



Reference Class D Audio Mono Amplifier

GaN FET Technology | Regulated SMPS | Active PFC

Features

- Unprecedented acoustic immersion
- Full GaN FET design
- Output power:
 - 200 W into 8 Ω load
 - 400 W into 4 Ω load
 - 800 W into 2 Ω load
- Very low THD+N: < 0.00005 % @ 1kHz, 200 W
- Very low output noise: < 20 μ V
- SNR: > 140 dB
- Damping factor: 20 000
- Peak efficiency: 98 %
- Power factor correction achieves $\cos \Phi$ of 1
- Universal input voltage range: 85 - 270 VAC

Description

IXYCORE is a single channel, advanced class D audio amplifier designed with GaN FET semiconductors. It includes a high efficiency switching mode power supply (SMPS) featuring power factor correction (PFC). Although IXYCORE was primarily designed to provide the listener with unprecedented acoustic immersion, it demonstrates exceptional performances such as vanishing distortion and very low output noise considering its high gain of 30.3 dB.

Power supply

The power supply is based on a current mode, *Forward* topology. The PFC stage provides a typical $\cos \Phi$ of 1 producing very little line distortion and ripple current. Furthermore, it allows IXYCORE to be operational over a wide AC input voltage range (85 - 270 VAC) with no impact on performances and without any setting required. The use of GaN FETs semiconductors combined with synchronous rectification and active snubbers made it possible to achieve very high peak efficiency (99 %).

Input connection

IXYCORE provides balanced input at the standard level of +4 dBu / +10 dBu, depending on the gain selector position located at the rear of the device. This type of connection is advantageous if the device needs to be located far from the audio source and close to the loudspeaker, allowing the use of a shorter output cable. An RCA input with a gain of -10 dBV / -4 dBV is also available.

Gain and input selection

Gain and input are selectable via two switches located at the rear of the amplifier.

Audio input coupling

Audio input can be AC coupled or DC coupled using the AC/DC switch located at the rear of the amplifier. When DC coupling is selected, it is strongly recommended to use an audio source with an offset voltage of less than 50 μ V.

12V trigger input

The amplifier can be switched on remotely via the “trigger” input located on the rear panel of the device.

Housing

The circuit boards are housed in a compact, compartmentalized aluminum enclosure compliant with EMC standards.

Clipping and power on indicator

A bi-color LED indicator, integrated on the power on button, indicates the amplifier's power status and clipping. For clipping, it lights up for at least 750 ms whenever the output voltage reaches the lower or upper limit.

Overload protection

IXYCORE is protected against overload and short-circuits conditions occurring at the output terminals. A current sense circuit monitors the output current and disables the power stage for a predefined period of time whenever the value of 28.5 A is reached.

Advanced Load Protection

Particular attention has been paid to the protection circuitry, implementing a strategy designed to guarantee load integrity upon detection of any anomaly. Rather than utilizing a traditional relay to isolate the load, a 300A static switch is connected across the output terminals, shunting the full current when triggered. This approach provides two decisive advantages:

1. **Response Time:** Triggering occurs in just 3 μs , compared to the tens of milliseconds required by mechanical relays.
2. **Preserved Damping Factor:** Since no resistive components are placed in series with the load, the damping factor remains completely unaffected. For instance, a relay with a 5 $\text{m}\Omega$ contact resistance would collapse the damping factor (measured at 20 000 at the board's output) to just: $8/5 \times 10^{-3} = 1600$!

The static switch is engaged immediately if any of the following conditions occur:

- **DC Offset:** DC voltage at the load terminals exceeds 1.5 V.
- **Overcurrent:** Output current in the power stage exceeds 28.5 A.
- **Rail Monitoring:** Detection of abnormal power supply voltage levels.
- **Thermal Management:** Power transistors exceed their safe operating temperature.

