



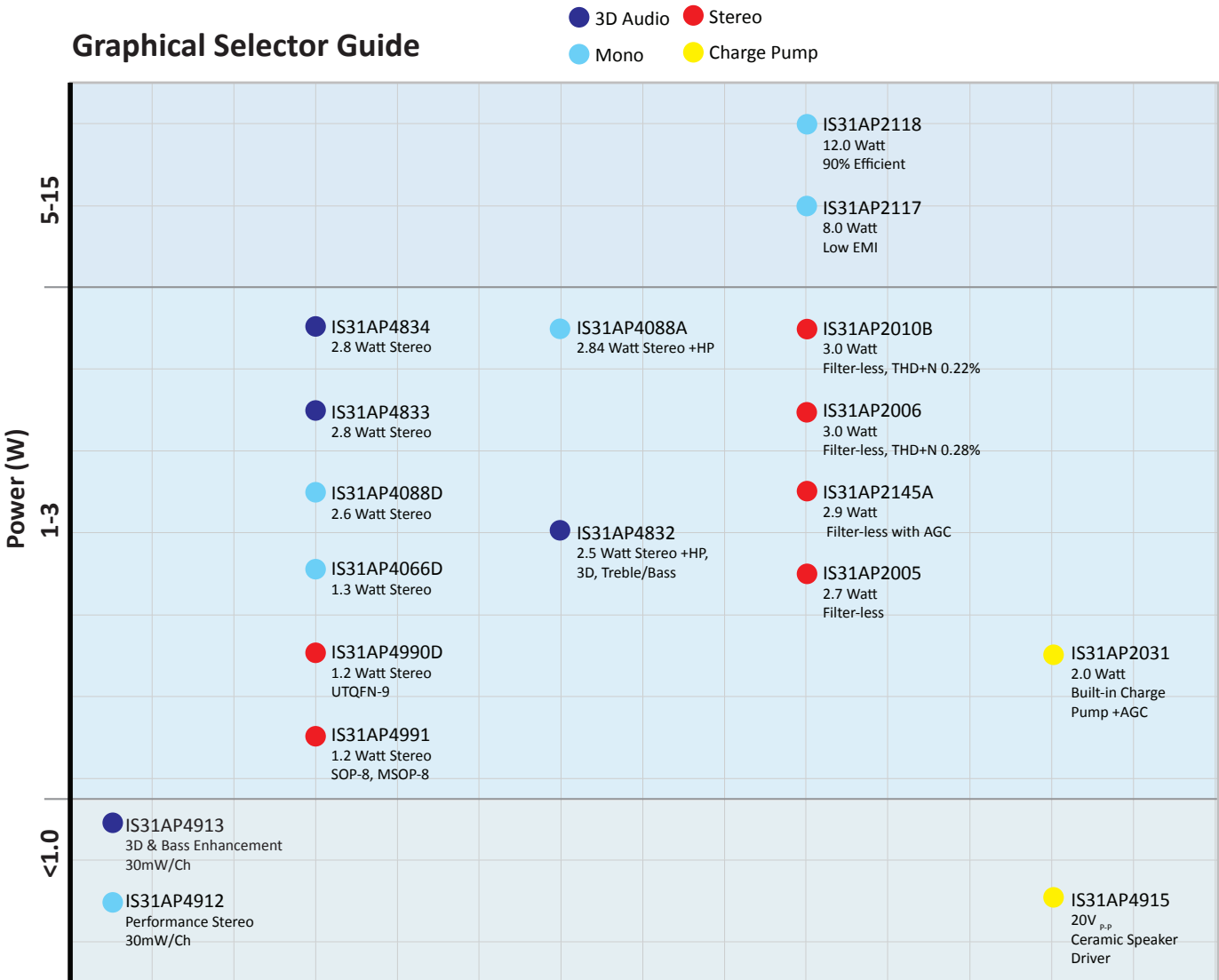
INTEGRATED SILICON SOLUTION, INC.
Analog & Mixed Signal Products

Audio Product Guide

April 2014



Audio Amplifier Selection



Class AB Amplifiers

Efficiently drives the maximum output power without dissipating excessive heat and can be biased to have very low distortion. Most common type of amplifier.

Class G Amplifiers

Designed to operate at low supply voltages for the majority of audio-signal levels, but are able to increase dynamic range temporarily when high signal levels are received.

