1 RS-775126000E7

1.1 RS-775126000E7 Initial Test Data

Table 1: RS-775126000E7 Initial Test Data

DC Voltage	DC Current	Power	RPM	Encod Freq	Resolution
12V	680mA	8.16W	5,500 RPM	641.0hz	51.48°
11V	660mA	7.26W	5,037 RPM	602.4hz	50.17°
10V	630mA	6.30W	4,545 RPM	537.6hz	50.73°
9V	620mA	5.58W	4,064 RPM	480.8hz	50.72°
8V	600mA	4.80W	3,600 RPM	434.8hz	49.68°
7V	580mA	4.06W	3,155 RPM	370.4hz	51.107°
6V	510mA	3.06W	2,728 RPM	310.6hz	52.70°
5V	496mA	2.48W	2,200 RPM	252.5hz	52.28°
4V	470mA	1.88W	1,700 RPM	201.6hz	50.60°
3V	460mA	1.38W	1,196 RPM	139.7hz	51.37 °
2V	434mA	868mW	701.0 RPM	82.64hz	50.90°
1V	430mA	430mW	222.0 RPM	23.58hz	56.68°
				Average Measured Resolution	51.53°

1.2 Step Resolution Using Measured Values

1.2.1 Resolution at 12VDC

Measured Frequency = 641.0hz or cycles per second

Measured RPM = 5,500RPM or revolutions per minute

Convert RPM to revolutions per second

$$RPS = \frac{RPM}{60} = \frac{5{,}500}{60} = 91.667RPS$$

Set cycles per second equal to revolutions per second and solve for the resolution per clock cycle.

$$\frac{641cycles}{Second} = \frac{91.667revolutions}{Second}$$

$$641cycles = 91.667revolutions$$

$$1cycle = \frac{91.667revolutions}{641} = 0.143revolutions$$

Convert revolutions to degrees

$$1rev = 360°$$

$$1cycle = \frac{91.667revolutions}{641} = 0.143 \times 360° = 51.48°$$

Final Formula for converting measured RPM and Frequency to Step Resolution:

$$Step\ Resolution = \left(\frac{RPM}{Frequency} \times 6\right)^{\circ} \tag{1}$$

1.3 Step Resolution Using Manufacturers Data

The manufacturer specification states "Pulses Per Revolution: 7".

$$7\ counts = 1 rev$$

Convert revolutions to degrees

$$7\ counts = 360°$$

Solve for resolution per count or step

$$1\ count = \frac{360°}{7} = 51.43°$$

$$Manufacturer\ Step\ Resolution = 51.43°\ per\ step \tag{2}$$

The manufacturer step resolution of $51.43°$ per step is consistent with the average measured step resolution of $51.53°$.

