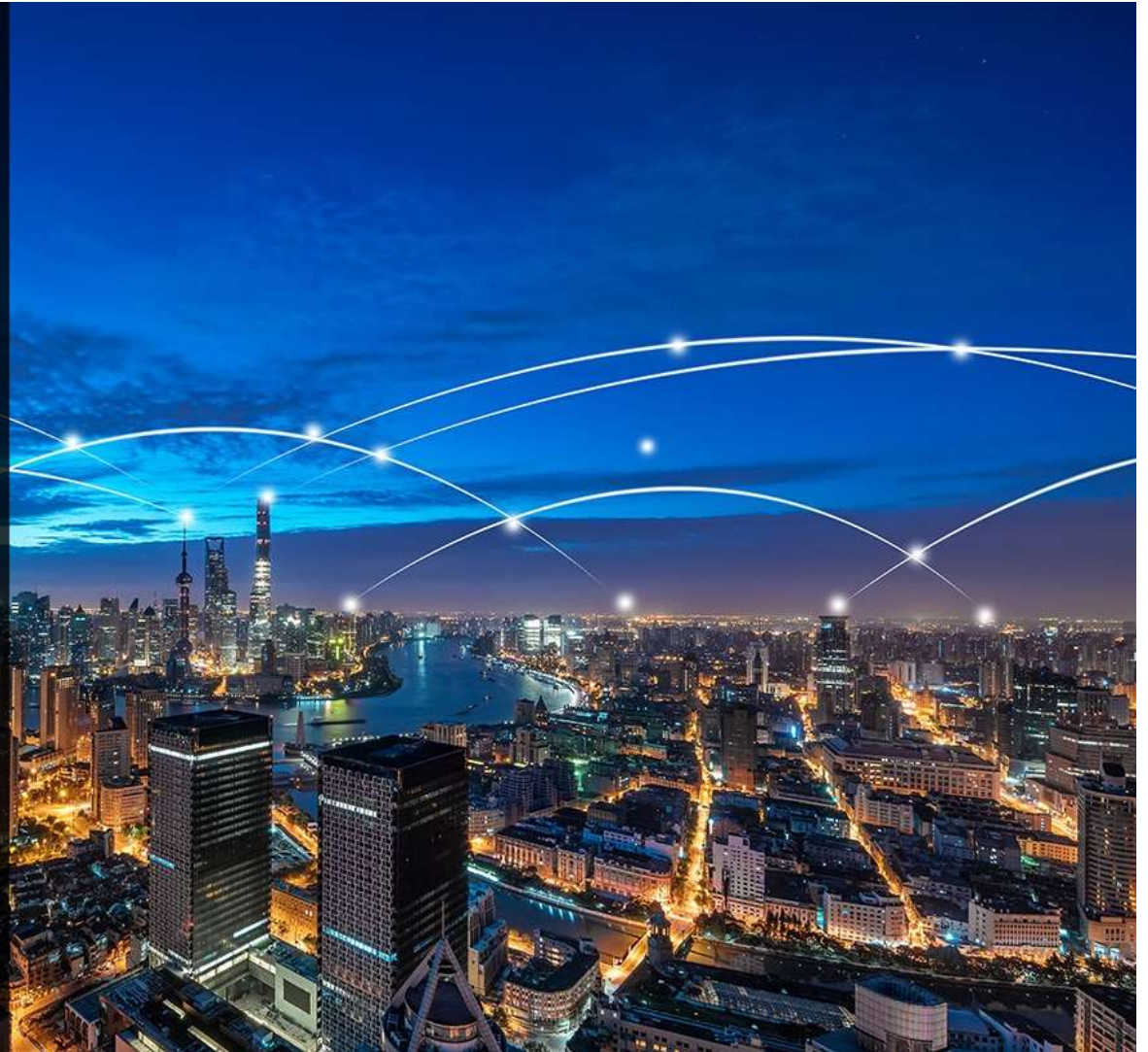




TRANSFORMING THE WORLD

WITH SMALLER, LOWER
COST, MORE EFFICIENT
POWER ELECTRONICS



1 → PRODUCT UPDATES

2 → TOOLS

3 → COMPETITION

4 → TECHNICAL APPLICATIONS

5 → MARKET & COMMUNICATION

6 → CUSTOMER OPERATIONS

7 → CALL TO ACTION

1



PRODUCT UPDATES



New products – Lead time

2



TOOLS

3



COMPETITION

4



TECHNICAL APPLICATIONS

5



MARKET & COMMUNICATION

6



CUSTOMER OPERATIONS

7



CALL TO ACTION

Broadest line of Transistors

650 V



GS66502B

7.5 A, 200 mΩ
6.6 x 5.0 mm



GS66504B

15 A, 100 mΩ
6.6 x 5.0 mm



GS66506T

22.5 A, 67 mΩ
5.6 x 4.5 mm



GS66508T

30 A, 50 mΩ
7.0 x 4.5 mm



GS66508B

30 A, 50 mΩ
8.4 x 7.0 mm



GS66516T

60 A, 25 mΩ
9.0 x 7.6 mm



GS66516B

60 A, 25 mΩ
11.0 x 9.0 mm



GS-065-060-5-T-A

60 A, 25 mΩ
9.0 x 7.6 mm



GS-065-060-5-B-A

60 A, 25 mΩ
11.0 x 9.0 mm



GS-065-150-1-D2

150 A, 10 mΩ
12.7 x 5.6 mm



GS-065-004-1-L 4 A, 450 mΩ

GS-065-008-1-L 8 A, 225 mΩ

GS-065-011-1-L 11 A, 150 mΩ

5.0 x 6.0 mm



GS-065-011-2-L 11 A, 150 mΩ

GS-065-030-2-L 30 A, 50 mΩ

8.0 x 8.0 mm

100 V



GS61004B

38 A, 16 mΩ
4.6 x 4.4 mm



GS61008P

90 A, 7 mΩ
7.6 x 4.6 mm



GS61008T

90 A, 7 mΩ
7.0 x 4.0 mm

L

Bottom-side Cooled 5x6 and 8x8 PDFN

Industry standard plastic package options

T

Top-side Cooled GaNPx

Simpler thermal design for hard-switching applications

B

Bottom-side Cooled GaNPx

Compact solution for lower power designs

A

Automotive Qualified

AEC-Q and AutoQual+ qualification

P

Bottom-side Cooled GaNPx

Compact solution for lower power designs

D

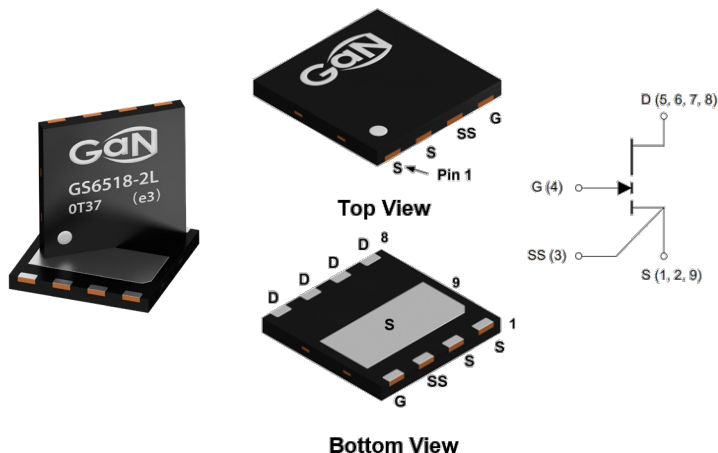
Die

Optimized for wire bonding. Suitable for power modules

Key Parameters

PART NUMBER	GS-065-018-2-L
V_{DS}	650 V
I_{DS}	18 A
$R_{DS(ON)}$	78 m Ω
PACKAGE	PDFN 8x8
QUALIFICATION	JEDEC

Pinout / Schematic



Key Features

- 650V Gen2 GaN with improved cost
- Industrial standard 8x8 PDFN package
 - Improved thermal performance vs PDFN 5x6
 - Easy adoption - pin compatible with IFX and other GaN vendors
 - Higher creepage distance (2.8 mm)
- Better cost-performance
- JEDEC Qualification for consumer, enterprise & industrial applications

Target Market

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> ▪ Consumer <ul style="list-style-type: none"> ▪ High Power Adapter ▪ TV/Audio SMPS ▪ Motor Drives ▪ LED Driver ▪ Wireless Power | <ul style="list-style-type: none"> ▪ Enterprise <ul style="list-style-type: none"> ▪ Totem Pole PFC ▪ LLC DC/DC ▪ Telecom/Server SMPS | <ul style="list-style-type: none"> ▪ Industrial <ul style="list-style-type: none"> ▪ AC/DC Power Supply ▪ Solar Inverter ▪ Motor drives ▪ UPS / ESS ▪ Wireless Power |
|--|---|--|

Product Status

- Engineering Samples: **Now**
- Est. Production: **May/22**

Family	Part #'s	Lead time (weeks)
GaNPX 650V	GS66502B, GS66504B, GS66506T, GS66608B, GS66508T, GS66516B, GS66516T	33
GaNPX 100V	GS61004B, GS61008P, GS61008T	34
GaNPX AutoQual+	GS-065-060-5-T-A, GS-065-060-5-B-A	34
PDFN	GS-065-004-1-L, GS-065-008-1-L, GS-065-011-1-L, GS-065-030-2-L, GS-065-011-2-L	21

- The semiconductor industry **continues to be under very tight capacity** constraints
- As a result, many semiconductor suppliers, including GaN and SiC competitors, **continue** to have lead times in **excess of 50 weeks**
- Some customers are **pushing out orders** due to other suppliers' delays
- Remind customers that this will be temporary, and they **should secure the GaN components** now for when other suppliers catch up.
- GaN Systems has **secured capacity** to minimize impact, and we are **in better shape than most of the industry**
- Remind customers to use **our supply advantage** to be their competitive advantage

[Book orders accordingly for 2022](#)

- 1 → PRODUCT UPDATES
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GaN Systems Introduces "50% Smaller" 250W AC/DC GaN Charger Design

GS-EVM-CHG-250WPFCLLC-GS1

250W AC/DC charger PFC & LLC reference design

This new high-power density and high-efficiency charger reference design is **50% smaller** and **40% lighter weight** in a slim form factor which provides a cased turn-key solution with :

