Ordering number : ENA0649

LV8080LP

Bi-CMOS LSI

Two channels Constant-current H-bridge Driver

ON Semiconductor®

http://onsemi.com

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 Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC}, VM max		6.5	V
Output voltage	V_{OUT} max	OUT1, OUT2, OUT3, OUT4	6.5	V
Input voltage	V_{IN} max	CONT, IN	-0.3 to +6.5	V
Ground pin source current	IGND	Per channel	400	mA
Allowable power dissipation	Pd max	Mounted on a circuit board.*	700	mW
Operating temperature	Topr		-30 to +85	°C
Storage temperature	Tstg		-40 to +150	°C

* Specified circuit board : 40×50×0.8mm^3 : 4-layer (2S2P) glass epoxy printed circuit board

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Allowable Operating Ratings at Ta = 25°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 Ta = 25°C, V_{CC} = 3.0V

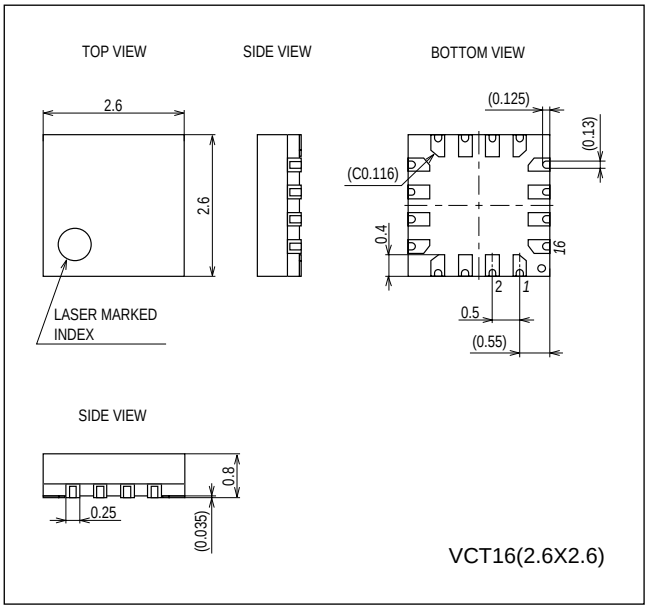
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CCO}	EN = 0V		0.1	1	μA
	$I_{CCO}1$	EN = 3V		0.7	1	mA
Output on resistance	Ron1	V_{CC} = 3.0V (High and low side total) EN = 3.0V, I_{OUT} = 100mA		2.0	3.0	Ω
	Ron2	V_{CC} = 5.0V (High and low side total) EN = 5.0V, I_{OUT} = 100mA		1.50	2.0	Ω
Constant-current output 1	$I_{OUT}1$	Between RFG and ground : 1Ω	95	100	105	mA
Constant-current output 2	$I_{OUT}2$	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	IPI/PR				20	mA
Input current	I_{IN}	V_{IN} = 3V		15	30	μA

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

Package Dimensions

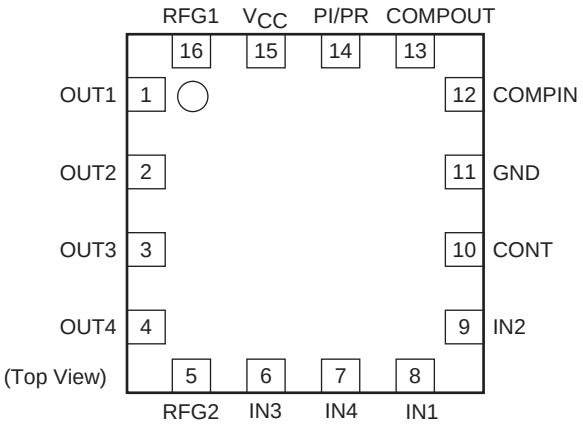
unit : mm (typ)

