



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

Bi-CMOS LSI

## LV8080LP — Two channels Constant-current H-bridge Driver

### Overview

The LV8080LP is a two-channel constant-current driver that supports low-voltage operation. It is optimal for constant-current drive of stepping motors (AF and zoom) in portable equipment such as camera cell phones.

### Features

- Two channels constant-current H-bridge driver
- Built-in power supply switch and position detection comparator for use with a photoreflector
- Supports both 2-phase drive and 1-2 phase drive.
- Implemented in a low-power MOS IC process.
- Ultraminiature easy to solder VCT16 package (2.6 × 2.6mm)
- Built-in thermal protection and low-voltage sensing circuits

### Specifications

**Absolute Maximum Ratings** at  $T_a = 25^\circ\text{C}$

| Parameter                   | Symbol                    | Conditions                   | Ratings      | Unit             |
|-----------------------------|---------------------------|------------------------------|--------------|------------------|
| Maximum supply voltage      | $V_{CC}, V_M \text{ max}$ |                              | 6.5          | V                |
| Output voltage              | $V_{OUT} \text{ max}$     | OUT1, OUT2, OUT3, OUT4       | 6.5          | V                |
| Input voltage               | $V_{IN} \text{ max}$      | CONT, IN                     | -0.3 to +6.5 | V                |
| Ground pin source current   | IGND                      | Per channel                  | 400          | mA               |
| Allowable power dissipation | $P_d \text{ max}$         | Mounted on a circuit board.* | 700          | mW               |
| Operating temperature       | $T_{opr}$                 |                              | -30 to +85   | $^\circ\text{C}$ |
| Storage temperature         | $T_{stg}$                 |                              | -40 to +150  | $^\circ\text{C}$ |

\* Specified circuit board : 40×50×0.8mm<sup>3</sup> : 4-layer (2S2P) glass epoxy printed circuit board

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## Allowable Operating Ratings at $T_a = 25^\circ\text{C}$

| Parameter                | Symbol   | Conditions | Ratings             | Unit |
|--------------------------|----------|------------|---------------------|------|
| Supply voltage           | $V_{CC}$ |            | 2.5 to 6.0          | V    |
| High-level input voltage | $V_{IH}$ | CONT, IN   | $0.6V_{CC}$ or more | V    |
| Low-level input voltage  | $V_{IL}$ |            | Up to $0.2V_{CC}$   | V    |

## Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 3.0\text{V}$

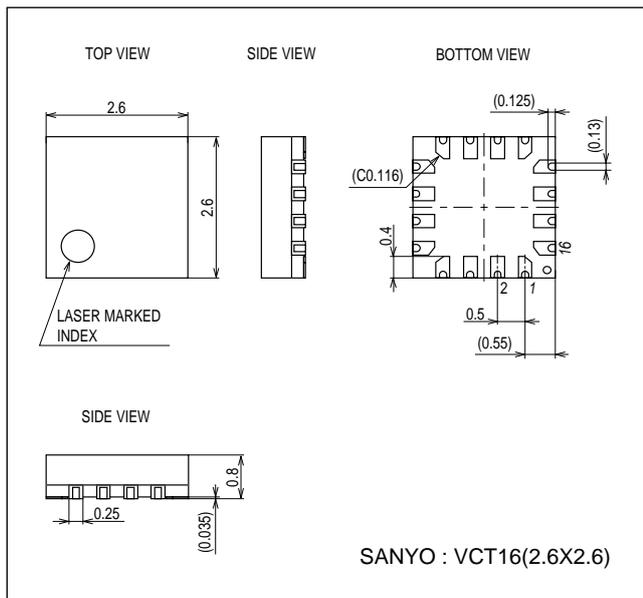
| Parameter                               | Symbol      | Conditions  | Ratings |      |       | Unit          |
|---|-------------|---|---------|------|-------|---------------|
|   |             |   | min     | typ  | max   |               |
| Current drain                           | $I_{CCO}$   | EN = 0V   |         | 0.1  | 1     | $\mu\text{A}$ |
|   | $I_{CCO1}$  | EN = 3V   |         | 0.7  | 1     | mA            |
| Output on resistance                    | Ron1        | $V_{CC} = 3.0\text{V}$ (High and low side total)<br>EN = 3.0V, $I_{OUT} = 100\text{mA}$ |         | 2.0  | 3.0   | $\Omega$      |
|   | Ron2        | $V_{CC} = 5.0\text{V}$ (High and low side total)<br>EN = 5.0V, $I_{OUT} = 100\text{mA}$ |         | 1.50 | 2.0   | $\Omega$      |
| Constant-current output 1               | $I_{OUT1}$  | Between RFG1 and ground : $1\Omega$   | 95      | 100  | 105   | mA            |
| Constant-current output 2               | $I_{OUT2}$  | Between RFG1 and ground : $0.5\Omega$<br>(Design specification)                         | 190     | 200  | 210   | mA            |
| Output turn-on time                     | Traise      | With RFG1 and RFG2 shorted to ground<br>(Design specification)                          |         | 1.3  | 3     | $\mu\text{s}$ |
| Output turn-off time                    | Tfall       | With RFG1 and RFG2 shorted to ground<br>(Design specification)                          |         | 0.25 | 0.65  | $\mu\text{s}$ |
| Position detection voltage (high level) | $V_H$       |   |         | 1.0  | 1.06  | V             |
| Position detection voltage (low level)  | $V_L$       |   | 0.74    | 0.8  |       | V             |
| Detection voltage hysteresis            | HYS         |   | 0.165   | 0.18 | 0.195 | V             |
| PI/PR pin current                       | $I_{PI/PR}$ |   |         |      | 20    | mA            |
| Input current                           | $I_{IN}$    | $V_{IN} = 3\text{V}$  |         | 15   | 30    | $\mu\text{A}$ |

