



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 : 40×50×0.8mm³ : 4-layer (2S2P) glass epoxy printed circuit board

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LV8080LP

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

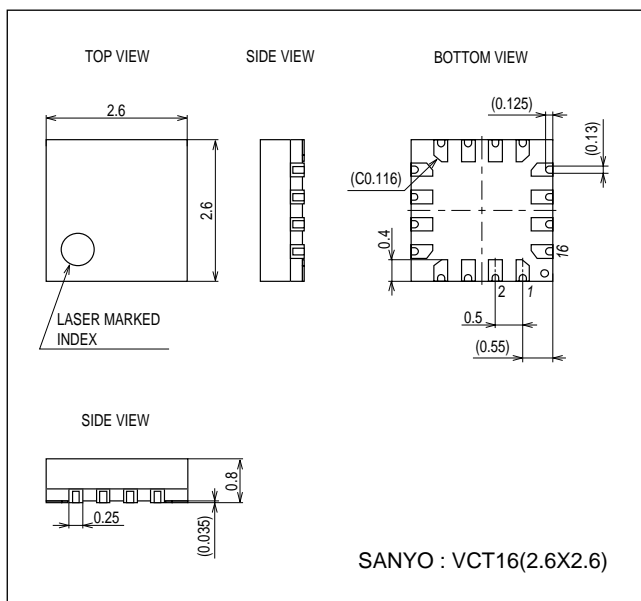
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|-------------|---|---------|------|-------|---------------|
| | | | min | typ | max | |
| Current drain | I_{CCO} | EN = 0V | | 0.1 | 1 | μA |
| | I_{CCO1} | EN = 3V | | 0.7 | 1 | mA |
| Output on resistance | Ron1 | $V_{CC} = 3.0\text{V}$ (High and low side total) EN = 3.0V, $I_{OUT} = 100\text{mA}$ | | 2.0 | 3.0 | Ω |
| | Ron2 | $V_{CC} = 5.0\text{V}$ (High and low side total) EN = 5.0V, $I_{OUT} = 100\text{mA}$ | | 1.50 | 2.0 | Ω |
| Constant-current output 1 | I_{OUT1} | Between RFG and ground : 1Ω | 95 | 100 | 105 | mA |
| Constant-current output 2 | I_{OUT2} | Between RFG and ground : 0.5Ω (Design specification) | 190 | 200 | 210 | mA |
| Output turn-on time | Traise | With RFG1 and RFG2 shorted to ground (Design specification) | | 1.3 | 3 | μs |
| Output turn-off time | Tfall | With RFG1 and RFG2 shorted to ground (Design specification) | | 0.25 | 0.65 | μs |
| 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 | μA |

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

Package Dimensions

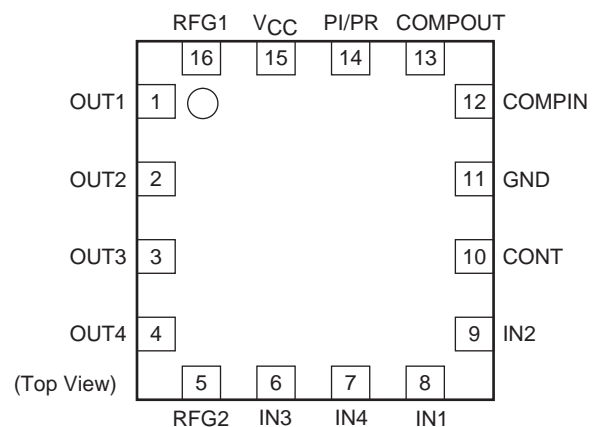
unit : mm (typ)