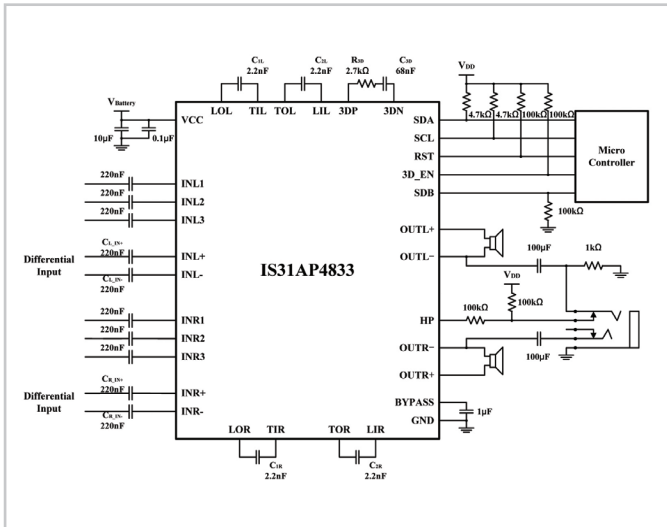
Class D Amplifiers

A switching or PWM amplifier, the switches are either fully on or fully off, significantly reducing the power losses in the output devices. Efficiencies of 90-95% are possible.

Class AB Audio Amplifiers

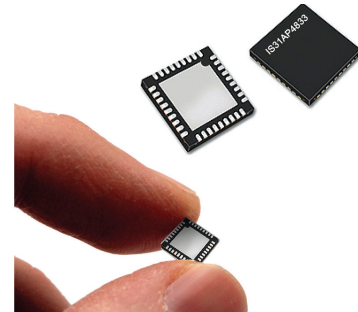
● IS31AP4833

All-in-one stereo amp with built-in headphone drivers

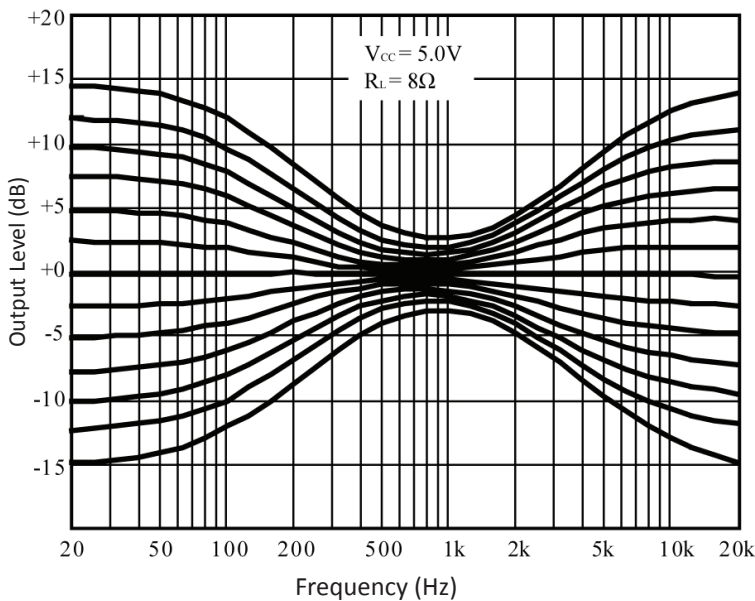


Features

- Independent volume control for two channels
- Treble, bass and mute control
- Stereo input MUX
- I2C control for tone, volume, 3D and mux input selection
- Software controlled shutdown
- Auto detect headphone plug-in with click-and-pop suppression
- 3D surround sound and tone control



