AN8746SA

PWM driver IC for portable CD player

■ Overview

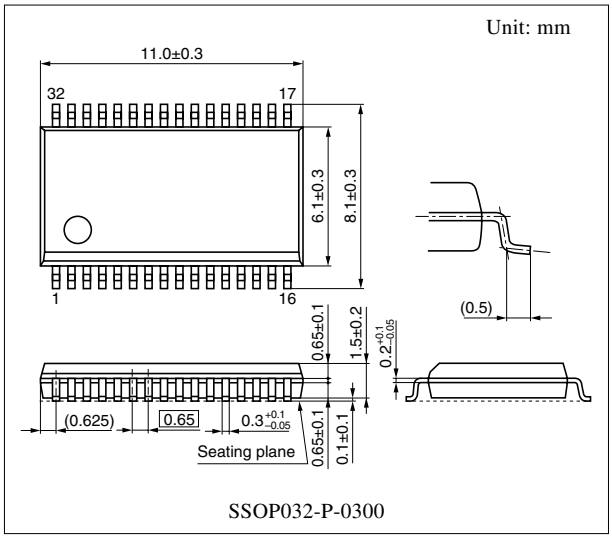
The AN8746SA is a 4-channel actuator/motor drive IC by DMOS direct PWM method for a portable CD player.

■ Features

- R_{ON} = 1.8 Ω (typ.)
- Supply voltage range
  (Control block: 2.0 V to 3.6 V, power block: 1.2 V to 3.6 V)
- Current at standby
  (Control block: 1 µA or less, power block: 1 µA or less)
- With an output pin of monitoring 1/2 of the power supply voltage

■ Applications

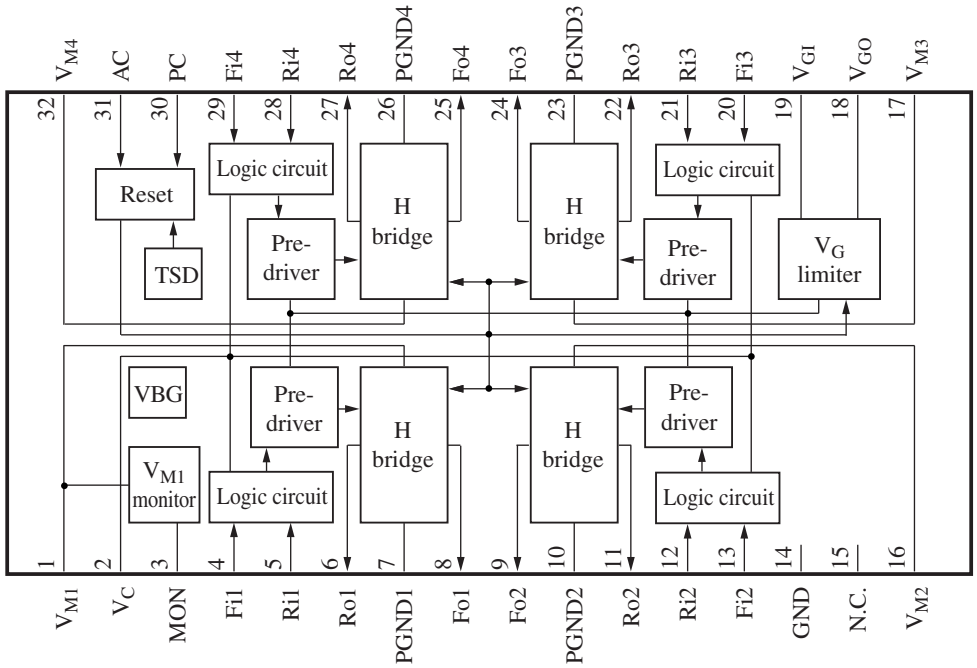
- Portable CD player



SSOP032-P-0300

Note) The package of this product will be changed to lead-free type (SSOP032-P-0300B). See the new package dimensions section later of this datasheet.

