# AN8290S

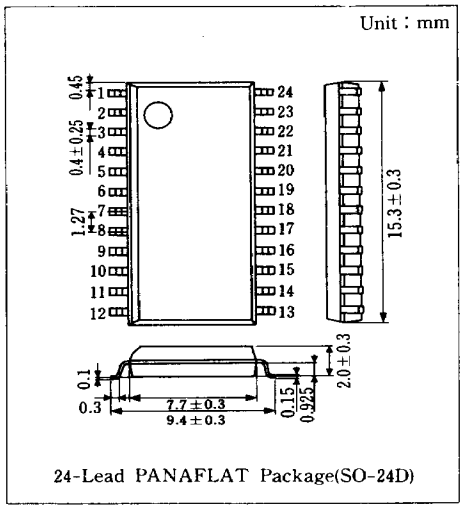
## IC for Spindle Motor Control

### ■ Outline

The AN8290S is an integrated circuit designed for the spindle motor control of a compact disc player. Because of the PWM 3-phase full-wave drive method, efficiency becomes high. The power-down circuit is built in, realizing the low power consumption.

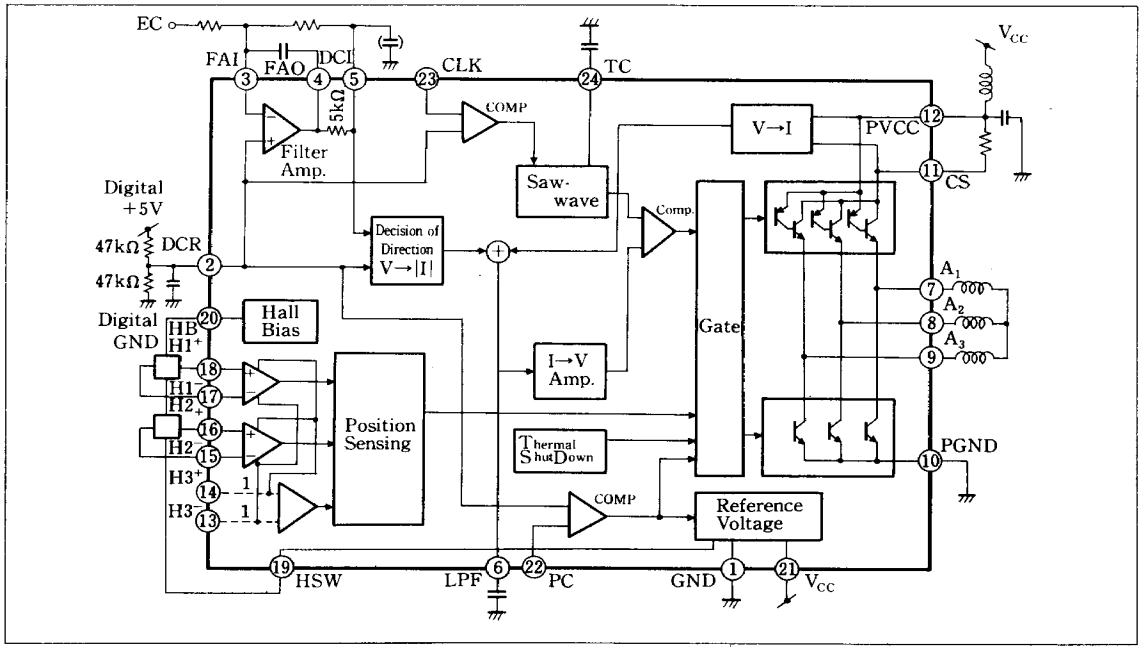
### ■ Features

- Operating power supply voltage: $V_{CC(opr)} = 4.5 \sim 20V$
- PWM 3-phase full-wave drive (with built-in power transistor)
- Thermal protector and power-down circuit built-in




24-Lead PANAFLAT Package(SO-24D)

### ■ Block Diagram



## ■ Absolute Maximum Ratings (Ta=25℃)

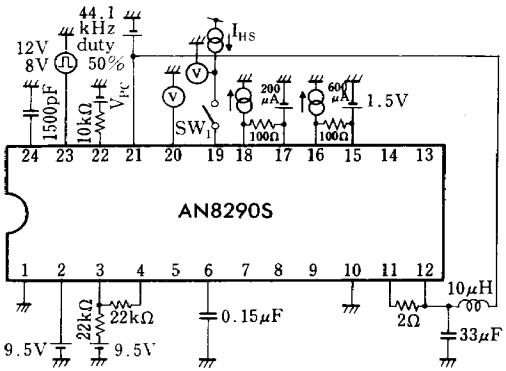
| Item | Symbol | Rating | Unit |
|---|---|---|---|
| Supply Voltage | $V_{CC}$ | 21 | V |
| Supply Current | $I_{CC}$ | 20 | mA |
| Power Dissipation | $P_D$ | 560 | mW |
| Operating Ambient Temperature | $T_{opr}$ | −20～+75 | ℃ |
| Storage Temperature | $T_{stg}$ | −55～+125 | ℃ |