- Ultra-slim design: < 22mm height
- High-power density: 50% size reduction, 16W/in³
- High efficiency: 96% peak efficiency
- Meets EN55032 Class B EMI and IEC62368-1 safety standards
- Temperature rise below 45°C at 40°C ambient



• A giveaway to qualified customers

Product Pages:

English: [GS-EVM-CHG-250WPFCLLC-GS1 Evaluation Board | GaN Systems](#)

Chinese: [GS-EVM-CHG-250WPFCLLC-GS1 Evaluation Board - 氮化镓系统 \(GaN Systems\)](#)

Part Number	Order Availability	Channel Promotion Date	Stocking Strategy
GS-EVM-CHG-250WPFCLLC-GS1	Now	6 th January 2022	Sample Giveaways

- **65W**

- **100W**

- **250W**

- Launched at CES

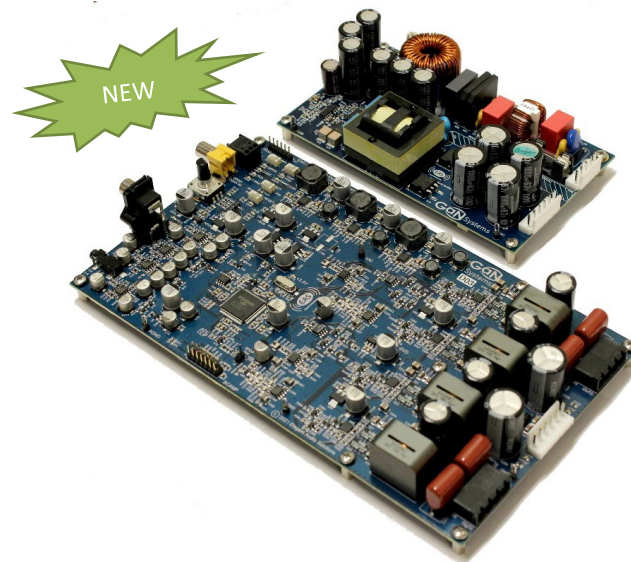
- **Maximize performance,
reduce design timeline**



Audio Class D 2-channel 200W per channel amplifier and 400W SMPS Evaluation boards

GS-EVB-AUD-BUNDLE2-GS

This solution is optimized for **sound quality, thermal performance, size, and cost**. The evaluation kit includes a 2 channel, 200W per channel (8 ohm) Class-D audio amplifier with **96% efficiency** and companion 400W continuous, 550W peak power audio-grade SMPS. The SMPS features **20% overall size reduction**. The amplifier and provides better thermal management resulting in **10°C temperature reduction**. In addition to these enormous improvements, GeN2 also **lowers bill of materials (BoM) cost**.

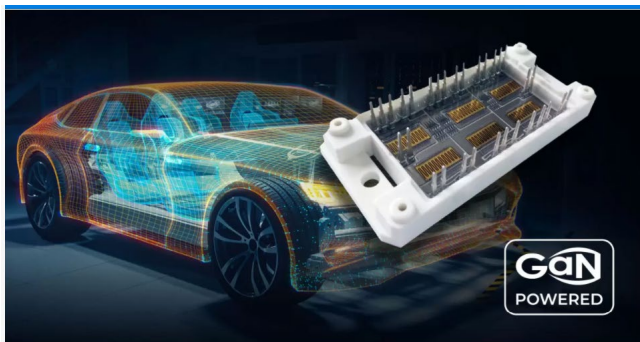


Product pages:

[GS-EVB-AUD-BUNDLE2-GS Evaluation Board | GaN Systems](#)

[GS-EVB-AUD-BUNDLE2-GS Evaluation Board - 氮化镓系统 \(GaN Systems\)](#)

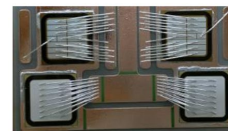
Part Number	Order Availability	Channel Promotion Date	Stocking Strategy
GS-EVB-AUD-BUNDLE2-GS	Now	6 th January 2022	Distributor Stocking



November 24, 2021

GaN Systems and USI Form Strategic Partnership to Accelerate GaN Adoption in Electric Vehicles

- USI has more than 20 years of experience in power electronics and the automotive industry.
- Various package types and high-reliability modules, including power modules, IPMs (intelligent power modules), DC/DC converters, and RF power transistors.






Power Module



IPM

- 1 → PRODUCT UPDATES
- 2 → TOOLS
- 3 → COMPETITION**
- 4 → TECHNICAL APPLICATIONS
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Key Parameters Comparison

Parameters Definition		GaN	Si	SiC	GaN's values
					
Blocking voltage	V_{ds} ; V	650	600	650	
On resistance	$R_{DS(on)}$, typ; m Ω	50	48	55	Almost same typical $R_{DS(on)}$
Time related effective output capacitance	$C_{o(tr)}$; pF	142	1171	210	Shorter dead time with low circulating loss
Output charge @ 400V	Q_{oss} ; nC	57	458	84	Lower switching tun-on loss; Shorter dead time with low circulating loss
Gate to drain charge	Q_{gd} ; nC	1.8	28	27	Lower switching loss
Turn-off time @5A 400V	t_{off} ; ns	2.52	15.1	11.0	Lower switching turn-off loss
Total gate charge	Q_g ; nC	5.8	79	73	Lower gate drive loss
Reverse Recovery charge @ 400V	Q_{rr} ; nC	0	720	85	Lower switching turn-on loss; no hard commutation failure

1 → PRODUCT UPDATES

2 → TOOLS

3 → COMPETITION

4 → **TECHNICAL APPLICATIONS**  GaN Systems Advantages in Class-D Audio

5 → MARKET & COMMUNICATION

6 → CUSTOMER OPERATIONS

7 → CALL TO ACTION

Selected Topics

1 GaN Systems Advantages in Class-D Audio



Value Proposition

➤ Provides systems with less power loss

➤ Provides systems that are smaller in size

➤ Provides systems that are lighter in weight

➤ Provides systems that are easier to use

➤ Provides systems with higher reliability

Abbreviations

PWM	Pulse Width Modulation
$R_{ds(on)}$	On-state resistance
THD	Total harmonic distortion
THD+N	Total Harmonic Distortion plus Noise
g_m	Transconductance
E_{on}	Turn-on Energy
IMS	Insulated Metal Substrate
$C_{o(ER)} / (TR)$	Effective Output Capacitance Energy Related / Time Related
Q_g	Gate Charge
C_{oss}	Output Capacitance
E_{oss}	Output Capacitance Stored Energy
P_{loss}	Total Power Loss
$R_{\theta JA}$	Junction to Ambient thermal resistance
$R_{\theta HSA}$	Heatsink to Ambient thermal resistance

Contact [GaN Systems](#) for more information

- **Introduction**

- What is a Class-D Amplifier?
- Why GaN in Class-D Audio?

- **Performance and Comparison**

- GaN Systems' solution – Test results
- GaN Systems vs. other GaN vendors

- **Conclusion**

Professional Audio

- Audio systems
- Touring amplifiers
- Active speakers
- Public message
- Musical instruments



Home Audio

- Multi-room systems
- Home hubs
- Sound bars
- Home theater
- Smart speakers



Portable Audio

- Batt.-op. speakers
- On-the-go speakers
- Docking speakers
- Party boom boxes
- Wearable speakers



Leisure Audio

- Watercraft
- Boat
- ATV
- Motorcycle
- RV



What is a Class-D Amplifier?

- The most commonly constructed amplifier classes that are used as audio amplifiers:

- Low distortion
- High sound quality
- Ideal eff.= 50%
- High heat dissipation
- Large heatsinks
- Energy wasted
- Increased weight

A

- Inferior sound quality
- Non-linear crossover distortion
- Less power dissipation
- Ideal eff.= 78%

B

- Compromise between A & B
- Less dissipation than A
- Minimized crossover distortion
- Good sound quality
- Ideal eff.= 78%

AB

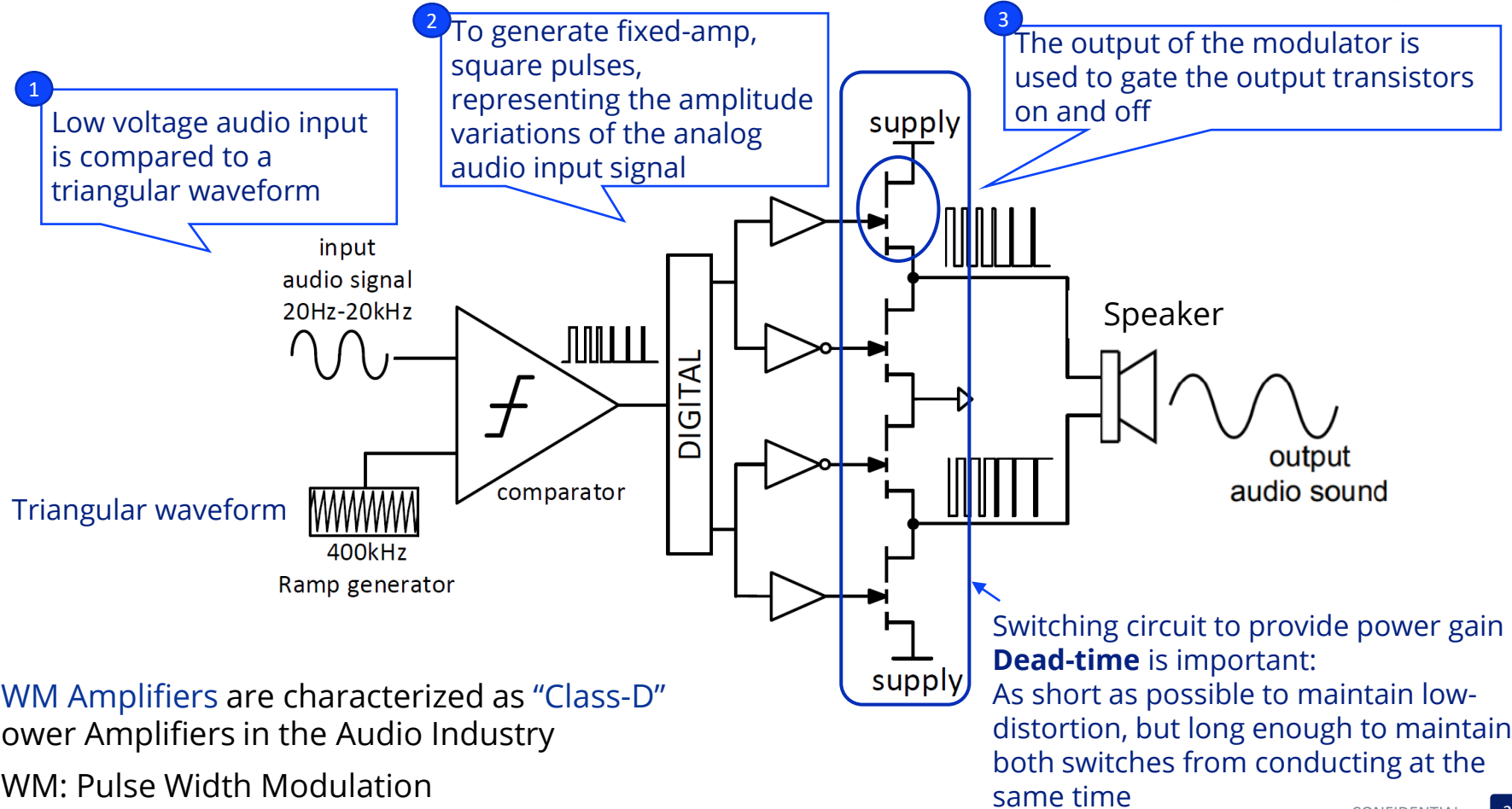
- Not officially recognized
- Variations upon the Class A/B
- Improved efficiency over Class A/B
- Increased cost and complexity
- Ideal eff.= 78%

