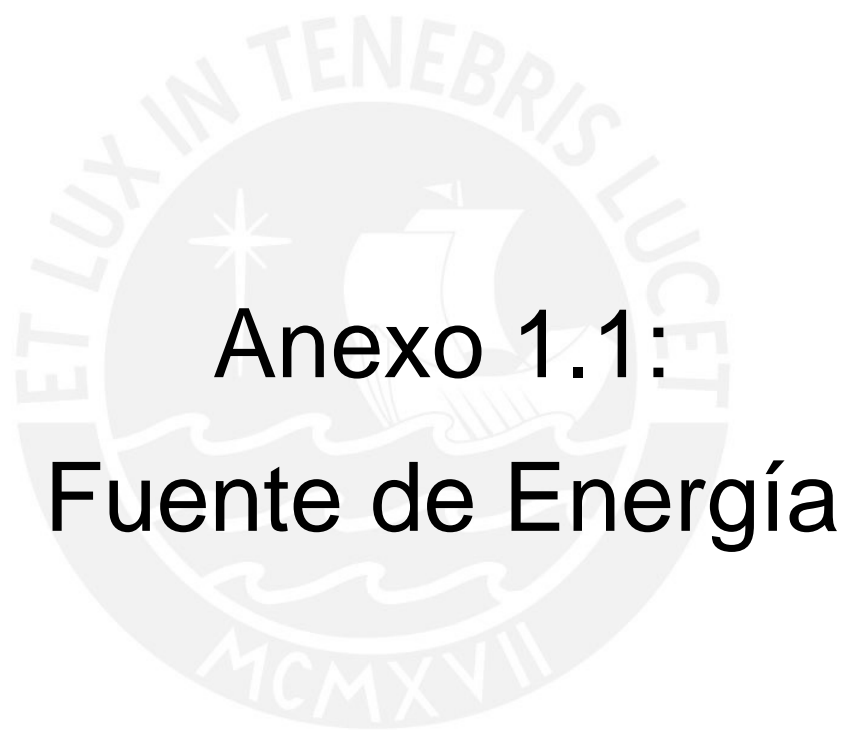


ANEXOS

Anexo 1: Hojas de Datos



Anexo 1.1: Fuente de Energía

NLP40 Series

Single, dual and triple output

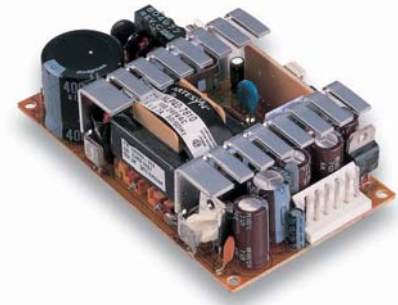


LOW TO MEDIUM POWER AC/DC POWER SUPPLIES

40-50 W AC/DC Universal Input Switch Mode Power Supplies

1

- 4.25 x 2.5 x 1.15 inch package (1U applications)
- Smallest industry package
- Overvoltage and short circuit protection
- 40 W with free air convection
- EN55022, EN55011 conducted emission level B
- EN61000-4-2, -3, -4, -5, -6 immunity compliant
- UL, VDE and CSA safety approvals
- Available RoHS compliant



The NLP40 series is a 40 W universal input ac-dc power supply on a 4.25 x 2.5 inch card with a maximum component height of 1.15 inches for use in 1U applications. This product is the smallest standard 40 W package in the industry making the series ideal for communication applications with space constraints where a standard 5 x 3 inch card solution is not suitable. The NLP40 provides 40 W of output power with free air convection cooling which can be boosted to 50 W with 20 CFM of air. Standard features include overvoltage and short circuit protection. The series, with full international safety approval and the CE mark, meets conducted noise EN55022 level B and has immunity compliance to EN61000-4-2,-3,-4, -5, -6. The NLP40 series is designed for use in low power data networking, computer and telecom applications such as hubs, routers, POS terminals, LCD projectors, cable modems and PABX's. This list is not exclusive as the generic feature set of the NLP40 series with industry standard output configurations provides a solution for most low power applications including many industrial applications.

CE (LVD)

2 YEAR WARRANTY

All specifications are typical at nominal input, full load at 25 °C unless otherwise stated

SPECIFICATIONS

OUTPUT SPECIFICATIONS

Total regulation (Line and load)	Main output	±2.0%
	Auxiliary outputs	±5.0%
Rise time	At turn-on	1.0 s, max.
Transient response	Main output	5.0% max. dev., 25% step at 0.1 A/μs 1 ms rec. to 1.0%
Temperature coefficient		±0.02%/°C
Overvoltage protection	Main outputs	135%, ±15%
Short circuit protection	Cyclic operation	Continuous
Minimum output current	Single	0 A
	Multiple	(See Note 5)

INPUT SPECIFICATIONS

Input voltage range (See Note 9)	Universal input	90-264 Vac 120-370 Vdc
Input frequency range		47-440 Hz
Input surge current	120 Vac, cold start 230 Vac, cold start	15 A max. 30 A max.
Safety ground leakage current	120 Vac, 60 Hz 230 Vac, 50 Hz	0.2 mA 0.4 mA
Input current	120 Vac 230 Vac	1.4 A rms 0.7 A rms
Input fuse	UL/IEC127	250 Vac H 3.15 A

EMC CHARACTERISTICS ⁽¹⁰⁾

Conducted emissions	EN55022, FCC part 15	level B
Radiated emissions	EN55022, FCC part 15	level A
ESD air	EN61000-4-2, level 3	Perf. criteria 1
ESD contact	EN61000-4-2, level 3	Perf. criteria 1
Surge	EN61000-4-5, level 3	Perf. criteria 1
Fast transients	EN61000-4-4, level 3	Perf. criteria 1
Radiated immunity	EN61000-4-3, level 3	Perf. criteria 1
Conducted immunity	EN61000-4-6, level 3	Perf. criteria 1

GENERAL SPECIFICATIONS

Hold-up time	120 Vac 230 Vac	12 ms @ 40 W 20 ms @ 40 W
Efficiency		75% typical
Isolation voltage	Input/output Input/chassis	3000 Vac 1500 Vac
Switching frequency	Fixed	65 kHz, ±5 kHz
Approvals and standards (See Note 8)		EN60950, IEC950, UL1950 VDE0805, CSA C22.2 No. 950
Weight		200 g (7.06 oz)
MTBF	MIL-HDBK-217F	150,000 hours min.

ENVIRONMENTAL SPECIFICATIONS

Thermal performance (See Notes 6, 7, 9)	Operating ambient, (see derating curve) Non-operating 50 °C to 70 °C ambient, convection cooled 0 °C to 50 °C, ambient, convection cooled 0 °C to 50 °C ambient, 20 CFM forced air Peak (0 °C to +50 °C, 60 s) (See Note 2)	0 °C to +70 °C -40 °C to +70 °C Derate to 50% load 40 W 50 W
Relative humidity	Non-condensing	5% to 95% RH
Altitude	Operating Non-operating	10,000 feet max. 30,000 feet max.
Vibration (See Note 4)	5-500 Hz	2.4 G rms peak
Shock	per MIL-STD-810E	516.4 Part IV

NLP40 Series

Single, dual and triple output



LOW TO MEDIUM POWER AC/DC POWER SUPPLIES

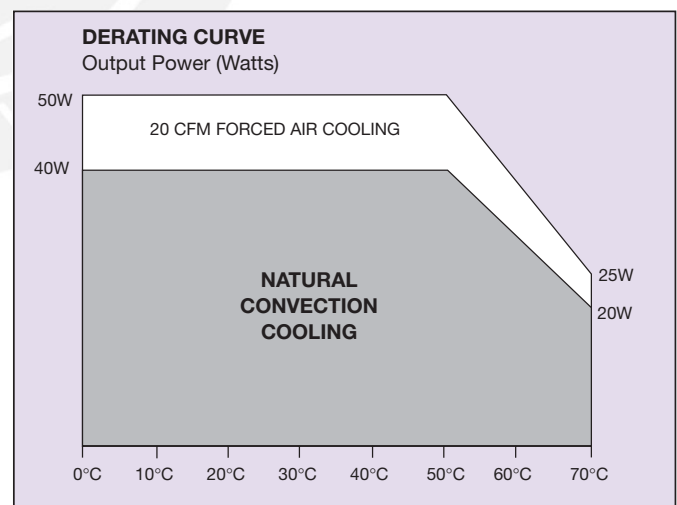
40-50 W AC/DC Universal Input Switch Mode Power Supplies

For the most current data and application support visit www.artesyn.com/powergroup/products.htm

