

# AN5452

## IC for landing correction

### Overview

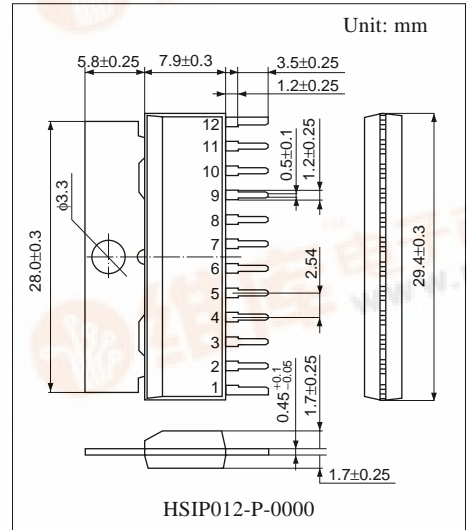
The AN5452 is an IC to drive a landing correction coil of CRT monitor. The circuit is suitable for low power consumption design.

### Features

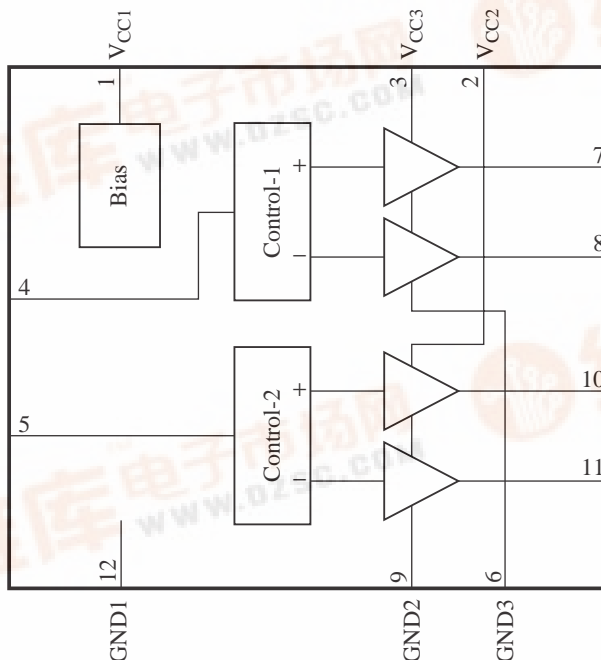
- Built-in power amplifier ( $\pm 200$  mA)
- Low standby current (typ.: 2 mA)
- Incorporating 2 circuits

### Applications

- CRT monitors



### Block Diagram



### ■ Pin Descriptions

| Pin No. | Description                                   | Pin No. | Description              |
|---------|---|---------|--------------------------|
| 1       | Control block power supply 12 V ( $V_{CC1}$ ) | 7       | Landing1 positive output |
| 2       | Output block power supply 12 V ( $V_{CC2}$ )  | 8       | Landing2 negative output |
| 3       | Output block power supply 12 V ( $V_{CC3}$ )  | 9       | Output block GND (GND2)  |
| 4       | Landing1 control input                        | 10      | Landing2 positive output |
| 5       | Landing2 control input                        | 11      | Landing2 negative output |
| 6       | Output block GND (GND3)                       | 12      | Control block GND (GND1) |

### ■ Absolute Maximum Ratings

| Parameter                        | Symbol    | Rating      | Unit |
|----------------------------------|-----------|-------------|------|
| Supply voltage                   | $V_{CC1}$ | 13.5        | V    |
|                                  | $V_{CC2}$ | 13.5        |      |
|                                  | $V_{CC3}$ | 13.5        |      |
| Supply current                   | $I_{CC1}$ | 35          | mA   |
|                                  | $I_{CC2}$ | 200         |      |
|                                  | $I_{CC3}$ | 200         |      |
| Power dissipation *2             | $P_D$     | 1 171       | mW   |
| Operating ambient temperature *1 | $T_{opr}$ | -20 to +75  | °C   |
| Storage temperature *1           | $T_{stg}$ | -55 to +150 | °C   |

Note) 1. \*1: Except for the power dissipation, operating ambient temperature, and storage temperature, all ratings are for  $T_a = 25^\circ\text{C}$ .

