **The catalog of available reports** includes cost analyzes on MEMS, Electronic components and Electronic systems (Telecom terminals, Power systems, Consumer products)

All these studies are performed using in-house developed costing tools and their technological databases.

### COSTING TOOLS

#### Software

- ✓ IC Price+ to calculate to cost of any integrated circuit
- ✓ SYS.Cost which is a powerful costing tool for electronic boards and systems

#### Costing Models

- ✓ Easy to use Excel-based models
- ✓ **Available now:** Board Assembly – System in Package – System on Chip – Memory Chip – Smart Card – Plastic Part
- ✓ Other costing models can be developed according to customer specification

#### Cost Simulation Tools

- ✓ Powerful flow builders including exhaustive databases to simulate a device processing cost
- ✓ **Available now:** MEMS CoSim+ • IGBT CoSim+ • SiC CoSim+ • LED CoSim+ • TSV CoSim+ • PV CoSim+ (photovoltaic)

Distributed by



Performed by



# TERMS AND CONDITIONS OF SALES

## 1. INTRODUCTION

The present terms and conditions apply to the offers, sales and deliveries of services managed by System Plus Consulting except in the case of a particular written agreement.

Buyer must note that placing an order means an agreement without any restriction with these terms and conditions.

## 2. PRICES

Prices of the purchased services are those which are in force on the date the order is placed. Prices are in Euros and worked out without taxes. Consequently, the taxes and possible added costs agreed when the order is placed will be charged on these initial prices.

System Plus Consulting may change its prices whenever the company thinks it necessary. However, the company commits itself in invoicing at the prices in force on the date the order is placed.

## 3. REBATES and DISCOUNTS

The quoted prices already include the rebates and discounts that System Plus Consulting could have granted according to the number of orders placed by the Buyer, or other specific conditions. No discount is granted in case of early payment.

## 4. TERMS OF PAYMENT

System Plus Consulting delivered services are to be paid within 30 days end of month by bank transfer except in the case of a particular written agreement.

If the payment does not reach System Plus Consulting on the deadline, the Buyer has to pay System Plus Consulting a penalty for late payment the amount of which is one and half the French legal interest rate. The legal interest rate is the current one on the delivery date. This penalty is worked out on the unpaid invoice amount without taxes, starting from the invoice deadline. This penalty is sent without previous notice.

When payment terms are over 30 days end of month, the Buyer has to pay a deposit which amount is 10% of the total invoice amount when placing his order.

## 5. OWNERSHIP

System Plus Consulting remains sole owner of the delivered services until total payment of the invoice.

## 6. DELIVERIES

The delivery schedule on the purchase order is given for information only and cannot be strictly guaranteed. Consequently any reasonable delay in the delivery of services will not allow the buyer to claim for damages or to cancel the order.

## 7. ENTRUSTED GOODS SHIPMENT

The transport costs and risks are fully born by the Buyer. Should the customer wish to ensure the goods against lost or damage on the base of their real value, he must imperatively point it out to System Plus Consulting when the shipment takes place. Without any specific requirement, insurance terms for the return of goods will be the carrier current ones (reimbursement based on good weight instead of the real value).

## 8. FORCE MAJEURE

System Plus Consulting responsibility will not be involved in non execution or late delivery of one of its duties described in the current terms and conditions if these are the result of a force majeure case. Therefore, the force majeure includes all external event unpredictable and irresistible as defined by the article 1148 of the French Code Civil?

## 9. CONFIDENTIALITY

As a rule, all information handed by customers to system Plus Consulting are considered as strictly confidential.

A non-disclosure agreement can be signed on demand.

## 10. RESPONSABILITY LIMITATION

The Buyer is responsible for the use and interpretations he makes of the reports delivered by System Plus Consulting. Consequently, System Plus Consulting responsibility can in no case be called into question for any direct or indirect damage, financial or otherwise, that may result from the use of the results of our analysis or results obtained using one of our costing tools.

## 11. APPLICABLE LAW

Any dispute that may arise about the interpretation or execution of the current terms and conditions shall be resolved applying the French law.

If the dispute cannot be settled out-of-court, the competent Court will be the Tribunal de Commerce de Nantes.