Note : The design specification items are design guarantees and are not measured.

## Package Dimensions

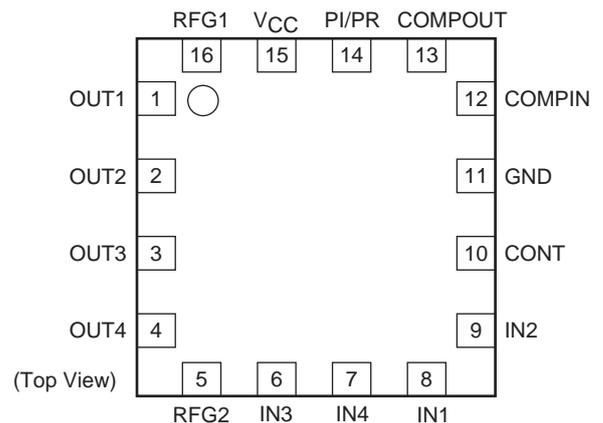
unit : mm (typ)

3318

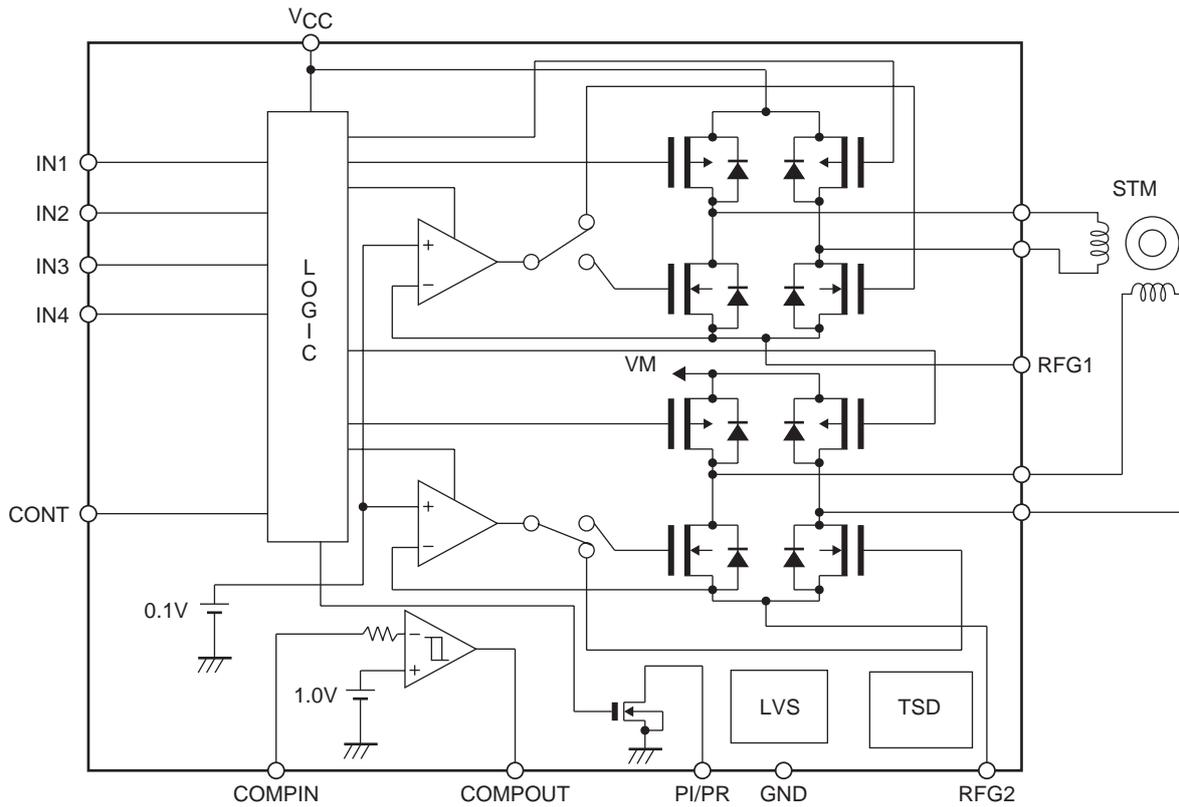


## Pin Assignment

(VCT16)



## Block Diagram



Constant-current calculation :  $I_{OUT} = 0.1 \div R_F$  Example : When an  $I_{OUT}$  of 100mA is required,  $R_F$  must be  $1\Omega$ .

### Usage Notes

The constant current is set by the resource  $R_F$  connected between RFG and ground according to the formula shown above.

### Truth Table

| Input |      |      |      | Output |      |      |      | Mode                  |
|-------|------|------|------|--------|------|------|------|-----------------------|
| IN1   | IN2  | IN3  | IN4  | OUT1   | OUT2 | OUT3 | OUT4 |                       |
| Low   | Low  | Low  | Low  | Off    | Off  | Off  | Off  | Standby mode          |
| Low   | High | -    | -    | Low    | High | Off  | Off  | Channel 1, reverse    |
| High  | Low  |      |      | High   | Low  |      |      | Channel 1, forward    |
| High  | High |      |      | Low    | Low  |      |      | Channel 1, brake mode |
| -     | -    | Low  | High | Off    | Off  | Low  | High | Channel 2, reverse    |
|       |      | High | Low  |        |      | High | Low  | Channel 2, forward    |
|       |      | High | High |        |      | Low  | Low  | Channel 2, brake mode |

Note : The "-" input unstable state. When off, a high-impedance state.

- The ENA goes to the standby state with a low-level input, and to the operating state with a high-level input.
- The control input switches the forward/reverse mode.

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## Pin Description

| Pin No.                | Pin Name                         | Description   | Equivalent Circuit |
|------------------------|----------------------------------|---|--------------------|
| 1<br>2<br>3<br>4       | OUT1<br>OUT2<br>OUT3<br>OUT4     | 1-4 : Output pins<br>H-bridge type output pins<br>Pins 1 and 2 are paired and pins 3 and 4 are paired.  |                    |
| 5<br>16                | RFG2<br>RFG1                     | 5, 16 : Current sensing resistor connection pins<br>Connect the current sensing resistor between these pins and ground to detect the output currents for constant current control.<br>Pin 16 corresponds to the output from pins 1 and 2 and pin 5 to the output from pins 1 and 2. |                    |
| 6<br>7<br>8<br>9<br>10 | IN3<br>IN4<br>IN1<br>IN2<br>CONT | Logic input pins  |                    |
| 11                     | GND                              | Ground  |                    |
| 12                     | COMPIN                           | Photo reflector position sensing comparator input   |                    |
| 13                     | COMPOUT                          | Photo reflector position sensing comparator output<br>This pin serves as an open-collector output of the NPN transistor.  |                    |