** This is a preliminary datasheet and some parameters are subject to change. Missing values and curves will be added in future revision of this datasheet.*

Electrical Characteristics

AMPLIFIER SECTION

| PARAMETERS | CONDITIONS | TYPICAL VALUE | UNITS |
|-----------------------|---|-------------------|-------------|
| Audio Input level | XLR | +4 / +10 | dBu |
| | RCA | -10 / -4 | dBV |
| Gain | XLR | 30.3 / 24.3 | dB |
| | RCA | 42 / 36 | dB |
| Input impedance | | 20 | k Ω |
| Output power | R load = 8 Ω | 200 | W |
| | R load = 4 Ω | 400 | |
| | R load = 2 Ω | 800 | |
| THD+N | R load = 8 Ω , f = 1 kHz, Po = 200W | < 0.00005 | % |
| Output noise | Inputs shorted to ground | < 20 | μ V |
| SNR | | > 140 | dB |
| Output impedance | | 63 | $\mu\Omega$ |
| Damping factor | Measured at board output terminals. R load = 8 Ω , f = 20 Hz | 20 000 | - |
| Bandwidth | | DC / 0.3 – 85 000 | Hz |
| DC Offset voltage | Inputs shorted to ground | \pm 150 | μ V |
| Switching frequency | | 1.2 | MHz |
| Peak efficiency | | 98 | % |
| Overcurrent detection | | 28.5 | A |

POWER SUPPLY SECTION

| PARAMETERS | CONDITIONS | TYPICAL VALUE | UNITS |
|----------------------|------------|---------------|-------|
| Input voltage range | | 85 - 270 | VAC |
| cos Φ | | 1 | - |
| Quiescent power | | 3 | W |
| Maximum output power | | 1300 | W |

MECHANICAL DATA

| | | | |
|---------------|----------------|--|----|
| Case material | aluminum | | |
| Dimensions | 300 x 240 x 65 | | mm |
| Weight | 4.5 | | kg |

CONNECTIVITY

| | |
|-------------------|-------------------------|
| Audio input | 3 pin female XLR header |
| | RCA female header |
| Speaker output | Binding post terminals |
| AC line input | IEC Appliance |
| 12V trigger input | Jack 3.5 mm |

Step Response (POWER STAGE)