3318

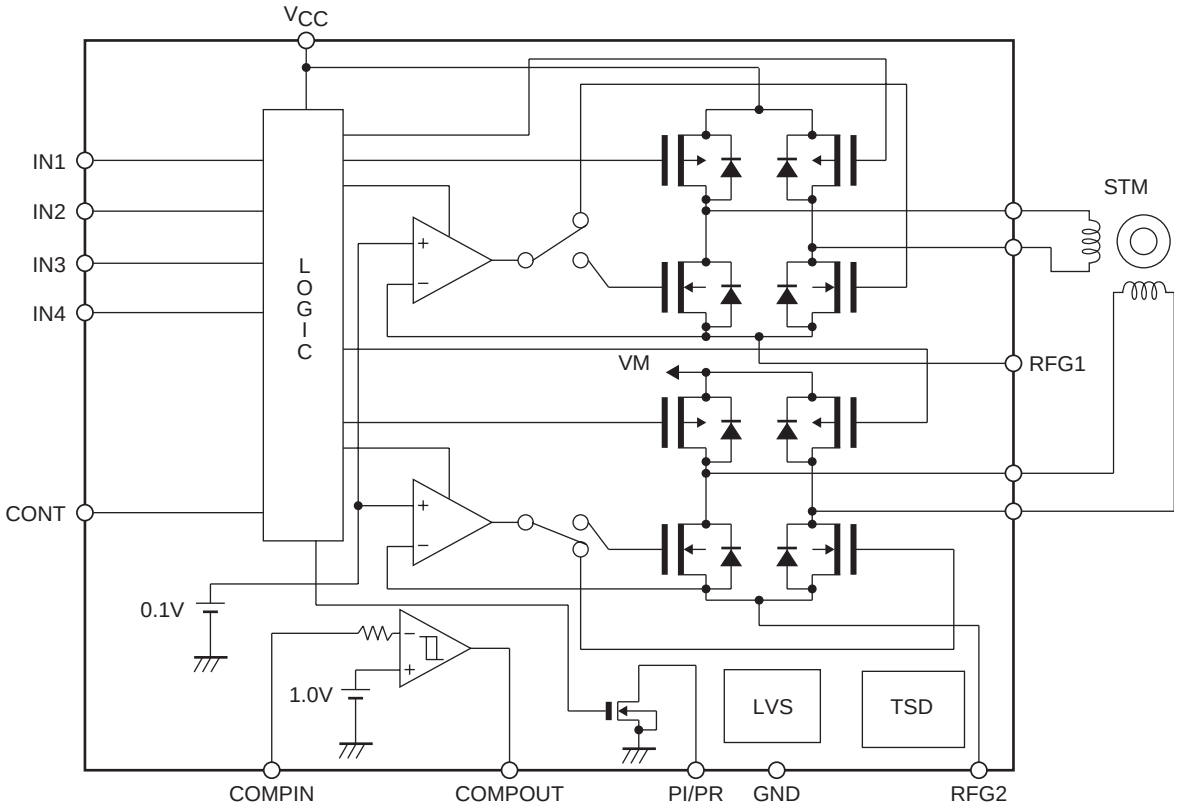


Pin Assignment

(VCT16)



Block Diagram



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

Usage Notes

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

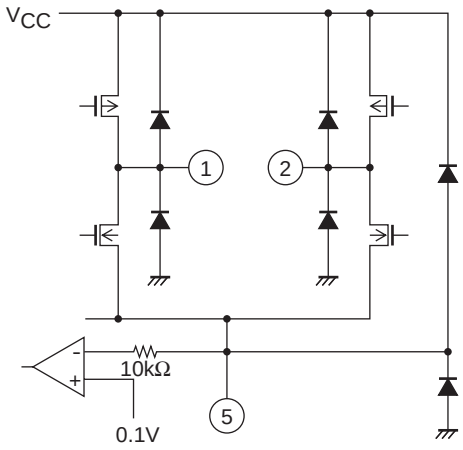
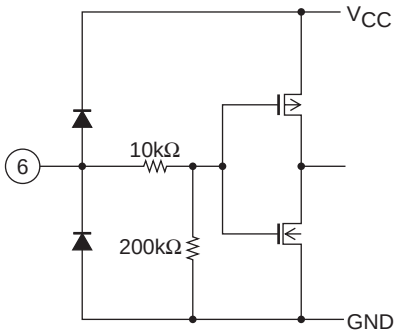
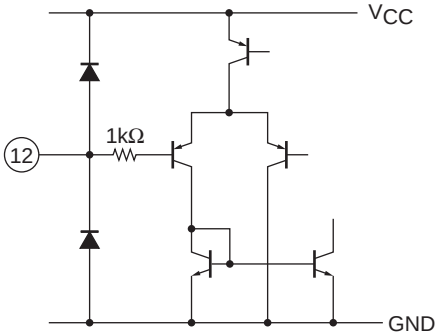
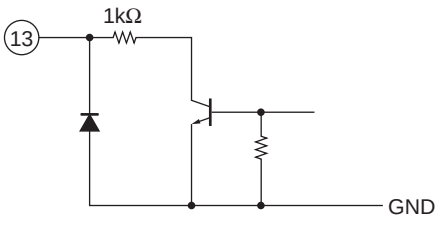
Truth Table

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.

