GP2Y0D805Z0F/810Z0F
Distance Measuring Sensor

Battery Operation for GP2Y0D805Z0F and GP2Y0D810Z0F

INTRODUCTION

SHARP's GP2Y0D805Z0F and GP2Y0D810Z0F are highly reliable sensors for applications such as hands-free dispensers.

The industry-first external Standby pin on these sensors, when activated, cuts current consumption to 5 µA. The pin allows the fixture to limit the number of hours the device remains "ON". Supported supply voltage are 2.7 V to 6.2 V, making them ideal for battery-powered applications.

Being fully integrated eliminates component drift, and provides extremely high component reliability compared to a discrete solution. Sharp's sensors rely on the principle of triangulation instead of reading the intensity of reflected light, so sensing is consistently accurate, regardless of sensed object color.

This Application Note assumes a 5 V supply and treats both devices as one (since the only difference is the measuring distance).

OPERATION

When the sensor comes up from Standby, it will pulse the LED an average of 8 times to make a measurement. After 8 attempts without a detection from the receiver, it will turn off the LED to save power (see Figure 1).

If the power supply should happen to be noisy or highly variable, the sensor will pulse the LED a maximum of 15 times in the effort to make a measurement; as before, without a detection from the receiver, it will turn off the LED to save power.

When the sensor first powers up to obtain a measurement, the first measurement is made but not output (in case of noise). This initial measurement can take up to as long as twice the typical measurement time (see Figure 2). After the second measurement is made, all measurements are reliable and output immediately.

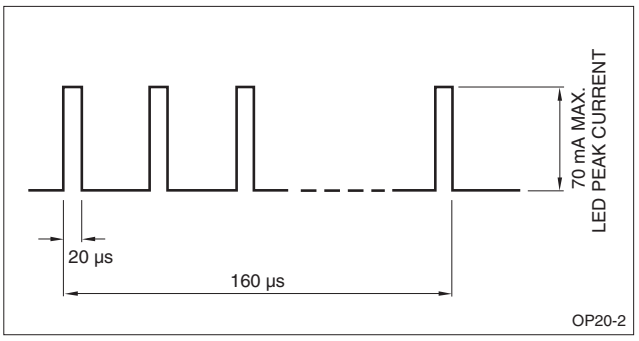

Figure 1. LED Output for Measurement, 8 Pulses (TYP.) 15 Pulses (MAX.)

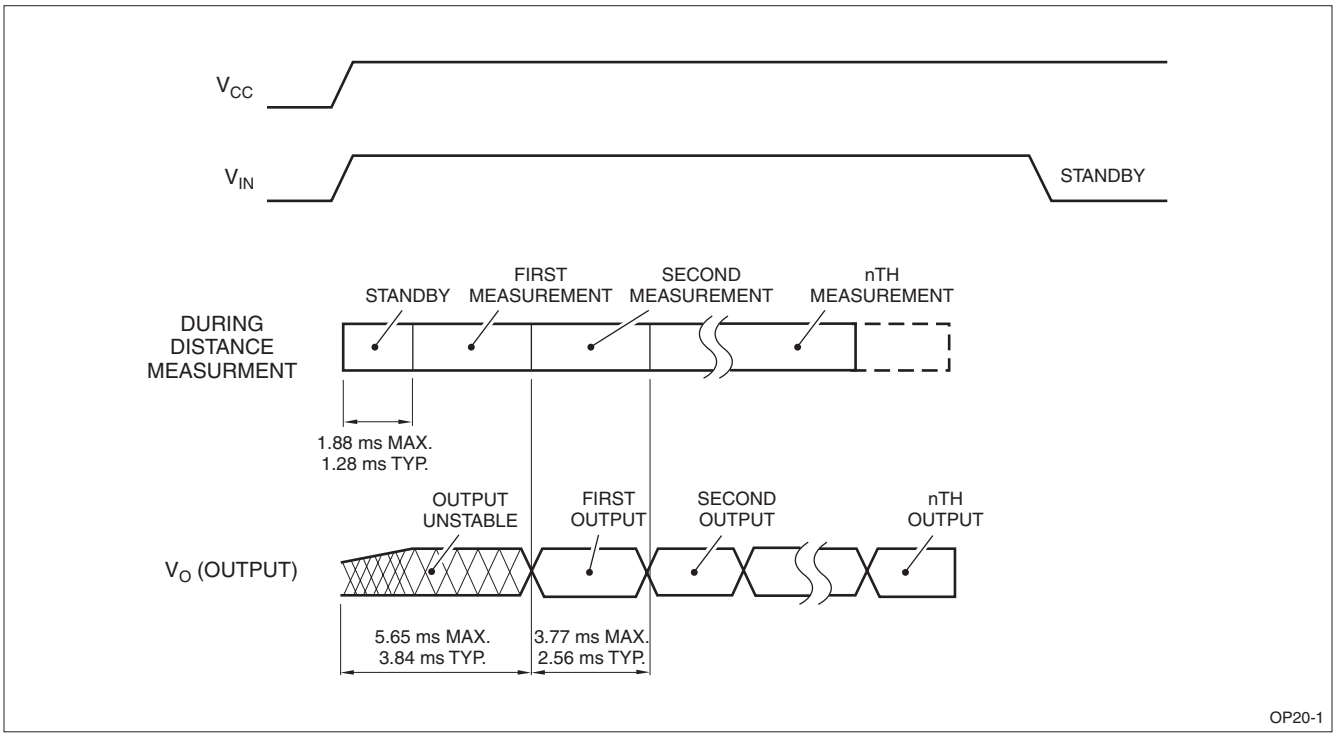

Figure 2. Initial versus Subsequent Measurements

CALCULATING CURRENT DRAW

This device draws intermittent bursts of higher current, so total current is calculated by considering the average draw over time.

Continuous Current Draw

Few battery applications will call upon the sensor to be on continuously, but it is helpful to have the figures.

For optimum sensing distance, in this example R1 = 4.3 Ω. This yields:

- Emission duration: 20 µs × 8 pulses = 160 µs
- LED current: 70 mA with an on time of 6 ms (MAX.)

Therefore the average current draw for the LED will be:

70 mA × 160 µs × 6 ms = 3.7 mA

The sensor and control circuitry draw 0.9 mA so the total current draw will average to 4.6 mA.

Intermittent Operation Current Draw

The most frequent use of the device will be for intermittent applications to save battery power. The continuous current draw in Standby mode is 5 µA. Using an intermittent cycle of 1/3 second, total current draw is:

- 6 ms × 4.6 mA + (333 ms – 6 ms) × 5 µs / 333 ms = 88 µA

NOTE

The power supply and circuit bus for this device needs to be capable of 70 mA for short bursts (20 µs each) to power the LED.

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