OUTPUT VOLTAGE	OUTPUT CURRENT			RIPPLE (3)	TOTAL REGULATION	MODEL NUMBER (11,12)
	MAX (1)	PEAK (2)	FAN (1)			
+3.3 V (I _A)	4 A	5 A	4.5 A	50 mV	±2.0%	NLP40-76T366J (5)
+12 V (I _B)	2 A	3 A	3 A	120 mV	±5.0%	
-12 V (I _C)	0.2 A	1 A	0.5 A	120 mV	±5.0%	
+5 V (I _A)	4 A	5 A	4.5 A	50 mV	±2.0%	NLP40-7608J (5)
+12 V (I _B)	2 A	3 A	3 A	120 mV	±5.0%	
-12 V (I _C)	0.2 A	1 A	0.5 A	120 mV	±5.0%	
+5 V (I _A)	4 A	5 A	4.5 A	50 mV	±2.0%	NLP40-7610J (5)
+15 V (I _B)	1.6 A	2 A	2 A	150 mV	±5.0%	
-15 V (I _C)	0.2 A	1 A	0.5 A	150 mV	±5.0%	
+12 V (I _A)	1.8 A	2.2 A	2.1 A	120 mV	±2.0%	NLP40-7627J (5)
-12 V (I _B)	1.8 A	2.2 A	2.1 A	120 mV	±5.0%	
+5 V (I _A)	4 A	5 A	4.5 A	50 mV	±2.0%	NLP40-7629J (5)
+12 V (I _B)	2 A	3 A	3 A	120 mV	±5.0%	
3.3 V (I _A)	8 A	10 A	9 A	50 mV	±2.0%	NLP40-76S3J
5 V	8 A	10 A	9 A	50 mV	±2.0%	NLP40-7605J
12 V	3.3 A	4.5 A	4 A	120 mV	±2.0%	NLP40-7612J
15 V	2.6 A	3.6 A	3.3 A	150 mV	±2.0%	NLP40-7615J
24 V	1.6 A	2.5 A	2 A	240 mV	±2.0%	NLP40-7624J
48 V	0.8 A	1.1 A	1 A	300 mV	±2.0%	NLP40-7617J

Notes

- Maximum output power is 40 W for natural convection cooling. With 20 CFM fan cooling, the maximum output power is 50 W.
- Peak output current lasting less than 60 seconds with duty cycle less than 5%. During peak loading, output voltage may exceed total reg. limits.
- Figure is peak-to-peak. Output noise measurements are made across a 50 MHz bandwidth using a 12 inch twisted pair, terminated with a 47 μF capacitor.
- Three orthogonal axes, random vibration 10 minutes for each axes, 2.4 G rms 5 Hz to 500 Hz.
- For multiple output units (except -7627J, 76T366J) to maintain stated regulation then:
 $0.25 \leq I_A / I_B \leq 5$, for $I_B > 0.3$ A
 $0.50 \leq I_A / I_B \leq 5$, for $I_B < 0.3$ A
 For maximum output current (I_C) on triple output models, i.e. for $I_C = I_{Max.}$, I_A min. ≥ 0.5 A and $I_A \geq I_B$.
 For NLP40-7627J only, to maintain stated regulation then:
 $0.5 \leq I_A / I_B \leq 2$.
 For NLP40-76T366J only, to maintain stated regulation then:
 $0.25 \leq I_A / I_B \leq 4$.
- For optimum reliability, no part of the heatsink should exceed 120 °C, and no semiconductor case temperature should exceed 130 °C.
- CAUTION: Allow a minimum of 1 second after disconnecting line power when making thermal measurements.
- This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.
- When the input voltage is <90 Vac the operating range is 0 °C to +40 °C.
- For system EMI compliance, a ground choke may be required before connecting the ground wire to the chassis. It is recommended that this ground choke be placed as close as possible to the systems ac inlet to eliminate noise pick-up in the system.
- The 'J' suffix indicates that these parts are Pb-free (RoHS 6/6) compliant. TSE RoHS 5/6 (non Pb-free) compliant versions may be available on special request, please contact your local sales representative for details.
- NOTICE: Some models do not support all options. Please contact your local Artesyn representative or use the on-line model number search tool at <http://www.artesyn.com/powergroup/products.htm> to find a suitable



NLP40 Series



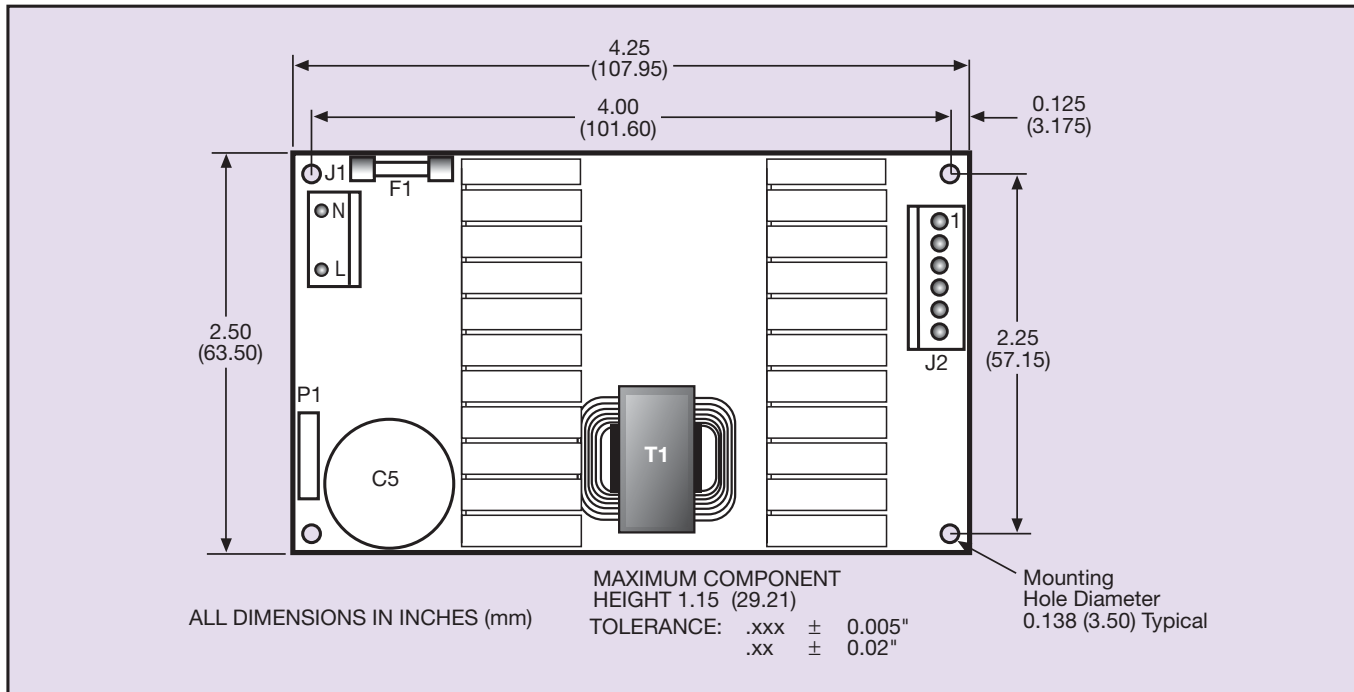
Single, dual and triple output

LOW TO MEDIUM POWER AC/DC POWER SUPPLIES

40-50 W AC/DC Universal Input Switch Mode Power Supplies

3

For the most current data and application support visit www.artesyn.com/powergroup/products.htm



Input and output connectors

AC (J1) connector type
Molex 26-60-4030 type.

DC (J2) connector type
Molex 26-60-4060 type.

Mating connectors

AC (J1) mating connector type
Molex 09-50-3031 or equivalent with Molex 08-50-0105 or equivalent crimp terminals.

DC (J2) mating connector type
Molex 09-50-3061 with Triurcon 6838 or equivalent crimp terminals.

Note: The input and output connectors are the same as those used on NFS40, NFN40, NAL40 and NAN40.

INPUT	
PIN CONNECTIONS	
J1	
Pin 1	AC Line
Pin 2	No Pin
Pin 3	AC Neutral
P1	
Pin 1	Safety Ground

OUTPUT PIN CONNECTIONS			
J2	SINGLE	DUAL	TRIPLE
Pin 1	+Vout	V (B)	V (B)
Pin 2	+Vout	V (A)	V (A)
Pin 3	+Vout	V (A)	V (A)
Pin 4	Return	Return	Return
Pin 5	Return	Return	Return
Pin 6	Return	Return	V (C)

International Safety Standard Approvals

VDE0805/EN60950/IEC950 File 10401-3336-0093
Licence No. 93662

UL1950 File No. E136005

CSA C22.2 No. 950 File No. LR41062C

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Anexo 1.2: Pantalla LCD



4D SYSTEMS

TURNING TECHNOLOGY INTO ART

4D 7.0" LCD CAPE

Beagle Bone Black 7.0" LCD CAPE

DATASHEET

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Please refer to the 4D Systems website for the latest Revision of this document

Document Date: 13th December 2013

Document Revision: 1.1

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1. Description

The 4D 7.0" LCD CAPE is a cape specifically designed for the Beagle Bone Black (BBB), and provides a 7.0" primary display for the BBB for direct user interaction and information display, along with the ability for additional CAPES to be attached at the same time.