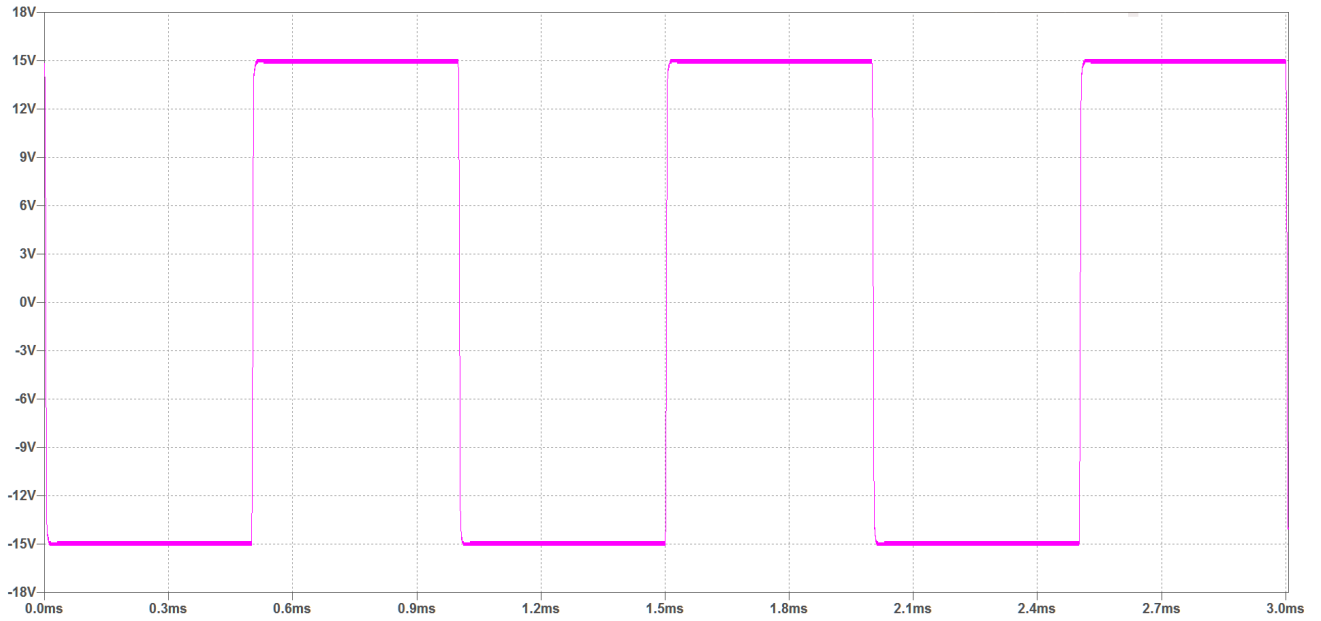


Figure 1. 30 V step response. $f = 1 \text{ kHz}$, $R_{load} = 8 \Omega$

