FDA4100LV



4 x 135 W / 2 x 270 W PWM digital input automotive power amplifier with I²C diagnostics, step-up driver and low voltage operation

Data brief



Features



- · AEC-Q100 qualified
- Integrated 108 dB D/A conversion
- I²S and TDM digital input (3.3/1.8 V)
- Input sampling frequency: 44.1kHz, 48 kHz, 96 kHz, 192 kHz
- MOSFET power outputs
- Step-up driver included
- EMI control for FM/AM compatibility
- EMI compliance at the CEI EN 55025 (2009-10)
- · Dithering possibility
- · Very low component count
- Output low-pass filter included in the feedback
- Low radiation function (LRF)
- High output power capability
 - 4 x 85 W/4 Ω @ 25 V, 1 kHz, 10% THD
 - 2 x 150 W/2 Ω @ 25 V, 1 kHz, 10% THD
- Max. output power
 - 4 x 135 W/4 Ω @ 25 V, 1 kHz
 - 2 x 270 W/2 Ω @ 25 V, 1 kHz
- Full I²C bus driving (3.3/1.8 V):
 - Independent front/rear soft play/ mute
 - I²C diagnostics (DC and AC load detection, internal test signal generated)
- Very flexible fault detection though integrated diagnostic
- Offset detector (play or mute mode)
- Four independent short circuit protection
- Clipping detector
- C-MOS compatible enable pin (3.3/5 V)
- ESD protection

• 6 V operation ("start - stop")

Description

The FDA4100LV is a new BCD- SOI (silicon on insulation) technology QUAD BRIDGE class D amplifier, specially intended for car radio applications.

Thanks to the technology used, it is possible to integrate a high performance D/A converter together with powerful MOSFET outputs in class D, to get an outstanding efficiency compared with the standard class AB.

The integrated D/A converter allows to reach outstanding performances (110 dB S/N ratio with 108 dB of dynamic range). The feedback loop includes the output L-C low-pass filter, allowing superior frequency response linearity and lower distortion independently of the inductor and capacitor quality.

FDA4100LV is fully configurable through I²C bus interface and integrates a full diagnostics array specially intended for automotive applications (with the status of each single speaker). Thanks to the solutions implemented to solve the EMI problems, the device is conceived to be used in the standard single DIN car-radio box together with the tuner.

The possibility to parallelize the outputs allows to drive both 2 Ω and 1 Ω speakers.

A built-in step-up driver allows to provide high output power even using the standard 14 V supply voltage.

Moreover FDA4100LV is able to work down to 6 V supply, thus supporting the most recent low voltage ('start-stop') car-makers specification.

Table 1. Device summary

Order code	Package	Packing	
FDA4100LV	HiQUAD92	Tray	
FDA4100LV-T	HIQUAD92	Tape & Reel	

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FDA4100LV Block diagram

1 Block diagram

PLL_Filter 42 PLL I2C 15/16 Out1-PWM Current Scrambler Generators Transresistance ch1 Array Power Amplifier 11 Feedback 2
5/6 Out2
9/10 Out2+

11 Feedback 2-12S-CLK 51 I2S-Sinc I2S Current PWM Scrambler Interpolator Generators Transresistance interface ch2 Array Power Amplifier Noise Shape I2S-Data 1 48 PWM Current 59/70 Out3-55/66 Out3+ - 64 Feedback 3+ Scrambler Generators Transresistance SU-Gnd ch3 Array Power Amplifier 14V 25 Comp 26 I1 27 Step Up PWM Current Scrambler Generators Transresistance Power Amplifier Array Gnd3 Vdd3 Gnd1 Gnd2 Vdd2 GAPGPS00384