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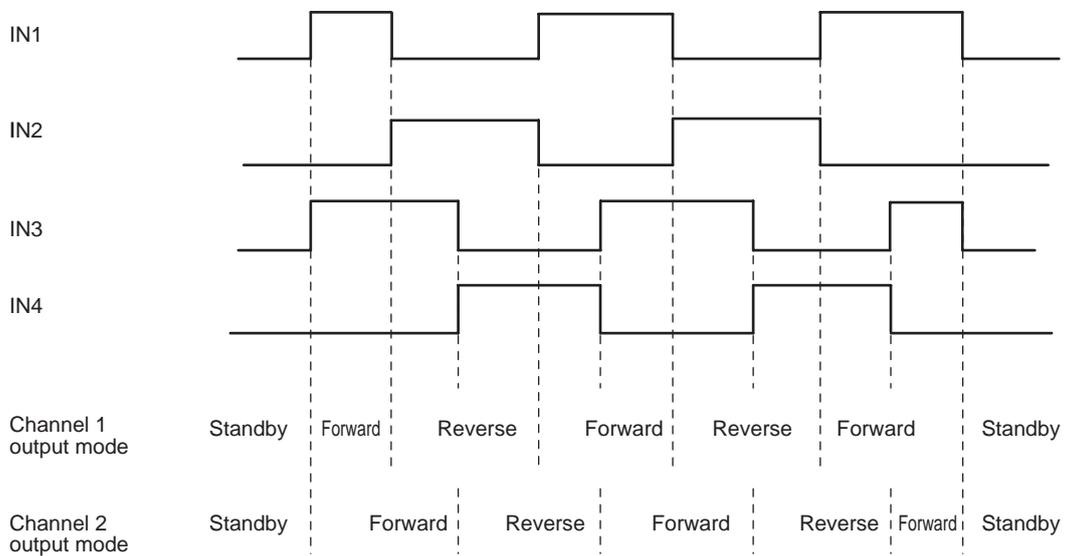
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| Pin No. | Pin Name        | Description  | Equivalent Circuit |
|---------|-----------------|--|--------------------|
| 14      | PI/PR           | <p>A switch, with NMOS open-drain output, used to turn on/off the power supply of the position sensor unit. When using this switch, connect the position sensor unit between this pin and the V<sub>CC</sub> pin.</p> <p>On/off control of this switch is accomplished by CONT pin. Setting the CONT pin high turns on the switch.</p> |                    |
| 15      | V <sub>CC</sub> | Power supply pin   |                    |