■ Block Diagram



■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	V_{M1}	Ch. 1 power supply	17	V_{M3}	Ch.3 power supply
2	V_C	Control circuit power supply	18	V_{GO}	Gate voltage clamp output
3	MON	VM1 monitor	19	V_{GI}	Gate voltage input pin
4	Fil	Ch. 1 forward direction input pin	20	Fi3	Ch. 3 forward direction input pin
5	Ril	Ch. 1 reverse direction input pin	21	Ri3	Ch. 3 reverse direction input pin
6	Rol	Ch. 1 reverse direction output pin	22	Ro3	Ch. 3 reverse direction output pin
7	PGND1	Ch. 1 power ground	23	PGND3	Ch. 3 power ground
8	Fo1	Ch. 1 forward direction output pin	24	Fo3	Ch. 3 forward direction output pin
9	Fo2	Ch. 2 forward direction output pin	25	Fo4	Ch. 4 forward direction output pin
10	PGND2	Ch. 2 power ground	26	PGND4	Ch. 4 power ground
11	Ro2	Ch. 2 reverse direction output pin	27	Ro4	Ch. 4 reverse direction output pin
12	Ri2	Ch. 2 reverse direction intput pin	28	Ri4	Ch. 4 reverse direction input pin
13	Fi2	Ch. 2 forward direction input pin	29	Fi4	Ch. 4 forward direction input pin
14	GND	Control circuit ground	30	PC	Power cut pin
15	N.C.	—	31	AC	All cut-off pin
16	V_{M2}	Ch. 2 power supply	32	V_{M4}	Ch. 4 power supply

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_C	5	V
	V_M	7	
	V_{GI}	8.2	
Supply current	I_{DD}	500	mA
Power dissipation *2	P_D	400	mW
Operating ambient temperature *1	T_{opr}	−30 to +75	°C
Storage temperature *1	T_{stg}	−55 to +150	°C

Note) ∗1: Except for the operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.

∗2: Use within the range of P_D = 390 mW or less at T_a = 75°C, following the allowable power dissipation characteristic curve of "■ Application Notes".

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V_C	2.0 to 2.4 to 3.6	V
	V_M	1.2 to 2.4 to 3.6	
	V_{GI}	V_M +3.5 to 7.0 to 8.0	
Signal input voltage	V_{IN}	0 to V_C	V

■ Electrical Characteristics at $V_C = 2.4$ V, $V_{M12} = V_{M34} = 2.4$ V, $V_{GI} = 7.0$ V, AC = PC = 2.4 V, $R_L = 8\ \Omega$, $T_a = 25°C$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Power supply current at mute (at PC = L or V_C = L) *1	I_{MO}	PC = 0 V, AC = V_C = 2.4 V or V_C = PC = AC = 0 V	—	—	1	µA
Control supply current at all cut (at AC = L or PC = L)	I_{CO}	AC = L, PC = L	—	—	1	µA
Control supply current at operating *2	I_C	AC = PC = V_C = 2.4 V	—	0.5	1	mA
Pre-driver supply current at all cut (at AC = L) *2	I_{GO}	AC = 0 V	—	—	1	µA
Pre-driver supply current at operation (at V_{GI} = 7 V) *2	I_G	AC = PC = V_C = 2.4 V	—	0.5	1	mA
PWM input voltage high-level	V_{INH}	AC = PC = V_C = 2.4 V Fil to Fi4 = Ril to Ri4 = H	$V_C - 0.6$	—	—	V
PWM input voltage low-level	V_{INL}	AC = PC = V_C = 2.4 V Fil to Fi4 = Ril to Ri4 = L	—	—	0.6	V
PWM input current high-level	I_{INH}	AC = PC = V_C = 2.4 V Fil to Fi4 = Ril to Ri4 = H	—	—	1	µA
PWM input current low-level	I_{INL}	AC = PC = V_C = 2.4 V Fil to Fi4 = Ril to Ri4 = L	−1	—	—	µA
Driver on resistance (upper and lower)	R_{ON}	AC = PC = V_C = 2.4 V	—	1.8	2.5	Ω
Output propagation delay time at rising *2	t_{Dr}	AC = PC = V_C = 2.4 V	—	0.2	1	µs
Output propagation delay time at falling *2	t_{Df}	AC = PC = V_C = 2.4 V	—	0.2	1	µs
Output propagation delay time difference t_{Dr}-t_{Df}	Δt_D	AC = PC = V_C = 2.4 V	− 0.3	—	0.3	µs
Minimum input pulse width *3	t_{min}	AC = PC = V_C = 2.4 V	0.3	—	—	µs
V_M monitor output voltage width	V_{MON}	AC = PC = V_C = 2.4 V	1.1	1.2	1.3	V
V_M monitor output gain	G_{MON}	AC = PC = V_C = 2.4 V	0.45	0.5	0.55	—
Power output pin flow-out/in current at low V_C *1	I_{HZ}	AC = PC = V_C = 0 V	−50	—	50	µA
V_M monitor output voltage at V_C limit	LMON	$V_{M12} = V_{M34}$ = 5.0 V AC = PC = V_C = 1.9 V	1.7	1.9	2.1	V

