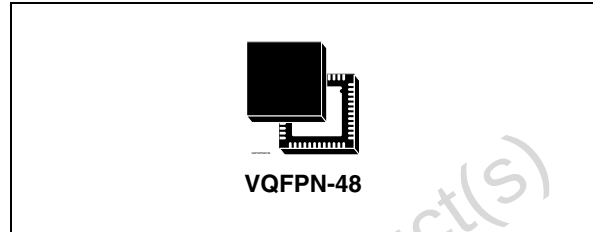


Automotive class-D audio power DAC with backlight LED driver and voice encoder

Data brief – target specification

Features

- FDA001 - dPal integrates:
 - a LED driver with dimming capability
 - an audio DAC converting a digital input into an analog stereo signal
 - a stereo headphone output
 - a class-D amplifier with programmable output power
 - a configurable DSP for sound equalization and volume/gain control
 - a CODEC for microphone input
 - a DC/DC converter that can be used to step-down the car battery to supply the portable device directly with car battery with no need of CLA, or to step-up the input USB voltage to have higher output power
- Synchronous switching voltage pre-regulator:
 - Internal high-side/low-side NDMOS
 - $V_{out} = 5/6/7/8$ V selectable through I²C bus
 - 3 A load current capability in step-down mode
 - Out-of-regulation flag on dedicated hardware pin
- Step-up switching voltage regulator for 10 LEDs driving:
 - Internal NDMOS switch
 - LED current control through dedicated pin
 - LED current selectable between 2.5 and 20 mA through I²C bus, allowing LED luminosity dimming
- Audio DSP and DAC with class-D power output and class-AB stereo headset output:
 - $P_{out} = 6$ W on 4 Ω load with pre-regulator output set to 7 V
 - 93 dB dynamic range output signal for headset
 - -60 dB $\Rightarrow$ +12 dB volume control selectable through I²C bus
 - 5-bands equalizer
 - signal dynamic compression



- Voice CODEC for microphone input:
 - 0/+20 dB pre-amplifier Gain, selectable through I²C bus
 - 0 $\Rightarrow$ 22.5 dB amplifier gain, selectable through I²C bus with 1.5 dB steps
- Load dump protection
- Thermal protection
- Robustness against ESD events

Description

FDA001 - dPal (digital Portable Audio and Led driver) is a very compact and complete companion IC for portable navigation devices or for advanced navigation head units.

It enhances the multimedia experience of navigation sets by adding a powerful and clear audio while allowing a very bright and uniform display backlighting.

The automotive compatibility is ensured by the integrated DC/DC converter which allows to connect the IC directly to the car battery. The same DC/DC boosts up the output audio power when connected to USB supply.

It is designed in a proprietary advanced BCD (Bipolar Cmos Dmos) silicon technology which allows to integrate in one chip both high-speed logic and power stages.

Table 1. Device summary

Order code	Package	Packing
FDA001	VQFPN-48	Tray

1 Pin description

1.1 Pin connection

Figure 1. Pin connection (bottom view)