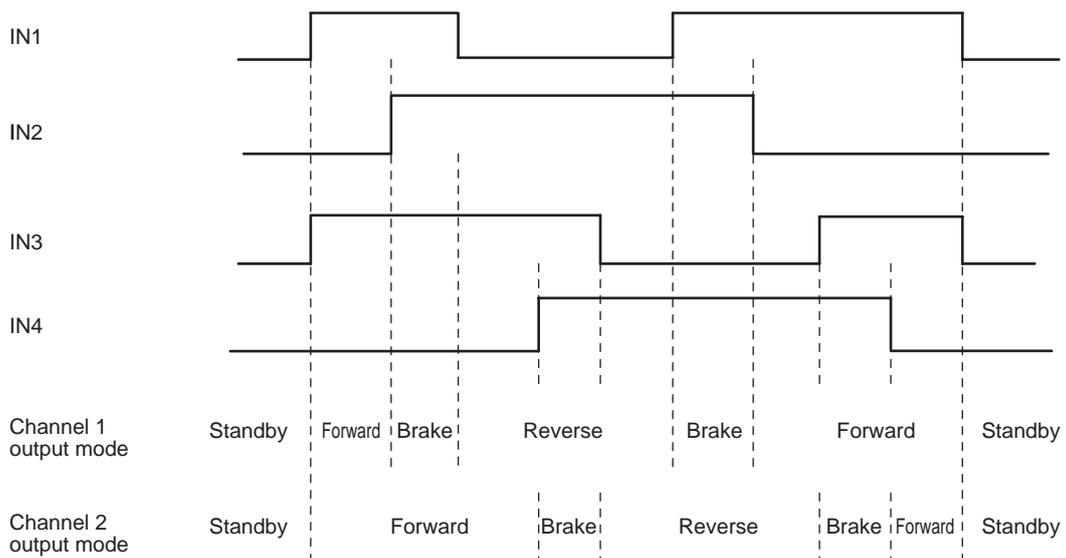
## Timing Chart

### (1) Stepper motor timing chart

Timing chart for 2-phase drive



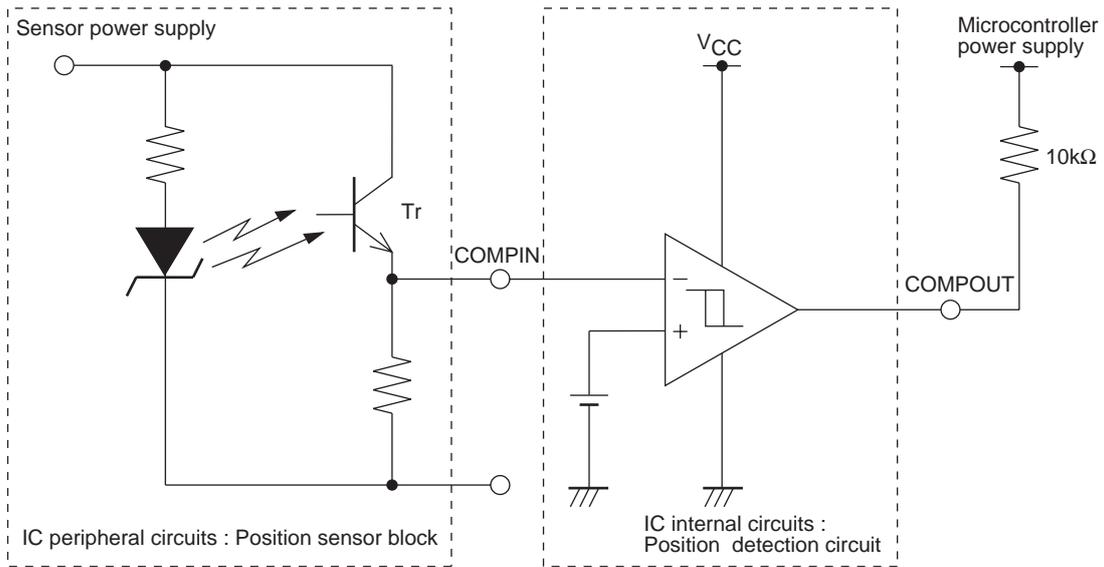