Note) ∗1: AC pin and PC pin are connected to V_C pin via a protective diode.
AC pin and PC pin must be set to 0 V at V_C = 0 V to avoid excessive flow-in current.
∗2: Measure at f = 44.1 kHz and in duty ratio = 50%.
∗3: Measure at f = 44.1 kHz. Output pulse width must be ≥ t_{min} /2.

■ Electrical Characteristics at $V_C = 2.4$ V, $V_{M12} = V_{M34} = 2.4$ V, $V_{GI} = 7.0$ V, AC = PC = 2.4 V, $R_L = 8\ \Omega$, $T_a = 25°C$ (continued)

• Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

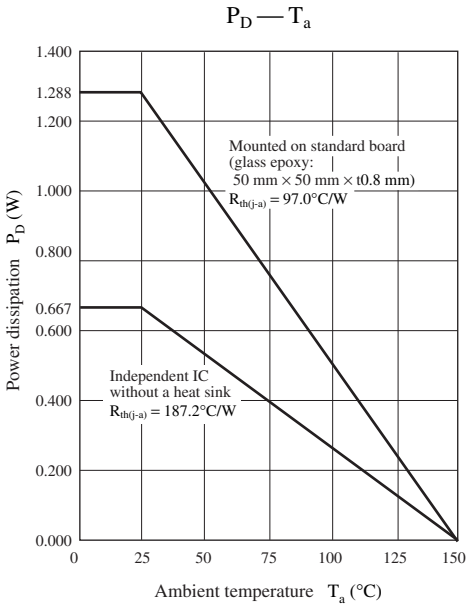
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Thermal protection						
Thermal protection operating temperature	T_{THD}		—	145	—	°C
Thermal protection hysteresis width	ΔT_{THD}		—	20	—	°C

■ Usage Notes

1. Care should be taken so as not to cause any of the following conditions on use of this IC. If the following conditions come up, the IC is likely to break down or to be smoking.
   Short-circuit between output pins
   Short-circuit between output pin and GND
   Short-circuit between output pin and power supply
   (Output pin refers to any of those Fo1 (pin 8), Ro1 (pin 6), Fo2 (pin 9), Ro2 (pin 11), Fo3 (pin 24), Ro3 (pin 22), Fo4 (pin 25), Ro4 (pin 27). GND refers to any of those GND (pin 14), PGND1 (pin 7), PGND2 (pin 10), PGND3 (pin 23), PGND4 (pin 26). Power supply refers to any of those V_C (pin 2), V_{GI} (pin 19), V_{M1} (pin 1), V_{M2} (pin16), V_{M3} (pin 17), V_{M4} (pin 32).
2. V_{M1} monitor pin (pin 3) outputs approximately one half of V_{M1} voltage and its upper limit is V_C supply voltage. This is meant to prevent the DSP connected to this Pin from damage when the voltage exceeding an operating supply voltage range is inputted to the V_{M1} pin. On use of this pin, therefore, note that no value exceeding V_C is outputted.