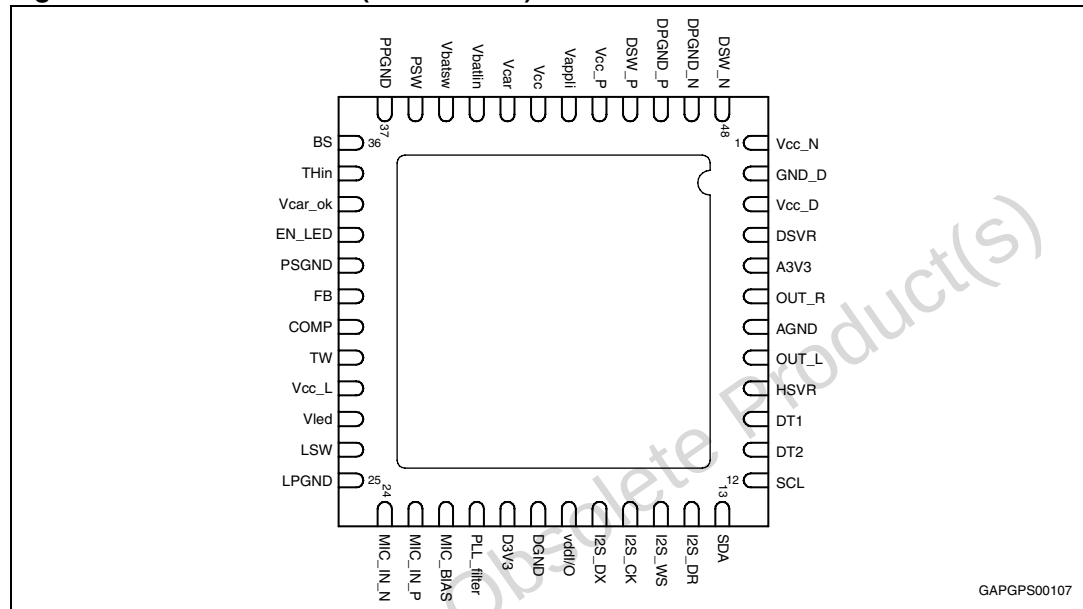


Table 2. Pin description

Pin #	Pin name	Pin function	Pin type
1	Vcc_N	Supply voltage for negative class-D output	Supply
2	GND_D	Ground for class-D low-signal circuit	Ground
3	Vcc_D	Supply voltage for class-D low-signal circuit	Supply
4	DSVR	Bias of class-D low-signal circuit	Output
5	A3V3	3.3V supply voltage for audio low-signal circuit	Supply
6	OUT_R	Right-channel headset output	Output
7	AGND	Ground for audio low-signal circuit	Ground
8	OUT_L	Left-channel headset output	Output
9	HSVR	Bias of headset output	Output
10	DT1	Digital circuit test	Test
11	DT2	Digital circuit test	Test
12	SCL	I2Cbus Clock	Input
13	SDA	I2Cbus Data	Input
14	I2S_DR	I2S input Data Receiver	Input
15	I2S_WS	I2S input Word Select	Input
16	I2S_OK	I2S input Clock	Input

Table 2. Pin description (continued)

