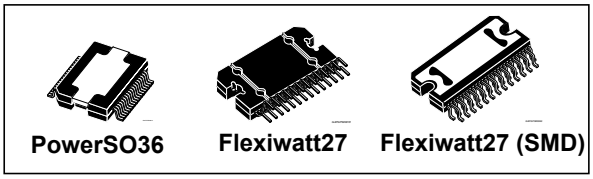
TDA7802

High efficiency digital input quad power amplifier with built-in diagnostics features, 'start stop' compatible

Data brief



Features

- 24-bit resolution
- 110 dB dynamic range (A-weighted)
- SB-I (SB - improved) high efficiency operation the highest 'non - class D' efficiency
- 1 Ohm driving capability (only in PowerSO36 package)
  - High output power capability: 4 x 28 W 4 Ω @ 14.4 V, 1 kHz, THD = 10 %
  - Max output power: 4 x 72 W 2 Ω
- Flexible mode control:
  - Full I^2C bus driving 1.8 V/3.3 V) with four addresses selectable (only for PowerSO36 package option)
  - Independent front/rear play/ mute
  - Four selectable gains for very-low noise line-out function
  - Digital diagnostic with DC and AC load detections
- Optional H/W control (no I^2C bus)
- Start-stop compatibility (operation down to 6 V)
- Sample rates: 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
- Flexible serial data port (1.8 V / 3.3 V):
  - I^2S standard, TDM 4Ch, TDM 8Ch, TDM 16Ch
- Offset detector (play or mute mode)
- Independent front/rear clipping detector
- Programmable diagnostic pin
- CMOS compatible enable pin
- Thermal protection
- Qualification in accordance to AEC Q100 rev. G standard

Description

The TDA7802 is a single chip quad bridge amplifier in advanced BCD technology integrating: a full D/A converter, digital input for direct connection to I^2S (or TDM) and powerful MOSFET output stages.

The integrated D/A converter allows the performance to reach an outstanding 115 dB S/N ratio with more than 110 dB of dynamic range.

Moreover the TDA7802 integrates an innovative high efficiency concept, optimized also for uncorrelated music signals, that makes it the most suitable device to simplify the thermal management in high power sets.

Thanks to this concept, the dissipated output power under average listening conditions can be reduced up to 50% when compared to the conventional class AB solutions.

The TDA7802 integrates also a programmable PLL that is able to lock at the input frequencies of 64*Fs and 50*Fs for all the input configurations.

The device is equipped with a full diagnostics array that communicates the status of each speaker through the I^2C bus. The same I^2C bus allows to control several configurations of the device.

The TDA7802 is able to play music down to 6 V supply voltage - so it is compatible with the so called 'start stop' battery profile recently adopted by several car makers (thus reducing the fuel consumption and and the impact over the environment).