G&H

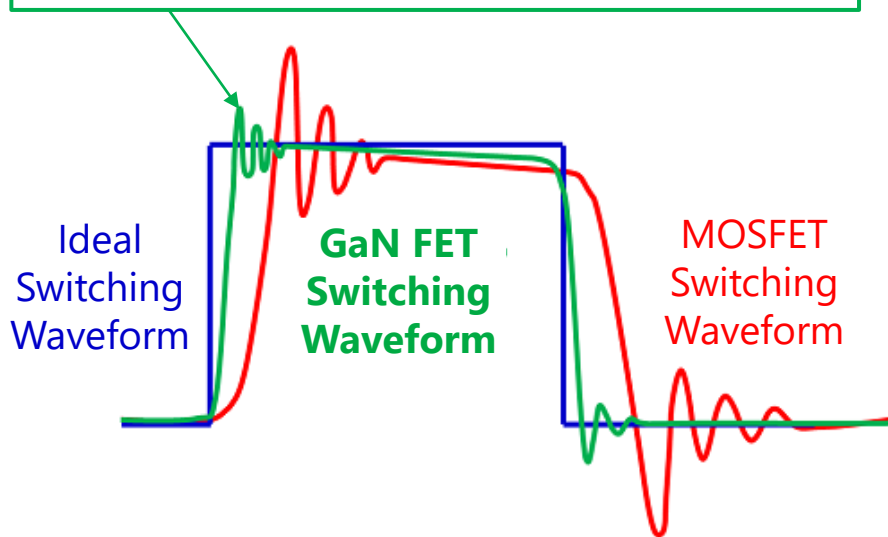
- Ideal eff.= 100%
- 90% at full load
- Reduced distortion
- Light weight, Small size
- Comparable sound quality to class A
- Low heat generation

D

- Class-D has highest power efficiency, lowest heat generation, smallest size, and lightest weight



With GaN:
More closely approaches the ideal line:
less distortion
Faster turn-on and turn-off: **short**
deadtime



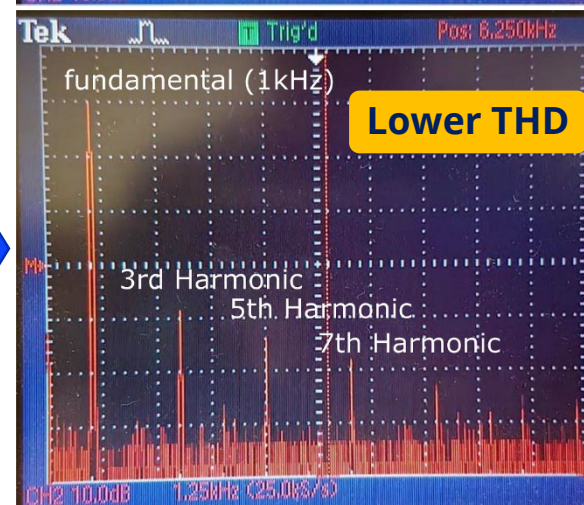
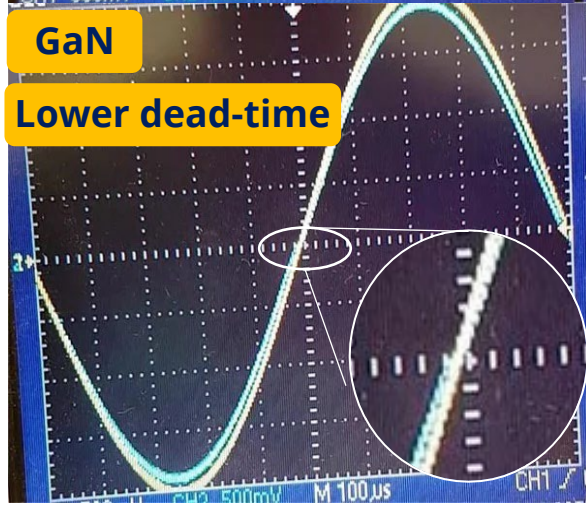
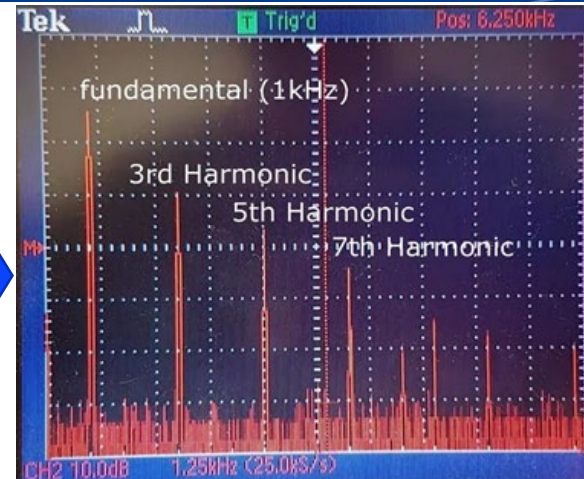
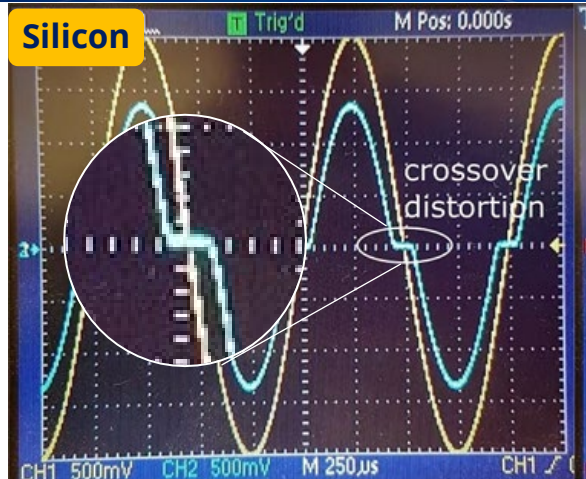
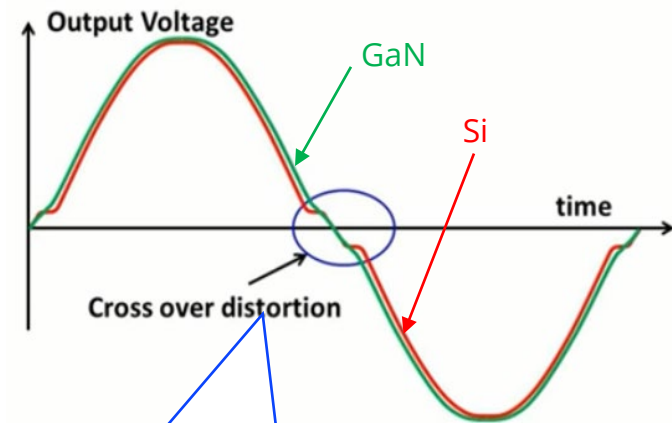
Nearly perfect with GaN...



GaN transistors: ≈ 0 capacitance $\gg \gg \approx 0$ deadtime $\gg \gg$ immediate switching $\gg \gg$ no overshoot and ringing.

GaN vs. Silicon in Audio

Significantly better harmonics

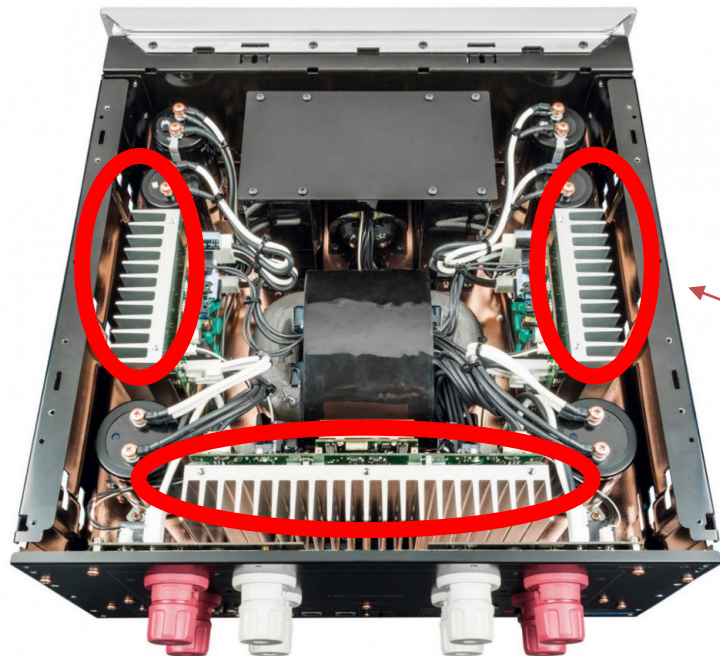


With GaN:

Fast switching & no reverse recovery charge (Q_{RR})

Low dead time → Low THD

Note: THD (Total Harmonic Distortion) is to measure linearity with sinusoidal signal