3318



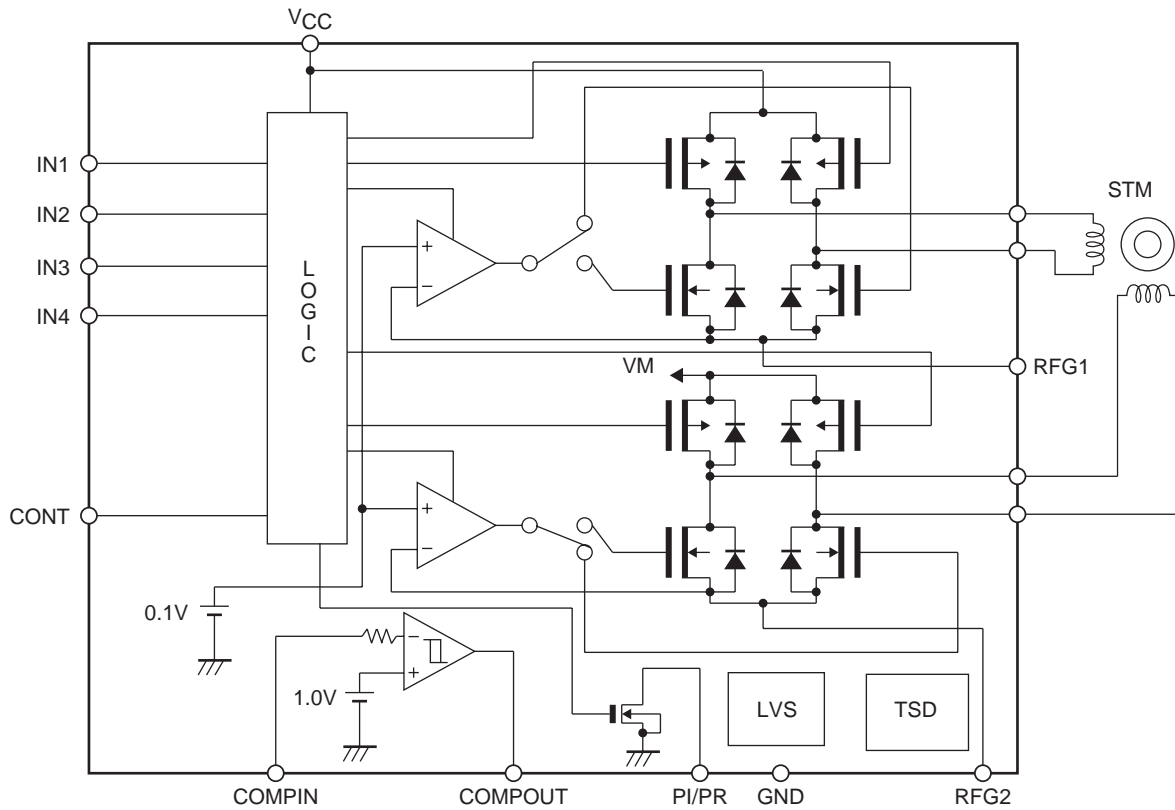
Pin Assignment

(VCT16)



LV8080LP

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 1Ω .

Usage Notes

The constant current is set by the resistor 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.

LV8080LP

Pin Description

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

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LV8080LP

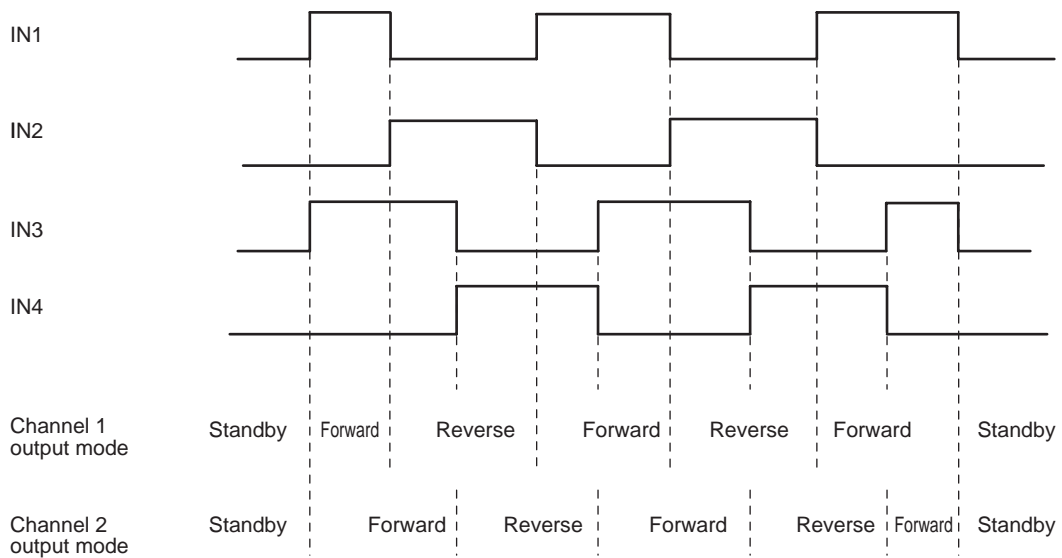
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| Pin No. | Pin Name | Description | Equivalent Circuit |
|---------|-----------------|--|--------------------|
| 14 | PI/PR | <p>A switch, with NMOS open-drain output, used to turn on/off the power supply of the position sensor unit. When using this switch, connect the position sensor unit between this pin and the V_{CC} 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 _{CC} | Power supply pin | |