36 Pin QFN Package 4x4 mm



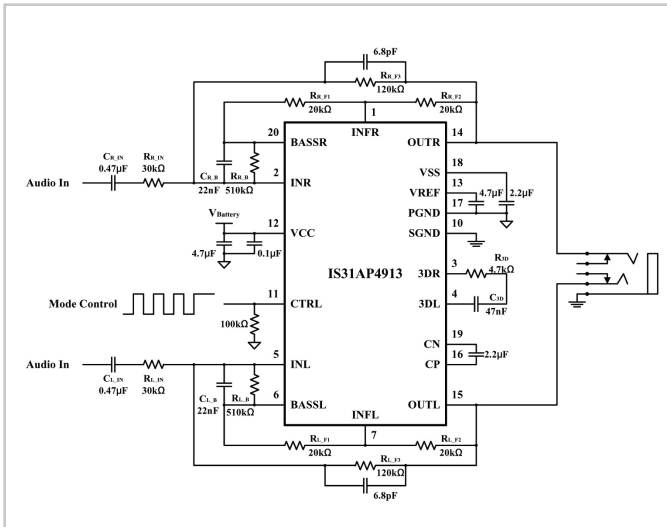
Bass and Treble Response vs. Frequency



Headphone Audio Amplifiers

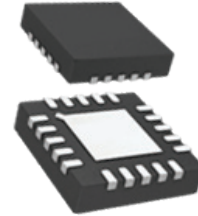
● IS31AP4913

High quality stereo headphone driver with 3D & Bass Enhancement

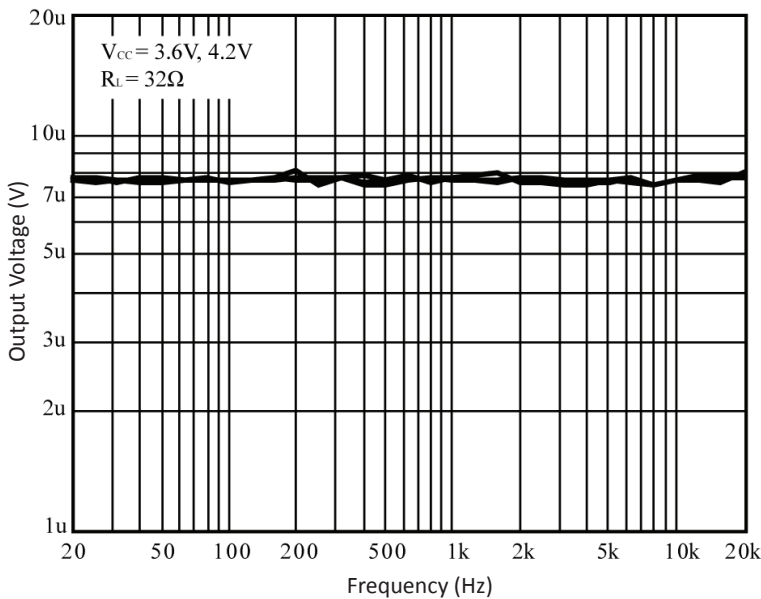


Features

- No output DC-blocking capacitors
- 3D Surround and Bass enhancement digitally enabled
- Pulse Count Control serial interface
- Ultra-low 8µV output noise
- High SNR (102db)
- Click-and-pop suppression
- Built-in Charge pump converter for low power



20 Pin QFN Package 3x3mm



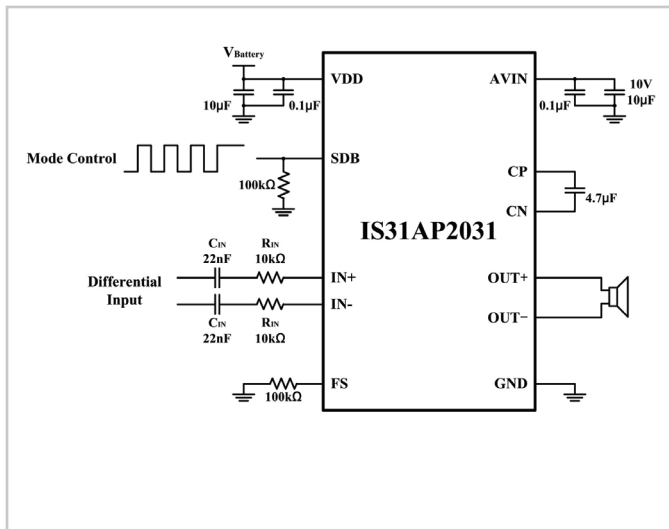
Low Output Noise



Class G Audio Amplifiers

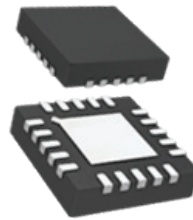
● IS31AP2031

High Power, Ultra-low EMI Class-G Amplifier with AGC

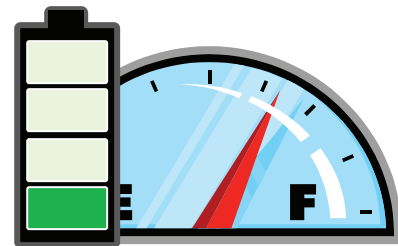


Features

- 2.0W into an 8Ω load from a 4.2V supply (10% THD+N)
- Fully differential amplifier for noise cancellation
- Highly efficient Class G with integrated charge pump
- Cost, space and power efficient than boost converter alternatives
- The operating mode and AGC function are controlled by Pulse Count Control (PCC wire) serial interface
- 4 gain levels: 12dB, 16dB, 24dB, 27.5dB