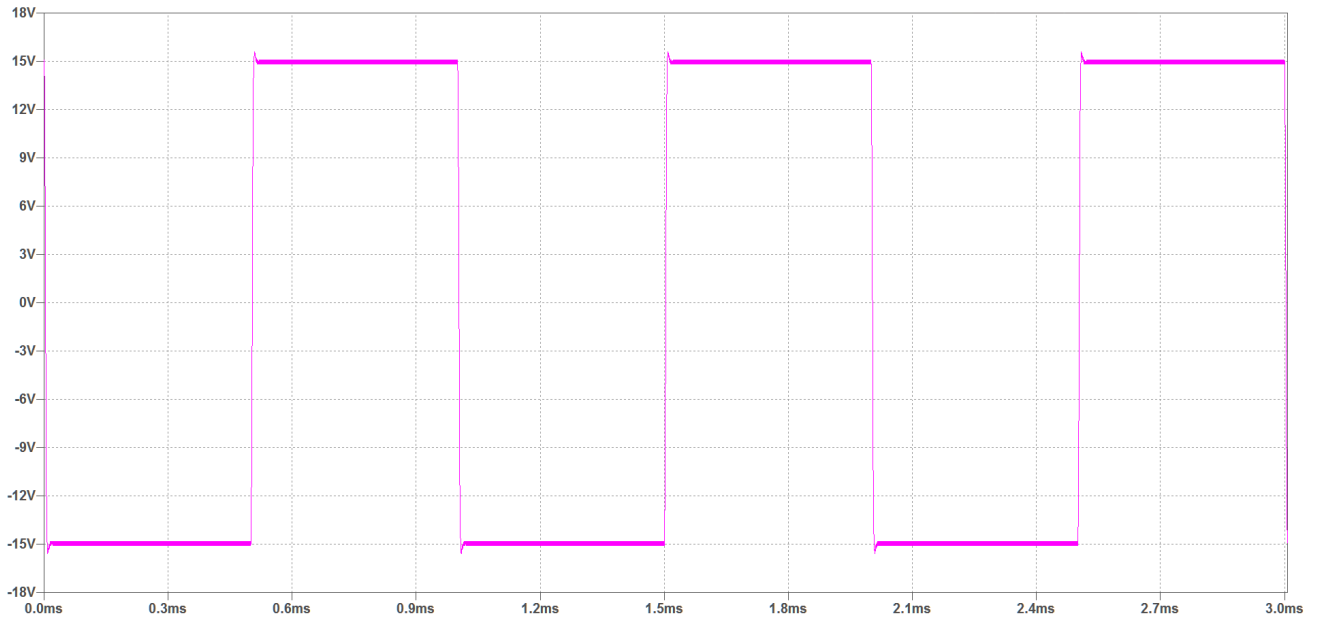


Figure 2. 30 V step response. $f = 1 \text{ kHz}$, $R_{load} = 3 \Omega$

Clipping Behavior (POWER STAGE)