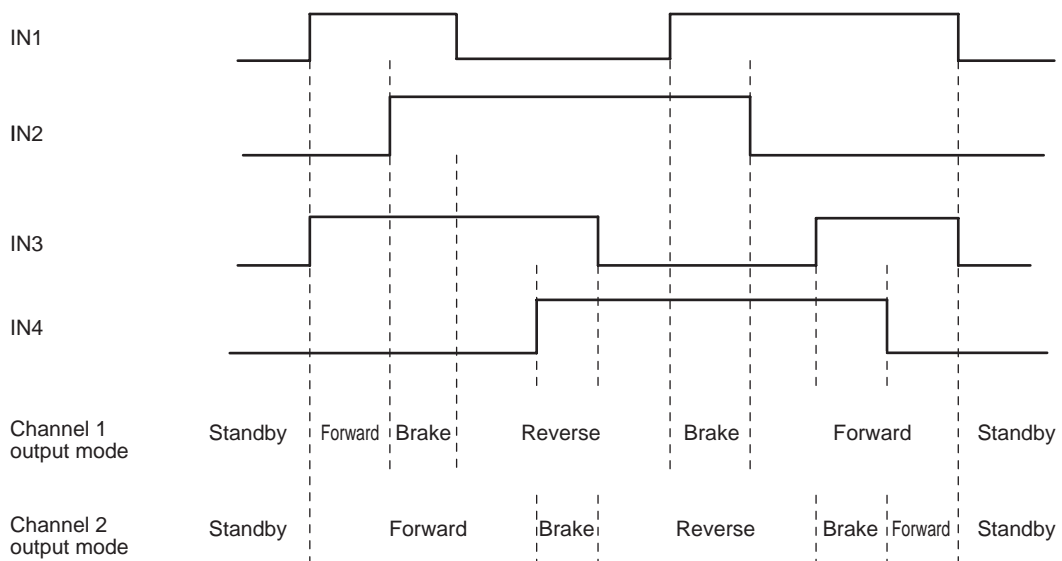
Timing Chart

(1) Stepper motor timing chart

Timing chart for 2-phase drive

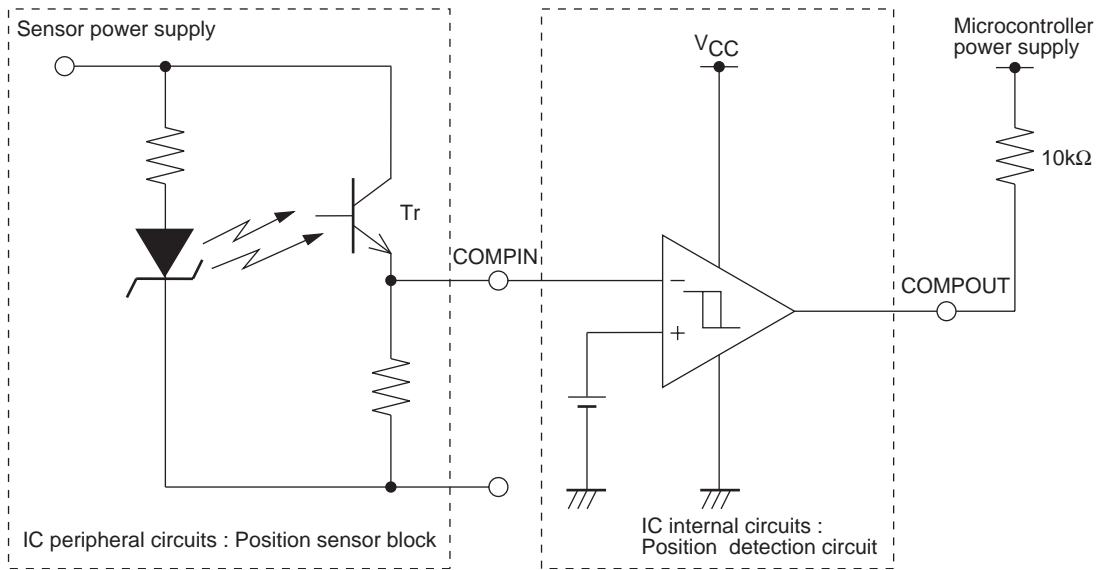


(2) Timing chart for 1-2 phase drive (Slow decay mode)