Pin Description

Pin No.	Pin Name	Description	Equivalent Circuit
1 2 3 4 5 16	OUT1 OUT2 OUT3 OUT4 RFG2 RFG1	1-4 : Output pins H-bridge type output pins Pins 1 and 2 are paired and pins 3 and 4 are paired. 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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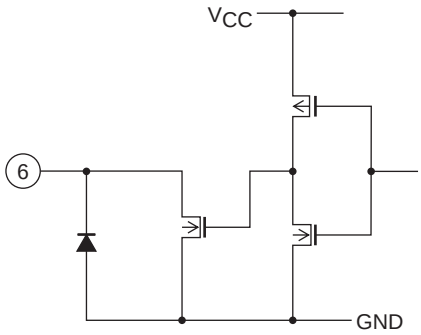
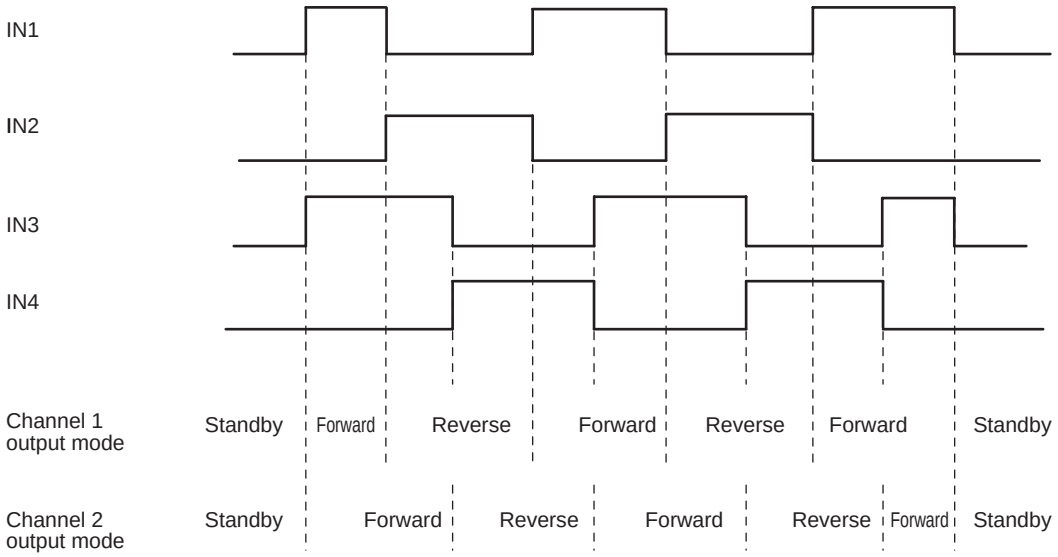
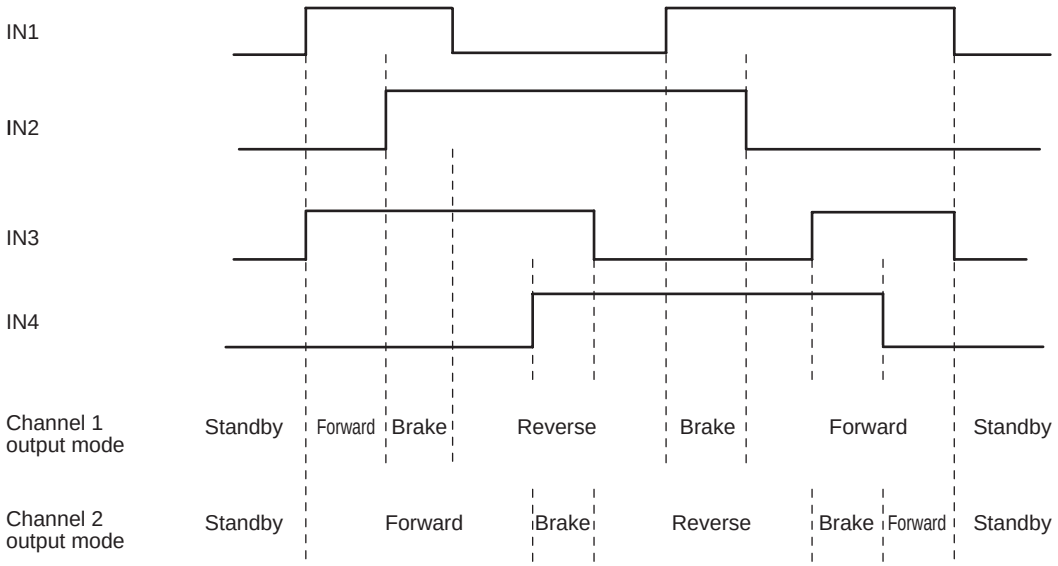
Pin No.	Pin Name	Description	Equivalent Circuit
14	PI/PR	A switch, with NMOS open-drain output, used to turn on/off the power supply of the position sensor unit. When using this switch, connect the position sensor unit between this pin and the V_{CC} pin. On/off control of this switch is accomplished by CONT pin. Setting the CONT pin high turns on the switch.	
15	V_{CC}	Power supply pin	

