

# AN8290S

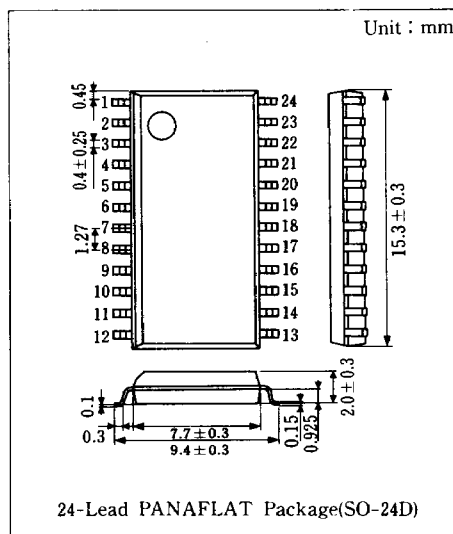
## IC for Spindle Motor Control

### ■ Outline

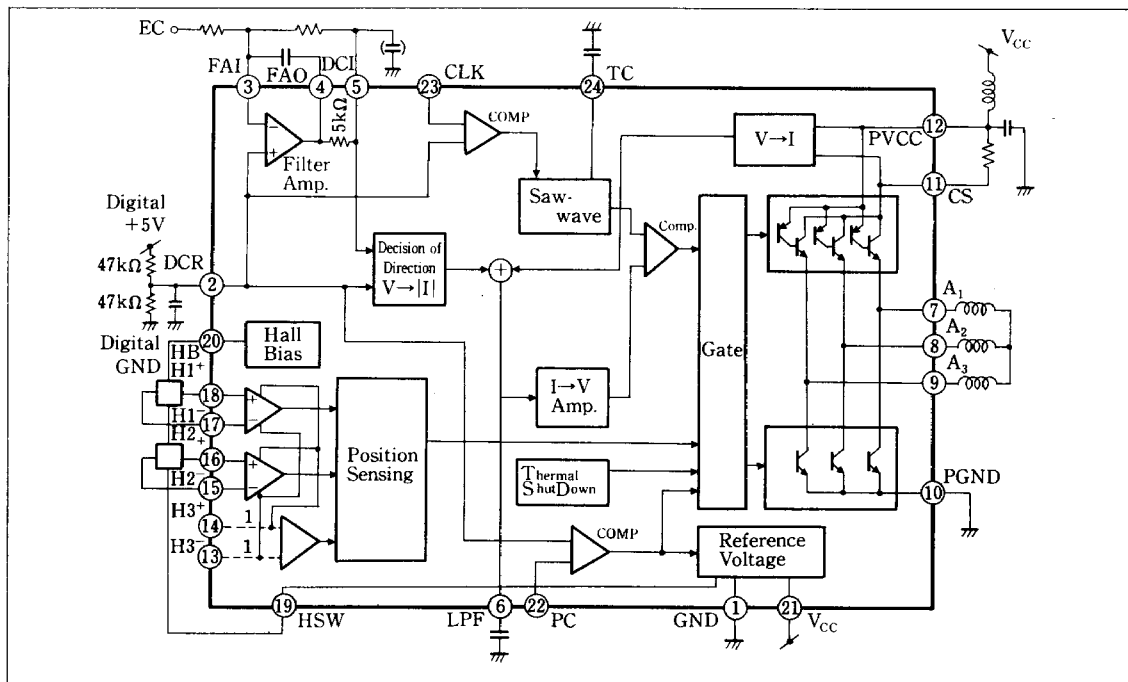
The AN8290S is an integrated circuit designed for the spindle motor control of a compact disc player. Because of the PWM 3-phase full-wave drive method, efficiency becomes high. The power-down circuit is built in, realizing the low power consumption.

### ■ 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



### ■ Block Diagram



# **Absolute Maximum Ratings (Ta=25°C)**

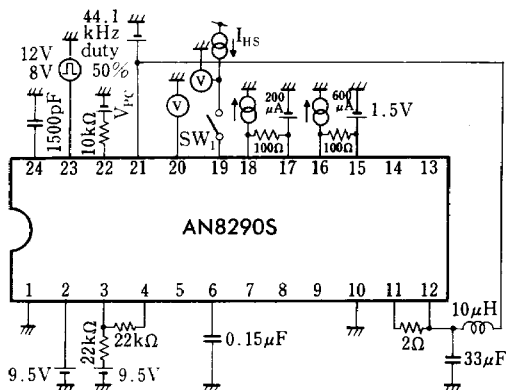
| Item                          | Symbol    | Rating     | Unit |
|-------------------------------|-----------|------------|------|
| Supply Voltage                | $V_{CC}$  | 21         | V    |
| Supply Current                | $I_{CC}$  | 20         | mA   |
| Power Dissipation             | $P_D$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