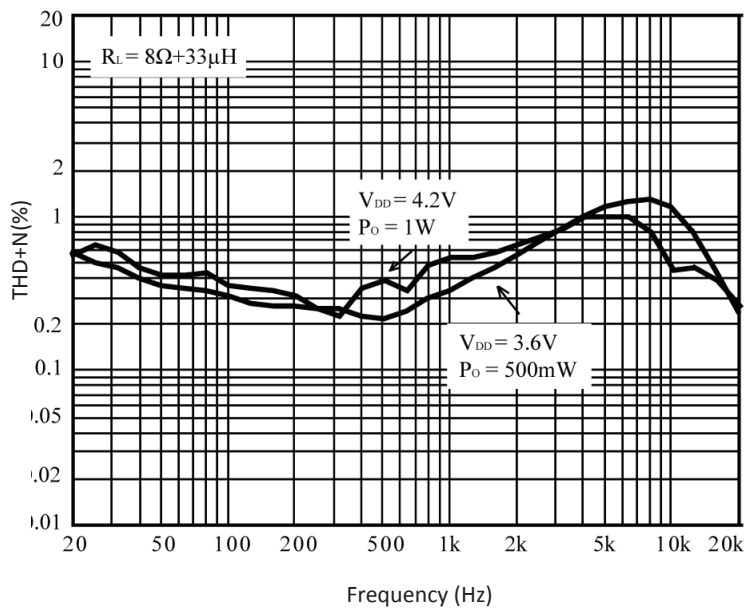


20 Pin QFN Package 3x3mm



Extended Battery Life!

High Efficiency operation even when in low battery condition.