Table 1. Device summary

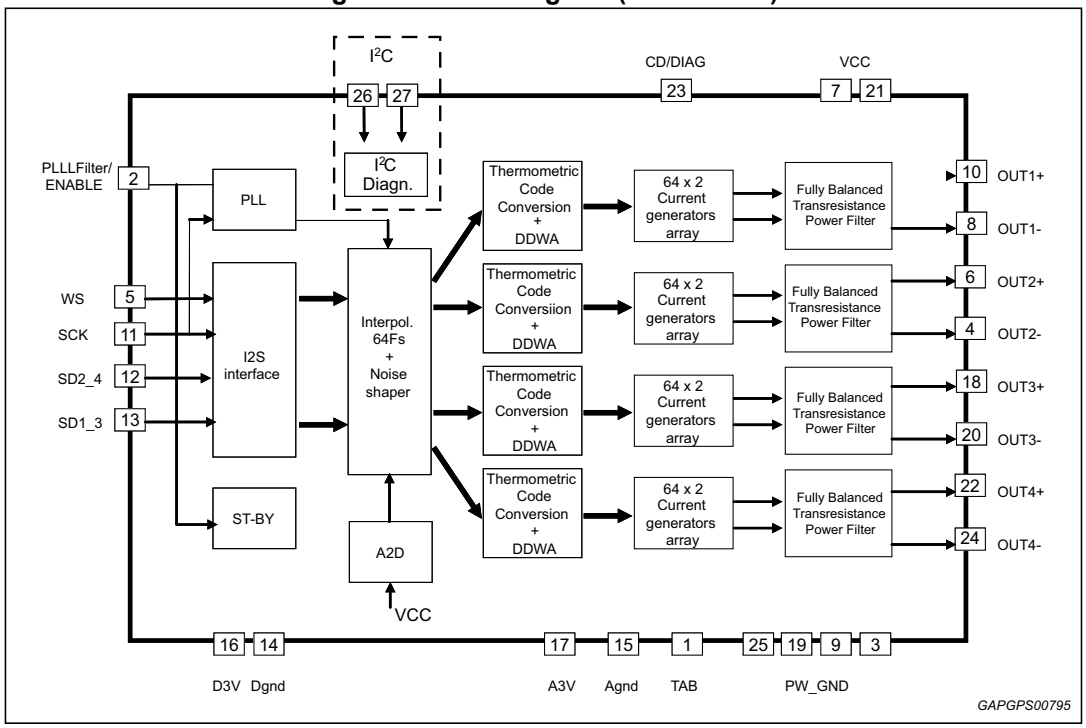
Order code	Package	Packing
TDA7802	Flexiwatt27 (Vertical)	Tube
TDA7802SM	Flexiwatt27 (SMD)	Tube
TDA7802SMTR		Tape & reel
TDA7802PD	PowerSO36	Tube
TDA7802PDTR		Tape & reel

Contents

1 Block diagram and pins description

1.1 Block diagram

Figure 1. Block diagram (Flexiwatt27)



