

## GaN(650V): GaN Transistors Manufacturing Cost Analysis

### Report Overview

GaN-based power devices are attracting significant attention in applications such as AC adapters, power supplies, BLDC motor drivers, and AI power supplies because they can operate at much higher frequencies than SiC MOSFETs. Furthermore, new GaN Bidirectional Switches (BDS) enable new circuit topologies, and are considered for applications in xEVs (OBCs, matrix converters, etc.).

For over 10 years, LTEC has accumulated data on high-voltage GaN transistor technologies. Now, leveraging these data, LTEC is releasing a report on the current technological trends and manufacturing costs of mainstream GaN-on-Si transistors exceeding 650V.

### Investigated GaN Products

The manufacturing cost analysis is based on the structural and process analysis of the following GaN products,

1. INFINEON 650V GaN G5 (INFINEON Villach, Austria: 200mm→300mm)
2. NAVITAS/Cambridge GaN Devices GaN IC (TSMC Foundry)
3. INNOSCIENCE 650V GaN (China manufacturer)

### Analysis details and report price

Refer to the next page for details of the report's contents

- Comparison of the Average Selling Price (ASP) trend and the cost/price and die area/Ron of power transistors. Is there a cost advantage at the system level?
- Trends in the specific On-Resistance (RonA) Performance Index: GaN vs. SiC
- On the area scaling limit of lateral (horizontal) GaN transistors
- Cost/price trend survey of GaN-on-Si (Sapphire) wafers
- Cost analysis of processed wafers based on manufacturing process flow extraction
- What is the impact (percentage) of GaN wafer costs?
- GaN device cost and price per die area?
- Cost estimate of Foundry manufactured GaN device wafer.

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### 2-3: Comparison of 650V Power Transistors

|   | Si- SJMOS      | GaN-on-Si     | SiC MOSFET       |
|---|----------------|---------------|------------------|
| Vdss [V]  | 650            | 650           | 650              |
| Technology Generation                           | CM8 (Infineon) | G5 (Infineon) | Gen 2 (Infineon) |
| RonAA [mΩ·mm <sup>2</sup> ]                     | ~500           | ~250          | ~135             |
| Max Current density, Id/AA [A/mm <sup>2</sup> ] | 4.5            | 7.1           | 17               |
| Ron·Qg [mΩ·nC]                                  | 2449           | 252           | 1120             |
| Ron·Qgd [mΩ·nC]                                 | 868            | 140           | 212              |
| ASP/Chip Area [\$/mm <sup>2</sup> ]             |                |               |                  |
| Price for Ron=100mΩ                             |                |               |                  |

※ Estimated

# Excerpt from the GaN transistor manufacturing cost analysis report.

## 1.1 Executive summary

The latest generation (2022-2025) of commercial (GaN-on-Si Substrate) 650V GaN FETs were evaluated and compared using correlation between structural/material physics analysis and electrical characteristics, and survey of GaN wafer price/cost. Three leading GaN manufacturers/vendors are considered:

- INFINEON GaN G5 process
- NAVITAS GaN (Manufactured by TSMC)
- INNOSCIENCE GaN (Manufactured in China).

1) A clear ASP (Average Selling Price) decreasing trend is observed. From 2022 to 2025, the per die area ASP has dropped from \$/mm2 (2022) to \$/mm2 in 2025, as manufacturing yield is 2-3x higher. Observe that this translates to a "GaN cost estimate" price of ~500,000\$/m2 !

2) T (NAVITAS) reduce the FOM of RonA to about

3) S, the better, GaN transistors have a clear

4) T substrates currently used are (a) GaN-on-Si

5) T

6) C surveyed to be \$' (China)-\$

7) T used mass production and sales, (ii) cheaper

## 4.5 Cost Analysis Summary of 600-650V GaN-on-Si FET/IC Manufacturing Process 2026

Table 2: Processed Wafer Cost (PWC) estimate

| #  |                                 |         | INFINEON     | INFINEON     | NAVITAS (TSMC GaN) | NAVITAS (TSMC GaN) | INNOSCIENCE   |
|----|---------------------------------|---------|--------------|--------------|--------------------|--------------------|---------------|
|    |                                 |         | IGLR65R140D2 | IGLT85R055B2 | NV6428             | NV6428             | INN650TA030AH |
| 1  | Process Technology              |         | G5           | G5           |                    |                    |               |
| 2  | Total Metal Layers              |         |              |              |                    |                    |               |
| 3  | Manufacturing Fab               |         |              |              |                    |                    |               |
| 4  | Device                          |         |              |              |                    |                    |               |
| 5  | Chip Size                       | mm2     |              |              |                    |                    |               |
| 6  | RON                             | mΩ      |              |              |                    |                    |               |
| 7  | Gross Die per wafer             |         |              |              |                    |                    |               |
| 8  | • Wafer Diameter Size           | mm      |              |              |                    |                    |               |
| 9  | • Raw Wafer Cost                | \$/waf  |              |              |                    |                    |               |
| 10 | • Epi Cost (AlGaIn, P-GaN)      | \$/waf  |              |              |                    |                    |               |
| 11 | • Wafer + Epi Cost              | \$/waf  |              |              |                    |                    |               |
| 12 | • Processing Cost               | \$/waf  |              |              |                    |                    |               |
| 13 | • Processed Wafer Cost, PWC     | \$/waf  |              |              |                    |                    |               |
| 14 | ◆ Manufacturer's profit         | %       |              |              |                    |                    |               |
| 15 | • Processed Wafer Price, PWP    | \$/waf  |              |              |                    |                    |               |
| 16 | • Defect Density, Do            | def/cm2 |              |              |                    |                    |               |
| 17 | • Manufacturing Yield, Y        | %       |              |              |                    |                    |               |
| 18 | • Yielded Dies per Wafer, N     |         |              |              |                    |                    |               |
| 19 | • Yielded Wafer Cost, YWC       | \$/waf  |              |              |                    |                    |               |
| 20 | • Die cost (without final test) | \$/die  |              |              |                    |                    |               |
| 21 | • Die cost per area             | \$/mm2  |              |              |                    |                    |               |
| 22 |                                 |         |              |              |                    |                    |               |
| 23 | ◆ Distributor ASP\$/Die Area    | \$/mm2  |              |              |                    |                    |               |