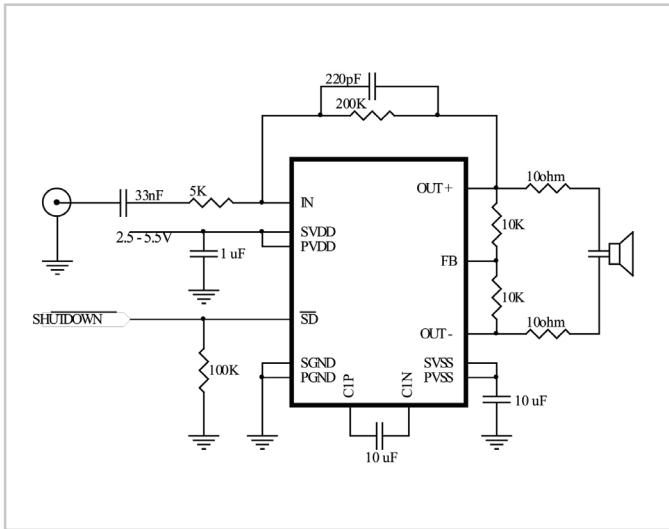


THD +N vs Frequency

Class G Audio Amplifiers

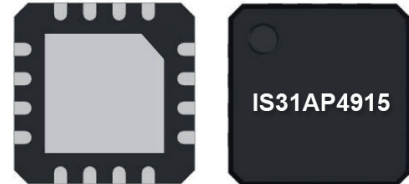
● IS31AP4915

20V_{P-P} Charge Pump Ceramic Speaker Driver

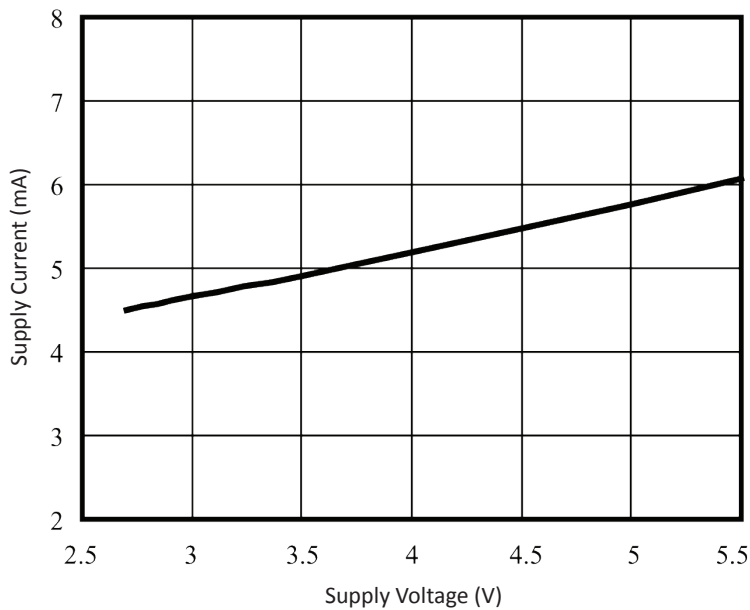


Features

- Integrated charge-pump power supply
- Ultra-Fast Start up of 450 us (typ)
- Drive high-capacitance ceramic loudspeaker
- 20V_{P-P} voltage swing
- Maximize battery life
- Extended temperature range



16 Pin QFN Package 4x4 mm



Supply Current vs Supply Voltage

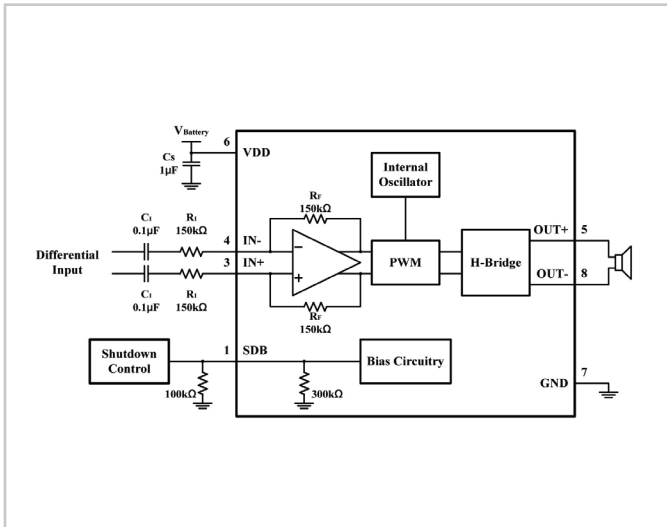


Piezo Speaker Driver

Class D Audio Amplifiers

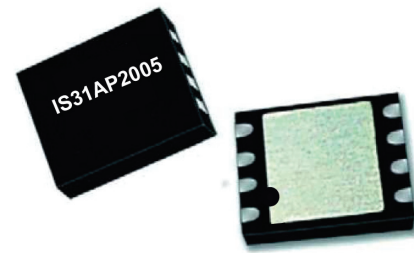
● IS31AP2005

2.95W Mono Filter-less Class-D Audio Power Amplifier

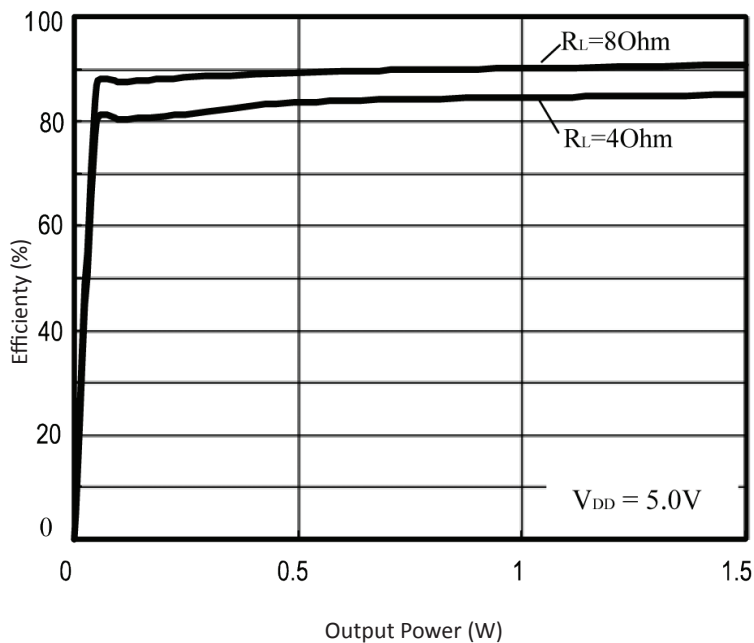


Features

- 89% efficiency at 5V with an 8Ω speaker
- Fully differential design reduces RF rectification and eliminates bypass capacitor
- Low noise PWM output stage eliminates LC output filter
- Reduced component count
- Integrated pop-and-click suppression circuitry