1.2 Pins description

Figure 2. Pins connection diagrams

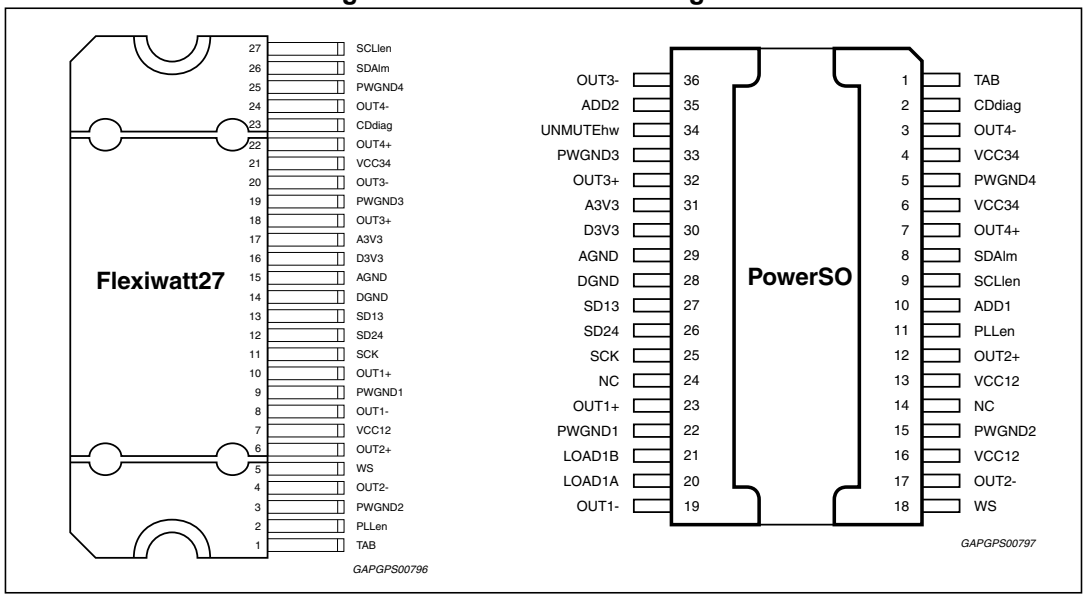


Table 2. Flexiwatt27 pins description

N°	Pin	Function	
1	TAB	TAB connection	Ground
2	PLLen	Pll loop filter / ENABLE	Input
3	PWGND2	Power ground channel 2	Power Ground
4	OUT 2-	Channel 2 (Left Rear) negative output	Power Output
5	WS	Word select (I2S bus)	Logic Input
6	OUT 2+	Channel 2 (Left Rear) positive output	Power Output
7	VCC12	Channel 1 and 2 positive supply	Battery
8	OUT 1-	Channel 1 (Left Front) negative output	Power Output
9	PWGND1	Power ground channel 1	Power Ground
10	OUT 1+	Channel 1 (Left Front) positive output	Power Output
11	SCK	Serial clock (I2S bus)	Logic Input
12	SD24	Serial data channels 2 and 4 (I2S bus)	Logic Input
13	SD13	Serial data channels 1 and 3 (I2S bus)	Logic Input
14	DGND	Digital ground	Signal Ground
15	AGND	Analog ground	Signal Ground
16	D3V3	Digital 3.3 V supply filter	Digital Regulator
17	A3V3	Analog 3.3 V supply filter	Analog Regulator
18	OUT3+	Channel 3 (right front) positive output	Power Output
19	PWGND3	Power ground channel 3	Power Ground
20	OUT3-	Channel 3 (right front) negative output	Power Output
21	VCC34	Channels 3 and 4 positive supply	Battery
22	OUT4+	Channel 4 (right rear) positive output	Power Output
23	CDdiag	Clip detector and diagnostic output: Overcurrent protection intervention Thermal warning POR Output DC offset Output short to VCC/GND	Open Drain Output
24	OUT4-	Channel 4 (right rear) negative output	Power Output
25	PWGND4	Power ground channel 4	Power Ground
26	SDAIm	I^2C data/legacy mode mute	Signal Input/Output
27	SCLIen	I^2C clock/enable legacy mode	Signal Input

Table 3. PowerSO36 pins description

N°	Pin	Function	
1	TAB	TAB connection	-
2	CDdiag	Clip detector and diagnostic output: Overcurrent protection intervention Thermal warning POR	Open Drain Output
3	OUT4-	Channel 4 (right rear) negative output	Power Output
4	VCC34	Channels 3 and 4 positive supply	Battery
5	PWGND4	Power ground channel 4	Power Ground
6	VCC34	Channels 3 and 4 positive supply	Battery
7	OUT4+	Channel 4 (right rear) positive output	Power Output
8	SDAIm	I^2C data/legacy mode mute	Signal Input/Output
9	SCLIen	I^2C clock/enable legacy mode	Signal Input
10	ADD1	I2C Address - First Pin	Logic Input
11	PLLen	Pll loop filter / ENABLE	Input
12	OUT 2+	Channel 2 (Left Rear) positive output	Power Output
13	VCC12	Channel 1 and 2 positive supply	Battery
14	NC	Not Connected	-
15	PWGND2	Power ground channel 2	Power Ground
16	VCC12	Channel 1 and 2 positive supply	Battery
17	OUT 2-	Channel 2 (Left Rear) negative output	Power Output
18	WS	Word select (I2S bus)	Logic Input
19	OUT 1-	Channel 1 (Left Front) negative output	Power Output
20	LOAD1A	Load Selection (channels 1 and 2)	Logic Input
21	LOAD1B	Load Selection (channels 3 and 4)	Logic Input
22	PWGND1	Power ground channel 1	Power Ground
23	OUT 1+	Channel 1 (Left Front) positive output	Power Output
24	NC	Not Connected	-
25	SCK	Serial clock (I2S bus)	Logic Input
26	SD24	Serial data channels 2 and 4 (I2S bus)	Logic Input
27	SD13	Serial data channels 1 and 3 (I2S bus)	Logic Input
28	DGND	Digital ground	Signal Ground
29	AGND	Analog ground	Signal Ground
30	D3V3	Digital 3.3 V supply filter	Digital Regulator
31	A3V3	Analog 3.3 V supply filter	Analog Regulator
32	OUT3+	Channel 3 (right front) positive output	Power Output
33	PWGND3	Power ground channel 3	Power Ground
34	UNMUTEhw	Unmute Hardware	Logic input
35	ADD2	I2C Address - Second Pin	Logic Input
36	OUT3-	Channel 3 (right front) negative output	Power 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*.

