

# FDA450LV

# 4 x 50 W PWM digital input power amplifier with built-in diagnostics features and low voltage operation

Data brief - production data



#### Features

- Integrated 108 dB D/A conversion
- I<sup>2</sup>S and TDM digital input (3.3/1.8 V)
- Input sampling frequency: 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
- MOSFET power outputs
- EMI control for FM/AM compatibility
- EMI compliance at the CEI EN 55025 (2009-10)
- Dithering possibility
- Very low external component count filter
- Output lowpass filter included in the feedback
- Low radiation function (LRF)
- Max. output power
   4 x 50 W/4 Ω @ 15.2 V, 1 kHz
- High output power capability
  - 28 W/4 Ω 10 % THD, Vd = 14.4 V
- Full I<sup>2</sup>C bus driving (3.3/1.8 V):
  - Independent front/rear soft play/ mute
  - I<sup>2</sup>C bus diagnostics (including DC and AC load detection, test signal internally 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 FDA450LV 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.

FDA450LV is fully configurable through I<sup>2</sup>C bus interface and integrates a full diagnostics array specially intended for automotive applications.

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  $\Omega$  and 1  $\Omega$  speakers.

Moreover FDA450LV is able to work with power supply as low as 6 V, thus supporting the most recent low voltage ('start-stop') car-makers specification.

#### Table 1. Device summary

Order code	Package	Packing	
FDA450LV	TQFP100 (exp. pad up)	Tray	

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This is information on a product in full production. For further information contact your local STMicroelectronics sales office.

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### Block diagram and pins description



Figure 1. Block diagram



#### Figure 2. Pins connection diagram (top view)



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Table 2. Pins list description						
N#	Pin	Function				
1	N.C.	Not connected				
2	Gnd2-	Channel 2, half bridge a Power Ground				
3	Feedback2-	Channel 2 half bridge a Feedback				
4	Out2-	Channel 2 half bridge a Output				
5	Out2-	Channel 2 half bridge a Output				
6	Vdd2-	Channel 2 half bridge a Power Supply				
7	Vdd2+	Channel 2 half bridge b Power Supply				
8	Out2+	Channel 2 half bridge b Output				
9	Out2+	Channel 2 half bridge b Output				
10	Feedback2+	Channel 2 half bridge b Feedback				
11	Gnd2+	Channel 2, half bridge b Power Ground				
12	Gnd1-	Channel 1, half bridge a Power Ground				
13	Feedback1-	Channel 1 half bridge a Feedback				
14	Out1-	Channel 1 half bridge a Output				
15	Out1-	Channel 1 half bridge a Output				
16	Vdd1-	Channel 1 half bridge a Power Supply				
17	Vdd1+	Channel 1 half bridge b Power Supply				
18	Out1+	Channel 1 half bridge b Output				
19	Out1+	Channel 1 half bridge b Output				
20	Feedback1+	Channel 1 half bridge b Feedback				
21	Gnd1+	Channel 1, half bridge b Power Ground				
22	Gnd	Ground				
23	N.C.	Not connected				
24	Vbat	Power supply				
25	TAB	-				
26	GND	Ground				
27	GND	Ground				
28	GND	Ground				
29	Enable 3	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	N.C.	Not connected				
39	Dig-N	Negative Digital Supply V(svr)-1.65 (Internally generated)				

Table 2. Pins list description





Table 2. Pins list description (continued)

N#	Pin	Function			
40	Dig-P	Positive Digital Supply V(svr)+1.65 (Internally generated)			
41	D-Gnd	Digital Ground			
42	Mute	Mute Input (10uA source current)			
43	PLL_Filter	PLL Filter Network			
44	Enable 1	Chip Enable 1			
45	Enable 2	Chip Enable 2			
		Clip detector and diagnostic output:			
46	CD/DIAG	Overcurrent protection intervention			
-10	ODIDIAO	Thermal warning			
		Offset detection			
47	N.C.	Not connected			
48	I2C-Data	I2C Data Input			
49	I2C-Clock	I2C Data Clock			
50	I2S-Data1	I2S/TDM Data 1 Input			
51	I2S Data 2	I2S/TDM Data 2 Input			
52	I2S-Sinc	I2S/TDM Sinc Input			
53	I2S-CLK	I2S/TDM Clock Input			
54	N.C.	Not connected			
55	Gnd4+	Channel 4, half bridge + Power Ground			
56	Feedback4+	Channel 4 half bridge + Feedback			
57	Out4+	Channel 4 half bridge + Output			
58	Out4+	Channel 4 half bridge + Output			
59	Vdd4+	Channel 4 half bridge + Power Supply			
60	Vdd4-	Channel 4 half bridge - Power Supply			
61	Out4-	Channel 4 half bridge - Output			
62	Out4-	Channel 4 half bridge - Output			
63	Feedback4-	Channel 4 half bridge - Feedback			
64	Gnd4-	Channel 4, half bridge - Power Ground			
65	Gnd3+	Channel 3, half bridge + Power Ground			
66	Feedback3+	Channel 3 half bridge + Feedback			
67	Out3+	Channel 3 half bridge + Output			
68	Out3+	Channel 3 half bridge + Output			
69	Vdd3+	Channel 3 half bridge + Power Supply			
70	Vdd3-	Channel 3 half bridge - Power Supply			
71	Ou3-	Channel 3 half bridge - Output			
72	Out3-	Channel 3 half bridge - Output			
73	Feedback3-	Channel 3 half bridge - Feedback			
74	Gnd3-	Channel 3, half bridge - Power Ground			
75	TAB	-			
76 to 100	N.C.	Not connected			



### 2 Package information

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

 $ECOPACK^{\mathbb{R}}$  is an ST trademark.

DIM.		mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
A			1.090			0.0429	MECHANICAL DATA
A1	-0.040		0.040			0.0016	
A2	0.950	1.000	1.050			0.0413	
b	0.170	0.220	0.270	0.0067	0.0087		
С	0.090		0.200	0.0035		0.0079	
D		16.000			0.6299		
D1		14.000	14.200		0.5512		
D2	7.700	8.000	8.300	0.3031	0.3150	0.3268	
D3		12.000			0.4724		
Е		16.000			0.6299		
E1	13.800	14.000	14.200	0.5433	0.5512	0.5591	
E2	7.700	8.000	8.300	0.3031		0.3268	
E3		12.000			0.4724		
е		0.500			0.0197		
L	0.450	0.600	0.750	0.0177	0.0236	0.0295	Size: 14x14x1.0 mm
L1		1.000			0.0394		
k	0	3.500	7.000	0	0.1378		
CCC			0.080			0.0031	TQFP100 (exposed pad up)
R		1.000			0.0394		Thin Quad Flat Package
1-T2		5.800			0.2283		
FIGURE	1		DIE	PAD SIDE			
FIGURE SEATING PLANE C			плининин с тор	VIEW			
SEATING	× 22		плиплиплип <u> с</u> тор				GAGE PLANE SWOOT - SWOOT - SWOOT - SWOOT - SWOOT - SWOOT - SWOOT - SWOOT -

Figure 3. TQFP100 (exposed pad up) mechanical data and package dimensions



## 3 Revision history

Date	Revision	Changes
18-Jul-2013	1	Initial release.
18-Sep-2013	2	Updated Disclaimer.



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