Timing Chart

(1) Stepper motor timing chart
Timing chart for 2-phase drive

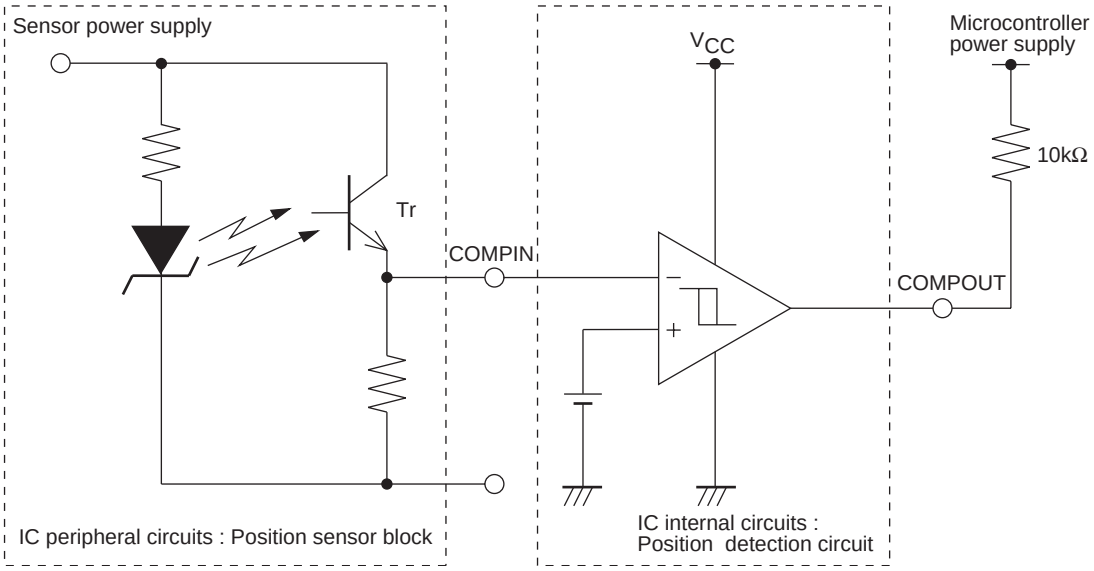


(2) Timing chart for 1-2 phase drive (Slow decay mode)