## ■ Electrical Characteristics ($V_{CC}$=12V, Ta=25℃)

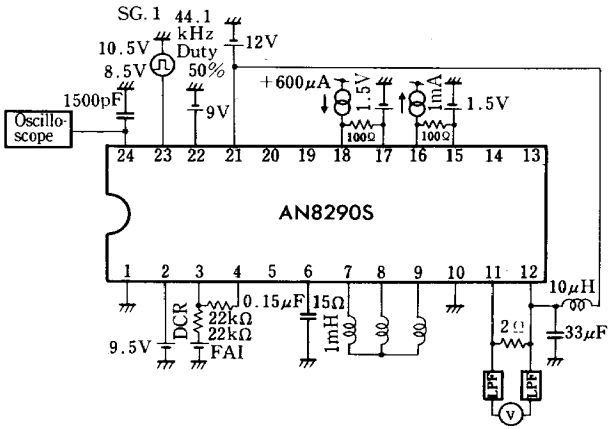
| Item | Symbol | Test Circuit | Condition | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| No-Load Total Current | $I_{tot}$ | 1 | $V_{CC}$=12V, $SW_1$OFF, $V_{PC}$=9V | 7.0 | 9.0 | 11.0 | mA |
| Power-Down Mode Total Current | $I_{tot(PD)}$ | 1 | $V_{CC}$=12V | | | 1 | mA |
| Output Amplitude (1-1) | $V_{01-1}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-2) | $V_{01-2}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-3) | $V_{01-3}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-4) | $V_{01-4}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-5) | $V_{01-5}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-6) | $V_{01-6}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-7) | $V_{01-7}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-8) | $V_{01-8}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-9) | $V_{01-9}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-10) | $V_{01-10}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-11) | $V_{01-11}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (1-12) | $V_{01-12}$ | 2 | $V_{CC}$=12V | 8.5 | | | V |
| Output Amplitude (2-1) | $V_{02-1}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-2) | $V_{02-2}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-3) | $V_{02-3}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-4) | $V_{02-4}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-5) | $V_{02-5}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-6) | $V_{02-6}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-7) | $V_{02-7}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-8) | $V_{02-8}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-9) | $V_{02-9}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-10) | $V_{02-10}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-11) | $V_{02-11}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Output Amplitude (2-12) | $V_{02-12}$ | 2 | $V_{CC}$=12V | −0.05 | | 0.05 | V |
| Limit Voltage (I) | $V_{LF}$ | 3 | $V_{CC}$=12V | 0.5 | 0.05 | 0.7 | V |
| Limit Voltage (II) | $V_{LD}$ | 3 | $V_{CC}$=12V | 0.5 | 0.53 | 0.7 | V |
| Idle Voltage | $V_{Idol}$ | 3 | $V_{CC}$=12V | | | 20 | mV |
| Drive Offset Voltage (I) | $V_{OF}$ | 3 | $V_{CC}$=12V | | | 100 | mV |
| Drive Offset Voltage (II) | $V_{OR}$ | 3 | $V_{CC}$=12V | | | 100 | mV |
| PWM Output (1) | $T_{P(1)}$ | 3 | $V_{CC}$=12V, FAI=9.9V | 140 | 200 | 260 | mV |
| PWM Output (2) | $T_{P(2)}$ | 3 | $V_{CC}$=12V, FAI=9.1V | 140 | 200 | 260 | mV |
| Sawtooth Wave Offset Voltage | $V_{KA}$ | 3 | $V_{CC}$=12V | 0,70 | 0.90 | 1.10 | V |
| Sawtooth Wave Offset Voltage | $V_{KO}$ | 3 | $V_{CC}$=12V | 1.80 | 1.95 | 2.10 | V |
| Hall Bias Voltage | $V_{HB}$ | 1 | $V_{CC}$=12V, $SW_1$ OFF, $I_{HR}$=0mA | 1.7 | 2.20 | 2.5 | V |
| Hall Switch Saturation Voltage | $V_{HS}$ | 1 | $V_{CC}$=12V, $SW_1$ ON, $I_{HS}$=10mA | | | 1.2 | V |