Output Power 150 W + 150 W (1 kHz, T.H.D. 0.5%, 8 Ω , 20 kHz LPF)
300 W + 300 W (1 kHz, T.H.D. 0.5%, 4 Ω , 20 kHz LPF)
THD+N 0.05% (1 kHz, 75 W, 8 Ω , 20 kHz LPF)
Power cons. 250 W
Dimensions 480 x 241 x 567 mm
Weight Approx. 54 kg, approx. 119 lbs

With Silicon, heatsink is big and heavy

→ System is **big** and **heavy**

With GaN, heatsink can be eliminated

→ system is **small** and **light**

- With GaN:
 - Eliminate heatsink
 - Reduce size
 - Reduce weight

- **Introduction**

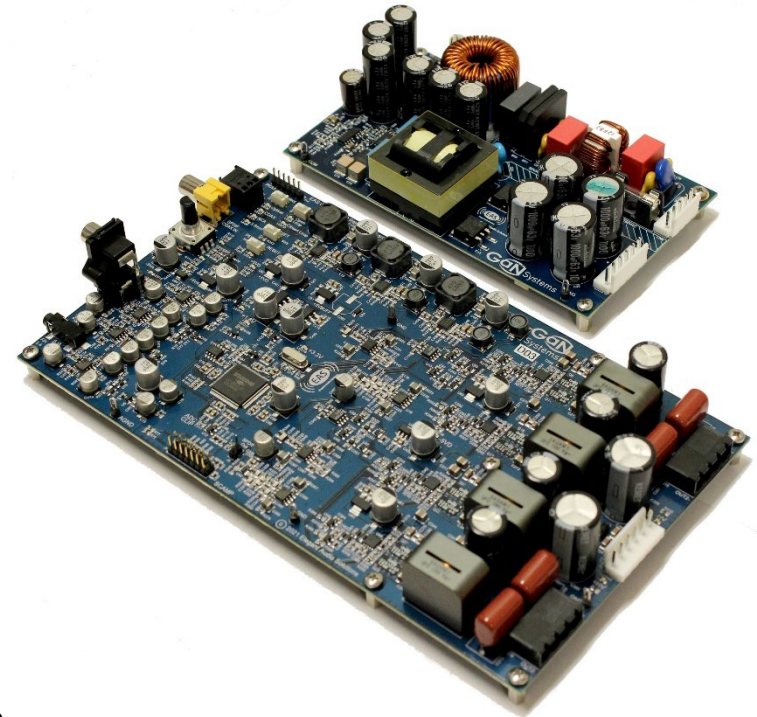
- What is a Class-D Amplifier?
- Why GaN in Class-D Audio?

- **Performance and Comparison**

- GaN Systems' solution & Test results
- GaN Systems vs. other GaN vendors

- **Conclusion**

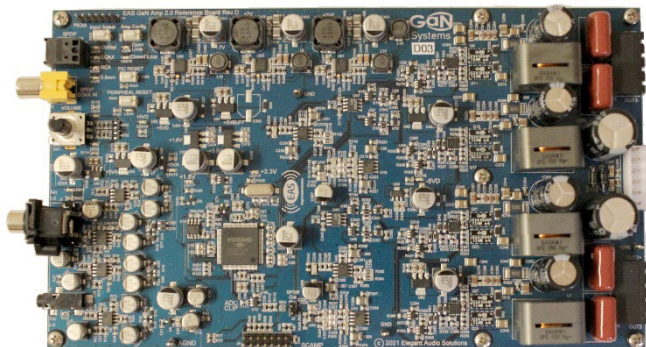
- The GaN Systems solution consists of a GaN FET-based SMPS (Switched-Mode Power Supply) with PFC and Stereo 200W/8-ohm Class-D Amplifier.
- **Class-D Amplifier:** Two-channel Bridge-Tied-Load (BTL) design composed of 4 ground-referenced Half-Bridge Output Stages with evident support for scalability and expandability.
- **SMPS:** High-efficiency LLC design with PFC and Universal Input support.
- The SMPS uses two [GS-065-030-2-L](#) for PFC Front-End and [GS-065-011-2-L](#) for LLC Half-Bridge Back-End and the [GS61008P](#) for each of the four Half-Bridge Output Stages of the Class-D Amplifier.



GS-EVB-AUD-BUNDLE2-GS

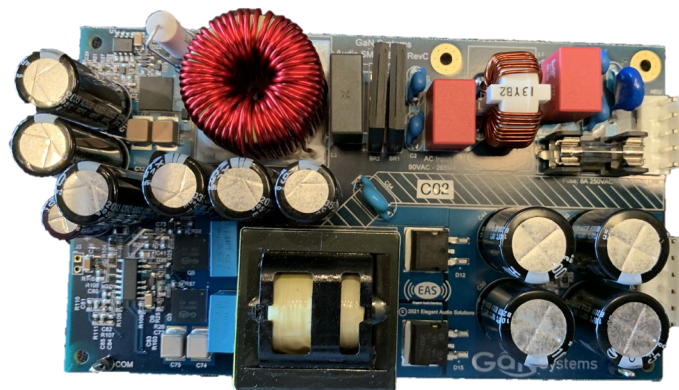
2-Channel Class D Amplifier

- 200W per Channel into 8 ohms
- 300W per Channel into 4 ohms
- Full load efficiency > 96%
- Low THD+N



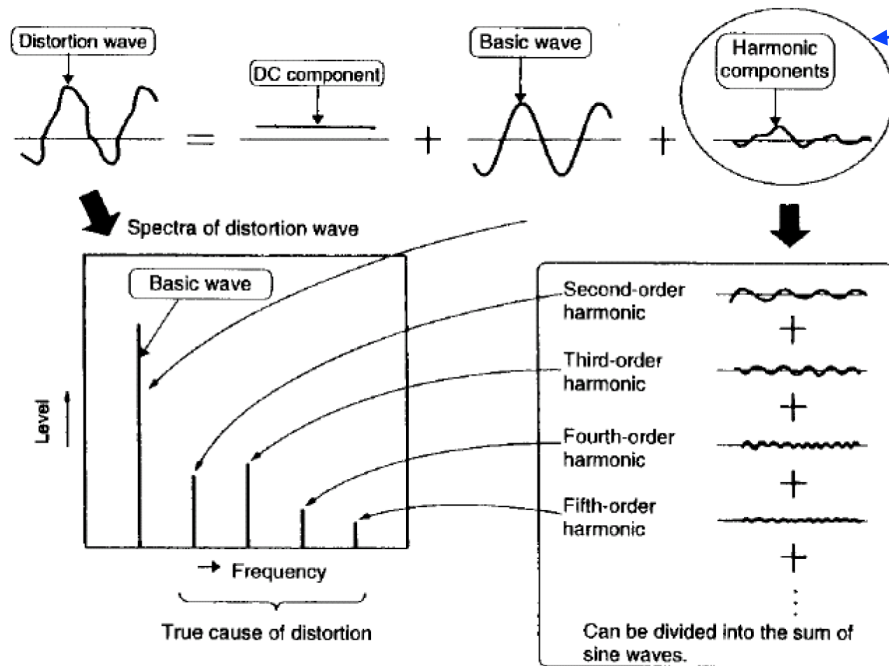
Switched-Mode Power Supply (SMPS)

- Universal AC line input voltage (85 V - 264 V)
- +/- 32 VDC Regulated Output Voltage
- 400W Continuous Output Power
- Full load Efficiency > 90%



To understand the test results, let's understand THD and THD+N first :

- THD is a simple way to measure non-linearity of the amplifier.
- If the amplifier is not linear, it generates harmonics



Any repetitive waveforms can be expressed as a sum of sinusoidal signal as

$$V_o = dc + \sum_{n=1}^{\infty} A_n \cdot \sin(n\omega t + \theta_n)$$

Harmonic distortion is a ratio of rms value of the harmonic component and the original waveform.

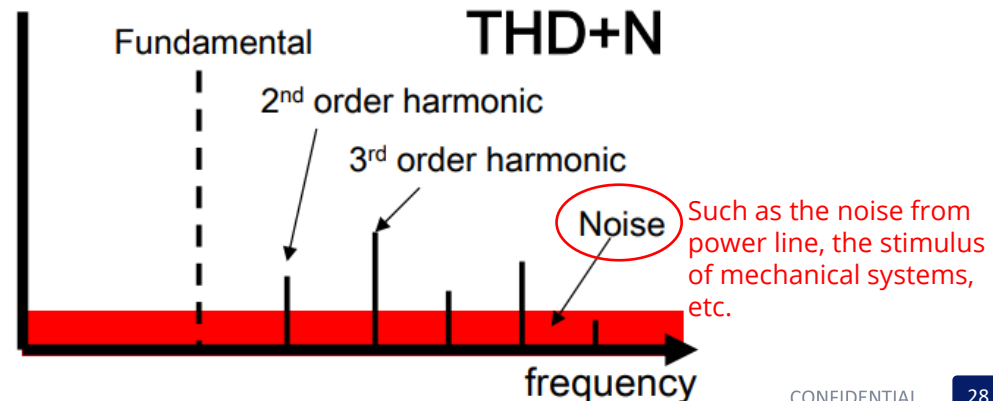
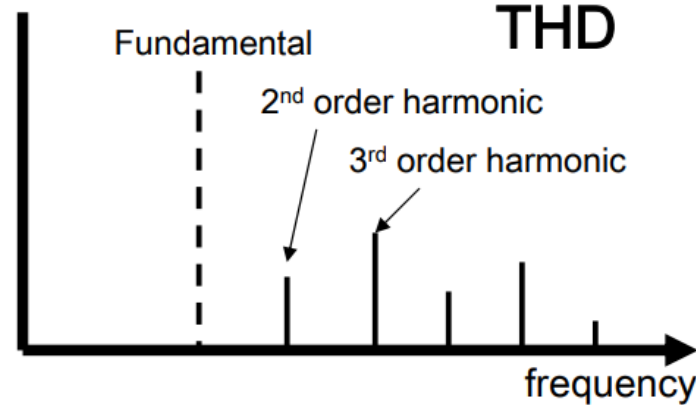
$$HD_n = A_n / A_1$$

Total harmonic distortion is a ratio of rms value of sum of the all harmonic component and the original waveform.

$$THD = \sqrt{\left(\sum_{n=2}^{\infty} HD_n^2 \right)}$$

What is THD+N?