Figure 1. Block diagram

Pins description FDA4100LV

2 Pins description

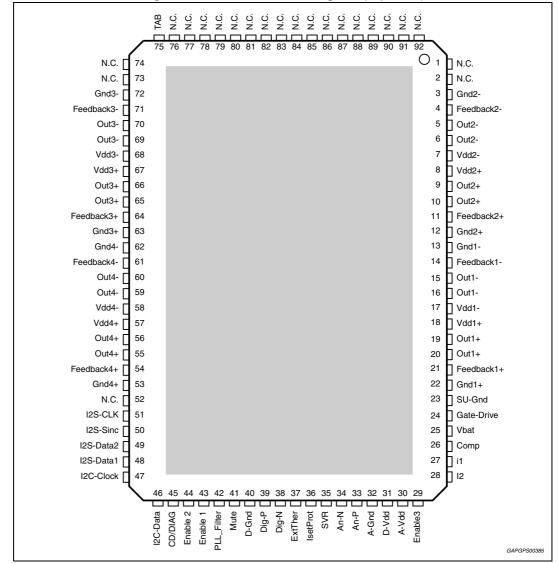


Figure 2. Pins connection diagram (top view)

Table 2. Pins list description

Pin # (HiQUAD-92)	Pin name	Function	
1	N.C.	Not connected	
2	N.C.	Not connected	
3	Gnd2-	Channel 2, half bridge power ground -	
4	Feedback2-	Channel 2 half bridge feedback -	
5	Out2-	Channel 2 half bridge output -	
6	Out2-	Channel 2 half bridge output -	

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FDA4100LV Pins description

Table 2. Pins list description (continued)

Pin #	Pin #		
(HiQUAD-92)	Pin name	Function	
7	Vdd2-	Channel 2 half bridge power supply -	
8	Vdd2+	Channel 2 half bridge power supply +	
9	Out2+	Channel 2 half bridge output +	
10	Out2+	Channel 2 half bridge output +	
11	Feedback2+	Channel 2 half bridge feedback +	
12	Gnd2+	Channel 2, half bridge power ground +	
13	Gnd1-	Channel 1, half bridge power ground -	
14	Feedback1-	Channel 1 half bridge feedback -	
15	Out1-	Channel 1 half bridge output -	
16	Out1-	Channel 1 half bridge output -	
17	Vdd1-	Channel 1 half bridge power supply -	
18	Vdd1+	Channel 1 half bridge power supply +	
19	Out1+	Channel 1 half bridge output +	
20	Out1+	Channel 1 half bridge output +	
21	Feedback1+	Channel 1 half bridge feedback +	
22	Gnd1+	Channel 1, half bridge power ground +	
23	SU-Gnd	Step-up power ground	
24	Gate-Drive	External PowerMOS gate drive output	
25	Vbat	Power supply (battery)	
26	Comp	Step-up compensation input	
27	I1	Step-up current limiting input	
28	12	Step-up current limiting reference	
29	Enable3	Chip enable 3	
30	A-Vdd	Analog power supply	
31	D-Vdd	Digital power supply	
32	A-Gnd	Analog ground	
33	An-P	Positive analog supply V(svr)+1.65 (internally generated)	
34	An-N	Negative analog supply V(svr)-1.65 (internally generated)	
35	SVR	Supply voltage ripple rejection capacitor	
36	IsetProt	Current protection resistor setting	
37	ExtTher	External thermal protection input	
38	Dig-N	Negative digital supply V(svr)-1.65 (internally generated)	
39	Dig-P	Positive digital supply V(svr)+1.65 (internally generated)	
40	D-Gnd	Digital ground	
41	Mute	Mute input (10 μA source current)	



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Pins description FDA4100LV

Table 2. Pins list description (continued)