\*2: The power dissipation for the independent package (without a heat sink) at  $T_a = 75^\circ\text{C}$ . Refer to "■ Technical Information" for details.

3. Be sure to comply with "■ Usage Notes" for the sequence of turning on power supply.

4. Refer to "■ Usage Notes" in case of using the IC at  $V_{CC2}, V_{CC3} \leq 8\text{ V}$

### ■ Recommended Operating Range

| Parameter                | Symbol     | Range        | Unit |
|--------------------------|------------|--------------|------|
| Supply voltage           | $V_{CC1}$  | 10.8 to 13.2 | V    |
|                          | $V_{CC2}$  | 7.0 to 13.2  |      |
|                          | $V_{CC3}$  | 7.0 to 13.2  |      |
| Landing1 control input   | $V_{4-12}$ | 0 to 6       | V    |
| Landing2 control input   | $V_{5-12}$ | 0 to 6       | V    |
| Landing1 positive output | $I_7$      | -200 to +200 | mA   |
| Landing1 negative output | $I_8$      | -200 to +200 | mA   |
| Landing2 positive output | $I_{10}$   | -200 to +200 | mA   |
| Landing2 negative output | $I_{11}$   | -200 to +200 | mA   |

### ■ Recommended Operating Range (continued)

| Parameter    | Symbol      | Range        | Unit |
|--------------|-------------|--------------|------|
| Peak current | $I_{7(P)}$  | -0.7 to +0.7 | A    |
|              | $I_{8(P)}$  | -0.7 to +0.7 |      |
|              | $I_{10(P)}$ | -0.7 to +0.7 |      |
|              | $I_{11(P)}$ | -0.7 to +0.7 |      |

Note) The peak current characteristic is the reference value for design. The shipping inspection of it is not performed.

For the evaluating conditions, refer to "■ Electrical Characteristics • Explanations of testing method".

### ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$

| Parameter                 | Symbol     | Conditions   | Min  | Typ  | Max  | Unit |
|---------------------------|------------|--|------|------|------|------|
| Circuit current 1         | $I_{CC1}$  | $V_{CC1} = 12\text{ V}, V_{CC2} = V_{CC3} = 12\text{ V}$ | 1.5  | 3.0  | 4.5  | mA   |
| Circuit current 2         | $I_{CC2}$  | $V_{CC1} = 12\text{ V}, V_{CC2} = V_{CC3} = 12\text{ V}$ | —    | 0    | 1    | mA   |
| Circuit current 3         | $I_{CC3}$  | $V_{CC1} = 12\text{ V}, V_{CC2} = V_{CC3} = 12\text{ V}$ | —    | 0    | 1    | mA   |
| Circuit voltage 7         | $V_{7-6}$  | $V_{CC1} = 12\text{ V}, V_{CC2} = V_{CC3} = 12\text{ V}$ | 4.1  | 4.5  | 4.9  | V    |
| Circuit voltage 8         | $V_{8-6}$  | $V_{CC1} = 12\text{ V}, V_{CC2} = V_{CC3} = 12\text{ V}$ | 4.1  | 4.5  | 4.9  | V    |
| Circuit voltage 10        | $V_{10-9}$ | $V_{CC1} = 12\text{ V}, V_{CC2} = V_{CC3} = 12\text{ V}$ | 4.1  | 4.5  | 4.9  | V    |
| Circuit voltage 11        | $V_{11-9}$ | $V_{CC1} = 12\text{ V}, V_{CC2} = V_{CC3} = 12\text{ V}$ | 4.1  | 4.5  | 4.9  | V    |
| Landing1 output voltage 1 | $E_{1(1)}$ | $V_7-V_8$ at $V_4 = 2.5\text{ V}$                        | -0.3 | 0.0  | +0.3 | V    |
| Landing1 output voltage 2 | $E_{1(2)}$ | $V_7-V_8$ at $V_4 = 5\text{ V}$                          | +5.1 | +5.5 | +5.9 | V    |
| Landing1 output voltage 3 | $E_{1(3)}$ | $V_7-V_8$ at $V_4 = 0\text{ V}$                          | -5.9 | -5.5 | -5.1 | V    |
| Landing2 output voltage 1 | $E_{2(1)}$ | $V_{10}-V_{11}$ at $V_5 = 2.5\text{ V}$                  | -0.3 | 0.0  | +0.3 | V    |
| Landing2 output voltage 2 | $E_{2(2)}$ | $V_{10}-V_{11}$ at $V_5 = 5\text{ V}$                    | +5.1 | +5.5 | +5.9 | V    |
| Landing2 output voltage 3 | $E_{2(3)}$ | $V_{10}-V_{11}$ at $V_5 = 0\text{ V}$                    | -5.9 | -5.5 | -5.1 | V    |

