SEMIKRON SKiM306GD12E4
1200V 300A IGBT Solderless Module

SKIM 63, solderless, sinter technology power module developed for high reliability operation in a light module

The SKiM306GD12E4 is a 1200V 300A 6-pack configuration with 3 separated half bridges for high reliability operation. Semikron uses silver sinter technology to increase the durability and pressure contact to obtain a solderless power module.

The SKiM306GD12E4 is based on IGBT4 technology from Infineon and CAL4-F diode. Semikron has designed the CAL4-F diode to be very efficient with the IGBT4. The diode has been designed to obtain a good resistance to environment in a non hermetic package and benefits from the expertise of Semikron in the irradiation to reduce the carrier lifetime.

The SKIM 63 module is a no baseplate design. The DBC substrates are directly assembled on the heatsink to enhance the power management and reduce the height of the module.

The sinter layer is very thin to decrease the thermal resistance and limit the cost of silver material. With a cost close to a classic SAC solder, the sintered joint increases the service life.

The report presents a deep technology analysis of the packaging and of the transistors and diodes structures.

It also includes production cost analysis and a specific economic comparison with Infineon FS100R12PT4 1200V 100A.
TABLE OF CONTENTS

Overview / Introduction

Companies Profile

Physical Analysis
  • Physical Analysis Methodology
  • Package
    ✓ View and dimensions
    ✓ Housing
    ✓ Base Plate Cross-Section
    ✓ DBC Cross-Section
    ✓ SKIM 63 Module
  • IGBT Die
    ✓ Dimension
    ✓ Gate Supply Line
    ✓ Guard Ring
    ✓ Trench Gate Cross-Section
    ✓ Revelation
    ✓ Infineon IGBT4 vs IGBT3
  • Diode Die
    ✓ Dimension
    ✓ Guard Ring
    ✓ Revelation

Manufacturing Process Flow
  • Overview
  • IGBT and Diode Process Flow
  • Description of the Wafer Fabrication Units
  • IGBT Process Flow
  • Diode Process Flow
  • Package Process Flow

Cost Analysis
  • Main steps of economic analysis
  • Yields Hypotheses
  • Cost Analysis IGBT
  • Wafer Cost Hypothesis
  • IGBT Wafer Cost
  • Breakdown per process step
  • IGBT Probe Cost
  • IGBT Die cost
  • Cost Analysis Diode
  • Cost Analysis SKiM306GD12E4
  • Assessing BOM
  • DBC Cost
  • SKiM306GD12E4 Module Cost
  • Yield Synthesis

Price Estimation

Comparison SKiM306GD12E4 and Infineon FS100R12PT4

POWER Cosim+
Cost simulation tool to evaluate the cost of any POWER process or device:
from single chip to complex structures.

POWER CoSim+ is a process-based costing tool used to evaluate the manufacturing cost per wafer using your own inputs or using the pre-defined parameters included in the tool.

All these tools are on sale under site or corporate licence.
**RELATED REPORTS**

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GaN Systems GS66508P</td>
<td>650V GaN on Silicon HEMT</td>
<td>For the first time high voltage GaN transistor (650V) embedded in optimized thin package from AT&amp;S.</td>
</tr>
<tr>
<td>Infineon FS100R12PT4</td>
<td>EconoPACK™4 1200V IGBT4 Module</td>
<td>Infineon IGBT4 power module with lower switching losses and higher operating temperature.</td>
</tr>
<tr>
<td>Infineon CoolMOS™ C7</td>
<td>7th generation Superjunction MOSFET</td>
<td>Infineon has improved the epitaxy process with a direct impact on Rdson, 20% lower.</td>
</tr>
</tbody>
</table>

*Images of products shown*

**ANNUAL SUBSCRIPTION OFFER**

Each year System Plus Consulting releases a comprehensive collection of new reverse engineering & costing analyses in various domains.

You can choose to buy over 12 months a set of 3, 4, 5, 7, 10 or 15 Reverse Costing® reports.

**Up to 45% discount!**

More than 40 reports released each year on the following topics (considered for 2015):

- **MEMS & Sensors (20 reports):**
  - Gyros/Accelerometers/IMU
  - Oscillators/RF switches
  - Pressure sensors/Microphones

- **Power Electronics & Systems (10 reports):**
  - GaN and SiC devices
  - Inverters & modules

- **Imaging & LEDs (5 reports):**
  - Camera modules
  - Infrared sensors & cameras
  - LEDs

- **Advanced Packaging (5 reports):**
  - WLP
  - TSV
  - Embedded Devices...
Please process my order for “SEMIKRON SKiM306GD12E4” Reverse Costing Report

Ref.: SP15232

- Full Reverse Costing report: EUR 3,290*
- Annual Subscription (including this report as the first of the year):
  - 3 reports EUR 8 400*
  - 4 reports EUR 11 000*
  - 5 reports EUR 12 500*
  - 7 reports EUR 16 000*
  - 10 reports EUR 21 000*
  - 15 reports EUR 27 500*

- Power Cosim+ / Power Price+ tools: contact us

*For price in dollars please use the day’s exchange rate  *For French customer, add 20 % for VAT *Our prices are subject to change. Please check our new releases and price changes on www.systemplus.fr. The present document is valid 6 months after its publishing date: August 2015

** Technology Analysis report contains only Physical Analysis & Manufacturing Process Flow

**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:

**BILLING CONTACT**
Name: 
Email:
Phone:

**ABOUT SYSTEM PLUS CONSULTING**
System Plus Consulting is specialized in the **cost analysis** of electronics from **semiconductor devices** to **electronic systems**. A complete range of services and costing tools to provide **in-depth production cost studies** and to estimate the **objective selling price** of a product is available.

Our services:

**COSTING SERVICES - COSTING TOOLS - TRAININGS**

www.systemplus.fr  -  sales@systemplus.fr
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 three times the 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, 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.