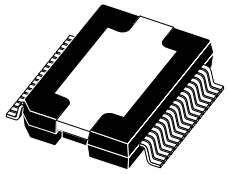
ECOPACK® is an ST trademark.

Figure 3. PowerSO36 (slug up) mechanical data and package dimensions

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	3.270	-	3.410	0.1287	-	0.1343
A2	3.100	-	3.180	0.1220	-	0.1252
A4	0.800	-	1.000	0.0315	-	0.0394
A5	-	0.200	-	-	0.0079	-
a1	0.030	-	-0.040	0.0012	-	-0.0016
b	0.220	-	0.380	0.0087	-	0.0150
c	0.230	-	0.320	0.0091	-	0.0126
D	15.800	-	16.000	0.6220	-	0.6299
D1	9.400	-	9.800	0.3701	-	0.3858
D2	-	1.000	-	-	0.0394	-
E	13.900	-	14.500	0.5472	-	0.5709
E1	10.900	-	11.100	0.4291	-	0.4370
E2	-	-	2.900	-	-	0.1142
E3	5.800	-	6.200	0.2283	-	0.2441
E4	2.900	-	3.200	0.1142	-	0.1260
e	-	0.650	-	-	0.0256	-
e3	-	11.050	-	-	0.4350	-
G	0	-	0.075	0	-	0.0031
H	15.500	-	15.900	0.6102	-	0.6260
h	-	-	1.100	-	-	0.0433
L	0.800	-	1.100	0.0315	-	0.0433
N	-	-	10°	-	-	10°
s	-	-	8°	-	-	8°

(1) "D and E1" do not include mold flash or protusions.
Mold flash or protusions shall not exceed 0.15mm (0.006").
(2) No intrusion allowed inwards the leads.

OUTLINE AND MECHANICAL DATA



PowerSO36 (SLUG UP)

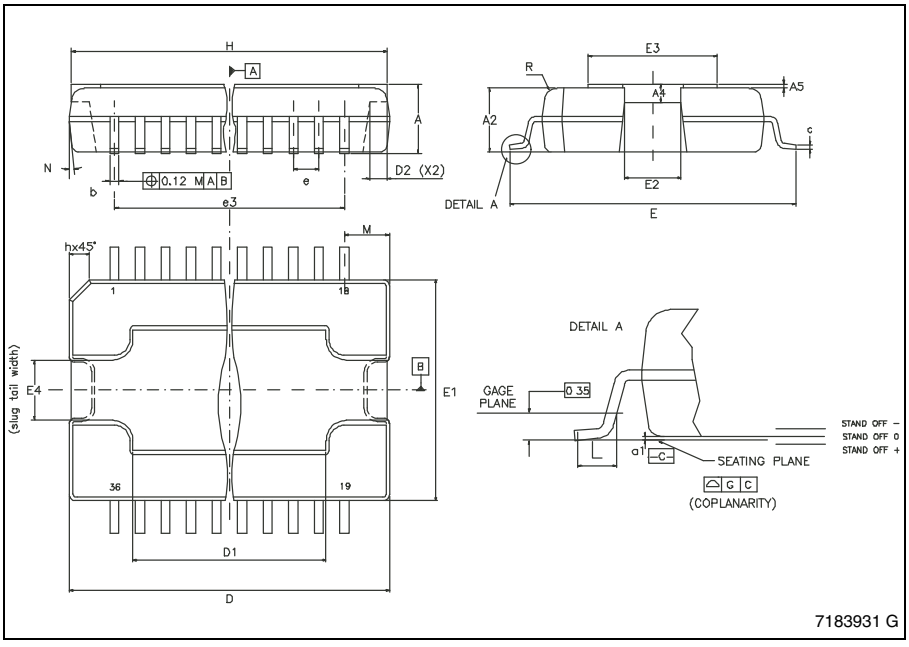
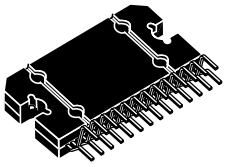