## 4.3 Analyzed GaN transistor's chips

INFINEON GaN G5  
IGLR65R140D2

NAVITAS GaN  
INV6514C

INNOSCIENCE GaN  
INN650TA030AH

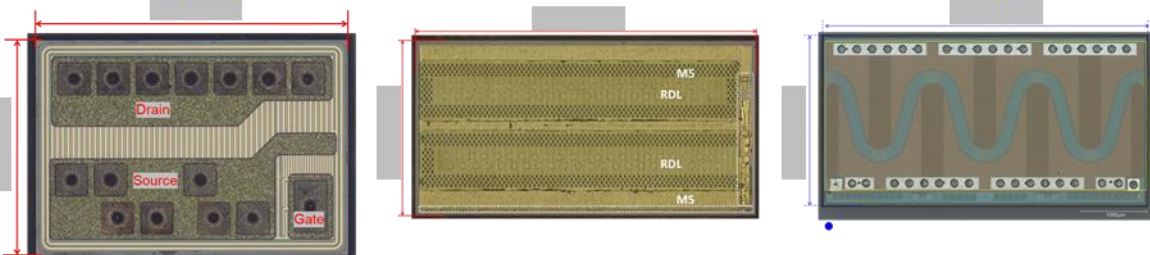


Fig.4-1: GaN transistors Chip

# Excerpt from the GaN transistor manufacturing cost analysis report.

## 2.2 Companies currently commercializing GaN power transistors

A.O.A. 2026/3

| Company                | US | GaN Structure       | Remarks   |
|------------------------|----|---------------------|---|
| Transphorm/<br>Renesas |    | Normally ON→Cascode | Vdss(600V~900V)<br>★ EPC announces GaN licensing agreement with Renesas (February 11, 2026)                   |
| INFINEON               |    |                     | Fab 200mm→300mm)+   |
| STMicro                |    |                     |   |
| NAVITAS                |    |                     |   |
| TI                     |    |                     |   |
| ROHM                   |    |                     | proprietary technology★<br>developed with ANCONA (Taiwan) (TSMC Fab)<br>in-house production of 650V GaN power |
| EPC                    |    |                     | supplies<br>agreement with Renesas (2026, 2月11日)  |
| NEXPERIA               |    |                     |   |
| INNOSCIENCE            |    |                     | NOSCIENCE.  |
| Power Integrations     |    |                     | verter for AC Adapters  |
| SANKEN                 |    |                     | high-voltage GaN superjunctions (lateral)   |
| Vanguard Foundry       |    |                     | agreement with TSMC (January 29, 2026).   |
| X-Fab Foundry          |    |                     |   |
| TSMC Foundry           |    |                     | ) → To withdraw in 2027   |

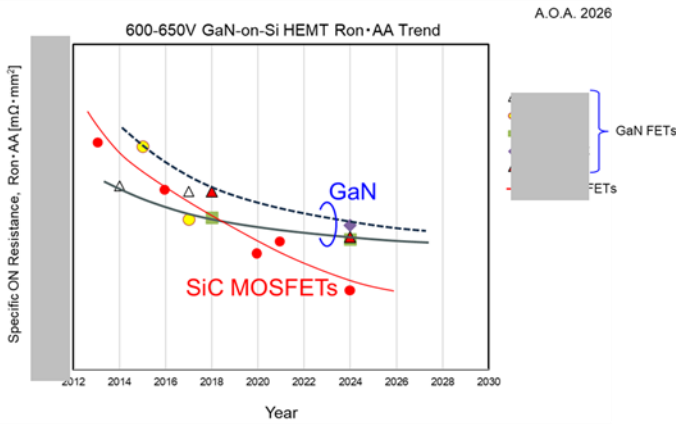


Fig.3-1: 600-650V GaN-on-Si FETs on-resistance (RONx $\lambda$ ) figure of merit (FOM) trends

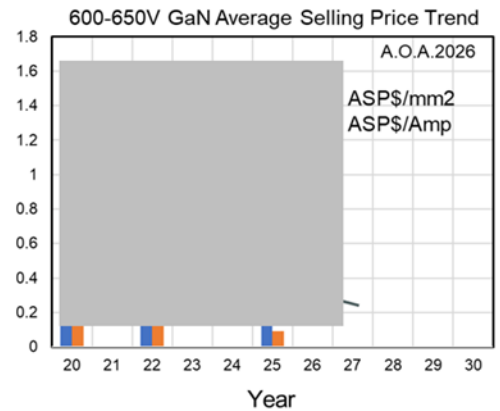


Fig. 2-2: Trends in per area (ASP\$/mm<sup>2</sup>) and per Ampere (ASP\$/Amp) average selling prices (ASP) of INFINEON GaN G5 transistors