

Digital input high efficiency automotive power amplifier with built-in diagnostics features

General Description

The SMH8083 is a quad-bridge amplifier based on advanced BCD technology, integrating a full D/A converter, a digital input interface directly compatible with I²S or TDM, and a high-performance MOSFET output stage.

The integrated D/A converter delivers outstanding performance, with a signal-to-noise ratio of 115 dB and a dynamic range exceeding 115 dB.

In addition, the SMH8083 integrates a High-efficient Class-AB amplifier technology. This approach enables up to a 50% reduction in dissipated output power under typical monitoring conditions compared to conventional Class AB solutions.

The device also features a programmable PLL capable of handling an input frequency of 64×Fs across all supported input configurations. A comprehensive diagnostic system is integrated, providing real-time speaker status feedback via the I²C bus. This same I²C interface allows for extensive device configuration and control.

Features and Benefits

- 24-bit digital processing;
- 115 dB dynamic range (A-weighted)
- Extreme high efficiency HE mode
- Support parallel mode function
- High output power capability:
 - 4 x 27 W 4 Ω @ 14.4 V, 1 kHz, THD = 10%
 - 4 x 22 W 4 Ω @ 14.4 V, 1 kHz, THD = 1%
- Flexible mode control:
 - Full I²C bus driving 5V with four addresses selectable (only for PSO36 package option)
 - Independent front/rear play/ mute
 - Selectable digital gains for very-low noise line-out function
- Digital diagnostic with DC and AC load detections
- Stop/start-car prepared: keeps operating without audible disturbance during engine start at a battery voltage as low as 6 V
- Sample rates: 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
- Flexible serial data port (1.8 V / 3.3 V):
 - I²S standard, TDM 4Ch, TDM 8Ch, TDM 16Ch
- Digital input Offset detector
- Thermal protection
- Programmable diagnostic pin
- CMOS compatible enable pin, Independent front/rear clipping detector
- Real-time die temperature monitor
- Digital impedance meter

Order code	Package	Qty	Packing
SMH8083AB SMH8083AC	PSO36 (exp. pad up)	84	Tray

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1 Block diagram and pins description