The 4DCAPE-70T is **not** compatible with the previous Beagle Bone (Beagle Bone White), and can only be used with the Beagle Bone Black.

The 4D 7.0" LCD CAPE features a 7.0" TFT LCD 800x480 resolution display with Resistive Touch.

The 4DCAPE-70T utilises the drivers developed for the CircuitCo LCD7 00A3, however provides a different form factor and pricing point to the LCD7.

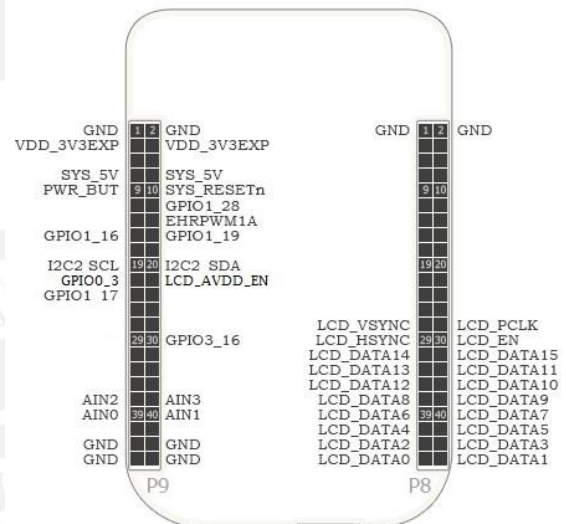
The Beagle Bone Black connects directly to the back of the 4DCAPE-70T, and provides everything the CAPE requires such as power and display signals. Another CAPE can be added to the secondary connectors on the back of the 4DCAPE-70T if required.

The 4D 7.0" LCD CAPE features 7 push buttons below the screen, LEFT, RIGHT, UP, DOWN, ENTER, RESET and POWER, along with 2 LED's to indicate Power and User Status (normally heartbeat).

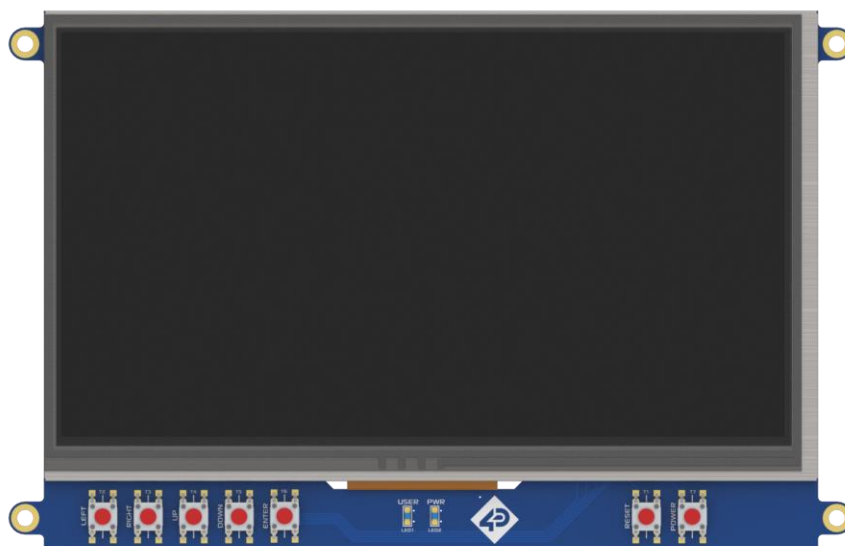
Mounting of the 4DCAPE-7.0T is achieved with the 4x 3.5mm mounting holes present on the CAPE, enabling standard M3 or #6-32 screws to fasten the 4DCAPE-7.0 as required.

2. Features

- 7.0" TFT LCD CAPE for the Beagle Bone Black
- Available only with Resistive Touch (4DCAPE-70T)
- 7 push buttons including LEFT, RIGHT, UP, DOWN, ENTER, RESET and POWER
- 2 LED Lights for Power and User
- 2x2 Jumper with shunts for EEPROM CAPE ID selection
- Module dimensions: 179.9 x 114.9 x 19.5mm
- Module dimensions with Beagle Bone Black connected: Approx 179.9 x 114.9 x 19.5mm
- 4x 3.5mm Mounting holes
- RoHS and CE Compliant.



Used pins for 4DCAPE-70T (Header's P1)



3. Getting Started

3.1. Requirements

The 4D 7.0" LCD CAPE is designed to work with existing software and drivers already developed for the Beagle Bone Black.

The Requirements for use are:

- 4DCAPE-70T Cape
- Beagle Bone Black (BBB) with suitable distribution loaded
- 5V DC Supply suitable for the Beagle Bone Black, recommended 2A @ 5V.
- A Stylus is recommended for accurate touch, however is not required.

3.2. How to use the 4D 7.0" LCD CAPE

The following steps should be all that is required in order to use the 4DCAPE-70T:

1. Connect the 4DCAPE-70T to the Beagle Bone Black while the Beagle Bone Black is not powered. Outline of the BBB is printed on the back of the 4DCAPE-70T as a guide for orientation.
2. If using with other cape's, ensure the 4DCAPE-70T is not conflicting pin wise to any other cape installed.
3. Ensure the DIP Switch on the CAPE is set to a different EEPROM ID to any other capes.
4. Ensure your Beagle Bone Black is loaded with a suitable Linux distribution which is compatible with the existing CircuitCo LCD7 00A3 CAPE or 4D Systems 4DCAPE-70T – See Section 6. Angstrom release 20.06.2013 or later is required. Android 4.2.2 has also been tested and functions correctly. Other distributions may also be compatible with this display.
5. Connect a 5V Supply to the DC Jack of the Beagle Bone Black. It is recommended to use a 2A supply to ensure sufficient supply.
6. Once power is connected, something should be displayed on the 4DCAPE-70T as it is booted. Once booted, the system should automatically log in (assuming Angstrom Linux distribution is used), and the Touch Screen Calibration Utility should load automatically. If using the 4DCAPE-70T without touch, this can be exited and ignored.
7. Calibrate the 4DCAPE-70T using the utility by following the on screen instructions. If the

utility is closed, it is available again under the System – Administration menu.

8. Complete – the Angstrom desktop should be displayed on the 4DCAPE-70T and is ready for use, else Andoid etc.

For support of the BBB and various distributions, please seek support from the respective websites associated with the BBB itself or the distributions.

A good place to start for information and support regarding the BBB and various distributions available, is www.beagleboard.org

This website details how to update your software on the BBB and the current version of Angstrom available for the BBB

http://circuitco.com/support/index.php?title=Updating_The_Software

This website details how to update your software on the BBB for the current version of Andoid.

http://downloads.ti.com/sitara_android/esd/TI_Android_DevKit/TI_Android_JB_4_2_2_DevKit_4_1_1/index_FDS.html

For support regarding the 4DLCD-70T CAPE hardware itself, please go to the 4D Systems website and either contact Support directly, or use the 4D Systems Forum. www.4dsystems.com.au

3.3. Changing the brightness (Angstrom)

By default the backlight brightness of the 4D CAPE 7.0 is set to 50% with Angstrom distribution (20.06.2013). It is possible to change the backlight brightness as the backlight is PWM controlled.

Please note, these instructions may become obsolete as new versions of Angstrom are released, or if different distributions are used.

One method is to SSH into the Beaglebone Black from your PC, and set the backlight value that way. Note this does not persist over restarts, so this would need to be entered into a startup script if the setting is required to be set each startup.

At the command prompt, type the following:

```
cd /sys/class/backlight/backlight.10/
echo 100 > brightness
```

Where 100 represents 100%, this can be changed to any number from 0 to 100 as required.

3.4. Changing the brightness (Android)

Changing the brightness on Android is simple. Navigate to the Settings menu, and to the Display option, and then to Brightness. Slide the slider to the desired position.