Pin # (HiQUAD-92)	Table 2. Pins list description (continued)				
43 Enable 1 Chip enable 1 44 Enable 2 Chip enable 2 45 CD/DIAG Clip detector and diagnostic output: overcurrent protection, thermal warning, offset detection 46 I2C-Data I2C data input 47 I2C-Clock I2C data input 48 I2S-Data1 I2S/TDM data 1 Input 49 I2S-Data2 I2S/TDM data 2 Input 50 I2S-Sinc I2S/TDM sinc Input DRAFT 51 I2S-CLK I2S/TDM olock Input 52 N.C. Not connected 53 Gnd4+ Channel 4, half bridge Power Ground + 54 Feedback4+ Channel 4 half bridge Feedback + 55 Out4+ Channel 4 half bridge Output + 56 Out4+ Channel 4 half bridge Power Supply + 58 Vdd4- Channel 4 half bridge Power Supply - 59 Out4- Channel 4 half bridge Output - 60 Out4- Channel 4 half bridge Output - 61 Feedback4- Channel 4 half bridge Power Ground - 63 Gnd3+ Channel 4, half bridge Power Ground - 64 Feedback3+ Channel 3, half bridge Power Ground + 66 Out3+ Channel 3, half bridge Power Ground - 67 Vdd3+ Channel 3 half bridge Power Ground - 68 Gnd3+ Channel 3 half bridge Power Ground - 69 Out3+ Channel 3 half bridge Power Ground - 60 Out3+ Channel 3 half bridge Power Ground - 61 Feedback3+ Channel 3 half bridge Power Ground - 62 Gnd4- Channel 3 half bridge Power Ground - 63 Gnd3+ Channel 3 half bridge Power Supply - 64 Feedback3+ Channel 3 half bridge Power Supply - 65 Out3+ Channel 3 half bridge Power Supply - 66 Out3+ Channel 3 half bridge Power Supply - 67 Vdd3+ Channel 3 half bridge Power Supply - 68 Vdd3- Channel 3 half bridge Power Supply - 69 Out3- Channel 3 half bridge Power Supply - 70 Out3- Channel 3 half bridge Power Ground - 71 Feedback3- Channel 3 half bridge Power Ground - 72 Gnd3- Channel 3 half bridge Power Ground - 73 74 N.C. Not connected 75 TAB		Pin name	Function		
44 Enable 2 Chip enable 2 45 CD/DIAG Clip detector and diagnostic output: overcurrent protection, thermal warning, offset detection 46 I2C-Data I2C data input 47 I2C-Clock I2C data input 48 I2S-Data1 I2S/TDM data 1 Input 49 I2S-Data2 I2S/TDM data 2 Input 50 I2S-Sinc I2S/TDM sinc Input DRAFT 51 I2S-CLK I2S/TDM olock Input 52 N.C. Not connected 53 Gnd4+ Channel 4, half bridge Power Ground + 54 Feedback4+ Channel 4 half bridge Output + 55 Out4+ Channel 4 half bridge Output + 56 Out4+ Channel 4 half bridge Power Supply + 58 Vdd4- Channel 4 half bridge Power Supply - 59 Out4- Channel 4 half bridge Output - 60 Out4- Channel 4 half bridge Output - 61 Feedback4- Channel 4 half bridge Power Ground - 63 Gnd3+ Channel 4 half bridge Power Ground - 64 Feedback3+ Channel 3, half bridge Power Ground + 65 Out3+ Channel 3 half bridge Power Ground + 66 Out3+ Channel 3 half bridge Power Ground + 67 Vdd3+ Channel 3 half bridge Power Ground + 68 Out3+ Channel 3 half bridge Power Supply + 69 Out3- Channel 3 half bridge Power Supply - 69 Out3- Channel 3 half bridge Power Supply - 70 Out3- Channel 3 half bridge Power Supply - 71 Feedback3- Channel 3 half bridge Power Supply - 72 Gnd3- Channel 3 half bridge Power Ground - 73,74 N.C. Not connected 75 TAB -	42	PLL_Filter	PLL filter network		
CD/DIAG Clip detector and diagnostic output: overcurrent protection, thermal warning, offset detection 46	43	Enable 1	Chip enable 1		