1.1 Block diagram

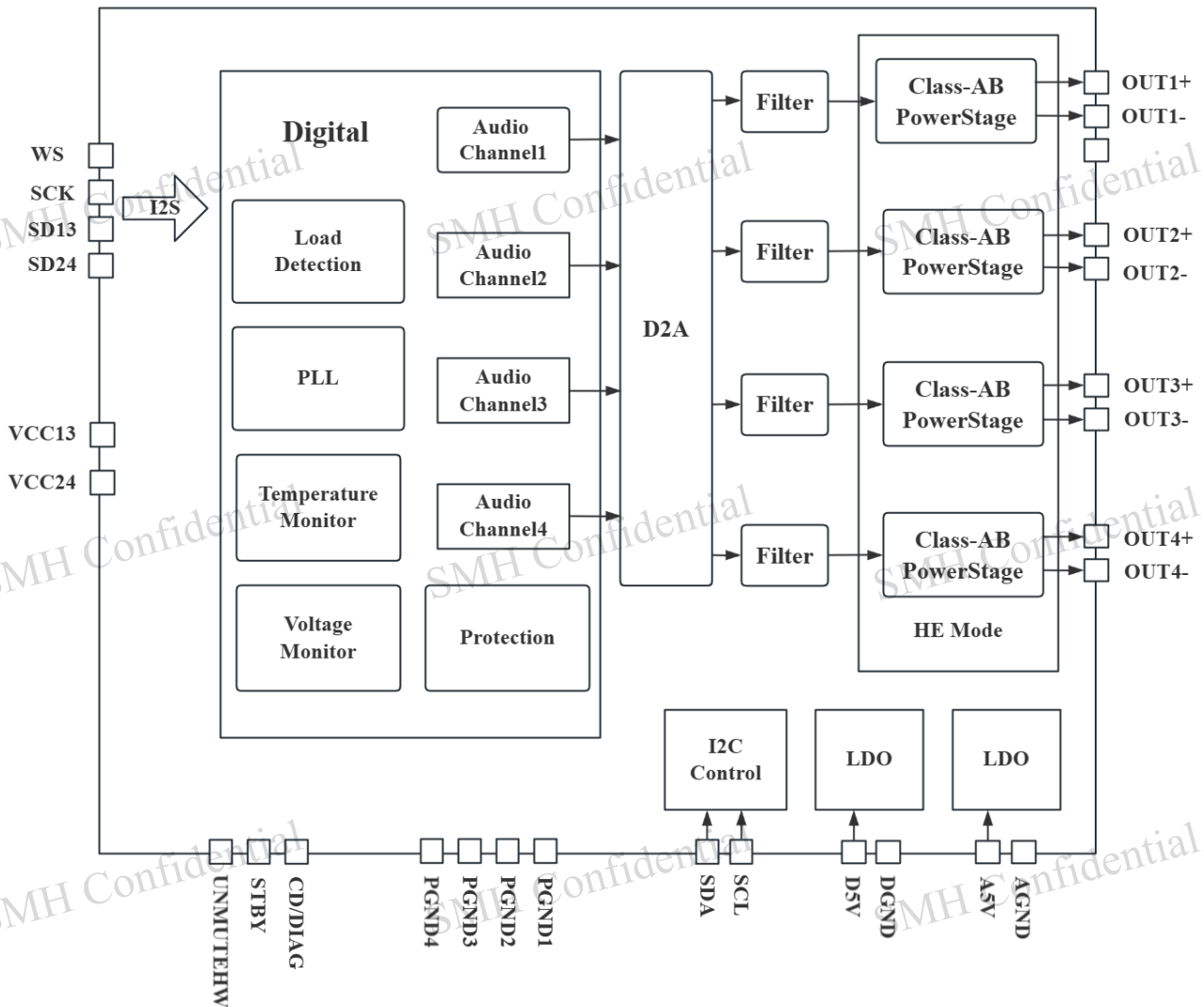
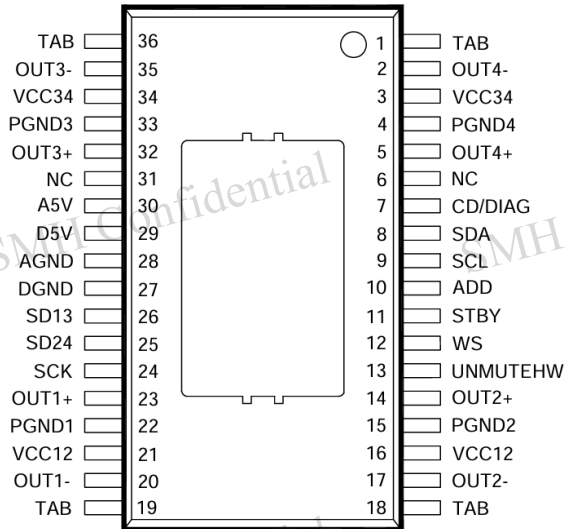
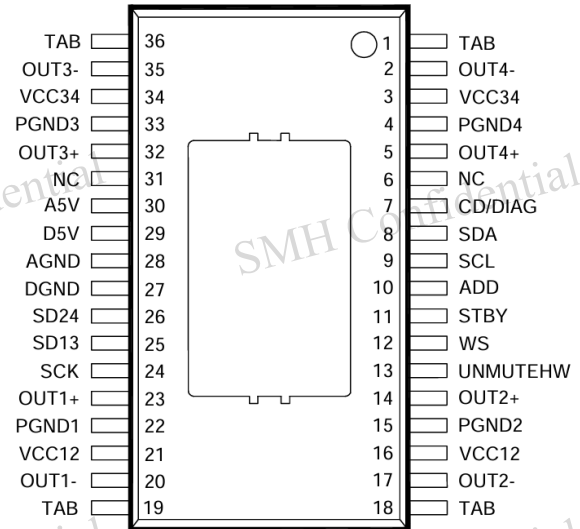