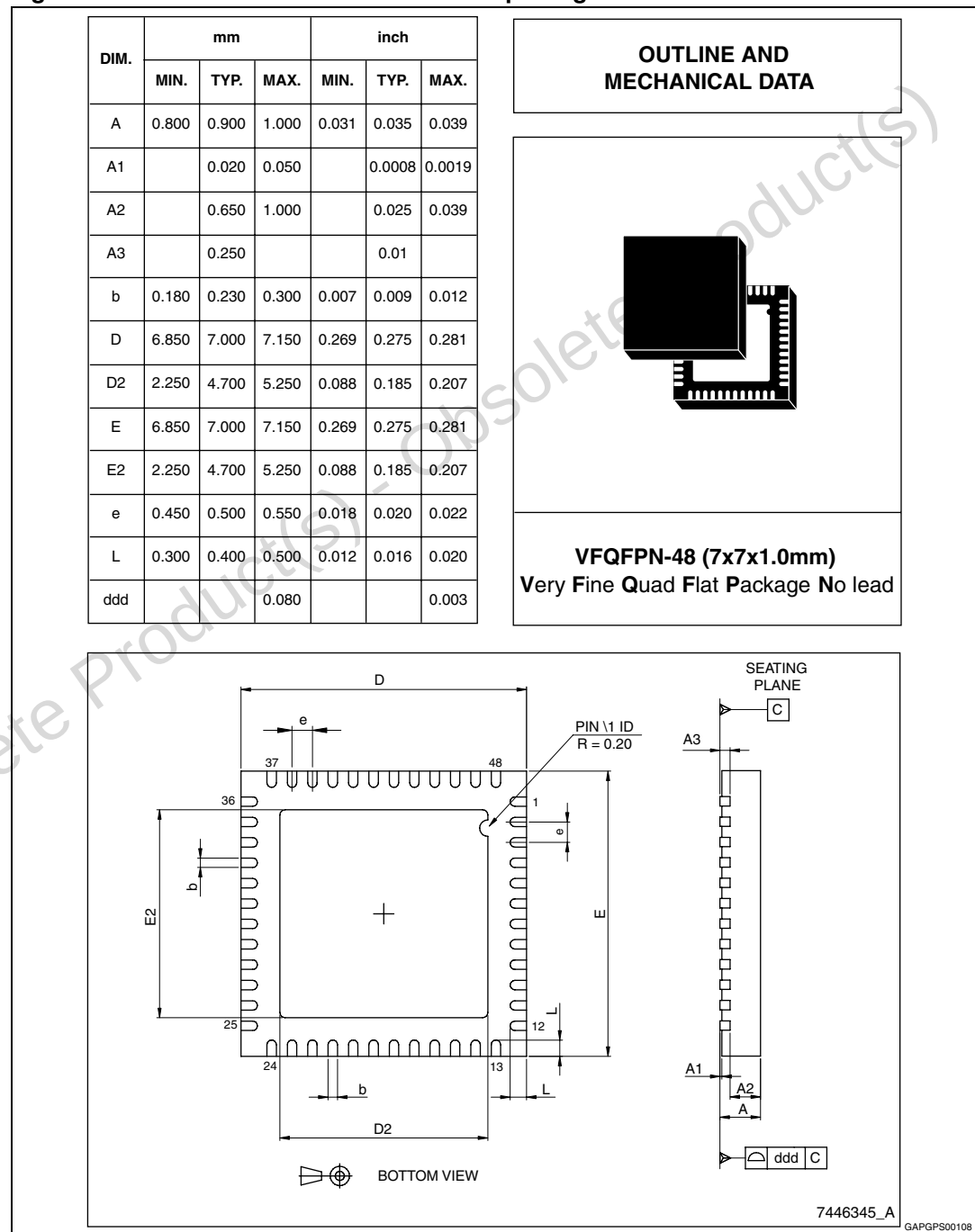
Pin #	Pin name	Pin function	Pin type
17	I2S_DX	I2S output Data Transmitter	Output
18	vddl/O	Digital Interfaces Supply	Supply
19	DGND	Ground for audio digital circuit	Ground
20	D3V3	3.3V supply voltage for audio digital circuit	Supply
21	PLL_filter	PLL filter	Input
22	MIC_BIAS	Microphone output bias	Output
23	MIC_IN_P	Microphone positive input	Input
24	MIC_IN_N	Microphone negative input	Input
25	LPGND	Power ground for LED Driver	Ground
26	LSW	LED Driver switching output	Output
27	Vled	LED Driver output voltage	Input
28	Vcc_L	Supply Voltage for LED Driver	Supply
29	TW	Thermal Warning	Output
30	COMP	Compensation for LED Driver	Output
31	FB	LED Driver feedback voltage	Input
32	PSGND	Pre-regulator signal ground	Ground
33	EN_LED	LED Driver Enable	Input
34	Vcar_ok	Pre-regulator in regulation flag	Output
35	THin	Thermal protection input	Test
36	BS	Boot-strap	Supply
37	PPGND	Pre-regulator power ground	Ground
38	PSW	Pre-regulator switching output	Output
39	Vbatsw	Car battery supply voltage for switching circuits	Supply
40	Vbatlin	Car battery supply voltage for linear circuits	Supply
41	Vcar	Pre-regulator output voltage	Input
42	Vcc	Selected supply voltage	Supply
43	Vappli	Auxiliary supply voltage	Supply
44	Vcc_P	Supply voltage for positive class-D output	Supply
45	DSW_P	Class-D positive switching output	Output
46	DPGND_P	Power ground for positive class-D output	Ground
47	DPGND_N	Power ground for negative class-D output	Ground
48	DSW_N	Class-D negative switching output	Output

2 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.

Figure 2. VQFPN-48 mechanical data and package dimensions



3 Revision history

Table 3. Document revision history

Date	Revision	Changes
23-Jul-2009	1	Initial release.
29-Jul-2009	2	Modified <i>Features</i> and <i>Section 1: Pin description</i> .
13-Sep-2012	3	Added maturity status in cover page.

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