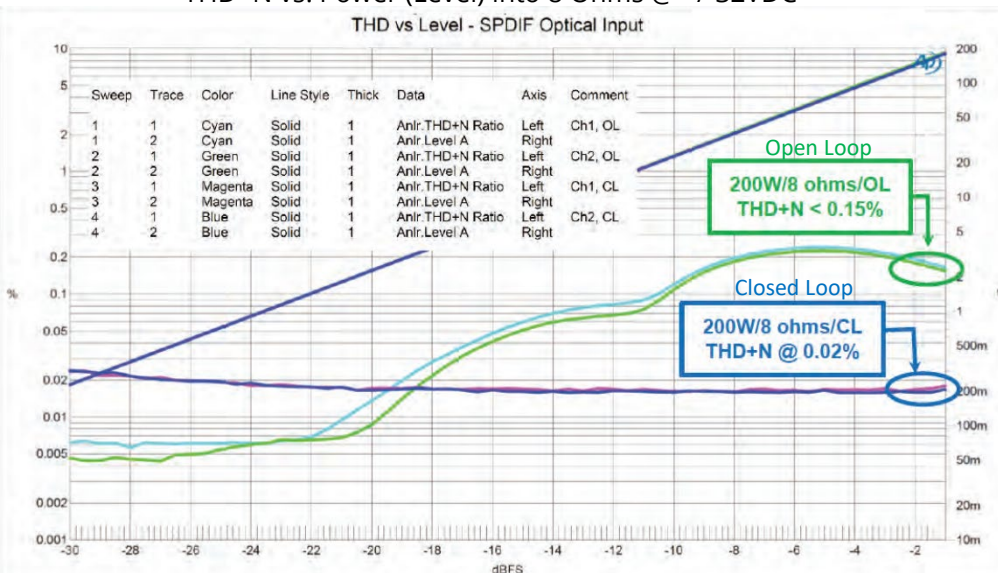
- **THD+N** is a sum of harmonic distortion components and noise, i.e. anything except fundamental spectrum.
- **THD** is a measure of linearity.
- **Noise** is a measure of added errors not depending on the input signal



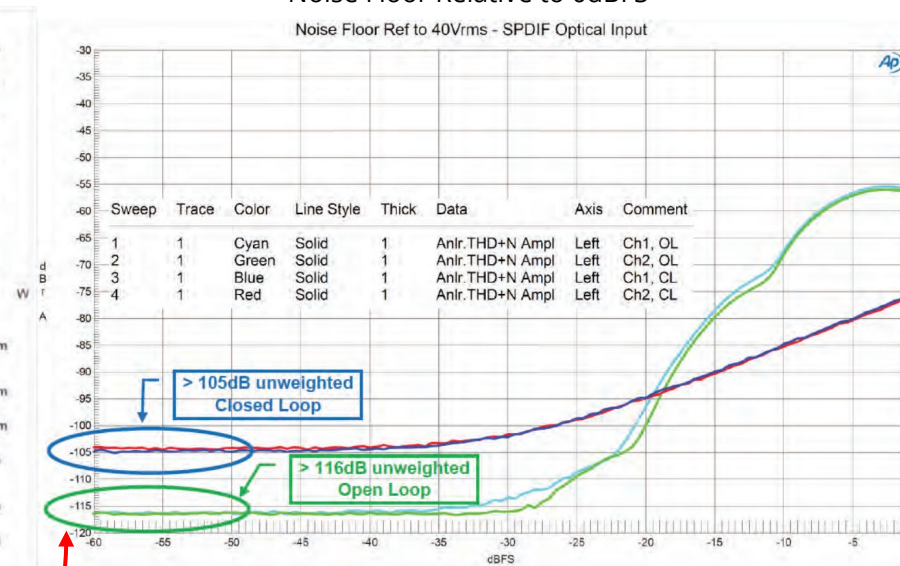
- Many Si-based Class D amplifiers in the market utilize **Close Loop**.
 - **Close Loop:** The output waveform is sensed and fed back to the input of the amplifier, and deviations in the supply rail are detected at the output and corrected by the control loop.
 - **Open loop:** The output does not affect the control action of the system.
 - A **Close loop** not only **improves linearity**, but also **allows the system to have capability of suppressing any power supply variations to its output signal**.
 - The advantages of a closed-loop design **come at the price of possible stability issues**.
- GaN Systems' solution accommodates **both Open-Loop and Closed-Loop** operation using GaN Systems transistors in the output stage providing excellent switch characteristics.

The noise floor is **the amount of noise generated by the device itself with no signal present**.

THD+N vs. Power (Level) into 8 Ohms @ +/-32VDC

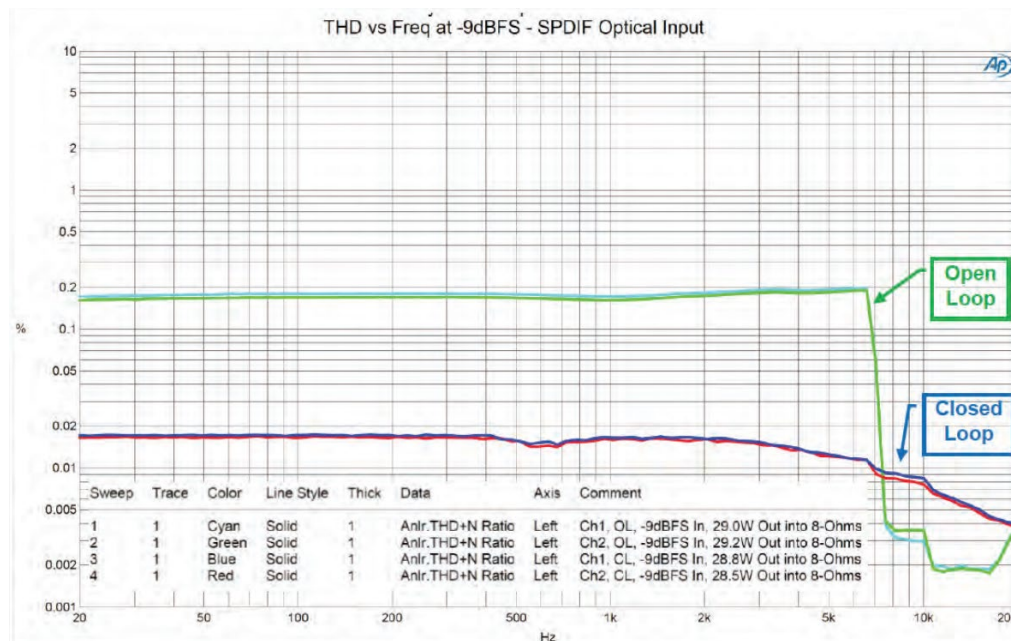


Noise Floor Relative to 0dBFS



- The low signal level THD performance for the **Open-Loop** amplifier exceeds that of the Closed-Loop approach, and this can be understood by comparing the **Noise Floor**.
- The THD+N of the Open-Loop architecture compares favorably is mainly due to the excellent characteristics of the **GaN Systems** transistors in output stage.
- As the audio signal level is increased, and hence the output power increased, the benefit of the Closed-Loop architecture is evident.

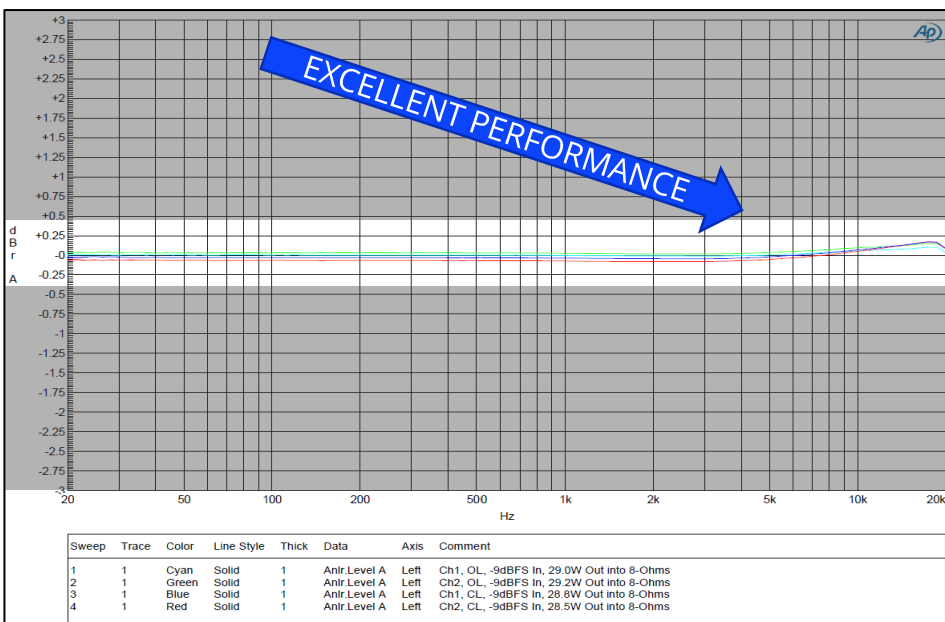
THD+N vs. Frequency into 8 Ohms @ -9dBFS



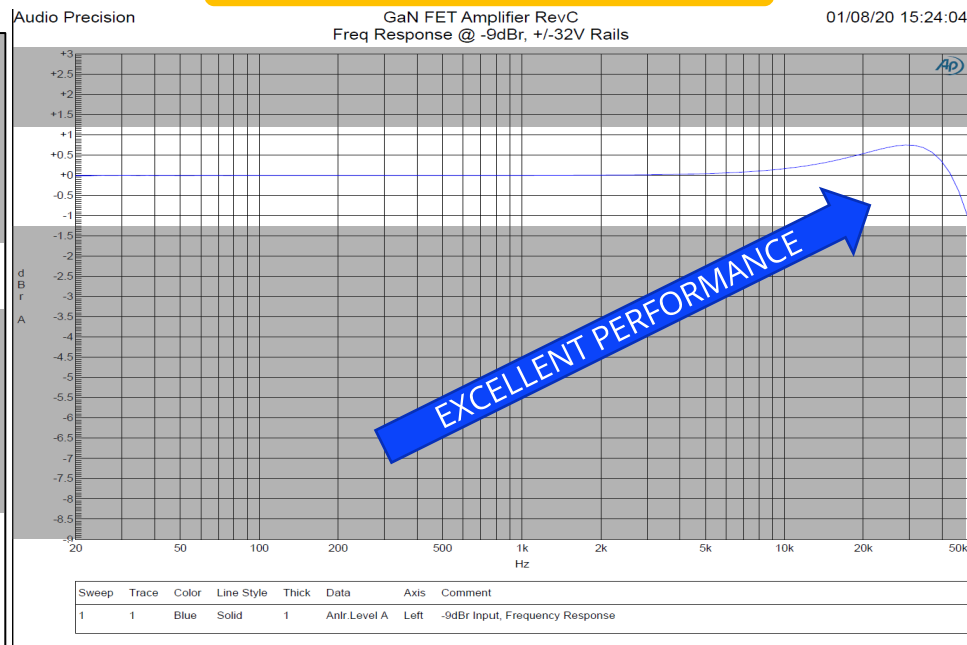
- The THD+N with the Close-Loop architecture is better at the lower frequencies.
- The Open-Loop architecture very quickly approaches the performance of the Closed-Loop architecture in the upper-mid-range.