Figure 1. Block diagram

1.2 Pin description



(1) SMH8083AC



(2) SMH8083AB

Figure 2. Pins connection diagram

Table 1. PSO36 pins description

N°	Pin	Function	
1	TAB	Device slug connection	Ground
2	OUT4-	Channel 4 (right rear) negative output	Power Output
3	VCC34	Channel 3 and 4 positive supply	Battery
4	PGND4	Power ground channel 4	Power Ground
5	OUT4+	Channel 4 (right rear) positive output	Power Output
6	NC	Not connected	-
7	CD/DIAG	Clip detector and diagnostic output	Open Drain Output
8	SDA	I ² C data	Signal Input
9	SCL	I ² C clock	Signal Input
10	ADD	I ² C Address	Logic Input
11	STBY	STBY pin	Input
12	WS	Word select (I ² S bus)	Logic Input
13	UNMUTEHW	Unmute Hardware	Logic Input
14	OUT2+	Channel 2 (Left Rear) positive output	Power Output
15	PGND2	Power ground channel 2	Power Ground
16	VCC12	Channel 1 and 2 positive supply	Battery
17	OUT2-	Channel 2 (Left Rear) negative output	Power Output
18	TAB	Device slug connection	Ground
19	TAB	Device slug connection	Ground
20	OUT1-	Channel 1 (Left Front) negative output	Power Output
21	VCC12	Channel 1 and 2 positive supply	Battery
22	PGND1	Power ground channel 1	Power Ground
23	OUT1+	Channel 1 (Left Front) positive output	Power Output
24	SCK	Serial clock (I ² S bus)	Logic Input
25 ⁽¹⁾	SD24 (SMH8083AC) SD13 (SMH8083AB)	SD24: Serial data channel 2 and 4 (I ² S bus) SD13: Serial data channel 1 and 3 (I ² S bus)	Logic Input
26 ⁽¹⁾	SD13 (SMH8083AC) SD24 (SMH8083AB)		Logic Input
27	DGND	Digital ground	Signal Ground
28	AGND	Analog ground	Signal Ground
29	D5V	Digital 5V supply filter	Digital Regulator
30	A5V	Analog 5V supply filter	Analog Regulator
31	NC	Not connected	-
32	OUT3+	Channel 3 (right front) positive output	Power Output
33	PGND3	Power ground channel 3	Power Ground
34	VCC34	Channel 3 and 4 positive supply	Battery
35	OUT3-	Channel 3 (right front) negative output	Power Output
36	TAB	Device slug connection	Ground

(1) For different customers' application request, there are two bonding versions with pin 25 and pin 26 function exchanged.

- In SMH8083AC version: pin 25 = SD24, pin 26 = SD13
- In SMH8083AB version: pin 25 = SD13, pin 26 = SD24

Note:

- 1) With I²S input data format, SD13 & SD24 are used as input line, and only SMH8083AC can be selected;
- 2) With TDM4/8/16 data format, only SD13 is used as input line:
 - a) If I²S data sent to pin 25 in application system, only SMH8083AB can be selected;
 - b) If I²S data sent to pin 26 in application system, only SMH8083AC can be selected.