Figure 4. Flexiwatt27 (vertical) mechanical data and package dimensions

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.45	4.50	4.65	0.175	0.177	0.183
B	1.80	1.90	2.00	0.070	0.074	0.079
C		1.40			0.055	
D	0.75	0.90	1.05	0.029	0.035	0.041
E	0.37	0.39	0.42	0.014	0.015	0.016
F (1)			0.57			0.022
G	0.80	1.00	1.20	0.031	0.040	0.047
G1	25.75	26.00	26.25	1.014	1.023	1.033
H (2)	28.90	29.23	29.30	1.139	1.150	1.153
H1		17.00			0.669	
H2		12.80			0.503	
H3		0.80			0.031	
L (2)	22.07	22.47	22.87	0.869	0.884	0.904
L1	18.57	18.97	19.37	0.731	0.747	0.762
L2 (2)	15.50	15.70	15.90	0.610	0.618	0.626
L3	7.70	7.85	7.95	0.303	0.309	0.313
L4		5			0.197	
L5		3.5			0.138	
M	3.70	4.00	4.30	0.145	0.157	0.169
M1	3.60	4.00	4.40	0.142	0.157	0.173
N		2.20			0.086	
O		2			0.079	
R		1.70			0.067	
R1		0.5			0.02	
R2		0.3			0.12	
R3		1.25			0.049	
R4		0.50			0.019	
V	5° (Typ.)					
V1	3° (Typ.)					
V2	20° (Typ.)					
V3	45° (Typ.)					

(1): dam-bar protusion not included
(2): molding protusion included

OUTLINE AND MECHANICAL DATA



Flexiwatt27 (vertical)

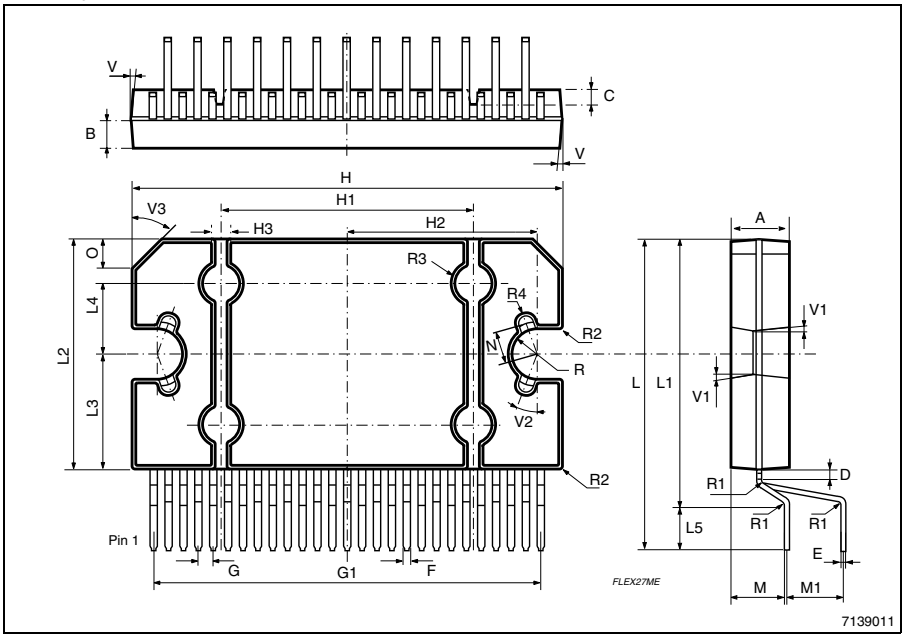
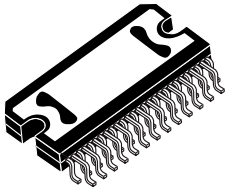