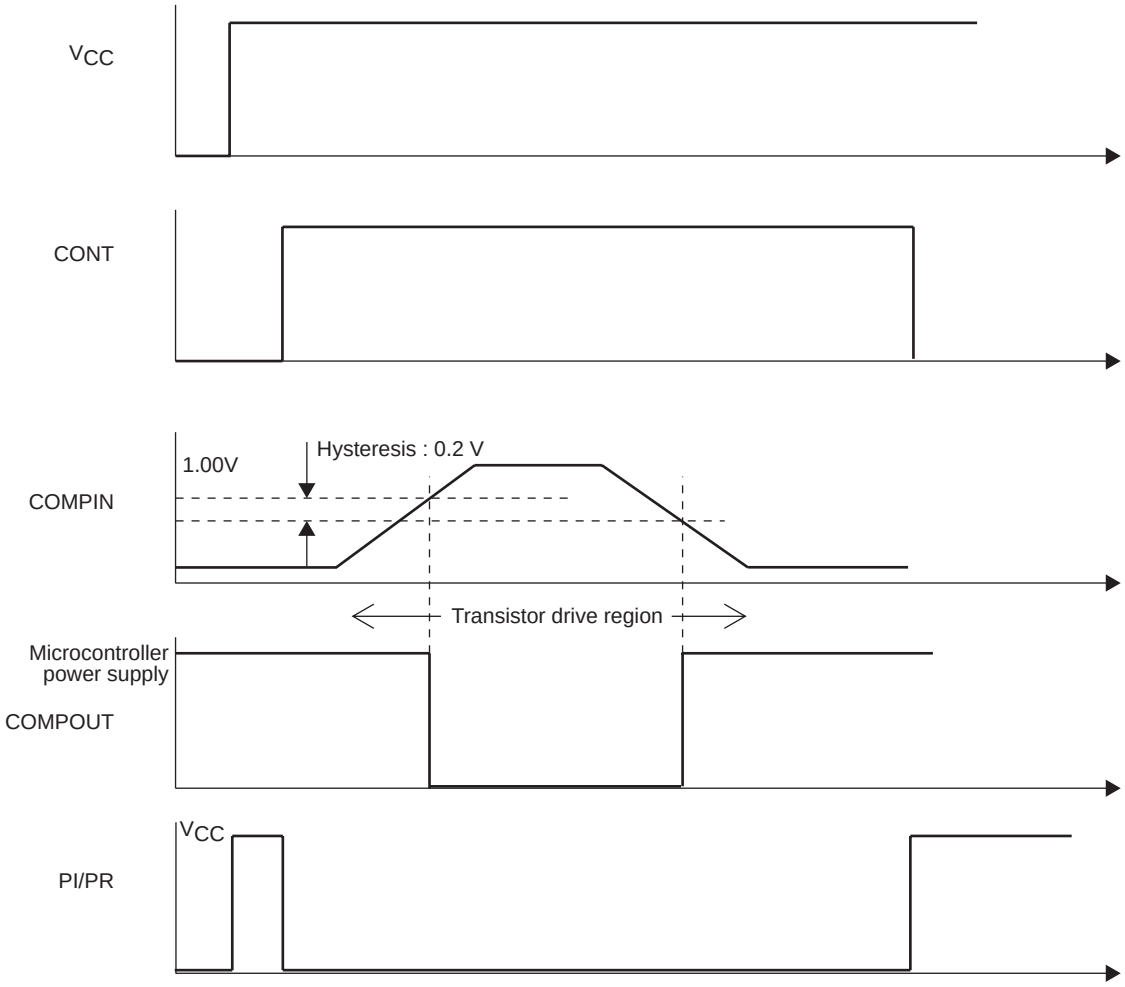


Photosensor Position Detection Application Circuit Example

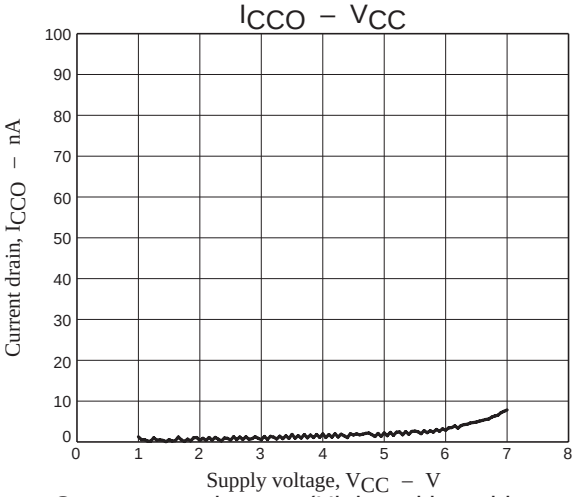
(a) Application circuit



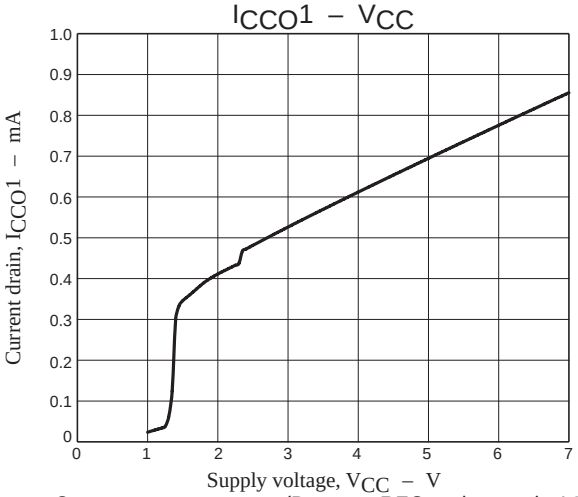
(b) Timing chart



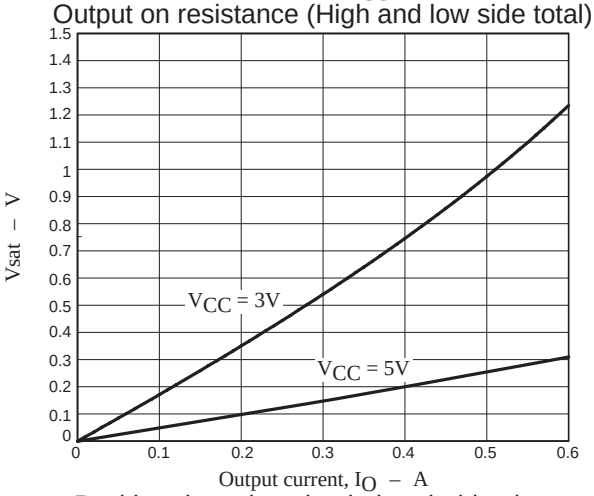
I_{CCO} – V_{CC}



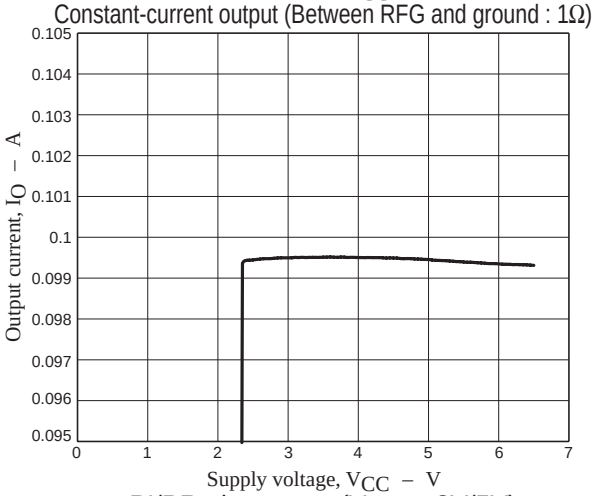