3.5. Calibrating resistive touch (Angstrom)

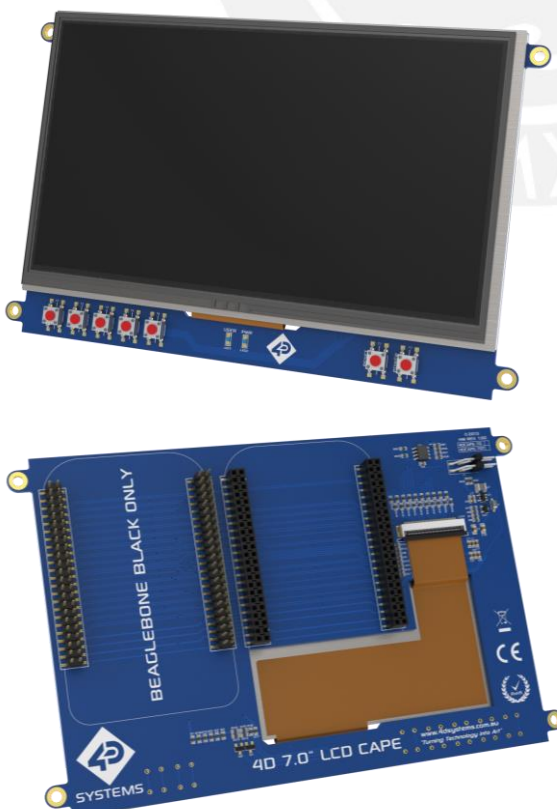
When a distribution is used for the first time with a 4DCAPE-70T, the default calibration application that comes with the Angstrom distribution is started automatically (Refer to section 3.2) on startup of Angstrom. If the calibration is however input incorrectly and it is required to be set again, a file must be deleted manually in order to then recalibrate the display.

Note, this may change as newer distributions of Angstrom become available, or if different distributions are used, so these instructions may become obsolete or inaccurate.

One method is to SSH into the BBB using your PC, navigate to the following folder and delete the specified file. Another is to connect a USB Mouse to navigate around using the 4DCAPE-70T, and delete the file that way.

```
/etc/pointercal.xinput
```

Once this file has been deleted, the calibration utility can be run again.



3.6. Android Information

The 4DCAPE-70T is compatible with Android 4.2.2 and has been tested with an image from TI (see section 3.2).

It has been noticed however that the EEPROM Jumper may need to be set to something other than both disconnected (0x57) else the CAPE may not be detected by the Android OS.

3.7. Secondary Headers

The 4DCAPE-70T features secondary headers (P2_A and P2_B) for another cape to be attached. Please refer to the schematic at the end of this datasheet in Section 7 to see which pins/IO from the BBB feature on the secondary headers.

It is up to the user to determine which capes are compatible based on which I/O is available.

4. EEPROM Details

On the 4D 7.0" LCD CAPE there is an EEPROM which is used to configure the Beagle Bone Black with the appropriate configuration in order to use the Cape.

Please note: some EEPROM content refers to the LCD7 00A3 which is made by CircuitCo. This is the case due to how the BBB identifies the CAPE and what drivers to apply to it. Since the 4DCAPE-70T utilises the LCD7 drivers, this must be the case.

4.1. 4DCAPE-70T EEPROM

EEPROM Support: YES
Board Name: 4D 7.0 LCD CAPE - 4DCAPE-70T
Manufacturer: 4D Systems

Note (*): The Beaglebone, Beaglebone Black and Beagleboard remains the property of beaglebone.org. All references to the words Beaglebone, Beaglebone Black, Beagleboard are licensed under a Creative Commons Attribution-Share Alike 3.0 license.

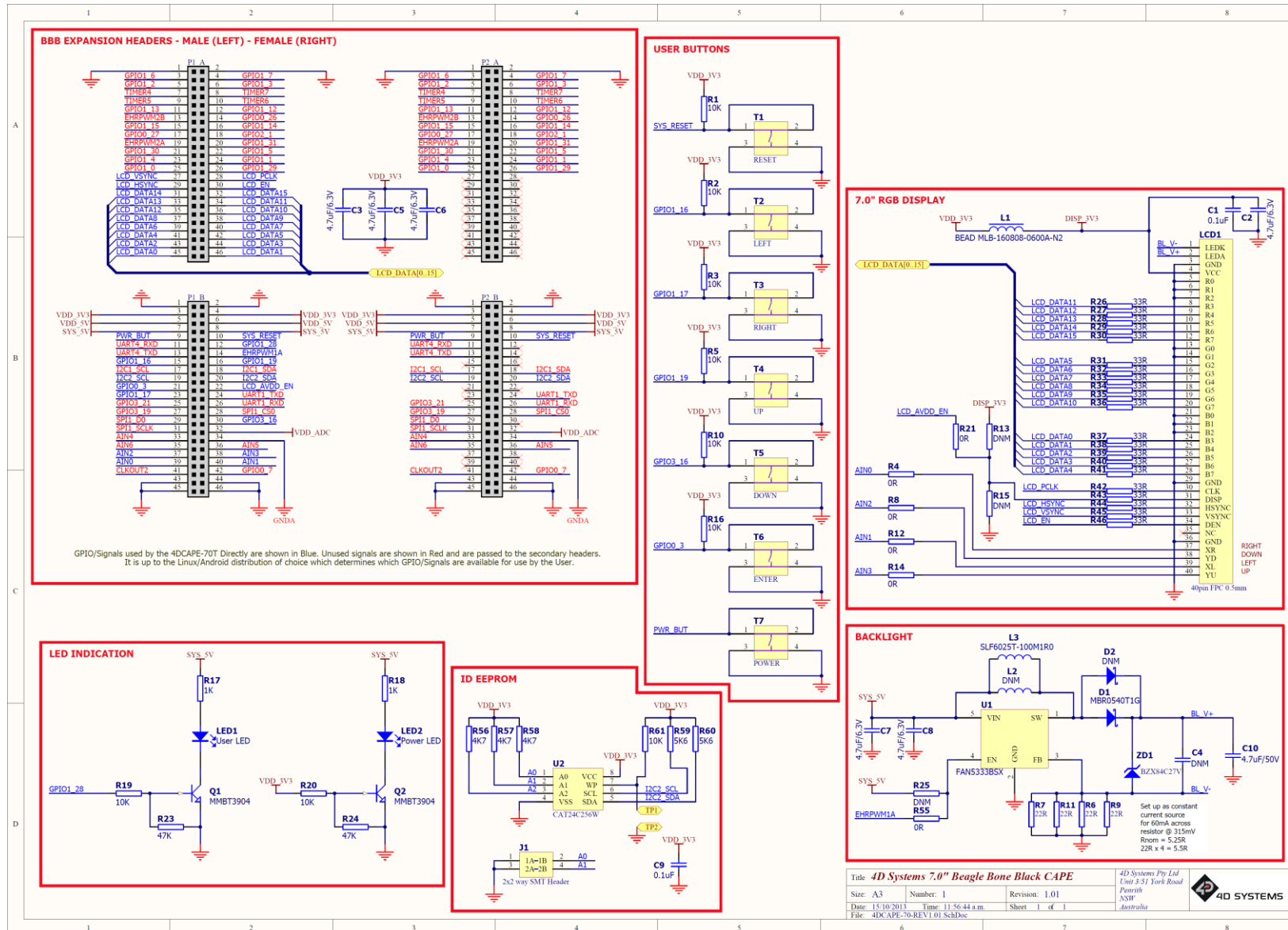
All references to CircuitCo and LCD7 remain the property of CircuitCo and beagleboardtoys.org and are not affiliated to 4D Systems in any way.

5. Display Precautions

- Avoid having to display the same image/object on the screen for lengthy periods of time. This will cause a burn-in which is a common problem with all types of display technologies. Blank the screen after a while or dim it very low by adjusting the contrast. Better still; implement a screen saver feature.
- Moisture and water can damage the display. Moisture on the surface of a powered display will cause the electrodes to corrode. Wipe off any moisture gently or let the display dry before usage.
- Dirt from fingerprint oil and fat can easily stain the surface of the display. Gently wipe off any stains with a soft lint-free cloth.
- The performance of the display will degrade under high temperature and humidity. Avoid such conditions when storing.
- Do not tamper with the display flex cable that is connected to the control board. This may affect the connection between the display and the driving circuitry and cause failure. Under no circumstances should the display flex be disconnected from the PCB and power applied to the PCB, as this could result in instant failure of the CAPE.
- Displays are susceptible to mechanical shock and any force exerted on the module may result in deformed zebra stripes, a cracked display cell and broken backlight
- Always use the mounting holes on the module to mount the display.

