Transphorm TPH3208PS
650V GaN HEMT
Power Semiconductor report by Sylvain Hallereau
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Company services
Executive Summary

This full reverse costing study has been conducted to provide insight on technology data, manufacturing cost and selling price of the Transphorm TPH3208PS 650V GaN HEMT.

- The TPH3206PS is the new generation GaN-on-silicon HEMT high voltage from Transphorm. With a breakdown voltage of 650V for a current of 20A at 25°C, the module is optimized for:
  - Renewable energy
  - Industrial
  - Automotive
  - Telecom and datacom
  - Servo motors

- The TPH3208PS is a Cascode transistor with a GaN on Silicon HEMT for the high voltage and the high frequency and a standard MOSFET in silicon to obtain a normally-off transistor drivable by a classic MOSFET driver die.

- The manufacturing of the GaN-on-Silicon HEMT is realized by Fujitsu in its 150mm wafer foundry in Aizu, Japan.

- The manufacturing of the Silicon MOSFET is realized by ON Semiconductor in its 150mm Roznov foundry in Czech Republic.

- The assembly module and final test (Back-end) are realized by ON Semiconductor and are assumed to take place in the Seremban plant in Malaysia.

Based on a complete teardown analysis, the report also provides an estimation of the production cost of the GaN, HEMT, MOSFET and package.

Moreover, the report proposes a comparison with GaN Systems GS66504B, Panasonic PGA26C09DV and Transphorm TPH3206PS GaN HEMT. This comparison highlights the huge differences in design and manufacturing process and their impact on device size and production cost.
Package characteristics

- The package type is a TO220D
- Package size: 15mm x 10mm x 4.5mm
- It has 3 contacts + the tab connected to the source, Pin pitch: 2.54mm
- It consists in a thick nickel-plated copper base plate on which a plastic enclosure is attached.
- The package markings include the following markings:
HEMT die Dimensions

- Die dimensions: XXX
- Active area: XXmm²
- Active area = XX of the surface
- Thickness: XXµm
- 30 wire bonds
Overview / Introduction

Company Profile & Supply Chain

Physical Analysis
- Synthesis
- Package
  - GaN on Si HEMT
- MOSFET

Manufacturing Process Flow

Cost Analysis

Selling Price Analysis

Comparison

About System Plus

Die process

Transistor process – Optical View
GaN HEMT cross section - Epitaxy
Structure Process Flow (1/4)

- Synthesis
  - GaN on Silicon HEMT
  - Silicon MOSFET
  - Packaging

Contact layer

XX

XX

XX

XX

Drawing not to Scale
HEMT Front-End Cost

The front-end cost ranges from [ ] according to yield variations.
# Component Cost

The component cost ranges from [insert range] according to yield variations.

<table>
<thead>
<tr>
<th>Component Cost</th>
<th>Low Yield</th>
<th>Medium Yield</th>
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<td>Cost</td>
<td>Breakdown</td>
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<td>HEMT Die cost</td>
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<td>Packaging cost</td>
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<td>Final test cost</td>
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<td>Yield losses cost</td>
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**Component Price**

SAMPLE
Related Reports

**REVERSE COSTING ANALYSES - SYSTEM PLUS CONSULTING**

**Power Semiconductors & Compound**
- Transphorm GaN-on-Silicon HEMT TPH3206PS
- Efficient Power Conversion EPC2040
- GaN Systems GaNpx Top Cooled – AT&S ECP® Embedded Power Die Package
- Transphorm TPH3002PS 600V GaN on Silicon HEMT
- GaN Systems GS66508P 650V HEMT
- EPC2010 GaN 200V power transistor
- Infineon – IPB60R280C6 600V CoolMOS C6 MOSFET
- Toshiba – TK31E60W 4thgen DTMOS 600V Super-Junction MOSFET

**MARKET AND TECHNOLOGY REPORTS - YOLE DÉVELOPPEMENT**

- Power GaN 2016: Epitaxy and Devices, Applications, and Technology Trends
Business Models Fields of Expertise

- Custom Analyses
  (>130 analyses per year)

- Reports
  (>40 reports per year)

- Costing Tools

- Trainings

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Overview / Introduction
Company Profile & Supply Chain
Physical Analysis
Manufacturing Process Flow
Cost Analysis
Selling Price Analysis

Comparison

About System Plus
- Company services
- Related reports
- Feedbacks
- Contact
- Legal