Frequency response measures how well an audio component reproduces all of the audible frequencies.

Amplifier Frequency Response to 20kHz

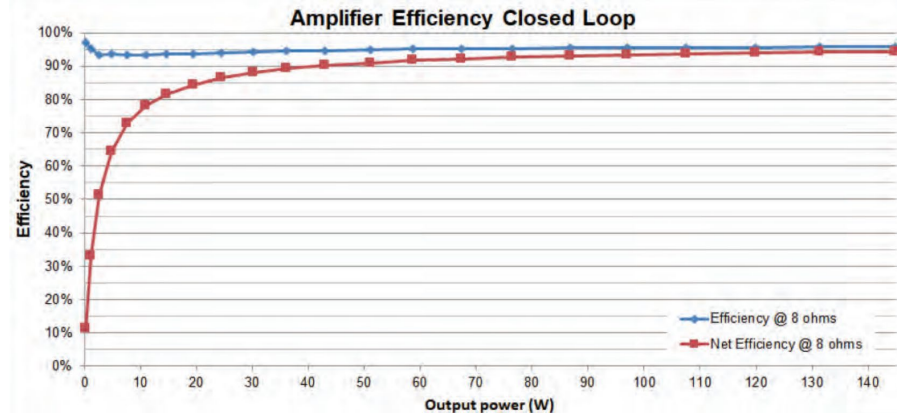


Amplifier Frequency Response to 50kHz



- The flat response means the amplifier will sound similar no matter what kind of loudspeaker load it drives.

Closed-Loop Amplifier Efficiency vs. Output Power @ 8 Ohms



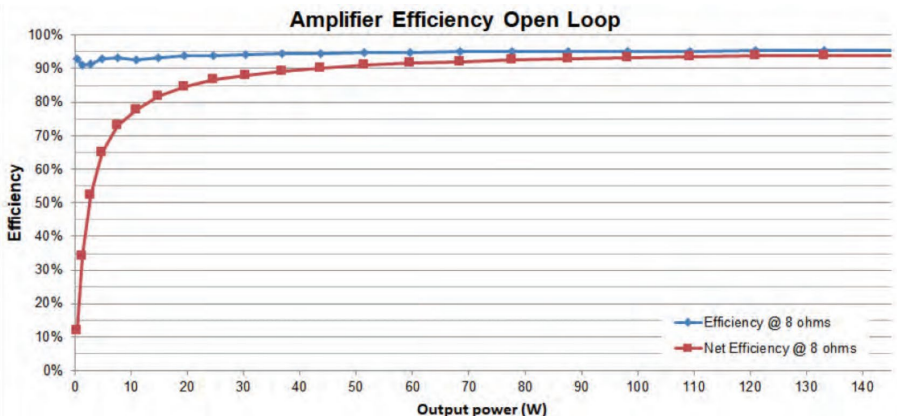
Blue curve meaning:

- Indicates the efficiency of the **Power Stage** and should be used when comparing the GaN FET Efficiency with other **Si MOSFET** or **Integrated Power Device** solutions.

Conclusion:

- With Power Stage Efficiency measured at **95% to 96%** GaN FET Power Stage is **6% - 10% higher** than a similar **Si MOSFET Class-D** Power Stage.
- Removed heat sink requirement and reduced EMI/EMC**

Open-Loop Amplifier Efficiency vs. Output Power @ 8 Ohms



Red curve meaning:

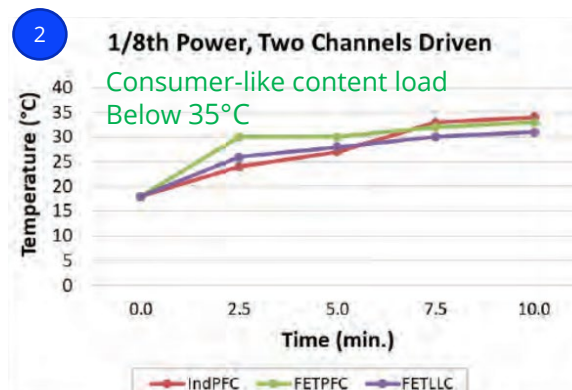
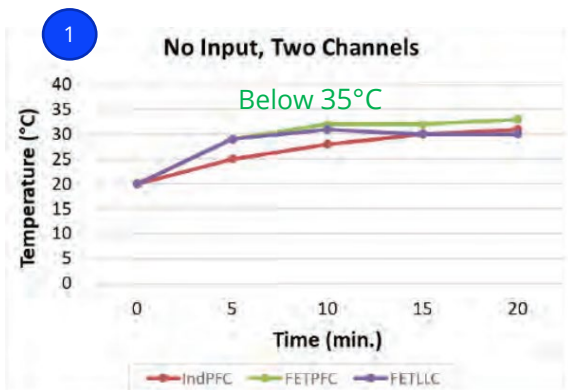
- Indicates the efficiency of the **GaN-based Class-D Amplifier** and should be used in comparison with other complete **Si MOSFET Reference Designs or Integrated Power Amplifiers**.

Conclusion:

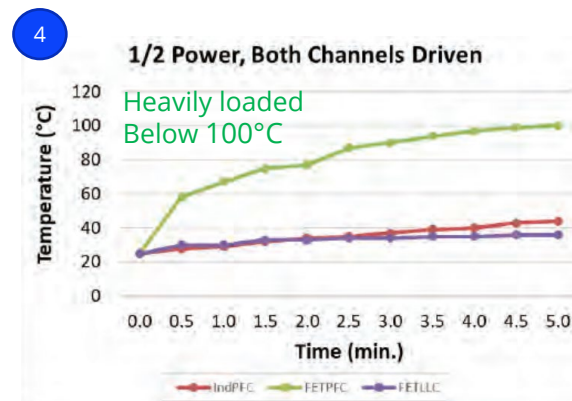
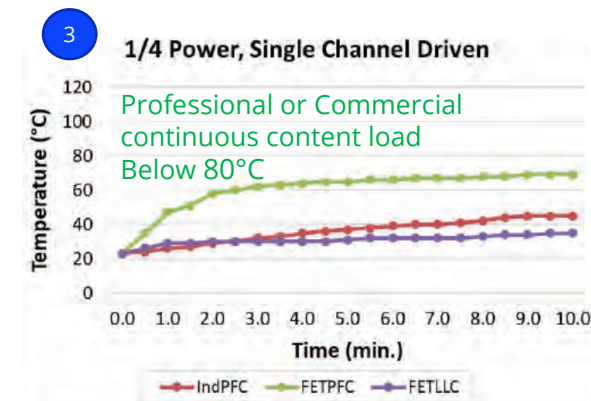
- With the 8-ohm Amplifier efficiency measured at **90% to 96%** efficient, GaN FET Amplifier is **3% - 10% higher** than a similar **Si MOSFET Class-D** Amplifier.
- The category of **Integrated Power Amplifier** could **NOT** play in the 8-ohm application that is defined by this performance.

Test Results: SMPS Thermal Performance - GS-EVB-AUD-BUNDLE2-GS

- Thermal performance was measured **without any heat sinking** on the devices.
- The thermal management of the GaN FETs was provided by PCB copper traces and planes.



- The temperature does not exceed 35°C.



- Even at heavy load, the SMPS is still well below the maximum safe operating condition.

IndPFC: PFC inductor
FETPFC: PFC GaN FET
FETLLC: LLC Half-bridge GaN FET

- To compare the various GaN and Silicon transistor approaches to Class-D Amplifier topologies assuming that the devices are applied in equivalent methods.

Parameter/Spec	GaN Systems GaN Class-D Design	GaN Supplier B GaN Class-D Design	GaN Supplier C GaN Class-D Design	Silicon Class-D Design
Voltage Rating	100V	100V	400V ⁽⁵⁾	100V
THD+N (1kHz)				
@ 1/10 Power	0.004%*	0.01%*	0.05%*	0.015%
@ 1/8 Power	0.005%*	0.008%*	0.02%*	0.005%
@ 1/3 Power	0.018%	0.006%	0.006%	0.007%
@ Full Power	0.018%	0.03%	0.008%	0.02%
THD+N (-9dBFS)				
@ 100Hz	0.002%*	0.004%*	N/A	0.003%
@ 1kHz	0.005%	0.006%	0.006%	0.007%
@ 6.7kHz	0.03%	0.03%	N/A	0.040%

Best THD+N

- In equivalent methods, GaN Systems provides Class-D design with overall lowest THD+N than other suppliers.

- **Introduction**

- What is a Class-D Amplifier?
- Why GaN in Class-D Audio?