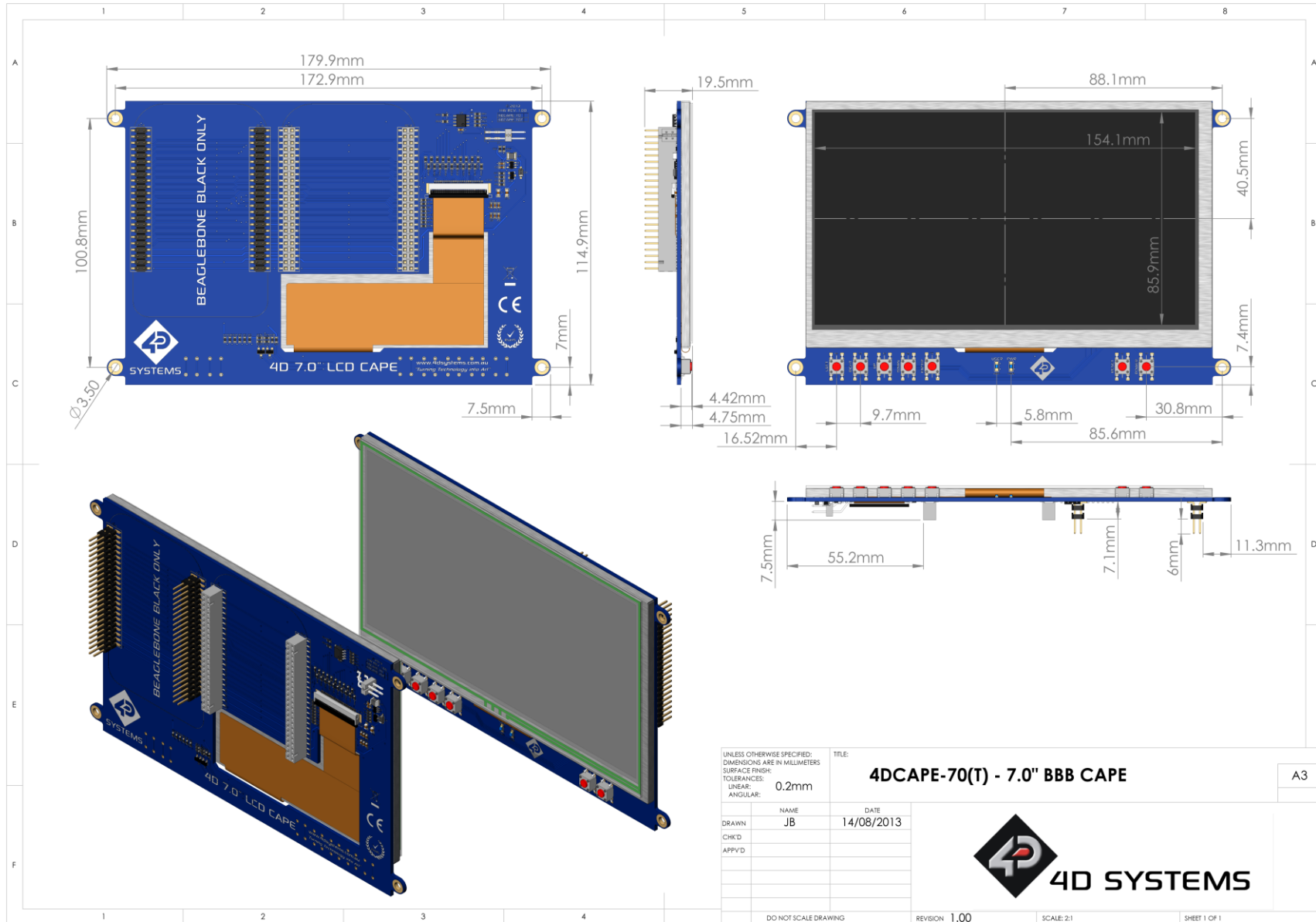
8. Schematic Diagram

4D 7.0" LCD CAPE - BBB



9. Mechanical Details

4D 7.0" LCD CAPE – BBB



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		TITLE: 4DCAPE-70(T) - 7.0" BBB CAPE	A3
0.2mm			
NAME	DATE		
JB	14/08/2013		
DRAWN			
CHK'D			
APP'VD			
DO NOT SCALE DRAWING		REVISION: 1.00	SCALE: 2:1
		SHEET 1 OF 1	



10. Ordering Information

ORDERING INFORMATION

Order Code:

4DCAPE-70T

Packaging: Module sealed in antistatic foam padded 4D Systems Box



11. Legal Notice

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For Sales Support: sales@4dsystems.com.au

Website: www.4dsystems.com.au

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Anexo 1.3: Actuadores

Anexo 1.3.1: Servomotor

HS-81 Micro

Shopping Cart

MAXIMUM TORQUE **42 oz-in.**

MAXIMUM SPEED **0.09 sec/60°**

The HS-81 is among our most popular servos. Available in both resin and metal gear versions. With a fine balance between speed and torque, the HS-81's were designed to be both economical and reliable. They are perfect for small electric aircraft as well as throttle servos on gas aircraft. By utilizing the standard size Hitec spline, any horn or arm that fits on a standard Hitec servo will fit on the HS-81.



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 136

Uses C1 Standard Spline
A1 B1 C1 D1

[Click for more information](#)

Price: **\$12.69**

Part: 31081S

Status: **In-Stock**

Rotation: **90° Rotation (Stock)** ▼

Direction: **Clockwise (Stock)** ▼

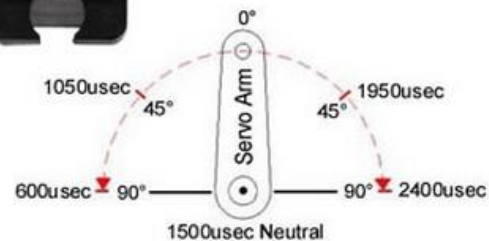
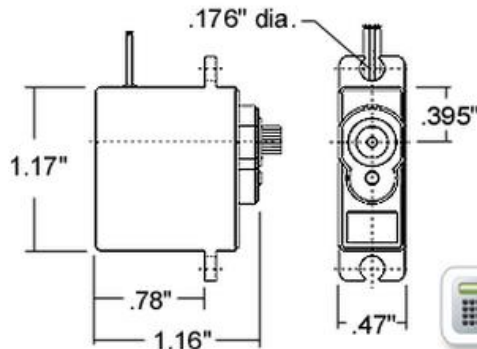
Qty: **1** **Add to Cart**



Analog Servo

Detailed Specifications

Control System: +Pulse Width Control 1500usec Neutral
Required Pulse: 3-5 Volt Peak to Peak Square Wave
Operating Voltage: 4.8-6.0 Volts
Operating Temperature Range: -20 to +60 Degree C
Operating Speed (4.8V): 0.11sec/60° at no load
Operating Speed (6.0V): 0.09sec/60° at no load
Stall Torque (4.8V): 36.10 oz/in. (2.6kg.cm)
Stall Torque (6.0V): 41.66 oz/in. (3kg.cm)
Operating Angle: 45 Deg. one side pulse traveling 450usec
Continuous Rotation Modifiable: No
Direction: Clockwise/Pulse Traveling 1500 to 1900usec
Current Drain (4.8V): 8.8mA/idle and 220mA no load operating
Current Drain (6.0V): 9.1mA/idle and 280mA no load operating
Dead Band Width: 8usec
Motor Type: 3 Pole Ferrite
Potentiometer Drive: Direct Drive
Bearing Type: None, outer case serves as bearing
Gear Type: All Nylon
Connector Wire Length: 6.29" (160mm)
Dimensions: 1.17" x 0.47" x 1.16" (29.8 x 12 x 29.6mm)
Weight: 0.58oz (16.6g)



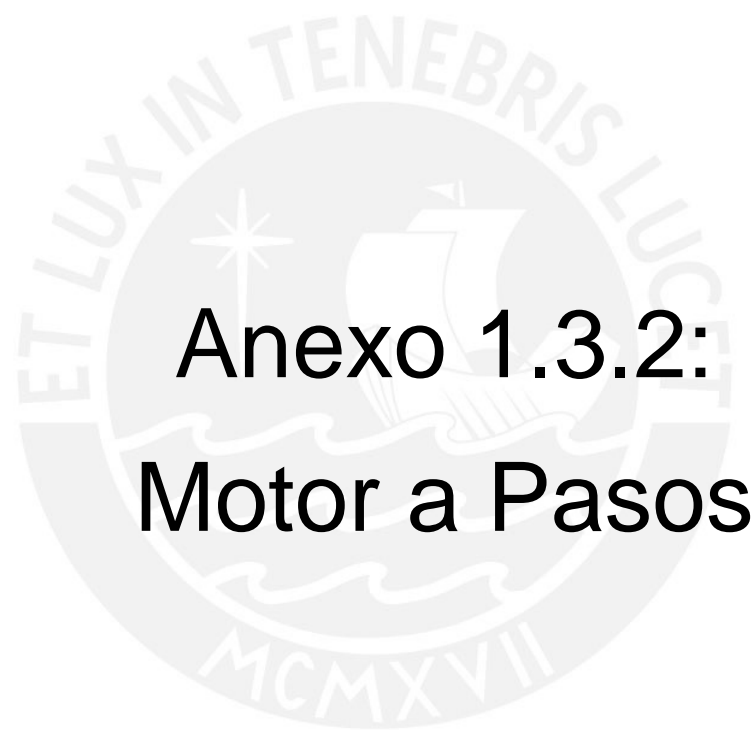
This servo can operate 180° when given a pulse signal ranging from 600usec to 2400usec. Since most R/C controllers cannot generate this wide of signal range, you will need to use our [servo stretcher](#) for 180° operation.