### • Design reference data

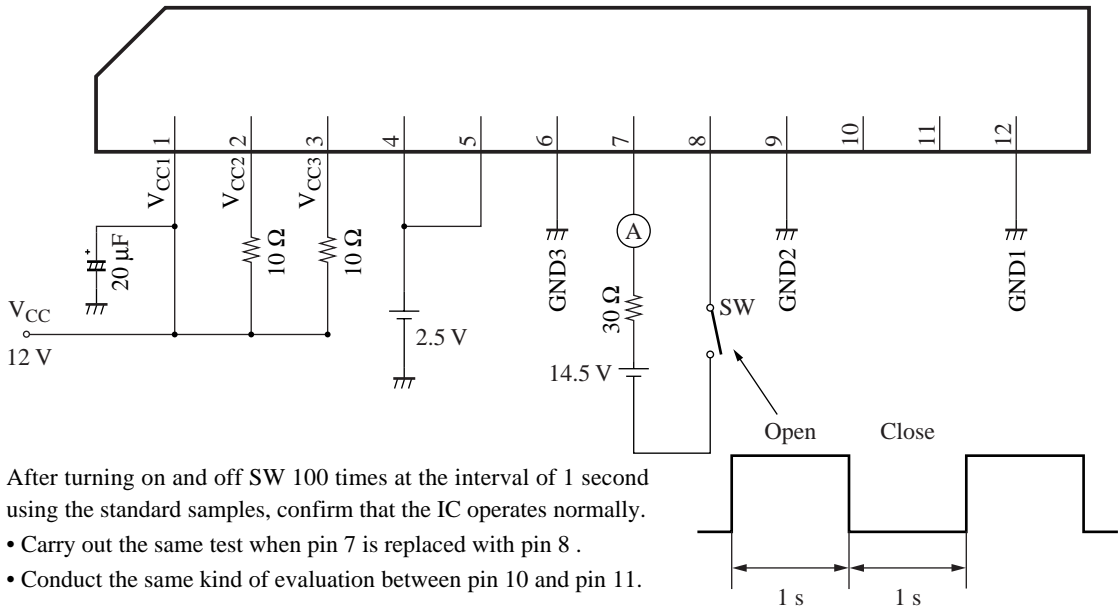
Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