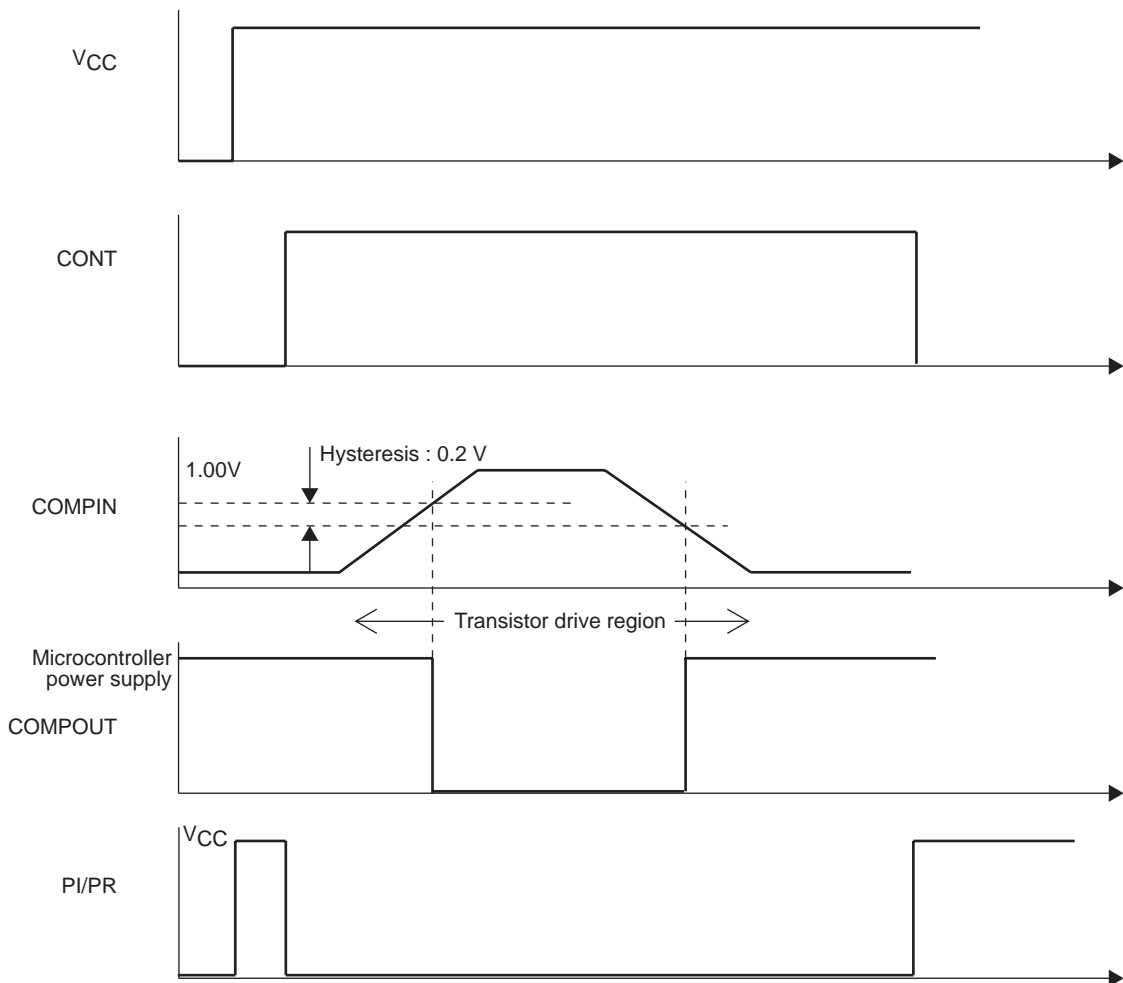


Photosensor Position Detection Application Circuit Example

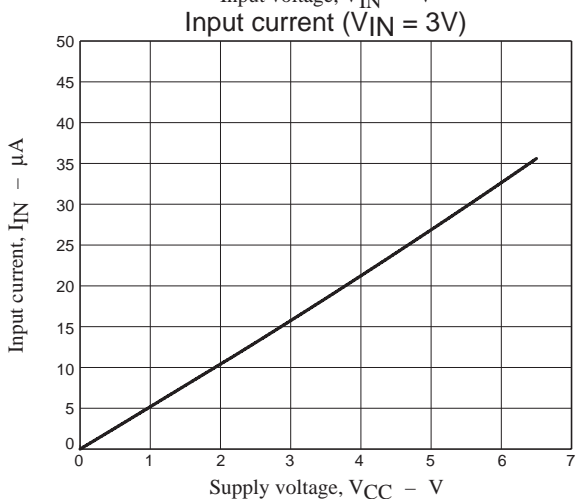
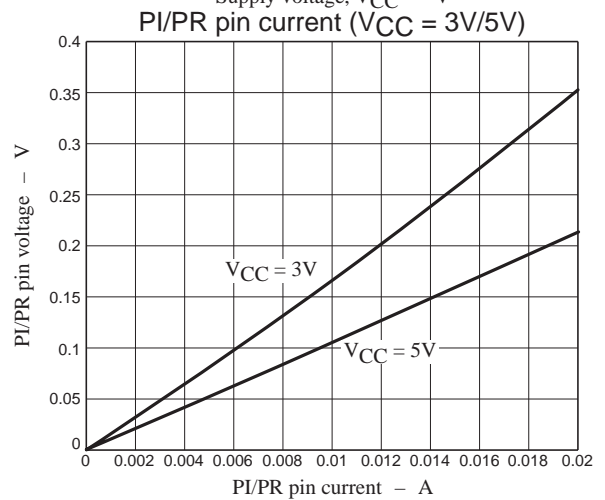