1.4 RS-775126000E7 Encoder Waveforms

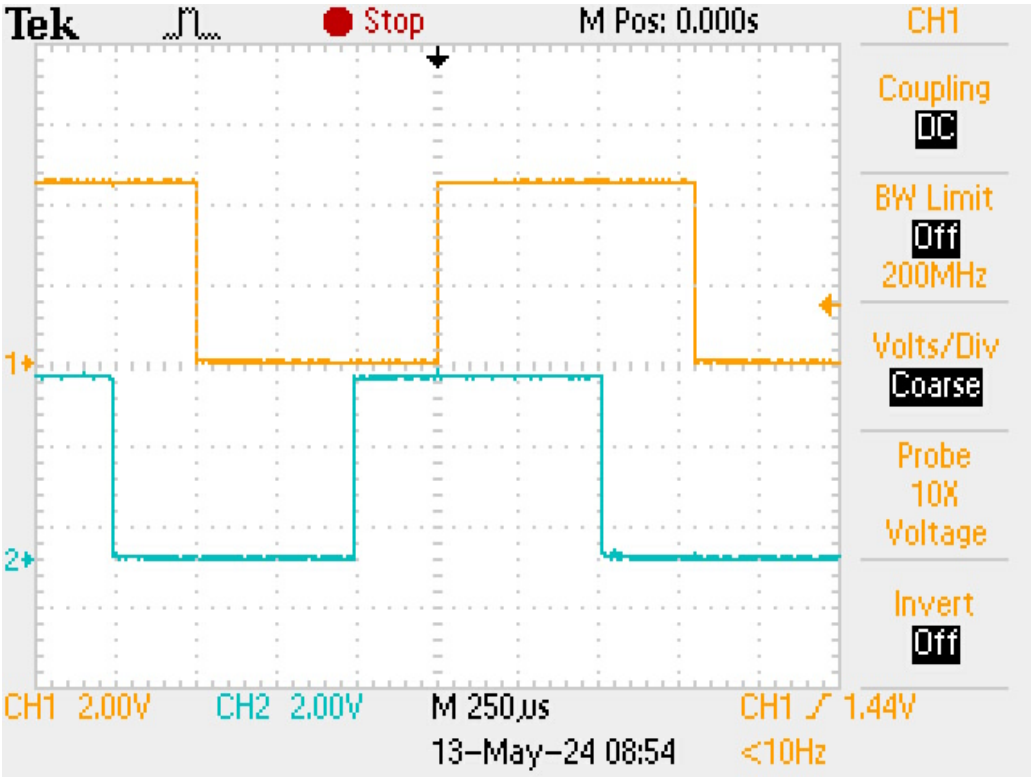

Figure 1: RS-775126000E7 Encoder Waveforms

2 TS-25GA370H-20

2.1 TS-25GA370H-20 Initial Test Data

Table 2: TS-25GA370H-20 Initial Test Data

DC Voltage	DC Current	Power	RPM	Encod Freq	Resolution
12V	78.2mA	938mW	276.5 RPM	1.111Khz	1.493°
11V	66.6mA	733mW	254.7 RPM	1.064Khz	1.436°
10V	61.5mA	615mW	231.1 RPM	980.4hz	1.414°
9V	56.4mA	508mW	210.1 RPM	862.1hz	1.462°
8V	51.0mA	408mW	185.3 RPM	757.6hz	1.468°
7V	47.3mA	331mW	161.4 RPM	657.9hz	1.472°
6V	43.6mA	262mW	138 RPM	574.7hz	1.441°
5V	40.1mA	201mW	114 RPM	480.0hz	1.425°
4V	36.4mA	145.6mW	90.1 RPM	373.1hz	1.449°
3V	32.2mA	96.6mW	67.5 RPM	285.7hz	1.418°
2V	28.8mA	57.6mW	44.3 RPM	177.3hz	1.499°
1V	22.0mA	22.0mW	19.3 RPM	79.37hz	1.459°
				Average Measured Resolution	1.435°

2.1.1 Resolution at 12VDC

Measured Frequency = 1.111Khz or cycles per second

Measured RPM = 276.5RPM or revolutions per minute

Convert RPM to revolutions per second

$$RPS = \frac{RPM}{60} = \frac{276.5}{60} = 4.608RPS$$

Set cycles per second equal to revolutions per second and solve for the resolution per clock cycle.

$$\frac{1.111Kcycles}{Second} = \frac{4.608revolutions}{Second}$$

$$1.111Kcycles = 4.608revolutions$$

$$1cycle = \frac{4.608revolutions}{1.111K} = 4.148 \times 10^{-3}revolutions$$

Convert revolutions to degrees

$$1rev = 360° \ \& \ 1cycle = 4.148 \times 10^{-3}revolutions$$

$$1cycle = 4.148 \times 10^{-3} \times 360° = 1.493°$$

Final Formula for converting measured RPM and Frequency to Step Resolution:

$$Step\ Resolution = \left(\frac{RPM}{Frequency} \times 6\right)^{\circ} \tag{3}$$

2.2 Step Resolution Using Manufacturers Data

The manufacturer specification states ”Single Output 240 Pulses Per Revolution”.

$$240\ counts = 1 rev$$

Convert revolutions to degrees

$$240\ counts = 360°$$

Solve for resolution per count or step

$$1\ count = \frac{360°}{240} = 1.5°$$

$$TS25GA370H20\ Manufacturer\ Step\ Resolution = 1.5°\ per\ step \tag{4}$$

The manufacturer step resolution of $1.5°$ per step is consistent with the average measured step resolution of $1.435°$.

2.3 TS-25GA370H-20 Encoder Waveforms

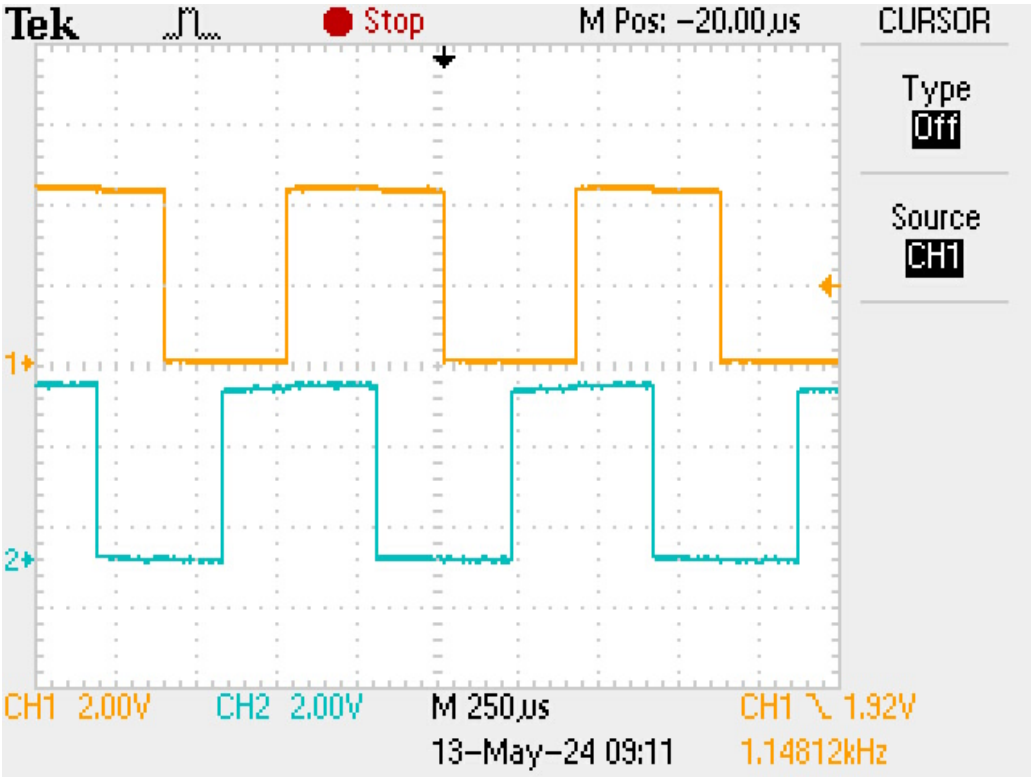

Figure 2: TS-25GA370H-20 Encoder Waveforms