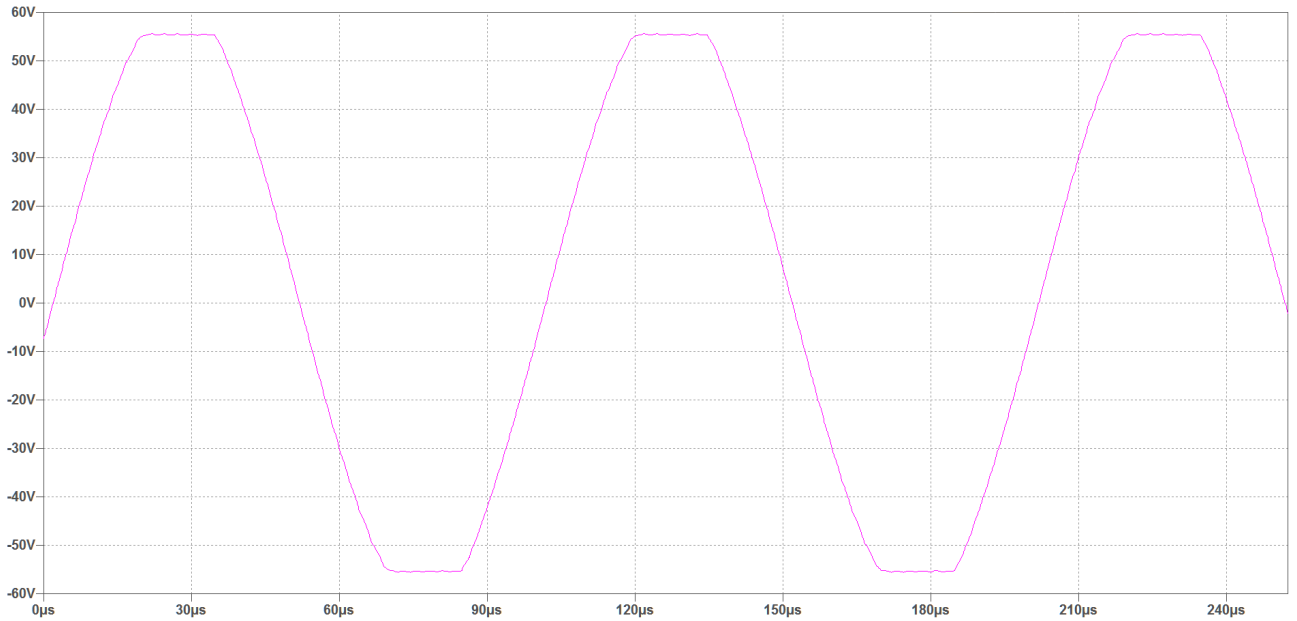


Figure 3. Clipping behavior. $f = 10 \text{ kHz}$, $R_{\text{load}} = 8 \Omega$

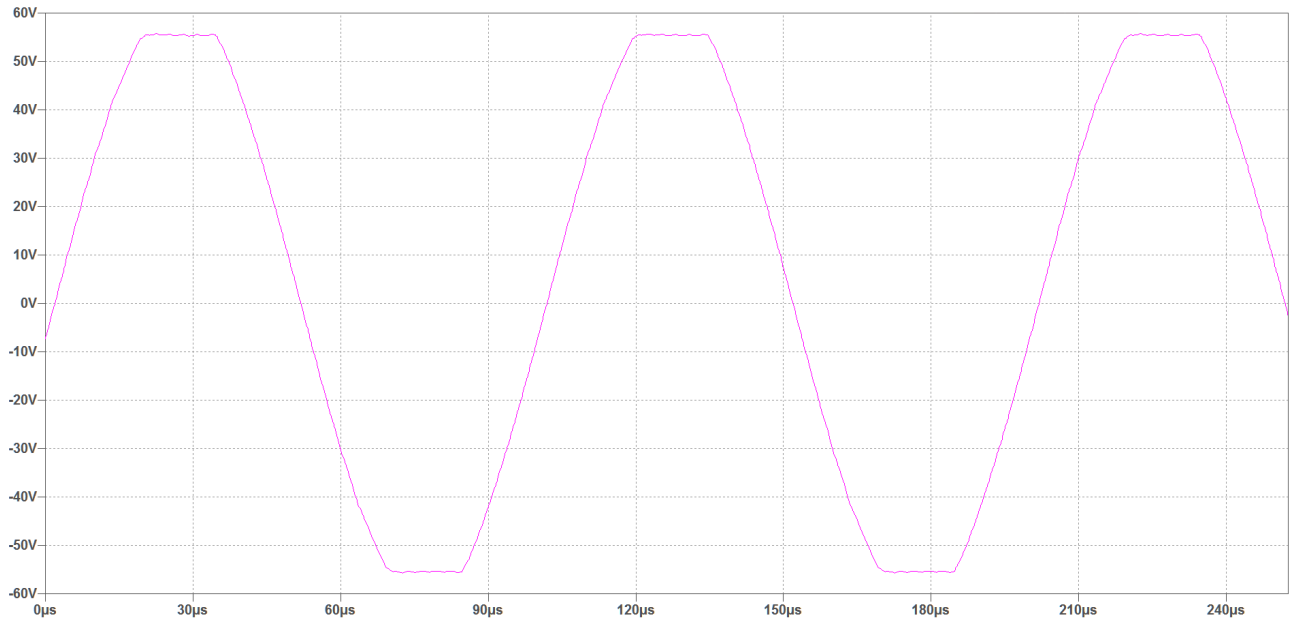


Figure 4. Clipping behavior. $f = 10 \text{ kHz}$, $R_{\text{load}} = 3 \Omega$

Relation between line voltage and current (POWER SUPPLY)

