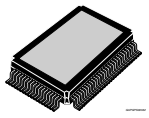
FDA4100LV

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



HiQUAD-92 (slug-up)

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.

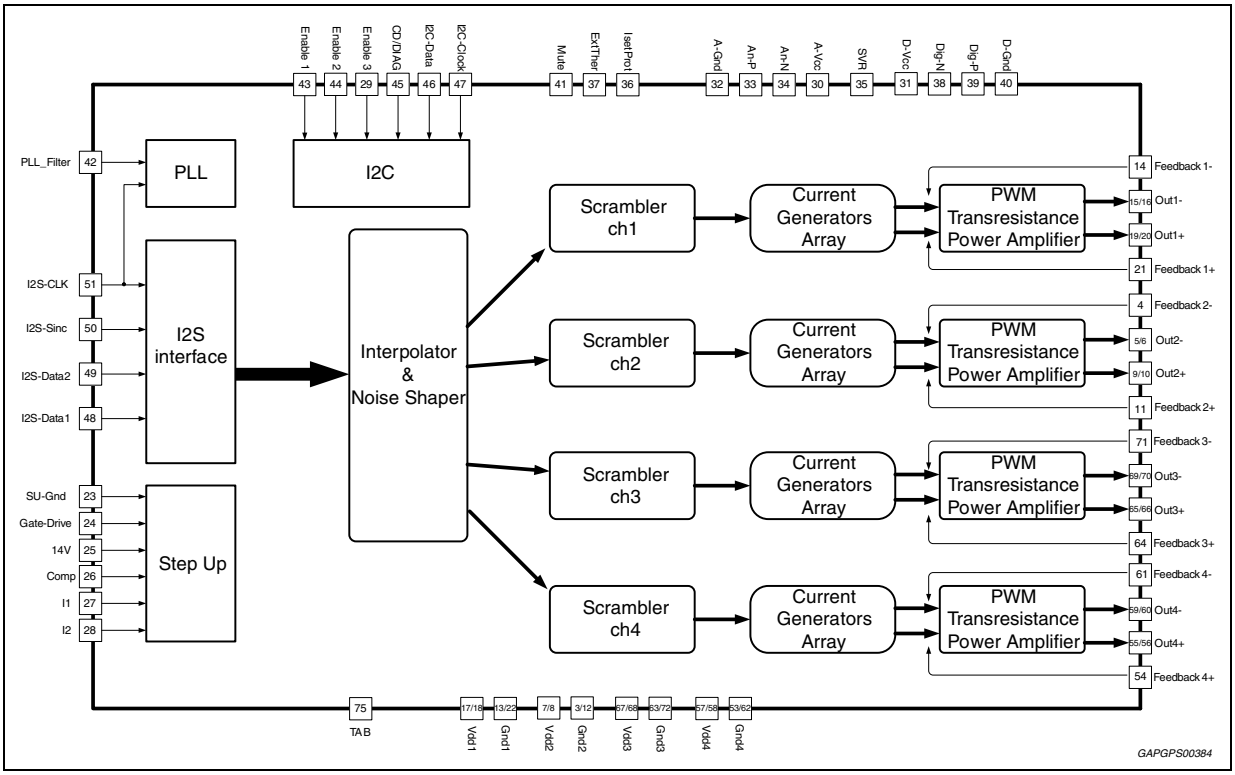
Table 1. Device summary

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

Contents

1 Block diagram

Figure 1. Block diagram



2 Pins description

Figure 2. Pins connection diagram (top view)