- **Performance and Comparison**

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- GaN Systems vs. other GaN vendors

- **Conclusion**

- ❑ The performance of this reference design is **very good** and system designers now **have a choice between Open-Loop and Closed-Loop designs**.
- ❑ The use of good Open-Loop topologies allows for **the elimination of complexities** associated with a Closed-Loop design counterpart.
- ❑ For the Open-Loop design, Power Supply becomes a more important component and the companion SMPS in this evaluation kit is a good pairing with the amplifier.
- ❑ **GaN devices provide the performance, size, and cost benefits to allow everyone to enjoy Class-D audio sound:**

❑ **In Class D amplifier**

- **Better audio performance**
- **Better efficiencies and increased bandwidth**
- **Smaller size and weight**

❑ **In Companion SMPS**

- **Increased efficiency**
- **Eliminate heatsink and fan cooling**
- **Good EMI/EMC**

- 1 → PRODUCT UPDATES
- 2 → TOOLS
- 3 → COMPETITION
- 4 → TECHNICAL APPLICATIONS
- 5 → MARKET & COMMUNICATION**
- 6 → CUSTOMER OPERATIONS
- 7 → CALL TO ACTION

Dell 240W adapter **46% smaller** and **25% lighter**



October 21, 2021

GaN Systems Inside the New 15" Dell Gaming Laptop Charger



氮化镓功率管采用GaN Systems GS-065-030-2-L



CONFIGURATIONS

PRODUCT DETAILS

RATINGS & REVIEWS

DRIVERS, MANUALS & SUPPORT

BOUNDARY-BREAKING CONNECTIVITY

Another Alienware first: We're bringing you the performance you expect from our systems in adapter form with Alienware's first small form factor power adapter. **46% smaller** and **25% lighter** than a traditional adapter, our Alienware-branded 240W adapter is 1.9% more efficient than the previous 240W adapter.

More ports mean more fun: Let the lightning-fast games begin with two Type-C ports for up to 40Gbps data transfer connections. These ports can also serve as an additional display output for external monitors. Plus, with a USB 3.2 Gen 1 Type-A with PowerShare up to 10Gbps connection speeds you'll have all the quality connection options you could ever need.

Killer Wi-Fi: Intel's Killer Wi-Fi 6 technology delivers multiple high-speed channel wireless for improved performance and reliability.

Go Native: Every x15 looks great anywhere you game, as each comes with HDMI 2.1 for native 4K/120Hz output onto other displays.

Experience less lag: The Alienware x15 uses a Type-C to RJ-45 dongle enabling gamers to have a wired networking experience while keeping the system thin and light. Plus, up to 2.5 Gbps connection speeds maintain a reliable and strong connection.

*AlienFX touchpad requires NVIDIA® GeForce RTX™ 3080 graphics card



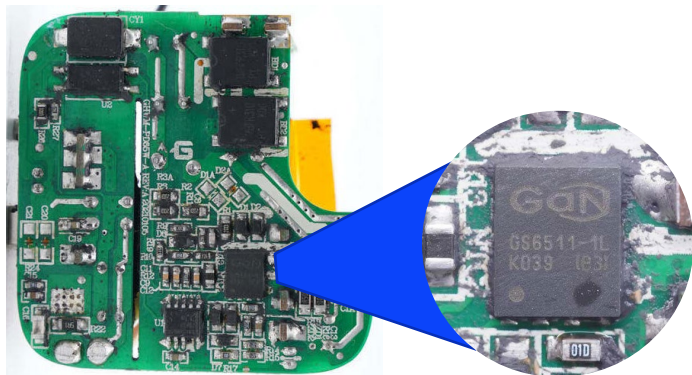
Another Alienware first: We're bringing you the performance you expect from our systems in adapter form with Alienware's first small form factor power adapter. **46% smaller** and **25% lighter** than a traditional adapter, our Alienware-branded 240W adapter is **1.9% more efficient** than the previous 240W adapter.

Harman GaN chargers **smaller and lighter**



October 5, 2021

HARMAN's InfinityLab 65W Wall Charger is GaN-Powered



Sustainably Built Intentional Design Advanced Technology



GaN technology

For portable chargers that are significantly smaller and lighter than average.

Say goodbye to the big old brick. InfinityLab's compact chargers are made using Gallium nitride (GaN) instead of silicon, making them exceedingly slim, much smaller than other chargers.



iPhone® 12



Samsung S21



Apple® MacBook Pro® 16"

Charge your device in the blink of an eye

Power Delivery 3.0 ensures fast charging for your devices. We're talking recharged up to 50% in 30 minutes for an iPhone® 12🔋, 40 minutes for a Samsung Galaxy S21🔋, or 45 minutes for a MacBook Pro® 16"🔋. Yes, that fast.

SYNG

TIME Magazine Best of 2021



- The Cell Alpha is industrial design driven. Therefore, the power supply had to be **designed to operate without heatsinks or active cooling**.
- While the continuous power level is low at most normal listening levels, the peak transient power can be very high, and handling these transient peaks correctly is a critical factor for sound quality. The Cell Alpha – and its GaN power supply – can **deliver peak transients of nearly 750 W**.



November 4, 2021

GaN Systems and Orchard Audio Deliver "Near Perfect" Fidelity

Marc Mamiye - HighStrungAudio (December 2021)

I was so impressed with the performance that I purchased this review unit for myself" and "...instruments and vocals are so pristine that the music is as close to a live performance as I have ever heard"

David Snyder - Dagogo (October 2021)

"...the background does not get any blacker than this." and "There was no hint of overload or distortion, and the echo trails and hall reverberation went on and on, extending further into the soundstage than I thought possible..." and "What amazes me is how the Starkrimson Streamer Ultra can deliver such excellent results with minimum fuss."

David Eccles - Small Room Audio (August 2021)

"In its own truth, it has beauty, particularly when we talk about the top end" and "A one-box solution that is very straightforward, and really sounds great" and "You've got to take your hat off to Orchard Audio, what they've done here is really rather good"



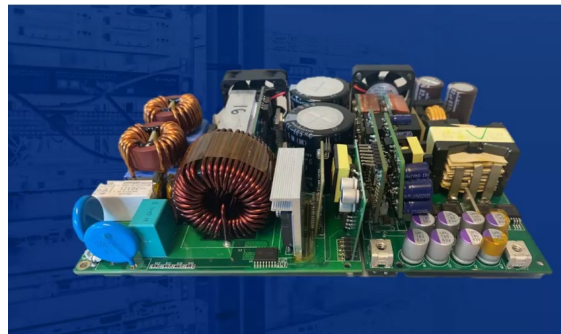
January 6, 2022

500W Heatsinkless Audio Amplifier from Axign and GaN Systems Demonstrates a New World of Extraordinary Audio Performance

- Ideal for consumer and automotive audio applications, including active loudspeakers, television soundbars, audio entertainment solutions, and streaming audio amplifier solutions.
- Key features:
 - Rated Output Power: 2x 250W in 4 Ohm BTL (optionally 1x 500W in 2 Ohm PBTL)
 - Freq. Resp.: 20Hz~20kHz +/- 0.1dB, DC~40kHz +/-3dB
 - High Dynamic Range: 109dB-A in BTL
 - Output Noise Voltage: 110uV A-weighted, 20kHz AES17
 - Very low and flat THD: <0.01%, 20Hz – 20kHz
- Benefits:
 - Eliminate heatsinks.
 - Increase efficiency as GaN has lower switching and conduction losses and high-current capabilities.
 - Enhance sound quality (or reach a Class-A sound quality) with a post-filter feedback Class-D controller with full control over the loudspeaker.

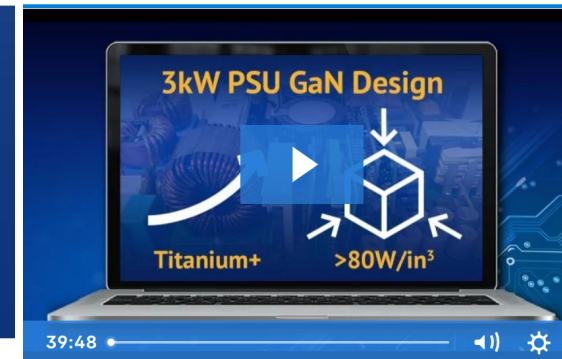
Trends driving GaN

- 100W/in³ power density
- Titanium-Plus efficiency



September 23, 2021

3kW AC/DC PSU from GaN Systems Shatters Size and Cost Barriers for Power Supply Applications



August 31, 2021

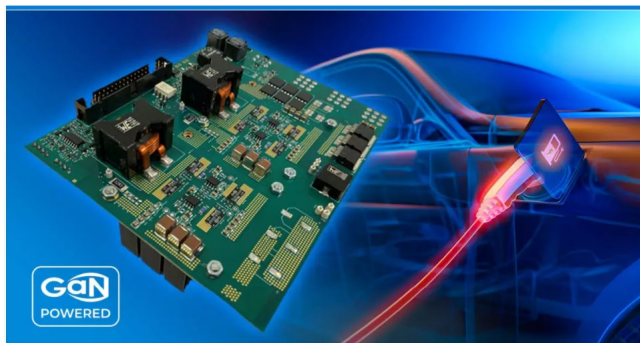
Webinar: Benefits and Advantages of a GaN-based 3kW AC/DC PSU

Benefits of GaN Per 10 Racks in a Data Center

\$3M profit increase per year

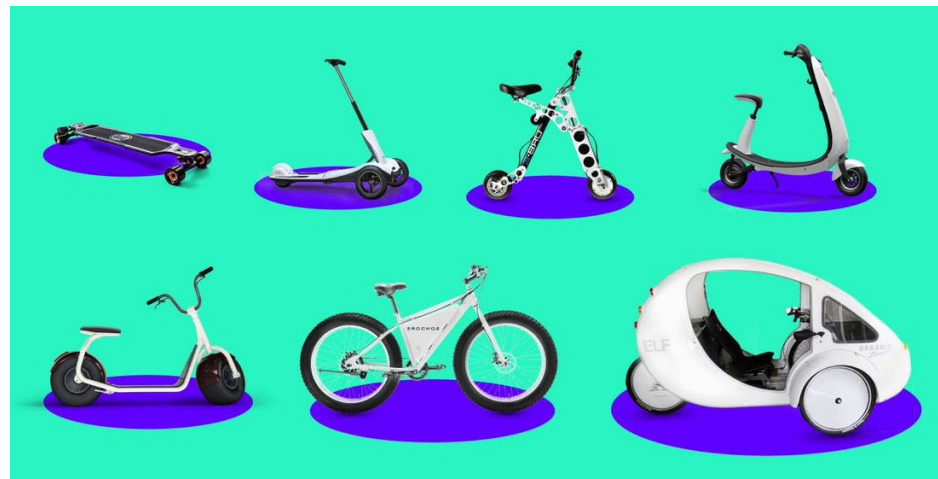
100 metric tons reduction per year

\$13k OPEX reduction per year



September 30, 2021

GaN Systems and EPowerlabs Make Leaps in E-Mobility Power Solution



Global **MICROMOBILITY** Market

OPPORTUNITIES AND FORECAST, 2021-2030

Global Micromobility Market is
expected to reach **\$195.42**
Billion by 2030

Growing at a
CAGR of 17.4% (2021-2030)





October 28, 2021

Signify Revolutionizes Lighting with Built-In Driver for Higher Power LED Bulbs with GaN Systems

- 17W and 26W LED bulbs
 - **Built-in GaN-based driver**
 - **Eliminates external power supply resulting in**
 - **Lower cost, higher power, and more energy-efficient LED lighting solution.**
- **Compact Design:** The built-in PSU measures 20mm in diameter and a height of 15mm. Without an external power supply, installation and replacement is simple.
- **Space and Cost Savings:** GaN enables significant size and weight reductions and allows the use of smaller or less external components, contributing to cost savings.
- **Longer Product Life:** The LED bulbs with the built-in PSU offer a higher level of protection against dust and water, extending product life.
- **Applications:** road and residential lighting, decorative floodlighting, indoor and outdoor recreational sports facilities, and other commercial and industrial applications.