Micro lead package DFN-8 3x3 mm



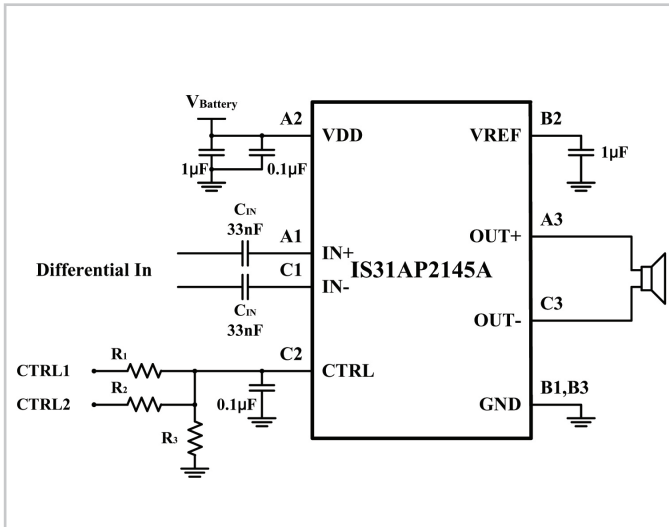
Efficiency vs. Output Power



Class D Audio Amplifiers

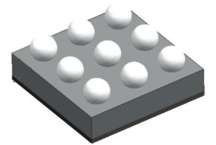
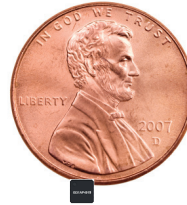
● IS31AP2145A

2.9W Mono Clilp-less & Filter-less Audio Amplifier with Built-in AGC

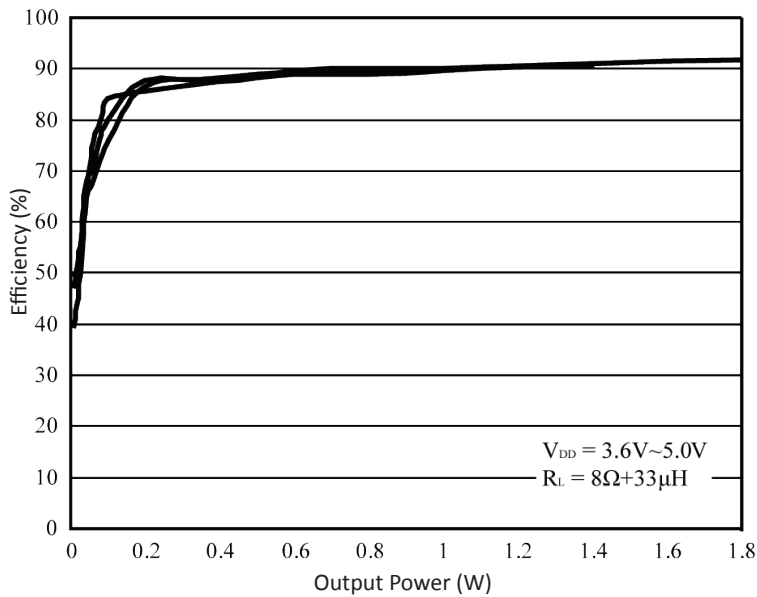


Features

- Filter-less Class-D architecture
- AGC enable/disable function
- Selectable attack and release times
- Improved RF-rectification immunity
- High efficiency: 90%
- Click-and-pop suppression
- Low shutdown current: 0.1µA