| Parameter  | Symbol                 | Conditions   | Min  | Typ | Max  | Unit |
|--|------------------------|--|------|-----|------|------|
| Landing1 output fluctuation with high-level supply voltage | $\Delta E_1 / V_{CCH}$ | $V_{CC1} = 12\text{ V} \rightarrow 13.2\text{ V},$<br>$\Delta E$ at $V_{CC2,3} = 12\text{ V} \rightarrow 13.2\text{ V}$              | -0.2 | —   | +0.2 | V    |
| Landing1 output fluctuation with low-level supply voltage  | $\Delta E_1 / V_{CCI}$ | $V_{CC1} = 12\text{ V} \rightarrow 10.8\text{ V},$<br>$\Delta E$ at $V_{CC2,3} = 12\text{ V} \rightarrow 10\text{ V}$                | -0.2 | —   | +0.2 | V    |
| Landing2 output fluctuation with high-level supply voltage | $\Delta E_2 / V_{CCH}$ | $V_{CC1} = 12\text{ V} \rightarrow 13.2\text{ V},$<br>$\Delta E$ at $V_{CC2,3} = 12\text{ V} \rightarrow 13.2\text{ V}$              | -0.2 | —   | +0.2 | V    |
| Landing2 output fluctuation with low-level supply voltage  | $\Delta E_2 / V_{CCI}$ | $V_{CC1} = 12\text{ V} \rightarrow 10.8\text{ V},$<br>$\Delta E$ at $V_{CC2,3} = 12\text{ V} \rightarrow 10\text{ V}$                | -0.2 | —   | +0.2 | V    |
| Landing1 output fluctuation with temperature               | $\Delta E_1 / T_a$     | $\Delta E$ at $T_a = +25^\circ\text{C} \rightarrow -25^\circ\text{C}$ and<br>$T_a = +25^\circ\text{C} \rightarrow +70^\circ\text{C}$ | -0.2 | —   | +0.2 | V    |
| Landing2 output fluctuation with temperature               | $\Delta E_2 / T_a$     | $\Delta E$ at $T_a = +25^\circ\text{C} \rightarrow -25^\circ\text{C}$ and<br>$T_a = +25^\circ\text{C} \rightarrow +70^\circ\text{C}$ | -0.2 | —   | +0.2 | V    |

■ Electrical Characteristics at  $T_a = 25^\circ\text{C}$  (continued)

• Explanations of testing method

Conditions at evaluating a peak current



■ Terminal Equivalent Circuits

| Pin No. | Equivalent circuit | Description  | Pin voltage DC (V) |
|---------|--------------------|--|--------------------|
| 1       |                    | Control block voltage 12 V ( $V_{CC1}$ ):<br>Power supply pin for control block<br>Apply DC 12 V.                                | 12                 |
| 2       |                    | Output block power supply 12 V ( $V_{CC2}$ ):<br>Power supply pin for landing2 output.<br>Apply DC 12 V via protection resistor. | 12                 |
| 3       |                    | Output block power supply 12 V ( $V_{CC3}$ ):<br>Power supply pin for landing1 output<br>Apply DC 12 V via protection resistor.  | 12                 |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Equivalent circuit | Description   | Pin voltage DC (V) |
|---------|--------------------|---|--------------------|
| 4       |                    | <p>Landing1 control input:<br/>Control input for landing 1<br/>Apply DC 0 V to 5 V (typ. = 2.5 V)</p>                     | —                  |
| 5       |                    | <p>Landing2 control input:<br/>Control input for landing 2<br/>Apply DC 0 V to 5 V (typ. = 2.5 V)</p>                     | —                  |
| 6       |                    | <p>GND3:<br/>Grounding pin for landing 1 output</p>   | 0                  |
| 7       |                    | <p>Landing1 positive output:<br/>Pin for landing 1 positive output.<br/>Output is given as the same polarity as pin 4</p> | 1.7 to 7.4         |

■ Terminal Equivalent Circuits (continued)

| Pin No. | Equivalent circuit | Description  | Pin voltage DC (V) |
|---------|--------------------|--|--------------------|
| 8       |                    | <p>Landing1 negative output:<br/>Pin for landing1 negative output.<br/>Output is given as the reverse polarity of pin 4</p>  | 1.7 to 7.4         |
| 9       |                    | <p>GND2:<br/>The grounding pin for the landing2 output</p>   | 0                  |
| 10      |                    | <p>Landing2 positive output:<br/>Pin for landing2 positive output.<br/>Output is given as the same polarity as pin 5.</p>    | 1.7 to 7.4         |
| 11      |                    | <p>Landing2 negative output:<br/>Pin for landing2 negative output.<br/>Output is given as the reverse polarity of pin 5.</p> | 1.7 to 7.4         |
| 12      |                    | <p>GND1:<br/>Grounding pin for control block.</p>  | 0                  |