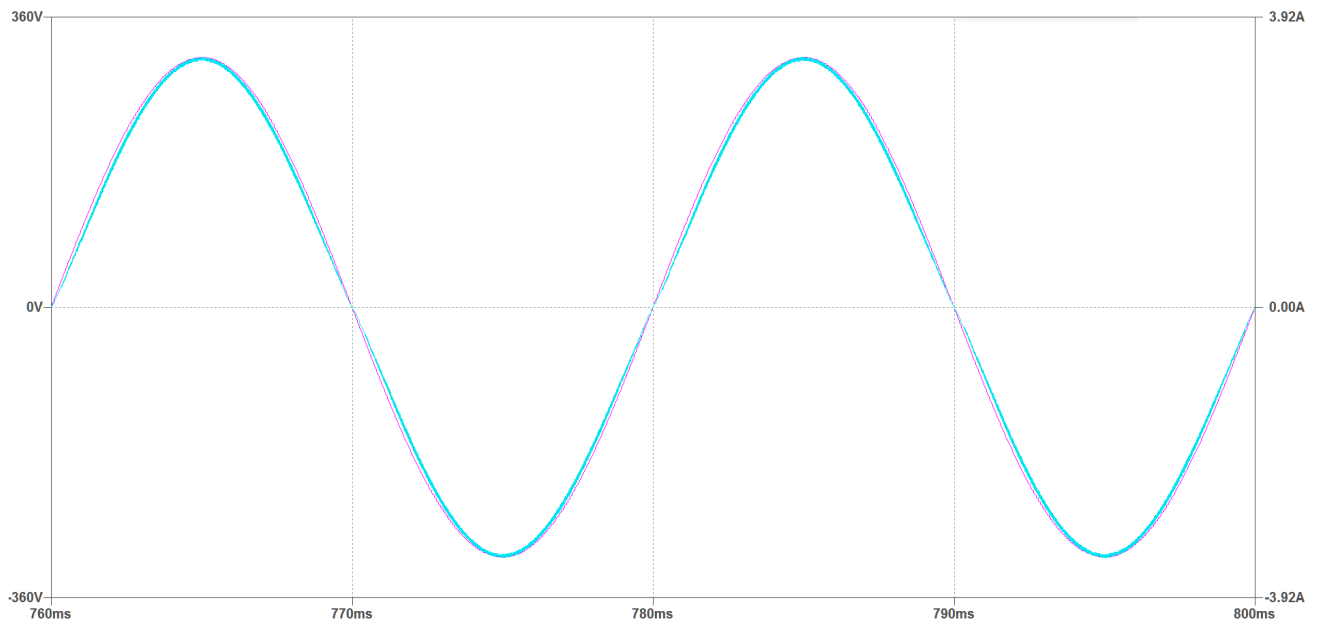


Figure 5. Relation between line voltage and current (220 V, 500 W)

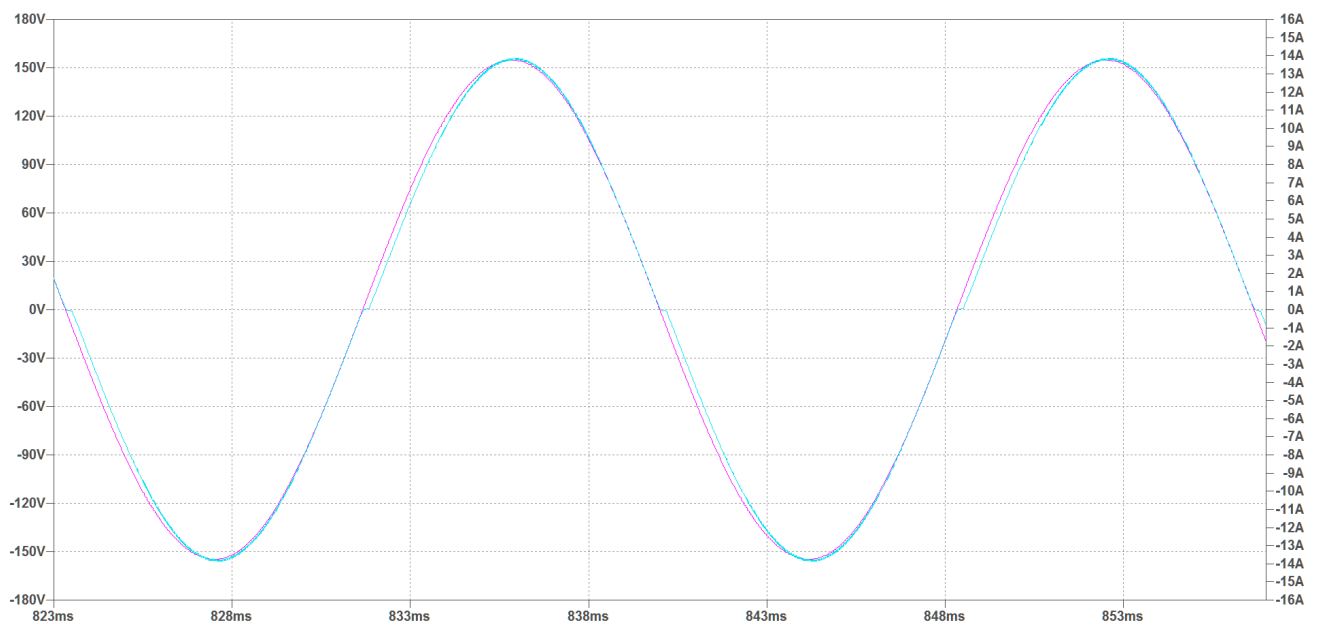


Figure 6. Relation between line voltage and current (110 V, 1 kW)