November 18, 2021

Power Semiconductor
Innovator GaN Systems
Announces \$150 Million in
Growth Capital Funding

- **GaN Systems** is the **leader** in Gallium Nitride (GaN) power semiconductors for automotive, consumer, enterprise, and industrial markets
- Funding round led by **Fidelity Investments** and joined by new strategic investors **Vitesco Technologies** and **USI**
- Existing investors, including **BMW**, participated in the round
- Funding will enhance technology **differentiation** and fuel the rapid market **penetration** of GaN



November 18, 2021

Vitesco Technologies Enters into Strategic Partnership with GaN Systems Alongside a Minority Investment

“By combining our automotive know-how with our partner’s GaN expertise, we will be able to reap the benefits of this wide bandgap technology in the car. We are excited about our strategic partnership with GaN Systems to **accelerate GaN adoption across our electrification solutions.**”

Thomas Stierle, Member of the Executive Board and head of Electrification Technology business unit

“GaN transistors help to minimize heat losses, particularly the switching losses at the high switching frequencies we require. GaN components simply outperform silicon chips in every respect. Together with GaN Systems we will be able to develop a platform for even more efficient automotive-grade **solutions for 400 V to 800 V DC/DC conversion, for onboard chargers and in the future also for inverters.**”

Dr. Gerd Rösel, head of Innovation, Electrification Technology business unit of Vitesco Technologies.

GaN Systems is Semiconductor sector leader

500TM

Technology **Fast 500**
2021 NORTH AMERICA



November 17, 2021

**GaN Systems Listed on 2021
Deloitte Technology Fast
500TM, the Fastest-Growing
Companies in North America**

The Technology Fast 500 by industry sector:

Sector	Sector Leader
Software & SaaS	GetUpside
Biotechnology/pharmaceutical	Coherus BioSciences, Inc.
Electronic devices/hardware	Pela
Digital content/media/entertainment	SolarLeadFactory
Communications/networking	Discord
Energy tech	Enercross
Medical devices	Axonics, Inc.
Semiconductor	GaN Systems



2022 Predictions eBook and video

- **CONSUMER ELECTRONICS:** Fast-Charging, Multi-Device Chargers and New Levels of Audio Quality Hit the Mainstream Marketplace
- **DATA CENTERS:** The Global Data Explosion Places Increased Pressure on Energy Sources and the Environment
- **ELECTRIC VEHICLES:** We Are At The Beginning Of A Game-Changing Revolution In The Way We Power Our Vehicles
- **SUSTAINABILITY:** The Aggregate Impact of GaN Is Significant in Creating a More Sustainable World
- **SUPPLY CHAIN:** Building a More Resilient and Sustainable Global Economy



1 → PRODUCT UPDATES

2 → TOOLS

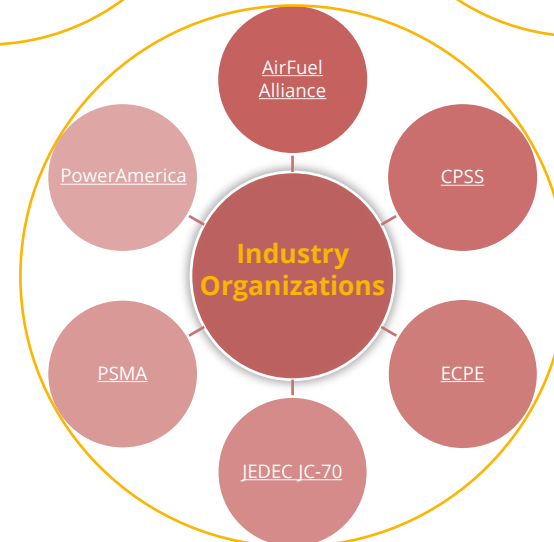
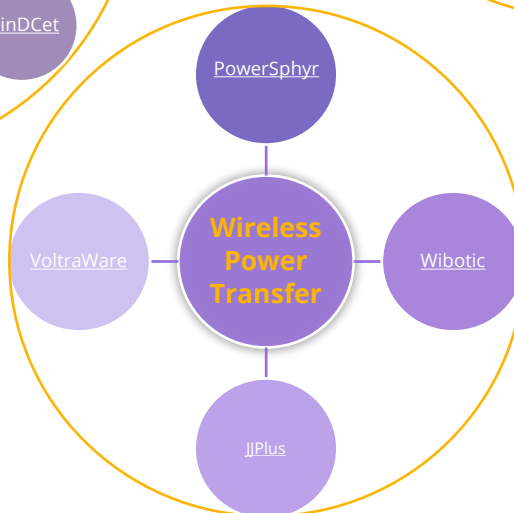
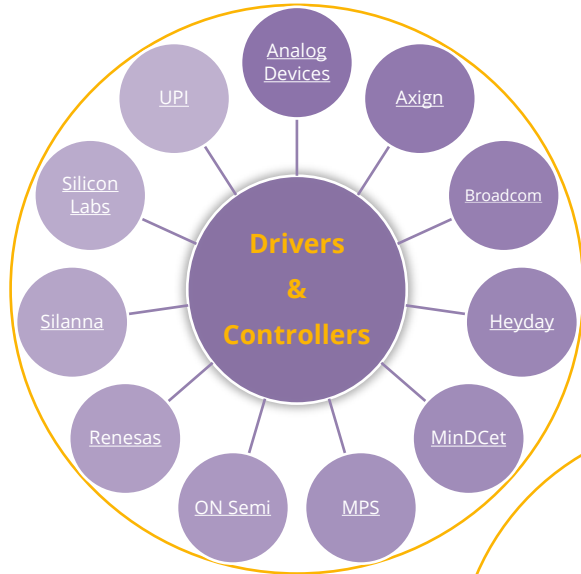
3 → COMPETITION

4 → TECHNICAL APPLICATIONS

5 → MARKET & COMMUNICATION

6 → CUSTOMER OPERATIONS  Partnerships - Date Codes

7 → CALL TO ACTION



Large partner network!

YWLL

1. First 2-digit YW (WY) date code rule → Year is the first digit for first half year, while work week is the second; and switch over in the second half year.
2. Second 2-digit (LL) work order code → Align with Assembly Lot Code (Assembly work order)

Year 2020				Year 2021				Year 2022			
Week# (1H)	Date Code 2-Digit	Week# (2H)	Date Code 2-Digit	Week# (1H)	Date Code 2-Digit	Week# (2H)	Date Code 2-Digit	Week# (1H)	Date Code 2-Digit	Week# (2H)	Date Code 2-Digit
1	0A	27	A0	1	1A	27	A1	1	2A	27	A2
2	0B	28	B0	2	1B	28	B1	2	2B	28	B2
3	0C	29	C0	3	1C	29	C1	3	2C	29	C2
4	0D	30	D0	4	1D	30	D1	4	2D	30	D2
5	0E	31	E0	5	1E	31	E1	5	2E	31	E2
6	0F	32	F0	6	1F	32	F1	6	2F	32	F2
7	0G	33	G0	7	1G	33	G1	7	2G	33	G2
8	0H	34	H0	8	1H	34	H1	8	2H	34	H2
9	0I	35	I0	9	1I	35	I1	9	2I	35	I2
10	0J	36	J0	10	1J	36	J1	10	2J	36	J2
11	0K	37	K0	11	1K	37	K1	11	2K	37	K2
12	0L	38	L0	12	1L	38	L1	12	2L	38	L2
13	0M	39	M0	13	1M	39	M1	13	2M	39	M2
14	0N	40	N0	14	1N	40	N1	14	2N	40	N2
15	0O	41	O0	15	1O	41	O1	15	2O	41	O2
16	0P	42	P0	16	1P	42	P1	16	2P	42	P2
17	0Q	43	Q0	17	1Q	43	Q1	17	2Q	43	Q2
18	0R	44	R0	18	1R	44	R1	18	2R	44	R2
19	0S	45	S0	19	1S	45	S1	19	2S	45	S2
20	0T	46	T0	20	1T	46	T1	20	2T	46	T2
21	0U	47	U0	21	1U	47	U1	21	2U	47	U2
22	0V	48	V0	22	1V	48	V1	22	2V	48	V2
23	0W	49	W0	23	1W	49	W1	23	2W	49	W2
24	0X	50	X0	24	1X	50	X1	24	2X	50	X2
25	0Y	51	Y0	25	1Y	51	Y1	25	2Y	51	Y2
26	0Z	52	Z0	26	1Z	52	Z1	26	2Z	52	Z2

E1DC
Week 31
Year 2021



- 1 → PRODUCT UPDATES
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- **Products**

- Promote audio bundle 2 and Re-engage audio customers where applicable
- Identify new 250W charger Customers
- Track the customers that got “ship-to-order” products / documents

- **Marketing**

- Keep following up on audio amplifier market
- Promote our new corporate video
 - English: <https://gansystems.com/newsroom/video-revolutionizing-power-industries/>
 - Mandarin: <https://gansystems.com/newsroom/gan-powered-revolutionizing-todays-most-power-demanding-industries-mandarin/>
- Involve customers in upcoming events
- Invite customers to subscribe to our mailing list

- **Customer operations**

- Drive your channel to book orders for 2022
- Review Topics selected for training in 2022 and provide your suggestions



Product and application support at
gansystems.com