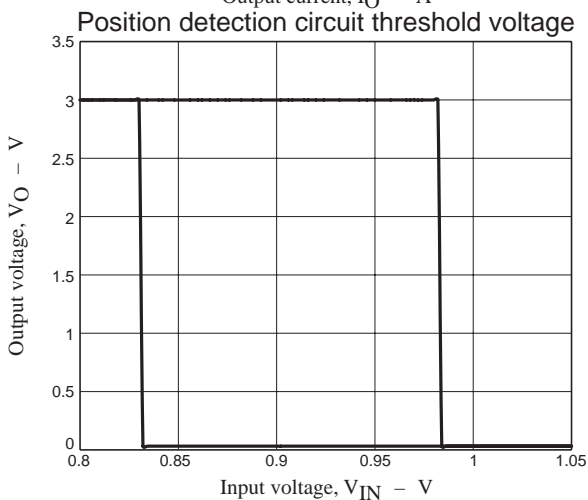
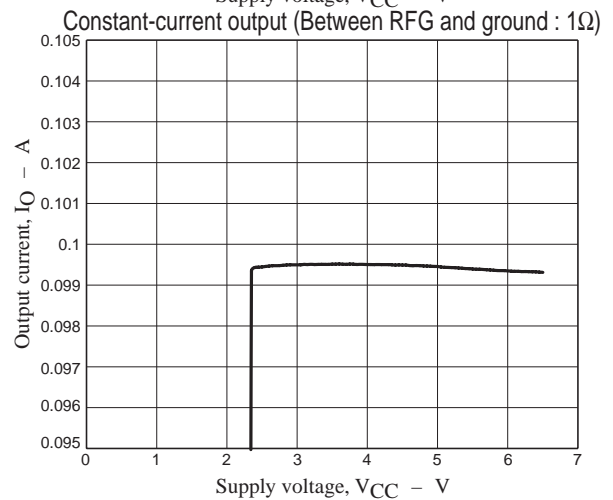
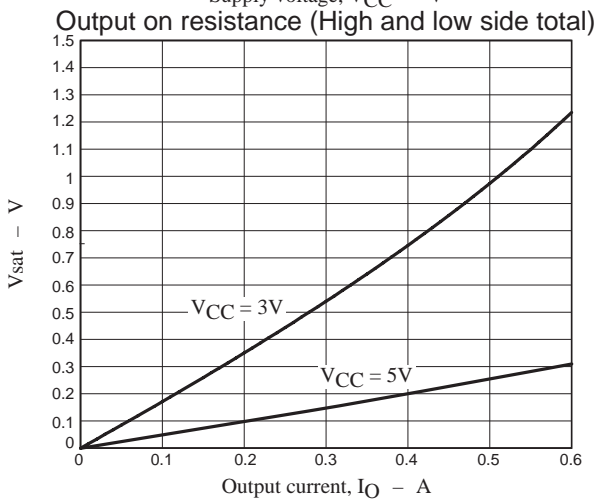
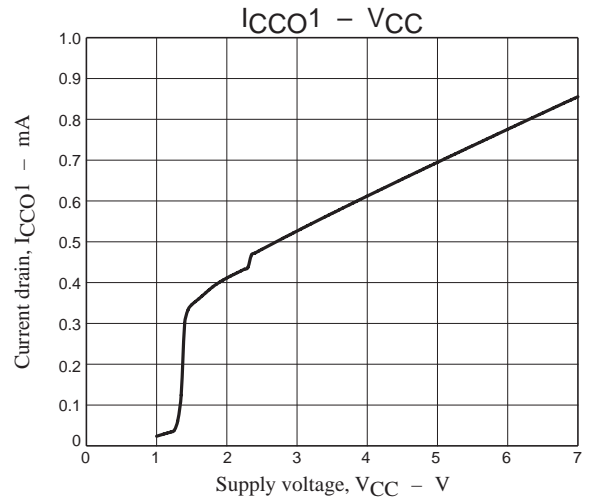
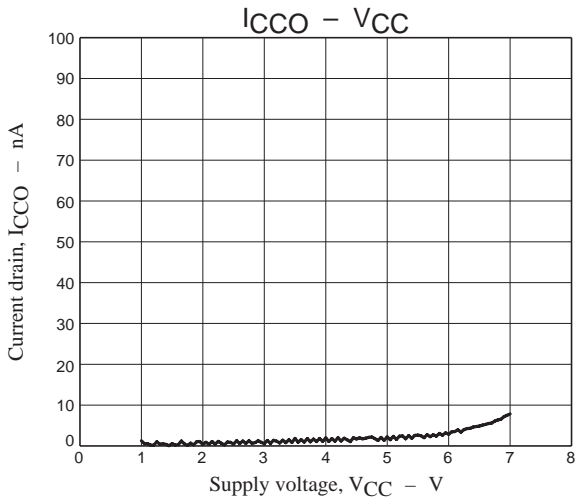
(a) Application circuit



(b) Timing chart



LV8080LP



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