GaN on Si HEMT vs SJ MOSFET: Technology and Cost Comparison

Will SJ MOSFETs still be attractive compared to GaN devices?

The report proposes an in-depth analysis of the latest innovations in 600/650V power devices showing the differences between SJ MOSFET and GaN HEMT from the technical and economical points of view. It includes details on manufacturing process and materials, packaging structure, component design, die size, electrical performances, current density, etc...

Super Junction technology has been commercially released for the first time in 1998 by Infineon. While new players are entering the market, the historical players are willing to keep the lead by decreasing production cost as low as possible or by introducing different technologies.

On the other side, GaN on Si HEMT offers news capabilities, such as the possibility to work at higher frequencies and the more and more competitive manufacturing cost.

GaN on Si HEMTs are good candidates to enter the 600/650V power devices sector but, at the same time, the improvement of silicon SJ MOSFET will keep them on the market and drive towards a standardization and popularization of these devices.

More than 30 devices from different manufacturers have been opened and analyzed to understand SJ MOSFETs and GaN on Si HEMTs technology innovations. The report includes detailed pictures of devices structure and breakdown cost analysis of the manufacturing process.
TABLE OF CONTENTS

Overview / Introduction
Introduction & Market

SJ Mosfets
• Technology Overview
• List of analysed devices
• SJ Mosfets Performances
  ✓ Infineon Coolmos
    ✓ Infineon Performances
    ✓ Infineon Evolution
    ✓ SPW47N60C3
    ✓ IPB60R280C6
    ✓ IPD65R225C7
  • Toshiba DTMos
    ✓ Toshiba Performances
    ✓ Toshiba Evolution
    ✓ TK40J60T
    ✓ TK10A60W
    ✓ TK31E60W
  • STMicroelectronics MDMesh
    ✓ STMicro Performances
    ✓ STMicro Evolution
    ✓ STP16N65M5
    ✓ STL17N65M5
    ✓ STL18N65M5
    ✓ STP30N65M5

GaN HEMT
• Technology Overview
• List of analysed devices
• HEMT Performances
• GaN Systems HEMT
  ✓ GaN Systems Performances
  ✓ GaN Systems Evolution
  ✓ GS66508P
  ✓ GS66506T
• Transphorm HEMT
  ✓ Transphorm Performances
  ✓ Transphorm Evolution
  ✓ TPH3002PS
  ✓ NTP8G206NG

GAN HEMT vs SJ Mosfets
• Performances comparison:
  ✓ Rdson evolution
  ✓ QgxRdso FOM
• Cost Comparison
  ✓ Devices supply chain
  ✓ Front end cost
  ✓ Back end cost
  ✓ Packaging cost
• Future Trends

Author:
Elena Barbarini
Elena is in charge of costing analyses for MEMS, IC and Power Semiconductors. She has a deep knowledge of Electronics R&D and Manufacturing environment. Elena holds a Master in Nanotechnologies and a PhD in Power Electronics.

Author (Lab):
Véronique Le Troadec
Véronique is in charge of structure analysis of semiconductors. She has a deep knowledge in chemical & physical technical analyses. She previously worked for 20 years in Atmel Nantes Laboratory.

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<table>
<thead>
<tr>
<th>GaN Systems GS66508P</th>
<th>Infineon CoolMOS C7</th>
<th>GaN and SiC Devices for Power Electronics Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>650V GaN on Silicon HEMT</td>
<td>7th generation Superjunction MOSFET</td>
<td>SiC and GaN will compete with silicon from low to high power.</td>
</tr>
</tbody>
</table>

For the first time high voltage GaN transistor (650V) embedded in optimized thin package from AT&S.

Infineon has improved the epitaxy process with a direct impact on $R_{dson}$, 20% lower.

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