2 PSO36 (slug up) package information

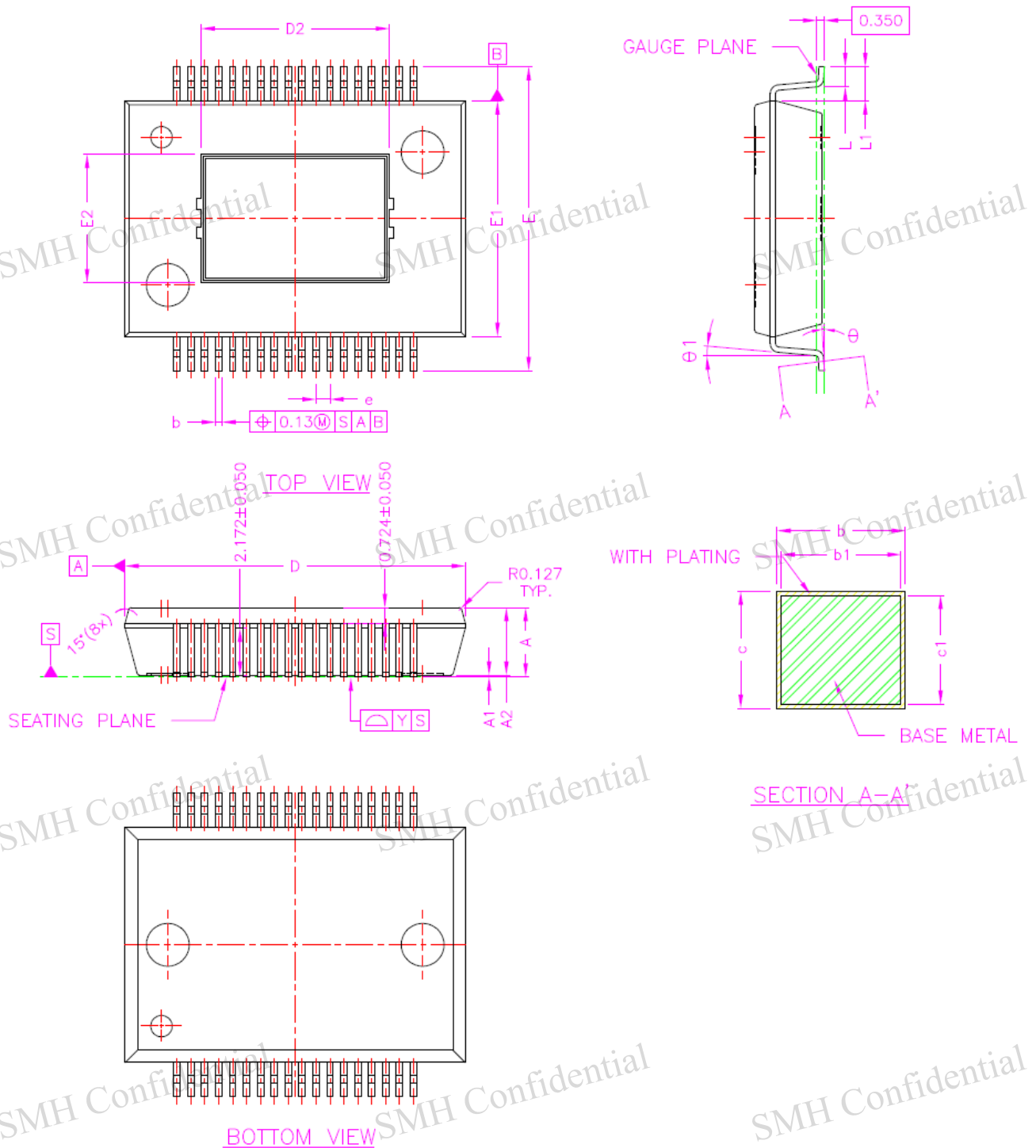


Figure 3. PSO36 (slug up) package outline

Table 2. PSO36 (slug up) package information

Symbol	Dimension (MM)			Dimension (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	3.27	-	3.41	128.7	-	134.3
A1	0.05	0.10	0.15	2.0	3.9	5.9
A2	3.20	3.25	3.30	125.9	128.0	130.0
b	0.22	0.30	0.38	8.7	11.8	15.0
b1	0.22	0.28	0.36	8.7	11.0	14.2
c	0.20	-	0.35	7.9	-	13.8
c1	0.24	0.25	0.26	9.4	9.8	10.2
D	15.70	15.90	16.10	618.1	626.0	633.9
D2	9.012	9.212	9.412	354.8	362.7	370.6
E	14.00	14.20	14.40	551.2	559.1	566.9
E1	10.80	11.00	11.20	425.2	433.1	440.9
E2	6.6	6.80	7.00	259.8	267.7	275.6
e	0.65 BSC			25.6 BSC		
L	0.80	0.95	1.10	31.5	37.4	43.3
L1	1.60REF			63REF		
Y	-	-	0.10	-	-	3.9
θ	0°	-	8°	0°	-	8°
θ1	0°	-	-	0°	-	-

Note:

- Dimension “D” does not include mold flash, protrusion or gate burrs, mold flash, protrusion and gate burrs shall not exceed 0.15mm per side.
- Dimension “E1” does not include interlead mold flash or protrusion, interlead mold flash or protrusion shall not exceed 0.25mm per side.
- Dimension “b” does not include dambar protrusion. Allowable dambar protrusion shall be 0.1mm total in excess of the “b” dimension at maximum material condition.
- The dambar can not be located on the lower radius of the foot.