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51 I2S-CLK I2S/TDM clock Input 52 N.C. Not connected 53 Gnd4+ Channel 4, half bridge Power Ground + 54 Feedback4+ Channel 4 half bridge Feedback + 55 Out4+ Channel 4 half bridge Output + 56 Out4+ Channel 4 half bridge Power Supply + 57 Vdd4+ Channel 4 half bridge Power Supply + 58 Vdd4- Channel 4 half bridge Power Supply - 59 Out4- Channel 4 half bridge Output - 60 Out4- Channel 4 half bridge Output - 61 Feedback4- Channel 4 half bridge Feedback - 62 Gnd4- Channel 4, half bridge Power Ground - 63 Gnd3+ Channel 3, half bridge Power Ground + 64 Feedback3+ Channel 3 half bridge Feedback + 65 Out3+ Channel 3 half bridge Output + 66 Out3+ Channel 3 half bridge Output + 67 Vdd3+ Channel 3 half bridge Power Supply - 68 Vdd3- Channel 3 half bridge Power Supply - 69 Out3- Channel 3 half bridge Output - 70 Out3- Channel 3 half bridge Output - 71 Feedback3- Channel 3 half bridge Output - 72 Gnd3- Channel 3, half bridge Power Ground - 73, 74 N.C. Not connected 75 TAB -	49	I2S-Data2	I2S/TDM data 2 Input		
52 N.C. Not connected 53 Gnd4+ Channel 4, half bridge Power Ground + 54 Feedback4+ Channel 4 half bridge Feedback + 55 Out4+ Channel 4 half bridge Output + 56 Out4+ Channel 4 half bridge Output + 57 Vdd4+ Channel 4 half bridge Power Supply + 58 Vdd4- Channel 4 half bridge Power Supply - 59 Out4- Channel 4 half bridge Output - 60 Out4- Channel 4 half bridge Output - 61 Feedback4- Channel 4 half bridge Feedback - 62 Gnd4- Channel 4, half bridge Power Ground - 63 Gnd3+ Channel 3, half bridge Power Ground + 64 Feedback3+ Channel 3 half bridge Feedback + 65 Out3+ Channel 3 half bridge Output + 66 Out3+ Channel 3 half bridge Output + 67 Vdd3+ Channel 3 half bridge Power Supply + 68 Vdd3- Channel 3 half bridge Power Supply - 69 Out3- Channel 3 half bridge Output - 70 Out3- Channel 3 half bridge Output - 71 Feedback3- Channel 3 half bridge Output - 72 Gnd3- Channel 3 half bridge Power Ground - 73, 74 N.C. Not connected 75 TAB -	50	I2S-Sinc	I2S/TDM sinc Input DRAFT		
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Gnd4- Channel 4, half bridge Power Ground - G3 Gnd3+ Channel 3, half bridge Power Ground + G4 Feedback3+ Channel 3 half bridge Feedback + G5 Out3+ Channel 3 half bridge Output + G6 Out3+ Channel 3 half bridge Output + G7 Vdd3+ Channel 3 half bridge Power Supply + G8 Vdd3- Channel 3 half bridge Power Supply - G9 Out3- Channel 3 half bridge Output - T0 Out3- Channel 3 half bridge Output - T1 Feedback3- Channel 3 half bridge Feedback - T2 Gnd3- Channel 3, half bridge Power Ground - T3, 74 N.C. Not connected TAB -	60	Out4-	Channel 4 half bridge Output -		
Gnd3+ Channel 3, half bridge Power Ground + 64 Feedback3+ Channel 3 half bridge Feedback + 65 Out3+ Channel 3 half bridge Output + 66 Out3+ Channel 3 half bridge Output + 67 Vdd3+ Channel 3 half bridge Power Supply + 68 Vdd3- Channel 3 half bridge Power Supply - 69 Out3- Channel 3 half bridge Output - 70 Out3- Channel 3 half bridge Output - 71 Feedback3- Channel 3 half bridge Feedback - 72 Gnd3- Channel 3, half bridge Power Ground - 73, 74 N.C. Not connected 75 TAB -	61	Feedback4-	Channel 4 half bridge Feedback -		
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68 Vdd3- Channel 3 half bridge Power Supply - 69 Out3- Channel 3 half bridge Output - 70 Out3- Channel 3 half bridge Output - 71 Feedback3- Channel 3 half bridge Feedback - 72 Gnd3- Channel 3, half bridge Power Ground - 73, 74 N.C. Not connected 75 TAB -	66	Out3+	Channel 3 half bridge Output +		
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71 Feedback3- Channel 3 half bridge Feedback - 72 Gnd3- Channel 3, half bridge Power Ground - 73, 74 N.C. Not connected 75 TAB -	69	Out3-	Channel 3 half bridge Output -		
72 Gnd3- Channel 3, half bridge Power Ground - 73, 74 N.C. Not connected 75 TAB -	70	Out3-	Channel 3 half bridge Output -		
73, 74 N.C. Not connected 75 TAB -	71	Feedback3-	Channel 3 half bridge Feedback -		
75 TAB -	72	Gnd3-	Channel 3, half bridge Power Ground -		
	73, 74	N.C.	Not connected		
76-92 N.C. Not connected	75	TAB	-		
	76-92	N.C.	Not connected		