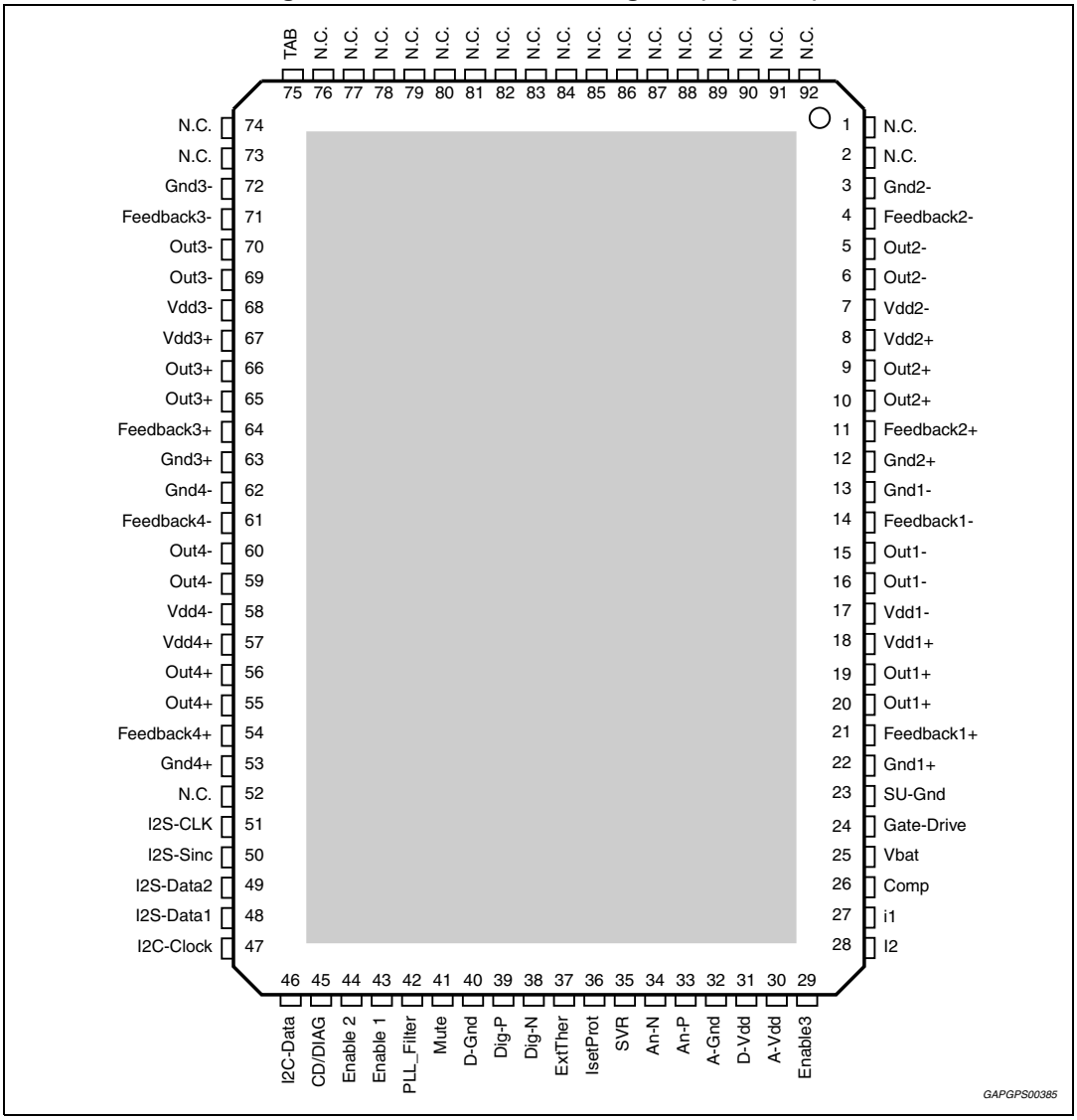


Table 2. Pins list description

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 -

Table 2. Pins list description (continued)

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	I2	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)

Table 2. Pins list description (continued)

Pin # (HiQUAD-92)	Pin name	Function
42	PLL_Filter	PLL filter network
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 Clock
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 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 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 Feedback -
72	Gnd3-	Channel 3, half bridge Power Ground -
73, 74	N.C.	Not connected
75	TAB	-
76-92	N.C.	Not connected

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

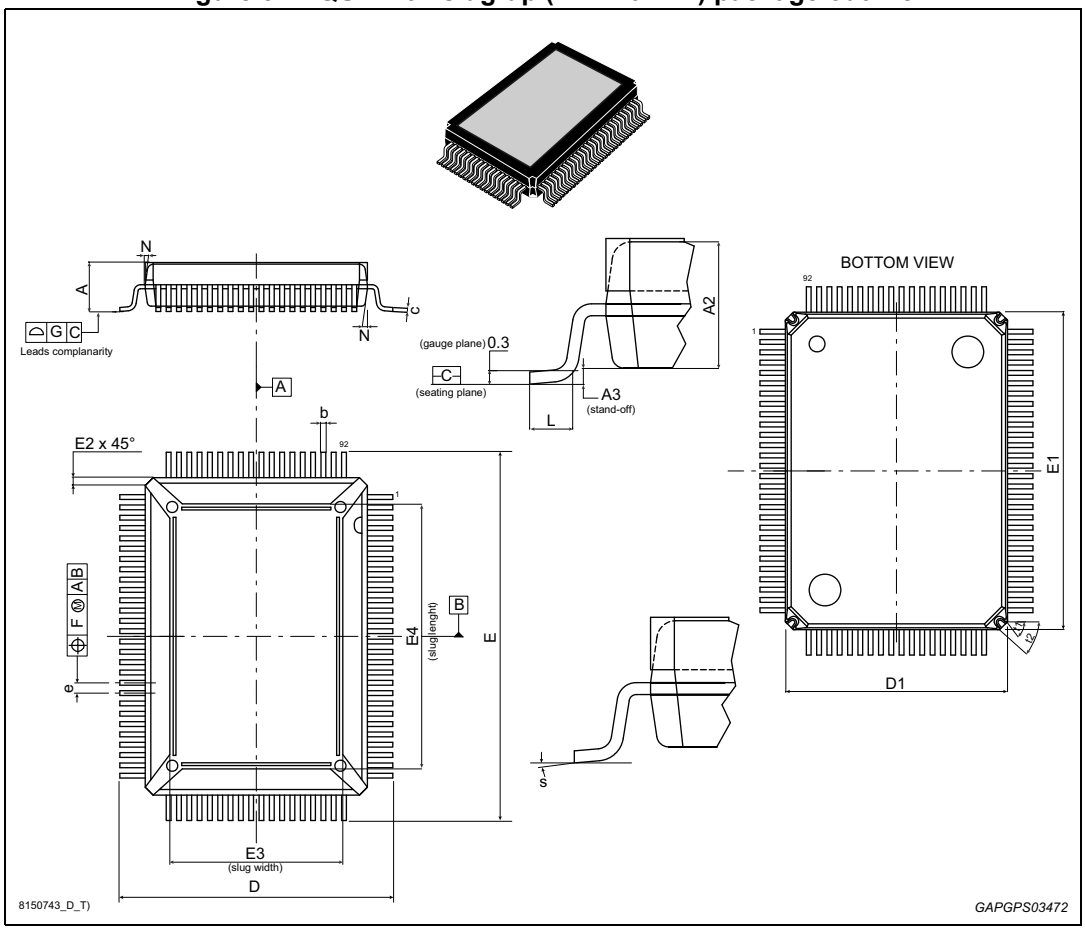


Table 3. HiQUAD-92 slug-up (14 x 20 mm) package mechanical data

Ref	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	-	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
c	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
E	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
e	-	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).

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 *Table 1: Device summary on page 1*. Updated *Section 3: Package information on page 7*.