■ Application Notes

1. P_D — T_a curves of SSOP032-P-0300



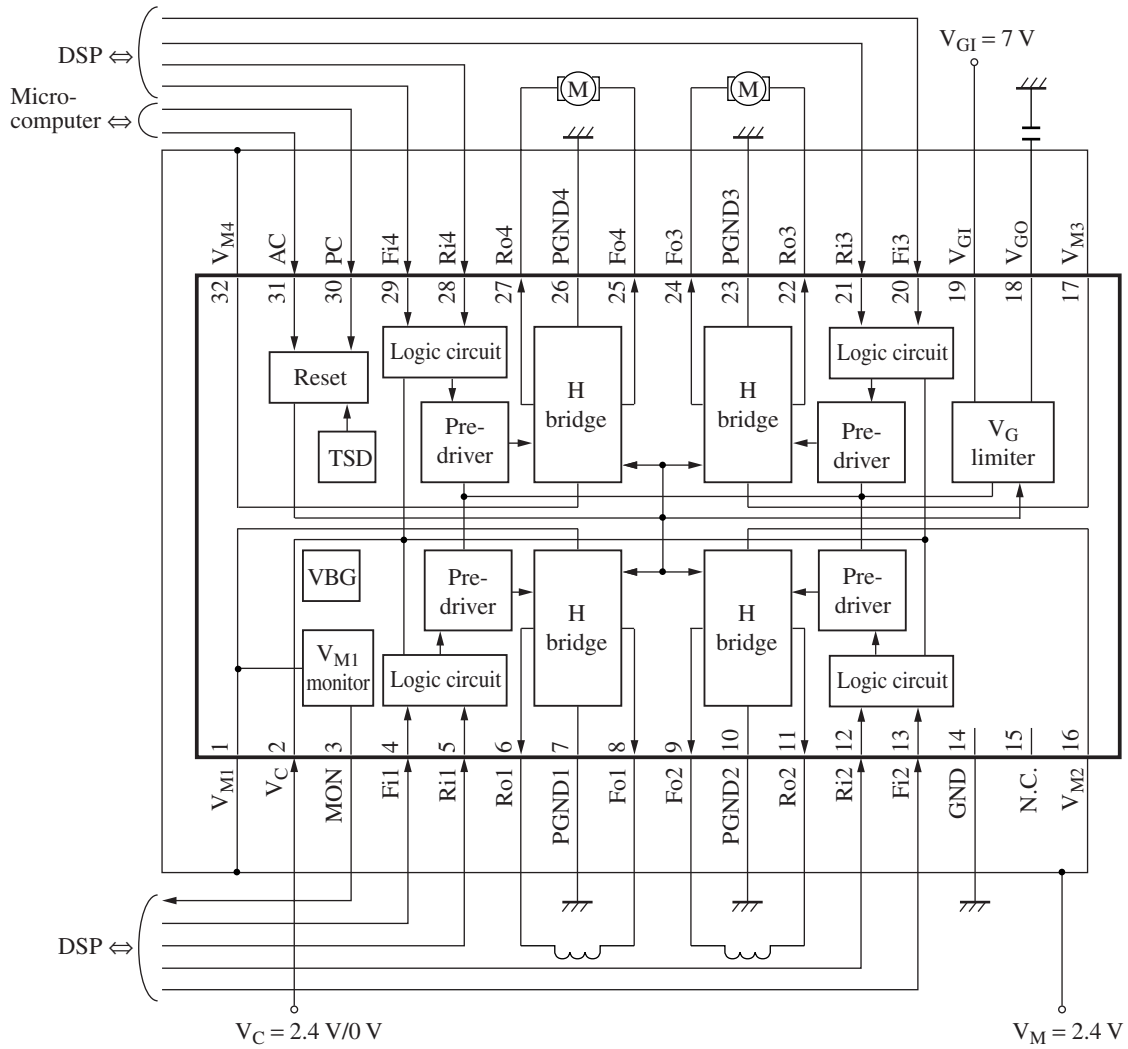
■ Application Notes

2. Logic table of driver

V_C	PC	Fil to Fi4	Ril to Ri4	Fol to Fo3	Rol to Ro3	Fo4	Ro4
H	H	L	L	L	L	L	L
H	H	L	H	L	H	L	H
H	H	H	L	H	L	L	L
H	H	H	H	L	L	H	L
H	L	X	X	L	L	L	L
L	X	X	X	Hi-Z	Hi-Z	Hi-Z	Hi-Z