# **Electrical Characteristics ( $V_{CC}=12V$ , $T_a=25^\circ C$ )**

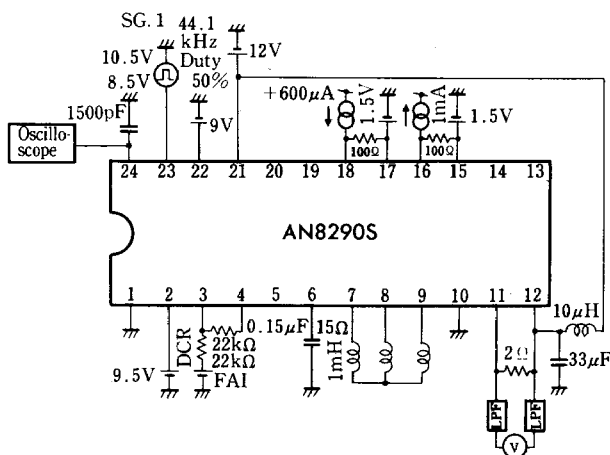
| Item                           | Symbol        | Test Circuit | Condition                                        | min.  | typ. | max. | Unit |
|--------------------------------|---------------|--------------|--------------------------------------------------|-------|------|------|------|
| No-Load Total Current          | $I_{tot}$     | 1            | $V_{CC}=12V$ , SW <sub>1</sub> 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                   | $V_{ido1}$    | 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 <sub>1</sub> OFF, $I_{HR}=0mA$ | 1.7   | 2.20 | 2.5  | V    |
| Hall Switch Saturation Voltage | $V_{HS}$      | 1            | $V_{CC}=12V$ , SW <sub>1</sub> ON, $I_{HS}=10mA$ |       |      | 1.2  | V    |

Note) Operating Supply Voltage Range :  $V_{CC(OPR)}=4.5\sim 20V$

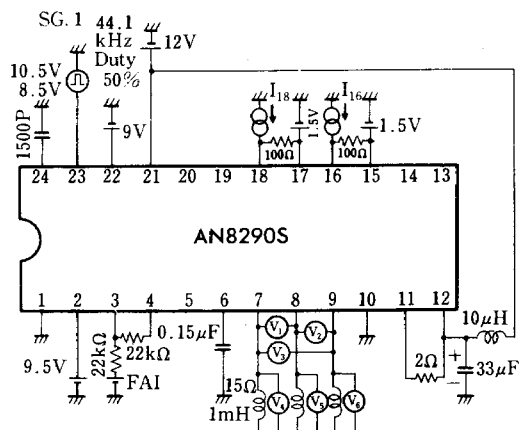
**Test Circuit 1** ( $I_{tot}$ ,  $I_{tot(PD)}$ ,  $V_{HB}$ ,  $V_{HS}$ )



**Test Circuit 3** ( $V_{LF}$ ,  $V_{LR}$ ,  $V_{Ido1}$ ,  $V_{OF}$ ,  $V_{OR}$ ,  
 $T_{P(1-2)}$ ,  $V_{KA}$ ,  $V_{KO}$ )



**Test Circuit 2** ( $v_{01-1-12}$ ,  $v_{02-1-12}$ )



| Item                   | FAI | $I_{16}$ | $I_{18}$ | Test Pin No.<br>(Digital Voltmeter) | Item                   | FAI | $I_{16}$ | $I_{18}$ | Test Pin No.<br>(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 <sup>-</sup> Output |
| 2       | Logic Reference        | 14      | H3 <sup>+</sup> Output |
| 3       | Filter Amp. Input      | 15      | H2 <sup>-</sup> Input  |
| 4       | Filter Amp. Output     | 16      | H2 <sup>+</sup> Input  |
| 5       | Absolute Circuit Input | 17      | H1 <sup>-</sup> Input  |
| 6       | Loop Filter            | 18      | H1 <sup>+</sup> Input  |
| 7       | Power Output (1)       | 19      | Hall Switch            |
| 8       | Power Output (2)       | 20      | Hall Bias Output       |
| 9       | Power Output (3)       | 21      | V <sub>CC</sub>        |
| 10      | Power GND              | 22      | Power Down Control     |
| 11      | Detector of Current    | 23      | Clock Input            |
| 12      | Power V <sub>CC</sub>  | 24      | Sawtooth-Wave Output   |

## ■ Application Circuit