Scale to size Tiny UTQFN-9 Package 1.5x1.5 mm



Efficiency vs. Output Power



Ordering Information

Class-AB Audio Power Amplifier with or without Headphone Driver

Part No.	No. of Channel	Power (W)	THD+N (kHs)	PSRR (dB)	VDD (V)	ISD (uA)	IDD (mA)	Package (Size in mm)	Key Feature	Status
IS31AP4990D	1	1.2	0.23%	61	2.7 - 5.5	1	3.8	UTQFN-9L (1.5x1.5)	1.2W Mono Audio Power Amplifier in UTQFN Package	Prod
IS31AP4991	1	1.2	0.03%	65	2.7 - 5.5	1	4.8	MSOP-8 (3.0x5.0) SOP-8 (5.0x6.0)	1.2W Mono Audio Power Amplifier	Prod
IS31AP4066D	2	1.3	0.10%	60	2.7 - 5.5	1.1	3.9	QFN-16 (3.0x3.0)	Dual 1.3W Stereo Audio Power Amplifier	Prod
IS31AP4088D	2	2.6	0.10%	60	2.7 - 5.5	1	4.5	QFN-16 (4.0x4.0)	Dual 2.6W Stereo Audio Power Amplifier	Prod
IS31AP4088A	2+2 HP	2.84	0.06%	80	2.7 - 5.5	1	5.7	QFN-16 (4.0x4.0)	Dual 2.84W Stereo Audio Power Amplifier with Headphone Driver	Prod
IS31AP4832	2+2HP	2.5	0.03%	70	3.0 - 5.5	3	8	QFN-28 (4.0x4.0)	Dual 2.5W Stereo Amplifier with Headphone, Tone Control and 3D using I2C interface	Prod
IS31AP4833	2+2HP	2.8	0.022%	67	3.0 - 5.5	1.0	6	QFN-36(4x4) TQFP48(9x9)	Stereo audio PA with headphone driver, with Multi input & I2C control for 3D, Tone, Volume	Prod
IS31AP4834	2+2HP	2.8	0.022%	67	3.0 - 5.5	1.0	6	QFN-36 (4.0x4.0)	Stereo audio PA with headphone driver, with Multi input & 3D, DC Volume and DC Tone control	S=Q1/13

Headphone Driver

Part No.	No. of Channel	Power (mW)	THD+N (kHs)	PSRR (dB)	VDD (V)	ISD (uA)	IDD (mA)	Package (Size in mm)	Key Feature	Status
IS31AP4912	2	30	0.024%	95	2.7 - 5.5	1.0	5.0	UTQFN-12 (2.0x2.0)	High Quality Stereo Headphone Driver with High SNR and 7uV Ultra-Low O/P Noise	Prod
IS31AP4913	2	30	0.05%	92	2.7 - 5.5	1.0	5.0	QFN-20 (3.0x3.0)	3D Surround & Bass Enhanced High Quality Stereo Headphone Driver	Prod

Class-D Audio Power Amplifier

Part No.	No. of Channel	Power (W)	THD+N (kHs)	PSRR (dB)	VDD (V)	ISD (uA)	IDD (mA)	Package (Size in mm)	Key Feature	Status
IS31AP2005	1	2.7	0.20%	63	2.5 - 5.5	1	3	DFN-8(3x3) MSOP-8	2.7W Mono Filter-less Class-D Audio Power Amplifier	Prod
IS31AP2006	1	3	0.28%	55	2.7 - 5.5	1	2.6	DFN-8(3x3)	3W Mono Filter-less Class-D Audio Power Amplifier	Prod
IS31AP2010B	1	3	0.22%	75	2.7 - 5.5	1	2.6	UTQFN-9 (1.5x1.5)	3W Mono Filter-less Class-D Audio Power Amplifier	Prod
IS31AP2145A	1	2.9	0.2%	72	2.7 - 5.5	0.1	2.0	UTQFN-9 (1.5x1.5)	2.9W Mono Clip-less & Filter-less Audio Amplifier with Built-in AGC	Prod
IS31AP2145B	1	2.7	0.20%	67	2.7 - 5.5	0.1	2.0	UTQFN-9 (1.5x1.5)	2.7W Mono Clip-less & Filter-less Audio Amplifier with Built in AGC	Prod
IS31AP2117	2	Mono 15/ Dual 8	0.1%	60	8 - 26	200	26	TSSOP-28	Low EMI, stereo Class-D Power Amplifier	S=Q2/13
IS31AP2118	2	Mono 20/ Dual 12	0.1%	70	8 - 26	200	35	TSSOP-28	High efficiency (90%), low EMI, stereo Class-D Power Amplifier	S=Q1/13