CONVERSION CALCULATORS

General Servo Information

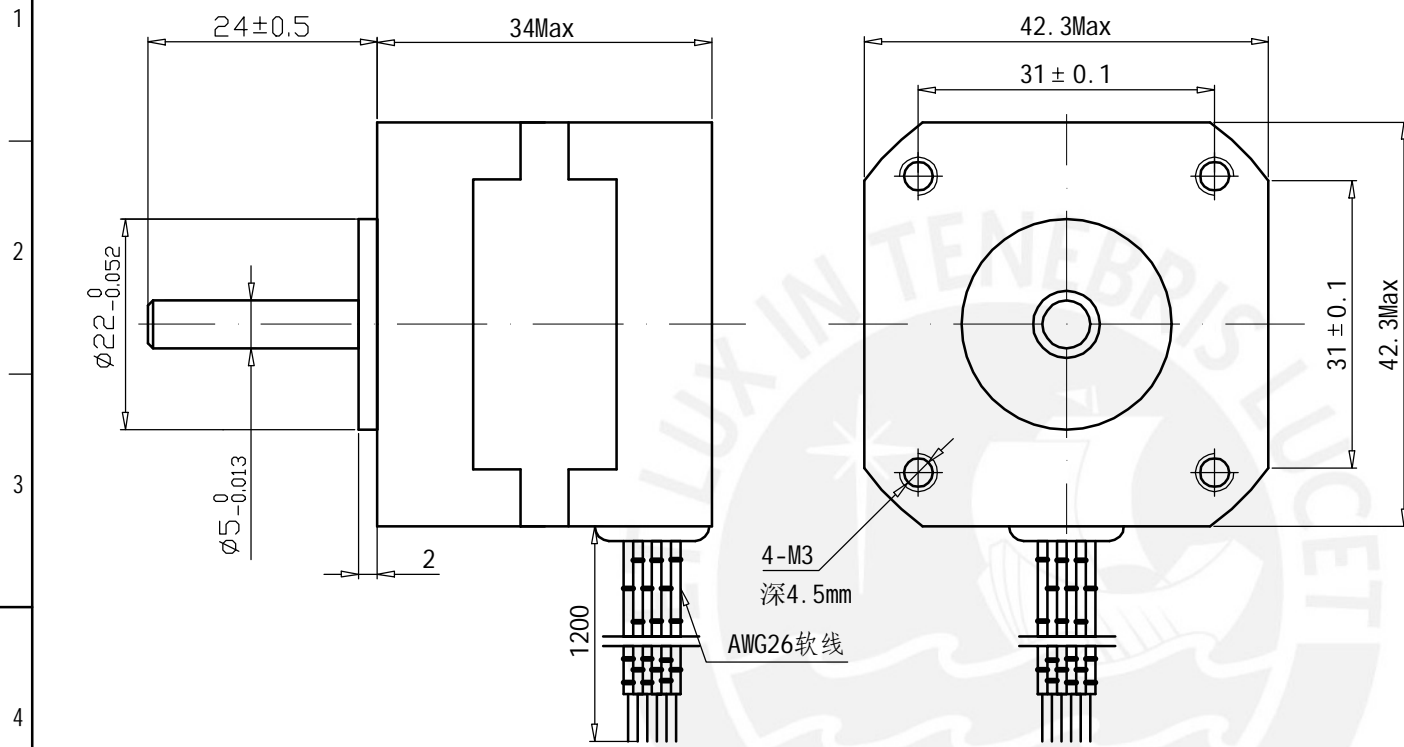
- [What is a servo?](#)
- [How servos work](#)
- [What servo to use](#)
- [Servo power & speed](#)
- [Rotation direction](#)
- [Connector types](#)
- [180° rotation](#)
- [Continuous rotation](#)

Hitec Servo Accessories

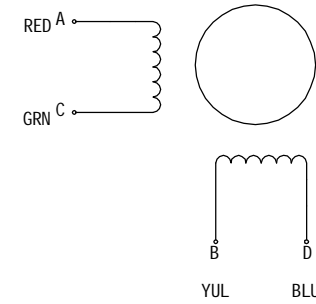


Anexo 1.3.2: Motor a Pasos

CONTROL SIGNATURE:



WIRING DIAGRAM

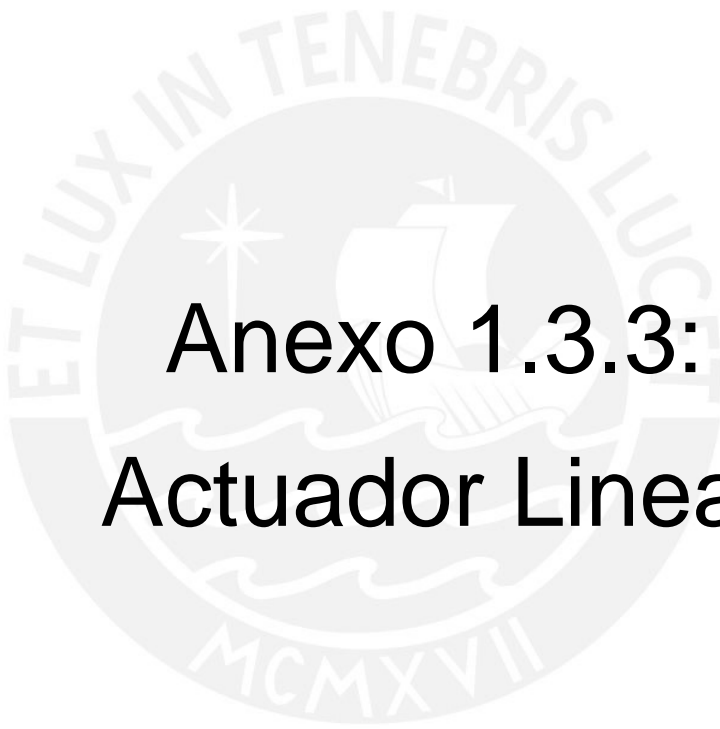


THE INFORMATION CONTAINED IN THIS DRAWING IS CONFIDENTIAL. COPYRIGHT

COMMON RATEING		SPECIVICATIONS	
STEP ANGLE	1.8°±5%	VOLTAGE	12V
PHASES	2	CURRENT	0.33A
INSULATION RESISTANCE	100Mohm(500V DC)	INDUCTANCE	46±20% Mh
CLASS OF INSULATION	B	RESISTANCE	34±10%
WEIGHT	0.20Kg	HOLDING TORQUE	0.23N.M

A		1ST ISSUE	090327
REV.	EPO#	DETAILS	DATE

SCALE	UNIT	UNSPECIFIED TOLERANCE:	
	mm	MERCURY MOTOR	
SIZE	A4		
DRAWN XUHEZHAO		MATERIAL	TITLE
20090307			SM-42BYG011-25
CHECKED		FINISH	SHEET 1 OF 1 REV A
APPROVED		DWG.NO. SM-42BYG011-25-090327	



**Anexo 1.3.3:
Actuador Lineal**

Miniature Linear Motion Series



Firgelli Technologies' unique line of Miniature Linear Actuators enables a new generation of motion-enabled product designs, with capabilities that have never before been combined in a device of this size. These small linear actuators are a superior alternative to designing with awkward gears, motors, servos and linkages.

Firgelli's L series of micro linear actuators combine the best features of our existing micro actuator families into a highly flexible, configurable and compact platform with an optional sophisticated on-board microcontroller. The first member of the L series, the L12, is an axial design with a powerful drivetrain and a rectangular cross section for increased rigidity. But by far the most attractive feature of this actuator is the broad spectrum of available configurations.