3 Generic Package View

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

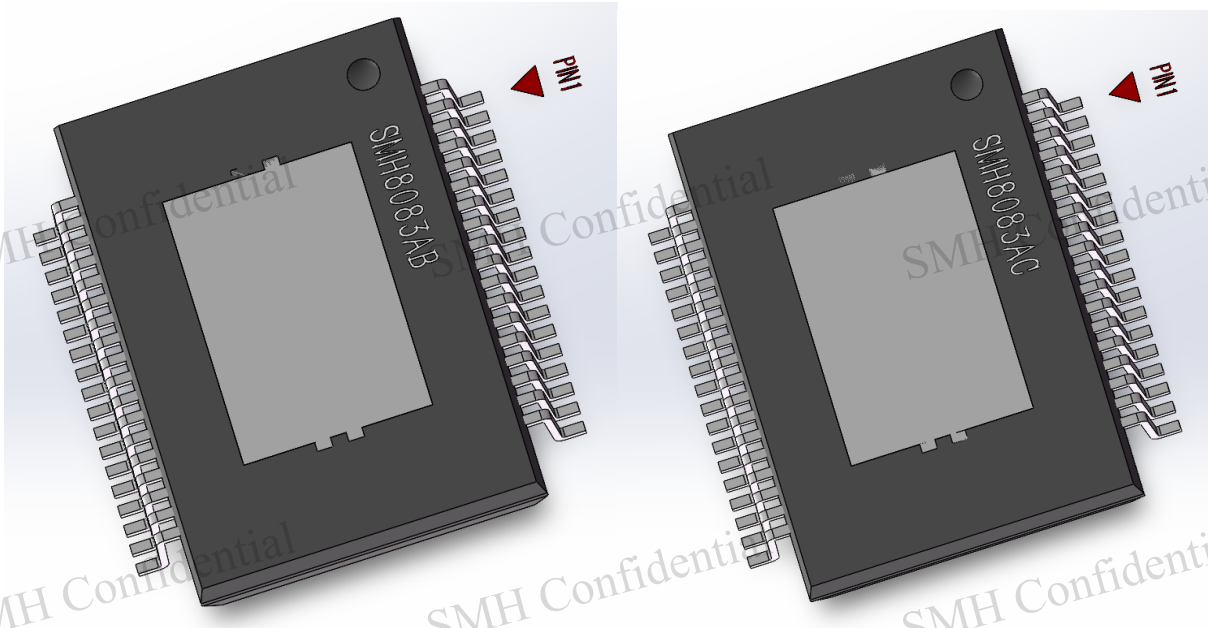


Figure 4. Generic Package View (top view)

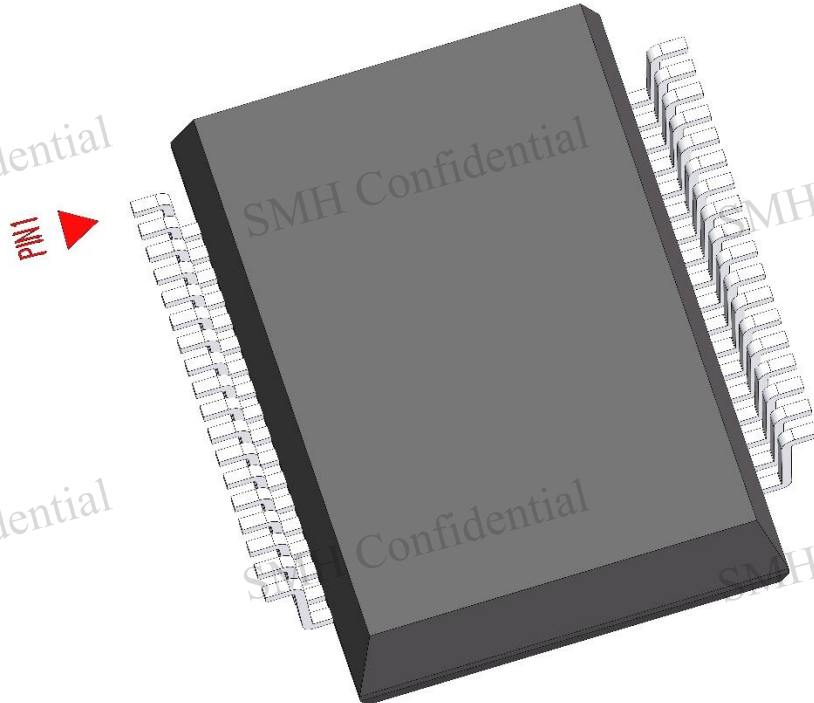


Figure 5. Generic Package View (bottom view)