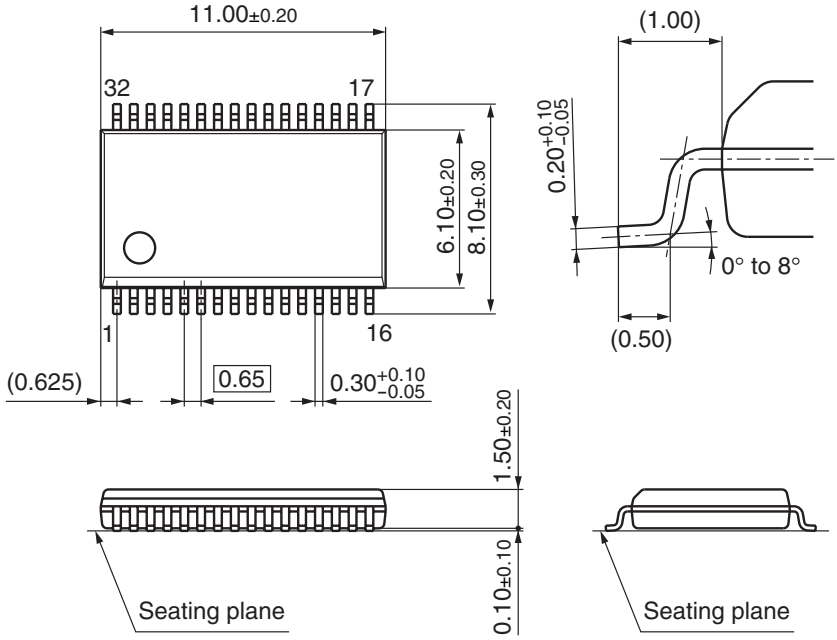
Note) AC = H on the above logic table. H stands for V_C power supply potential, L for GND potential (0 V) and X for H or L.
Hi-Z indicates that the driver output pin becomes a high impedance state.
Logic input pin must not be left open. And do not apply any other voltages than H or L.

■ Application Circuit Example



■ New Package Dimensions (Unit: mm)

• SSOP032-P-0300B (Lead-free package)



Request for your special attention and precautions in using the technical information and semiconductors described in this material

(1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.

(2) The technical information described in this material is limited to showing representative characteristics and applied circuit examples of the products. It does not constitute the warranting of industrial property, the granting of relative rights, or the granting of any license.

(3) The products described in this material are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
- Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
- Any applications other than the standard applications intended.

(4) The products and product specifications described in this material are subject to change without notice for reasons of modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.

(5) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, redundant design is recommended, so that such equipment may not violate relevant laws or regulations because of the function of our products.

(6) When using products for which dry packing is required, observe the conditions (including shelf life and after-unpacking standby time) agreed upon when specification sheets are individually exchanged.

(7) No part of this material may be reprinted or reproduced by any means without written permission from our company.

Please read the following notes before using the datasheets

A. These materials are intended as a reference to assist customers with the selection of Panasonic semiconductor products best suited to their applications.
Due to modification or other reasons, any information contained in this material, such as available product types, technical data, and so on, is subject to change without notice.
Customers are advised to contact our semiconductor sales office and obtain the latest information before starting precise technical research and/or purchasing activities.

B. Panasonic is endeavoring to continually improve the quality and reliability of these materials but there is always the possibility that further rectifications will be required in the future. Therefore, Panasonic will not assume any liability for any damages arising from any errors etc. that may appear in this material.

C. These materials are solely intended for a customer's individual use.
Therefore, without the prior written approval of Panasonic, any other use such as reproducing, selling, or distributing this material to a third party, via the Internet or in any other way, is prohibited.

2001 MAR