$I_{CCO}1$ – V_{CC}



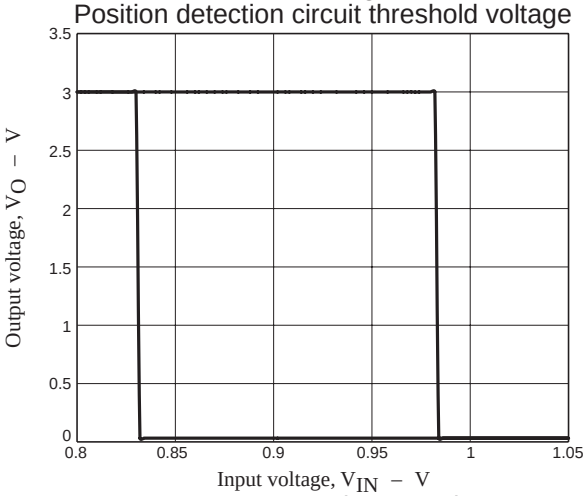
Output on resistance (High and low side total)



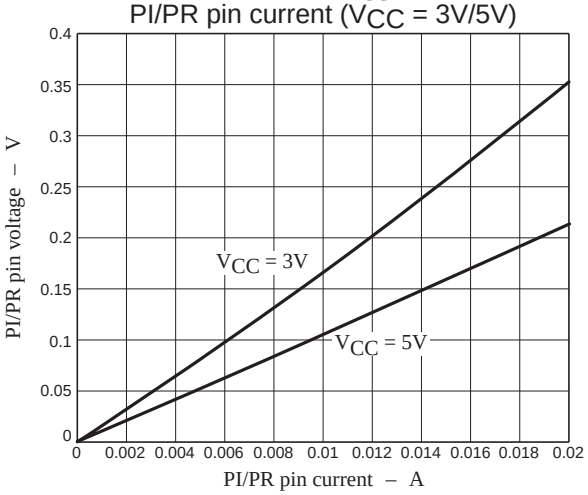
Constant-current output (Between RFG and ground : 1Ω)



Position detection circuit threshold voltage



PI/PR pin current (V_{CC} = 3V/5V)



Input current (V_{IN} = 3V)