Figure 5. Flexiwatt27 (SMD) mechanical data and package dimensions

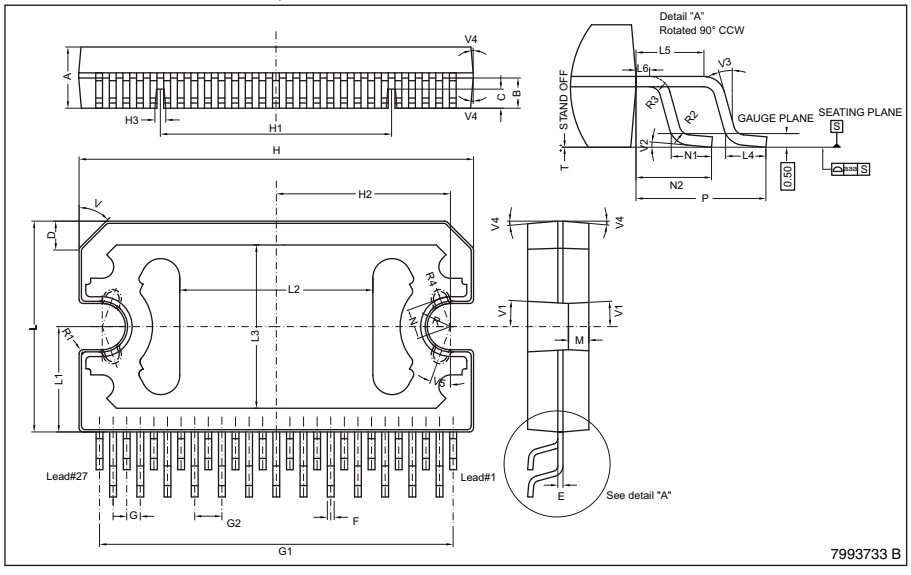
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.45	4.50	4.65	0.1752	0.1772	0.1831
B	2.12	2.22	2.32	0.0835	0.0874	0.0913
C		1.40			0.0551	
D		2.00			0.0787	
E	0.36	0.40	0.44	0.0142	0.0157	0.0173
F(**)	0.47	0.51	0.57	0.0185	0.0201	0.0224
G(*)	0.75	1.00	1.25	0.0295	0.0394	0.0492
G1	25.70	26.00	26.30	1.0118	1.0236	1.0354
G2(*)	1.75	2.00	2.25	0.0689	0.0787	0.0886
H(**)	28.85	29.23	29.40	1.1358	1.1508	1.1575
H1		17.00			0.6693	
H2		12.80			0.5039	
H3		0.80			0.0315	
L(**)	15.50	15.70	15.90	0.6102	0.6181	0.6260
L1	7.70	7.85	7.95	0.3031	0.3091	0.3130
L2	14.00	14.20	14.40	0.5512	0.5591	0.5669
L3	11.80	12.00	12.20	0.4646	0.4724	0.4803
L4	1.30	1.48	1.66	0.0512	0.0583	0.0654
L5	2.42	2.50	2.58	0.0953	0.0984	0.1016
L6	0.42	0.50	0.58	0.0165	0.0197	0.0228
M		1.50			0.0591	
N		2.20			0.0866	
N1	1.30	1.48	1.66	0.0512	0.0583	0.0654
N2(*)	2.73	2.83	2.93	0.1075	0.1114	0.1154
P(*)	4.73	4.83	4.93	0.1862	0.1902	0.1941
R		1.70			0.0669	
R1		0.30			0.0118	
R2	0.35	0.40	0.45	0.0138	0.0157	0.0177
R3	0.35	0.40	0.45	0.0138	0.0157	0.0177
R4		0.50			0.0197	
T(*)	-0.08		0.10	-0.0031		0.0039
aaa(*)		0.1			0.0039	
V		45°			45°	
V1		3°			3°	
V2	3°	5°	7°	3°	5°	7°
V3	12°	15°	18°	12°	15°	18°
V4		5°			5°	
V5		20°			20°	

(*) Golden parameters
(**) – Dimension "F" doesn't include dam-bar protrusion.
– Dimensions "H" and "L" include mold flash or protrusions.

OUTLINE AND MECHANICAL DATA



Flexiwatt27 (SMD)



3 Revision history

Table 4. Document revision history

Date	Revision	Changes
18-Jul-2013	1	Initial release.
18-Sep-2013	2	Updated Disclaimer.
24-Oct-2014	3	Added ‘AEC Q100 rev. G compliant’ in *Features* list.
27-Oct-2014	4	Modified in cover page the feature ‘AEC Q100 rev. G compliant’ in ‘Qualification in accordance to AEC Q100 rev. G standard’.