### (2) Timing chart for 1-2 phase drive (Slow decay mode)



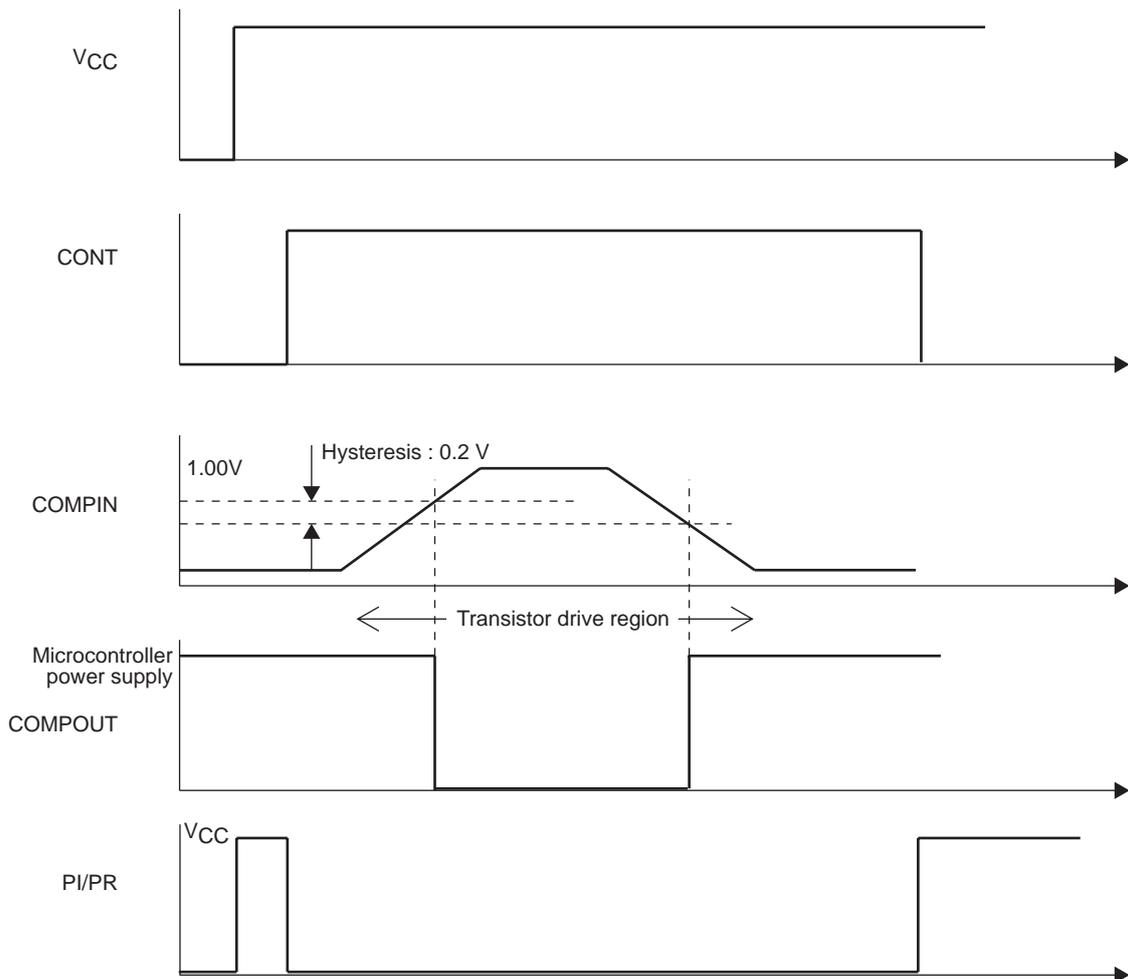
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## Photosensor Position Detection Application Circuit Example