Note) Operating Supply Voltage Range : $V_{CC(opr)}$=4.5～20V

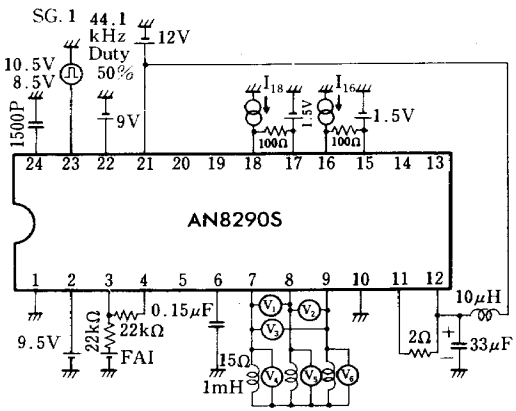
**Test Circuit 1** ($I_{tot}$, $I_{tot(PD)}$, $V_{HB}$, $V_{HS}$)




**Test Circuit 3** ($V_{LF}$, $V_{LR}$, $V_{Idol}$, $V_{OF}$, $V_{OR}$, $T_{P(1)\sim(2)}$, $V_{KA}$, $V_{KO}$)




**Test Circuit 2** ($v_{O1\text{-}1\sim12}$, $v_{O2\ 1\sim12}$)




| Item | FAI | $I_{16}$ | $I_{18}$ | Test Pin No. (Digital Voltmeter) | Item | FAI | $I_{16}$ | $I_{18}$ | Test Pin No. (Digital Voltmeter) |
|---|---|---|---|---|---|---|---|---|---|
| Output Amplitude (1-1) | 8V | −600μA | −200μA | $V_{7-9}(V_3)$ | Output Amplitude (2-1) | 8V | −600μA | −200μA | ($V_5$) |
| Output Amplitude (1-2) | 8V | −600μA | −200μA | $V_{8-9}(V_2)$ | Output Amplitude (2-2) | 8V | −600μA | +200μA | ($V_4$) |
| Output Amplitude (1-3) | 8V | −200μA | +600μA | $V_{8-7}(V_1)$ | Output Amplitude (2-3) | 8V | −200μA | +600μA | ($V_6$) |
| Output Amplitude (1-4) | 8V | +200μA | +200μA | $V_{9-7}(V_3)$ | Output Amplitude (2-4) | 8V | +200μA | +200μA | ($V_5$) |
| Output Amplitude (1-5) | 8V | +600μA | −200μA | $V_{9-8}(V_2)$ | Output Amplitude (2-5) | 8V | +600μA | −200μA | ($V_4$) |
| Output Amplitude (1-6) | 8V | +600μA | −1mA | $V_{7-8}(V_1)$ | Output Amplitude (2-6) | 8V | +600μA | −1mA | ($V_6$) |
| Output Amplitude (1-7) | 11V | −600μA | −200μA | $V_{9-7}(V_3)$ | Output Amplitude (2-7) | 11V | −600μA | −200μA | ($V_5$) |
| Output Amplitude (1-8) | 11V | −600μA | +200μA | $V_{9-8}(V_2)$ | Output Amplitude (2-8) | 11V | −600μA | +200μA | ($V_4$) |
| Output Amplitude (1-9) | 11V | −200μA | +600μA | $V_{7-8}(V_1)$ | Output Amplitude (2-9) | 11V | −200μA | +600μA | ($V_6$) |
| Output Amplitude (1-10) | 11V | +200μA | +200μA | $V_{7-9}(V_3)$ | Output Amplitude (2-10) | 11V | +200μA | +200μA | ($V_5$) |
| Output Amplitude (1-11) | 11V | +600μA | −200μA | $V_{8-9}(V_2)$ | Output Amplitude (2-11) | 11V | +600μA | −200μA | ($V_4$) |
| Output Amplitude (1-12) | 11V | +600μA | −1mA | $V_{8-7}(V_1)$ | Output Amplitude (2-12) | 11V | +600μA | −1mA | ($V_6$) |

## ■ Pin

| Pin No. | Pin Name | Pin No. | Pin Name |
|---|---|---|---|
| 1 | Signal GND | 13 | H3⁻ Output |
| 2 | Logic Reference | 14 | H3⁺ Output |
| 3 | Filter Amp. Input | 15 | H2⁻ Input |
| 4 | Filter Amp. Output | 16 | H2⁺ Input |
| 5 | Absolute Circuit Input | 17 | H1⁻ Input |
| 6 | Loop Filter | 18 | H1⁺ Input |
| 7 | Power Output (1) | 19 | Hall Switch |
| 8 | Power Output (2) | 20 | Hall Bias Output |
| 9 | Power Output (3) | 21 | $V_{CC}$ |
| 10 | Power GND | 22 | Power Down Control |
| 11 | Detector of Current | 23 | Clock Input |
| 12 | Power $V_{CC}$ | 24 | Sawtooth-Wave Output |

## ■ Application Circuit