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FDA4100LV Package information

3 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com.

ECOPACK® is an ST trademark.

3.1 HiQUAD-92 slug-up (14 x 20 mm) package information

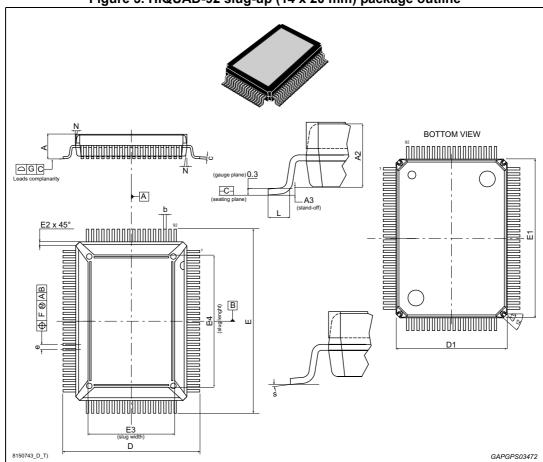


Figure 3. HiQUAD-92 slug-up (14 x 20 mm) package outline

Package information FDA4100LV

Table 3. HiQUAD-92 slug-up (14 x 20 mm) package mechanical data

	Dimensions					
Ref	Millimeters			Inches ⁽¹⁾		
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	-	-	3.05	-	-	0.1201
A2	2.50	-	2.90	0.0984	-	0.1142
A3	-0.05	-	0.05	-0.0019	-	0.0019
b	0.22	-	0.38	0.0087	-	0.0150
С	0.23	-	0.32	0.0091	-	0.0126
D	17.00	-	17.40	0.6693	-	0.6850
D1 ⁽²⁾	13.90	14.00	14.10	0.5472	0.5512	0.5551
Е	23.00	-	23.40	0.9055	-	0.9213
E1 ⁽²⁾	19.90	20.00	20.10	0.7835	0.7874	0.7913
E2	-	0.500	-	-	0.0197	=
E3	10.70	-	11.10	0.4213	-	0.4370
E4	16.50	-	16.90	0.6496	-	0.6654
е	-	0.65	-	-	0.0256	-
F	-	0.12	-	-	0.0047	-
G	-	0.10	-	-	0.0039	-
L	0.80	-	1.10	0.0315	-	0.0433
N	-	-	10°	-	-	10°
s	0°	-	8°	0°	-	8°
t1	53°			53°		
t2	42°			42°		

^{1.} Values in inches are converted from mm and rounded to 4 decimal digits.

^{2.} Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15 mm (.006 inches).

FDA4100LV Revision history

4 Revision history

Table 4. Document revision history

Date	Revision	Changes
19-Jul-2013	1	Initial release.
18-Sep-2013	2	Updated Disclaimer.
28-Nov-2016	3	Added "automotive" in the title in cover page. Added in cover page the feature "AEC-Q100 qualified and car logo. Added new order code in <i>Table 1: Device summary on page 1</i> . Updated <i>Section 3: Package information on page 7</i> .

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