■ Usage Notes

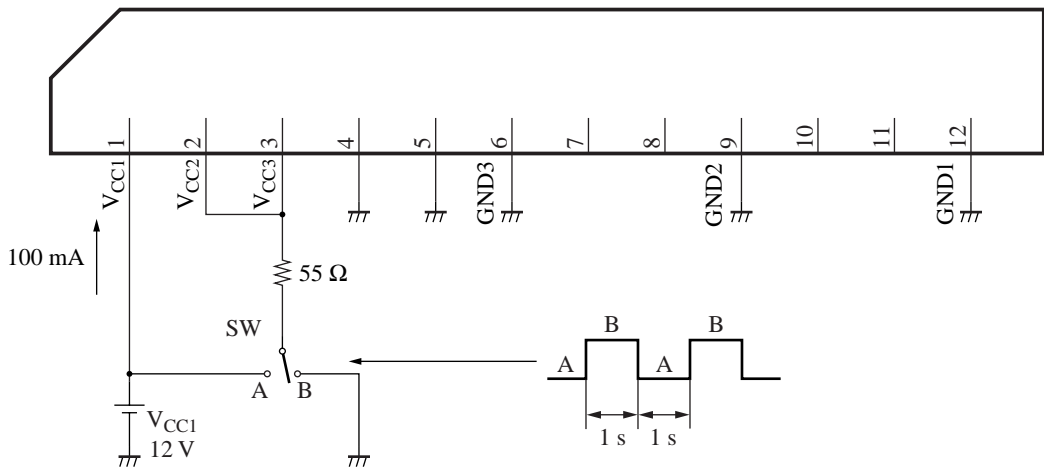
1. The order of power supply turning on and off

- 1) Turning on sequence
  - 1st time pin 2, pin 3 (12 V power supply)
  - 2nd time pin 1 (12 V power supply)
- 2) Turning off sequence
  - 1st time pin 1 (12 V power supply)
  - 2nd time pin 2, pin 3 (12 V power supply)

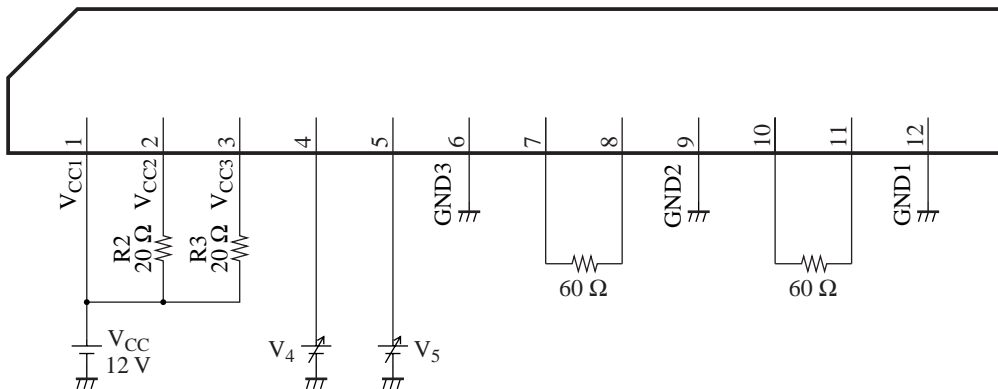
In the state that the pin 1 has been established, if pin 2 or pin 3 is decreased to under 5 V, an abnormal current of 50 mA to 300 mA flows to pin 1, so that there is a possibility of breakdown of the IC. The above setting sequence should be observed.

It is confirmed that the IC operates normally after turning on and off SW 100 times at the interval of 1 second using the following circuit. Therefore, there will be no problem even if a current of 100 mA or less is allowed to flow to pin 1 for only about 50 ms at turning on and turning off the set power supply. However, we do not give guarantee by shipping test.