Ordering Information

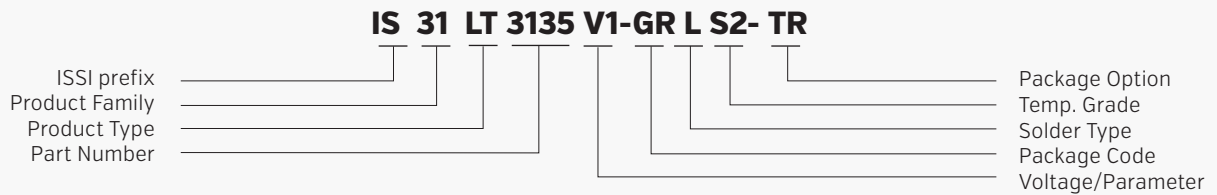
Class-G Speaker Amplifier

Part No.	No. of Channel	Power (W)	THD+N (kHs)	SNR (dB)	VDD (V)	ISD (uA)	IDD (mA)	Package (Size in mm)	Key Feature	Status
IS31AP4915	1	20VP-P	0.01%	100	2.5 - 6.5	1	6	QFN-16 (4.0x4.0)	20VP-P Charge Pump Ceramic Speaker Driver	Prod
IS31AP2031	1	2W	0.33%	-	2.7 - 4.5	1	5	QFN-20 (3.0x3.0)	High Power, Ultra-Low EMI Class-G Amplifier with AGC	Prod

Audio Amplifier Evaluation Boards

IC Part Number	Demo Board Part Number	Description
IS31AP2005-DLS2-TR	IS31AP2005-DLS2-EB	2.95W Mono Filter-less Class-D Audio Power Amplifier
IS31AP2005-SLS2-TR	IS31AP2005-SLS2-EB	2.95W Mono Filter-less Class-D Audio Power Amplifier
IS31AP2010B-UTLS2-TR	IS31AP2010B-UTLS2-EB	3W Mono Filter-less Class-D Audio Power Amplifier
IS31AP2145A-UTLS2-TR	IS31AP2145A-UTLS2-EB	2.9W Mono Clip-less & Filter-less Class-D Audio Power Amplifier
IS31AP4990D-UTLS2-TR	IS31AP4990D-UTLS2-EB	1.2W Audio Power Amplifier with Active-low Shutdown Mode
IS31AP4991-SLS2-TR	IS31AP4991-SLS2-EB	1.2W Audio Power Amplifier with Active-low Standby Mode
IS31AP4991-GRLS2-TR	IS31AP4991-GRLS2-EB	1.2W Audio Power Amplifier with Active-low Standby Mode
IS31AP4066D-QFLS2-TR	IS31AP4066D-QFLS2-EB	Dual 1.3W Stereo Audio Amplifier
IS31AP4088A-QFLS2-TR	IS31AP4088A-QFLS2-EB	Dual 2.84W Stereo Audio Amplifier Plus Headphone Driver
IS31AP4088D-QFLS2-TR	IS31AP4088D-QFLS2-EB	Dual 2.6W Stereo Audio Amplifier
IS31AP4913-QFLS2-TR	IS31AP4913-QFLS2-EB	3D and Bass Enhancement Stereo Headphone Driver

Ordering Information



• **Analog Product Family**

- 31 = Commercial/Industrial Analog
- 32 = Automotive Analog and Mixed Signal

• **Product Type**

- AP = Audio Power Amplifier
- BL = White LED Driver for LCD Backlight
- FL = FxLED Driver
- LT = Lighting LED Driver
- SE = Sensor

• **Temperature Grade**

- S1 = Commercial [0°C to 70°C]
- S2 = Industrial temp. [-40°C to 85°C]
- S3 = Industrial temp. [-40°C to 105°C]
- S4 = Industrial temp. [-40°C to 125°C]
- A1 = Automotive Grade [-40°C to +85°C]
- A2 = Automotive Grade [-40°C to +105°C]
- A3 = Automotive temp. [-40 to 125°C]

• **Solder Type**

- Blank = Sn/Pb
- L = Lead-free (RoHS Compliant)

• **Package Type**

- C = WCSP
- D = DFN
- GR = SOP
- QF = QFN
- S = MSOP
- SD = SOT89
- ST = SOT23
- TT = TSOT23
- UT = UTQFN
- Z = TSSOP

• **Voltage Range / Parameters**

- Sense Voltage Range
- V1 = 91mV to 101mV
- V2 = 99mV to 110mV
- Under-Voltage Range
- V1 = 1.13V to 1.21V
- V2 = 1.19V to 1.26V

• **Package Option**

- Blank = Tray or Tube
- TR = Tape & Reel



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