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Audio Power Chipset for Class D Digital Amplifiers

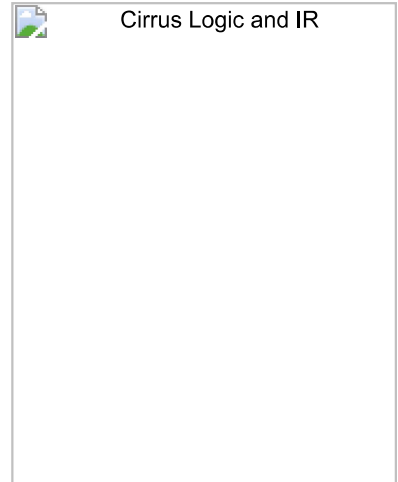
THE IR ADVANTAGE

When combined with Class D amplifier controller and compared to Class AB amplifier:

- Increases efficiency from 50% to 90%
- Reduces size by a factor of four
- Reduces THD for high quality sound

FEATURES AT A GLANCE

- HEXFET[®] power MOSFETs with high speed gate driver ICs
- Up to 1MHz operating frequency with 10ns deadtime control
- Low $R_{DS(on)}$, Q_{GD} and C_{OSS} for low power losses
- Fast and soft recovery body diode to minimize THD
- Gate driver IC for fast switching and low power losses



International Rectifier's power semiconductor chipsets for Class D amplifiers include HEXFET[®] power MOSFETs and high speed gate driver ICs. The ICs and MOSFETs in the selector guides below have been specifically matched for use with Class D power amplifier controller IC.

Today, most audio applications use Class AB linear amplifiers. The emerging trend is to move to digital amplifiers, which offer a number of benefits over the traditional linear solution. With a higher efficiency, digital amplifiers are smaller, lighter, streamlined, cool and quiet with extended battery life compared to the power hungry analog devices.

International Rectifier has leveraged its applications expertise in switching mode power supplies along with its advanced MOSFET technology to offer high performance MOSFETs for Class D amplifiers. In the Class D amplifier topologies, which evolved from switch mode power supplies, dead time control is critical to reduce total harmonic distortion (THD) and provide high audio quality.

The HEXFET MOSFETs selected for Class D amplifiers offer switching speeds up to 1MHz, without any compromise in efficiency, thanks to their low gate-to-drain charge (Q_{GD}), output capacitance (C_{OSS}) and on resistance ($R_{DS(on)}$). These MOSFETs minimize conduction and switching losses to improve the efficiency of Class D amplifiers. The industry norm efficiency for Class AB amplifier with bipolar transistors averages 50%. IR audio power chipset combined with Class D amplifier controller deliver a breakthrough efficiency of over 90%.

The low output capacitance and soft and fast recovery diode of the HEXFET MOSFETs enhance Class D amplifier to significantly reduce distortions in sound output. The gate driver IC combines, in a single chip, most of the functions to drive the MOSFETs and provides very fast switching speeds and low power dissipation.

Enhanced efficiency allows manufacturers to dramatically shrink the size of a typical audio amplifier by a factor of four. Better efficiency also translates in weight and system cost reduction. The size reduction increases product design creativity, allowing the amplifier to be built into a speaker or other unit, such as set-top boxes and DVD players. Increased efficiency also enables battery-powered amplifiers that can run up to three times as long compared to conventional amplifiers.

SPECIFICATIONS

HALF BRIDGE TOPOLOGY, 4Ω LOAD			
Output RMS Power	Part Number	Max. Recommended Rail Voltage	Recommended Gate Driver
25W	IRF7469	+/- 17V	-
30W	IRF7341	+/- 18V	-

	IRF7343		
35W	IRF7341	+/- 20V	IR2010S
50W	IRFR024N IRFR4105	+/- 24V	IR2010S
100W	IRFR3911	+/- 33V	IR2010S
150W	IRF530NS	+/- 41V	IR2010S
200W	IRFR18N15D	+/- 47V	IR2010S
250W	IRFR18N15D IRFS23N15D	+/- 53V	IR2010S
400W	IRFS23N20D	+/- 67V	IR2010S
500W	IRFS31N20D	+/- 74V	IR2010S
1000W	IRFP264N	+/- 105V	IR2010S
HALF BRIDGE TOPOLOGY, 8Ω LOAD			
Output RMS Power	Part Number	Max. Recommended Rail Voltage	Recommended Gate Driver
25W	IRF7343	+/- 24V	-
30W	IRF7478	+/- 26V	IR2010S
35W	IRF7473	+/- 28V	IR2010S
50W	IRFR3911 IRF7473_(100V)	+/- 33V	IR2010S
100W	IRFR13N15D	+/- 47V	IR2010S
150W	IRFR18N15D	+/- 58V	IR2010S
200W	IRFR13N20D IRFS17N20D	+/- 67V	IR2010S
250W	IRFS17N20D IRFS23N20D	+/- 74V	IR2010S IR2113S
400W	IRFP254N	+/- 94V	IR2113S
500W	IRFP254N	+/- 105V	IR2113S
FULL BRIDGE TOPOLOGY, 4Ω LOAD			
Output RMS Power	Part Number	Max. Recommended Rail Voltage	Recommended Gate Driver
25W	IRF7317	17V	-
30W	IRF7389	18V	-
35W	IRF7389	20V	-
50W	IRF7389	24V	IR2010S
100W	IRF7471	33V	IR2010S
150W	IRFR4105	41V	IR2010S
200W	IRFR4105 IRFR1205	47V	IR2010S
250W	IRFR3411	53V	IR2010S
400W	IRF1310NS	67V	IR2010S
500W	IRF540NS	74V	IR2010S
1000W	IRF3515S IRF3415S	105V	IR2010S
2000W	IRFP260N	149V	IR2113S
FULL BRIDGE TOPOLOGY, 8Ω LOAD			

Output RMS Power	Part Number	Max. Recommended Rail Voltage	Recommended Gate Driver
25W	IRF7319	24V	-
30W	IRF7389	26V	IR2010S
35W	IRF7389	28V	IR2010S
50W	IRF7341 IRFR4105	33V	IR2010S
100W	IRFR024N	47V	IR2010S
150W	IRFR2407	58V	IR2010S
200W	IRFR3911	67V	IR2010S
250W	IRF530NS	74V	IR2010S
400W	IRFR18N15D IRFS23N15D	94V	IR2010S
500W	IRFS23N15D IRF3315S	105V	IR2010S
1000W	IRFS31N20D	149	IR2113S
2000W	IRFP264N	210V	IR2113S

Note: Switching frequency up to 400kHz, max. modulation index M=85%

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