L12 Specifications

Gearing Option	50	100	210	
Peak Power Point ¹	12 N @ 11 mm/s	23 N @ 6 mm/s	45 N @ 2.5 mm/s	
Peak Efficiency Point	6 N @ 16 mm/s	12 N @ 8 mm/s	18 N @ 4 mm/s	
Max Speed (no load)	23 mm/s	12 mm/s	5 mm/s	
Backdrive Force ²	43 N	80 N	150 N	
Stroke Option	10 mm	30 mm	50 mm	100 mm
Weight	28 g	34 g	40 g	56 g
Positional Accuracy	0.1 mm	0.2 mm	0.2 mm	0.3 mm
Max Side Force (fully extended)	50 N	40 N	30 N	15 N
Mechanical Backlash	0.1 mm			
Feedback Potentiometer	2.75 kΩ/mm ± 30%, 1% linearity			
Duty Cycle	20 %			
Lifetime	1000 hours at rated duty cycle			
Operating Temperature	-10°C to +50°C			
Storage Temperature	-30°C to +70°C			
Ingress Protection Rating	IP-54			
Audible Noise	55 dB at 45 cm			
Stall Current	450 mA at 5 V & 6 V, 200 mA at 12 V			

Benefits

- Compact miniature size
- Simple control using industry standard interfaces
- Low voltage
- Equal push / pull force
- Easy mounting

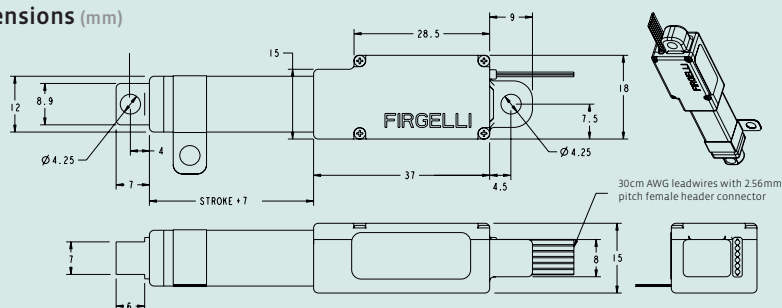
Applications

- Robotics
- Consumer appliances
- Toys
- Automotive
- Industrial automation

¹ 1 N (Newton) = 0.225 lb_f (pound-force)

² a powered-off actuator will statically hold a force up to the Backdrive Force

Dimensions (mm)



Firgelli Technologies Inc.

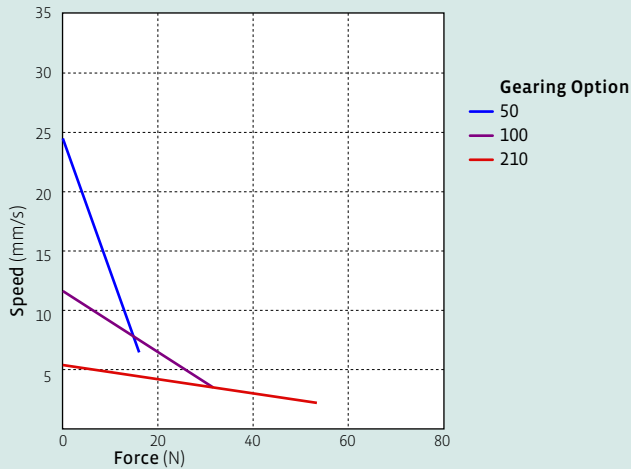
580 Starling Lane
Victoria, BC, V9E 2A9
Canada

1 (206) 347-9684 phone
1 (888) 225-9198 toll-free
1 (206) 347-9684 fax

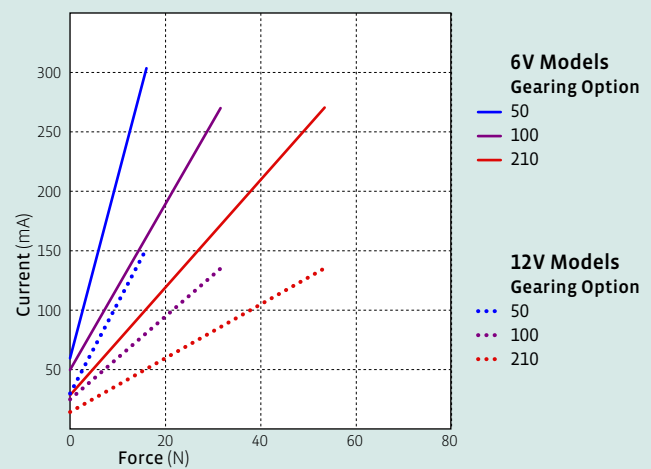
sales@firgelli.com
www.firgelli.com

L12 Specifications

Load Curves



Current Curves



Model Selection

The L12 has five configurable features. L12 configurations are identified according to the following scheme:

L12-SS-GG-VV-C-L

feature	options
SS: Stroke Length (in mm)	10, 30, 50, 100 Any stroke length between 10 and 100mm is available on custom orders, in 2mm increments.
GG: Gear reduction ratio (refer to force/speed plots)	50, 100, 210 Other gearing options may be possible on custom orders.
VV: Voltage	06 6V (5V power for Controller options B and P) 12 12V
C: Controller	B Basic 2-wire open-loop interface, no position feedback, control, or limit switching. Positive voltage extends, negative retracts. S 2-wire open-loop interface (like B option) with limit switching at stroke endpoints. P Simple analog position feedback signal, no on-board controller. I Integrated controller with Industrial and RC servo interfaces (see L12 Controller Options section). Not available with 10mm stroke length configurations. R RC Linear Servo. Not available with 10mm stroke or 12 volts.
L: Mechanical or electrical interface customizations	Custom option codes will be issued by Fircelli for custom builds when applicable.

Basis of Operation

The L12 actuator is designed to move push or pull loads along its full stroke length. The speed of travel is determined by the gearing of the actuator and the load or force the actuator is working against at a given point in time (see Load Curves chart on this datasheet). When power is removed, the actuator stops moving and holds its position, unless the applied load exceeds the backdrive force, in which case the actuator will backdrive. Stalling the actuator under power for short periods of time (several seconds) will not damage the actuator. Do not reverse the supply voltage polarity to actuators containing an integrated controller (I controller option).

Each L12 actuator ships with two mounting clamps, two mounting brackets and two rod end options: a clevis end and a threaded end with nut (see drawing on page 4). When changing rod ends, extend the actuator completely and hold the round shaft while unscrewing the rod end. Standard lead wires are 28 AWG, 30 cm long with 2.56 mm (0.1") pitch female header connector (Hi-Tec™ and Futaba™ compatible). Actuators are a sealed unit (IP-54 rating, resistant to dust and water ingress but not fully waterproof).

Ordering information

Sample quantities may be ordered with a credit card directly from www.fircelli.com.

Please contact Fircelli at sales@fircelli.com for volume pricing or custom configurations.

Note that not all configuration combinations are stocked as standard products. Please refer to www.fircelli.com/orders for current inventory.

Option 3—Basic 2-wire interface

WIRING:

1 (red) **Motor V+** (5V or 12V)

2 (black) **Motor ground**

The -B actuators offer no control or feedback mechanisms. While voltage is applied to the motor V+ and ground leads, the actuator extends. If the polarity of this voltage is reversed, the actuator retracts. The 5V actuator is rated for 5V but can operate at 6V.

Option 5—Basic 2-wire interface

WIRING:

1 (red) **Motor V+** (5V or 12V)

2 (black) **Motor ground**

When the actuator moves to a position within 0.5mm of its fully-retracted or fully-extended stroke endpoint, a limit switch will stop power to the motor. When this occurs, the actuator can only be reversed away from the stroke endpoint. Once the actuator is positioned away from its stroke endpoint, normal operation resumes. For custom orders, limit switch trigger positions can be modified at the time of manufacture, in 0.5mm increments.

Option P—Position feedback signal

WIRING:

1 (orange) **Feedback potentiometer negative reference rail**

2 (purple) **Feedback potentiometer wiper** (position signal)

3 (red) **Motor V+** (5V or 12V)

4 (black) **Motor ground**

5 (yellow) **Feedback potentiometer positive reference rail**

The -P actuators offer no built-in controller, but do provide an analog position feedback signal that can be input to an external controller. While voltage is applied to the motor V+ and ground leads, the actuator extends. If the polarity of this voltage is reversed, the actuator retracts. Actuator stroke position may be monitored by providing any stable low and high reference voltages on leads 1 and 5, and then reading the position signal on lead 2. The voltage on lead 2 will vary linearly between the two reference voltages in proportion to the position of the actuator stroke.

Option 4—Integrated controller with industrial and RC servo interfaces

WIRING:

1 (green) **Current input signal** (used for 4–20 mA interface mode)

2 (blue) **Voltage input signal** (used for the 0–5V interface mode and PWM interface modes)

3 (purple) **Position Feedback signal** (0–3.3 V, linearly proportional to actuator position)

4 (white) **RC input signal** (used for RC-servo compatible interface mode)

5 (red) **Motor V+** (+6 Vdc for 6 V models, +12 Vdc for 12 V models)

6 (black) **Ground**

The -I actuator models feature an on-board software-based digital microcontroller. The microcontroller is not user-programmable.