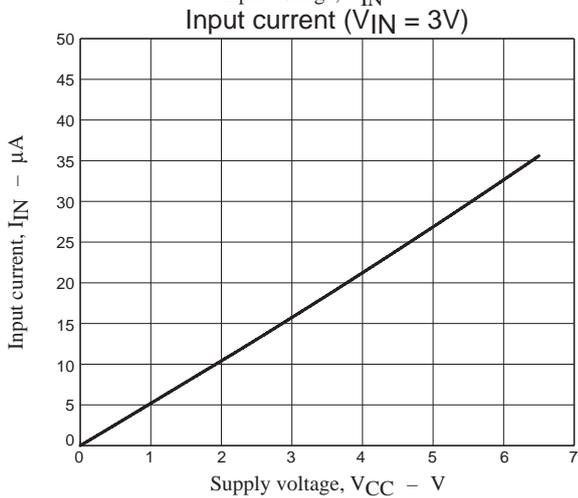
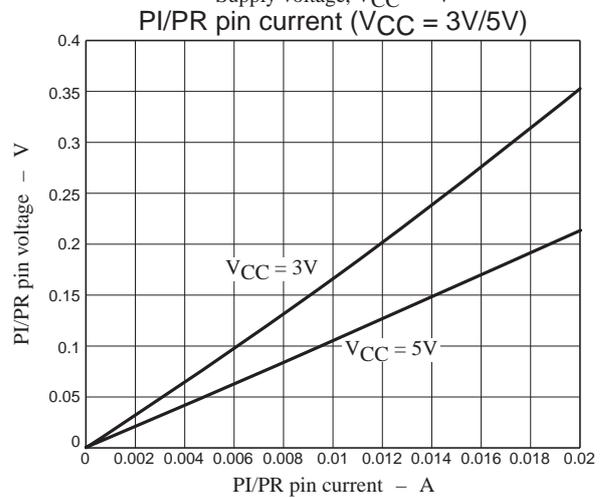
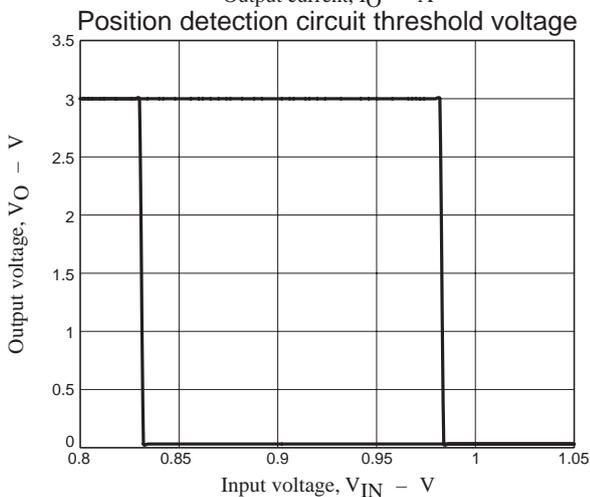
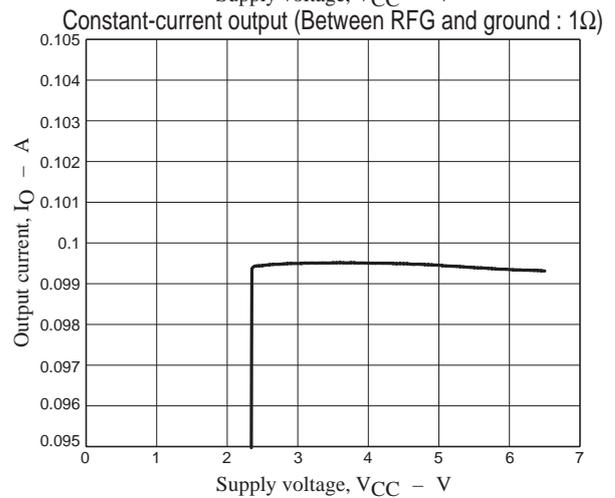
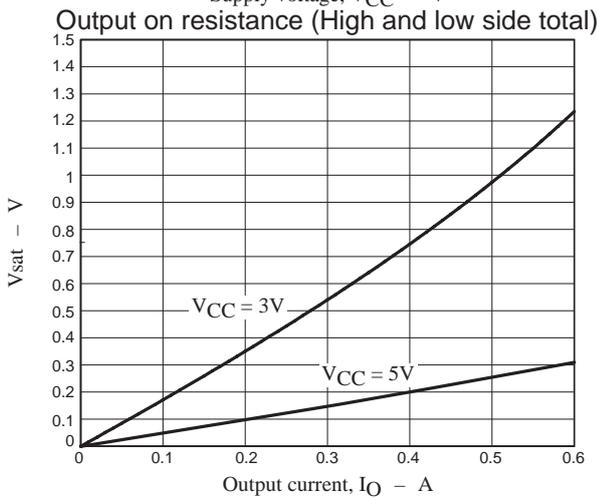