2. Circuit for checking abnormal current



3. The change in output voltage by the  $V_{CC2}$  and  $V_{CC3}$  voltage change



If pin 3 ( $V_{CC3}$ ) becomes a voltage of 8 V or less by making resistance value of R3 larger, the upper limit of output voltage for pin 7 and pin 8 is restricted and then the output becomes as shown in figure 1.

Similarly, if pin 2 ( $V_{CC2}$ ) voltage becomes 8 V or less by making resistance value R2 larger, the output voltage of pin 10 and pin 11 becomes as shown in figure 2.

A care must be taken in case of using  $V_{CC2}$  and  $V_{CC3}$  at a voltage of 8 V or less.

■ Usage Notes (continued)

3. The change in output voltage by the  $V_{CC2}$  and  $V_{CC3}$  voltage change (continued)

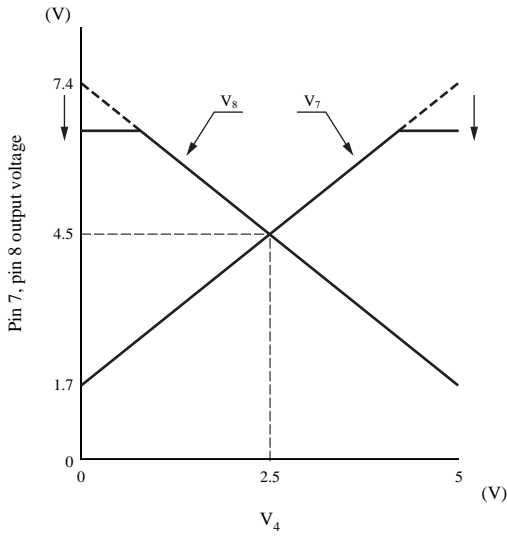


Figure 1

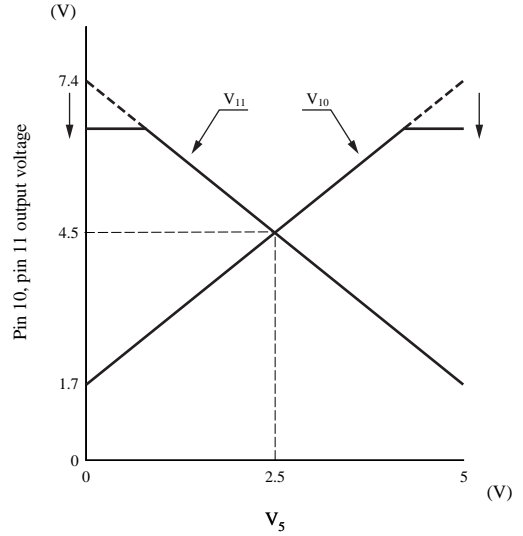
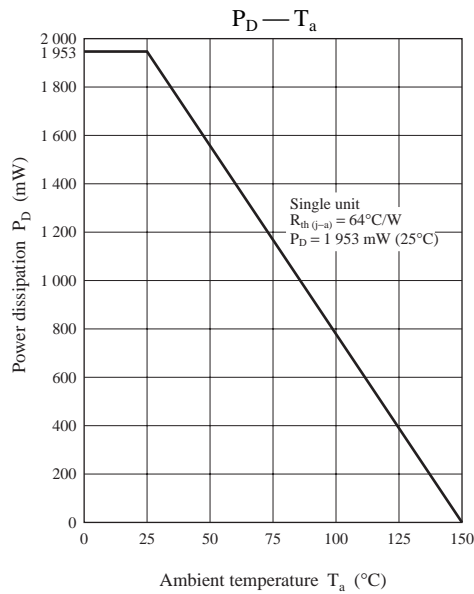


Figure 2

■ Technical Information

- $P_D - T_a$  curve of HSIP012-P-0000





■ Application Circuit Example