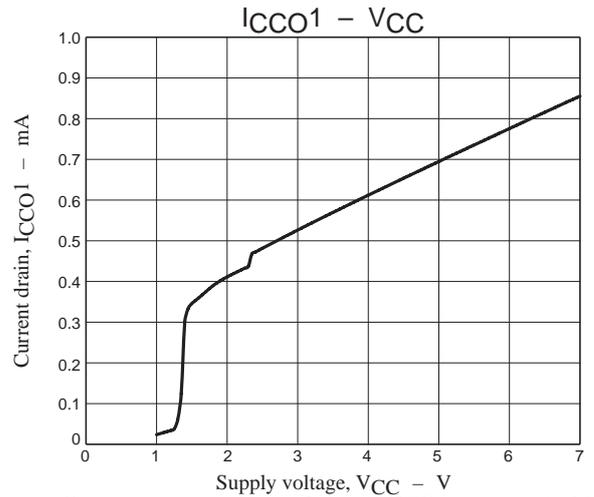
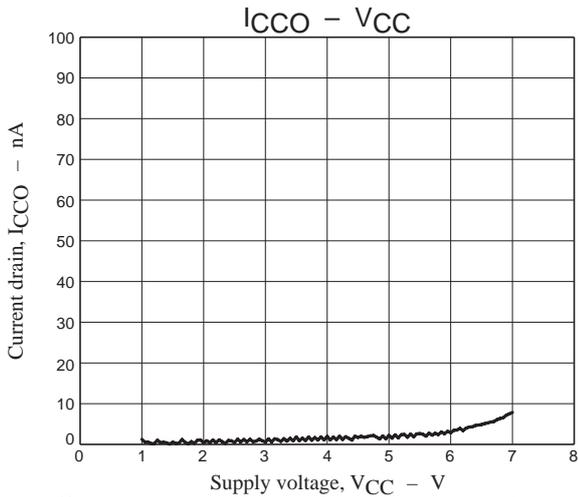
(a) Application circuit



(b) Timing chart



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