The six lead wires are split into two connectors. Leads 4, 5 and 6 terminate at a universal RC servo three-pin connector (Hi-Tec™ and Futaba™ compatible). Leads 1, 2 and 3 terminate at a separate, similarly sized connector.

When the actuator is powered up, it will repeatedly scan leads 1, 2, 4 for an input signal that is valid under any of the four supported interface modes. When a valid signal is detected, the actuator will self-configure to the corresponding interface mode, and all other interface modes and input leads are disabled until the actuator is next powered on.

0–5V Interface Mode: This mode allows the actuator to be controlled with just a battery, and a potentiometer to signal the desired position to the actuator – a simple interface for prototypes or home automation projects. The desired actuator position (setpoint) is input to the actuator on lead 2 as a voltage between ground and 5V. The setpoint voltage must be held on lead 2 until the desired actuator stroke position is reached. Lead 2 is a high impedance input.

4–20 mA Interface Mode: This mode is compatible with PLC devices typically used in industrial control applications. The desired actuator position (setpoint) is input to the actuator on lead 1 as a current between 4 mA and 20 mA. The setpoint current must be held on lead 1 until the desired actuator stroke position is reached.

RC Servo Interface Mode: This is a standard hobby-type remote-control digital servo interface (CMOS logic), compatible with servos and receivers from manufacturers like Futaba™ and Hi-Tec™. The desired actuator position is input to the actuator on lead 4 as a positive 5 Volt pulse width signal. A 1.0 ms pulse commands the controller to fully retract the actuator, and a 2.0 ms pulse signals full extension. If the motion of the actuator, or of other servos in your system, seems erratic, place a 1–4Ω resistor in series with the actuator’s red V+ leadwire.

PWM Mode: This mode allows control of the actuator using a single digital output pin from an external microcontroller. The desired actuator position is encoded as the duty cycle of a 5 Volt 1 kHz square wave on actuator lead 2, where the % duty cycle sets the actuator position to the same % of full stroke extension. The waveform must be 0V to +5V in order to access the full stroke range of the actuator.

Option R—RC Linear Servo

WIRING:

1 (white) **RC input signal**

2 (red) **Motor V+** (6VOC)

3 (black) **Ground**

The -R actuators or ‘linear servos’ are a direct replacement for regular radio controlled hobby servos. Operation is as above in RC servo interface mode (option I). The -R actuators are available in 6 volt and 30, 50 and 100 mm strokes only.



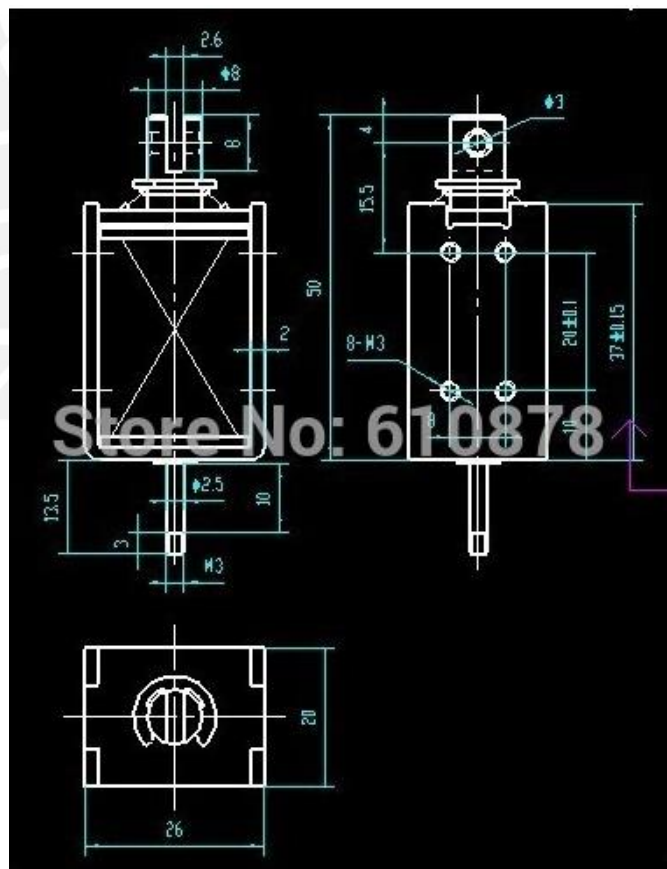
Anexo 1.3.4: Solenoide

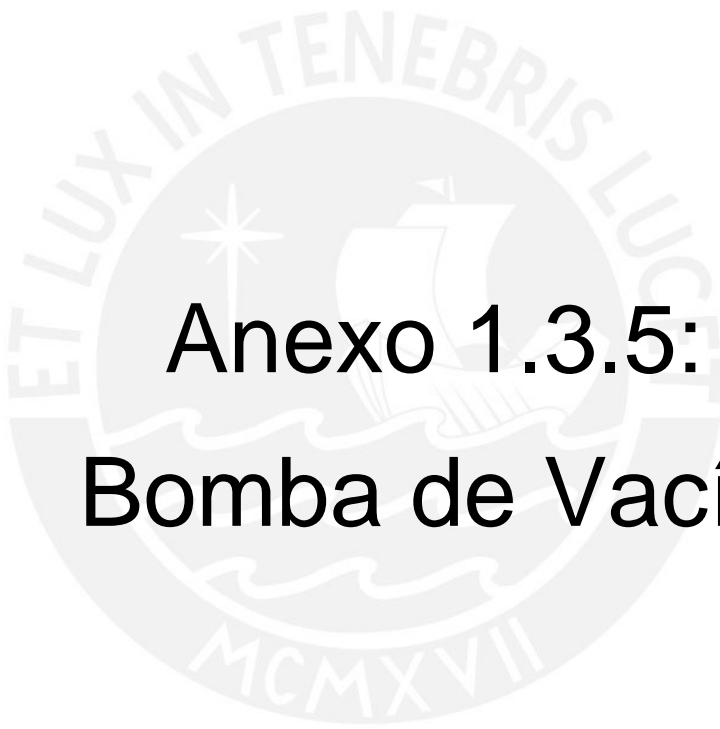
DC 12V Push Type Open Frame Solenoid Electromagnet 0.8N Holding ZYE1-0837Z

Product Description

100% Brand new , never used
 Item's color might be different from the picture because of the aberration.
 This is a high Quality push type, linear motion, open frame, plunger spring return, DC solenoid Electromagnet.
 DC Solenoid Electromagnet mainly used in vending machines, transport equipment, office facility household appliance, mechanical, etc.
 Long service life and reliable.
 With the simple design structure.
 When energized, doing work through pushing away pushing rod joined object.
 Operating Temperature: -5 to 40 degree non-condensing.
 Operating Humidity: 45% to 85% non-condensing.
 Dielectric strength: the dielectric strength between coil and yoke should at least be able to withstand 600VAC /min.
 Installation of solenoid frame: through the four hours to fix on the applicable device.
 Holding Force: 0.8N
 Model: ZYE1-0837Z
 Frame Material: Metal
 Input Voltage: 12V DC
 Stroke: 10mm
 Amperage:0.75A
 Push Bar Diameter: 0.3 inch / 0.8 cm
 Frame Size (L x W x H): Approx. 1.5 x 0.8 x 1 inch / 3.7 x 2 x 2.5 cm
 Lead Length: Approx. 8.66 inch / 22 cm
 Weight: 89g

Package include:
 1 x Open frame solenoid





Anexo 1.3.5: Bomba de Vacío

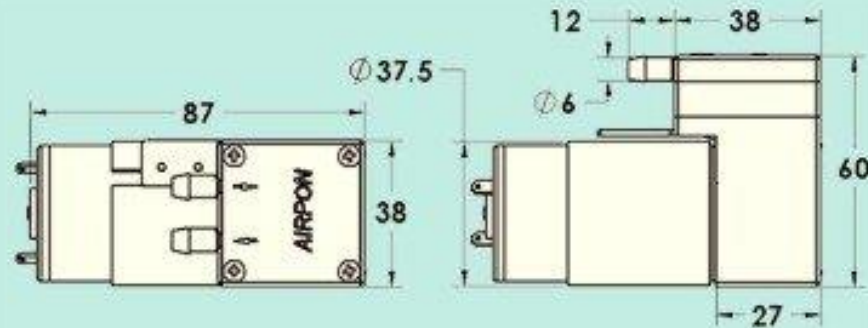
AIR PUMP SERIES

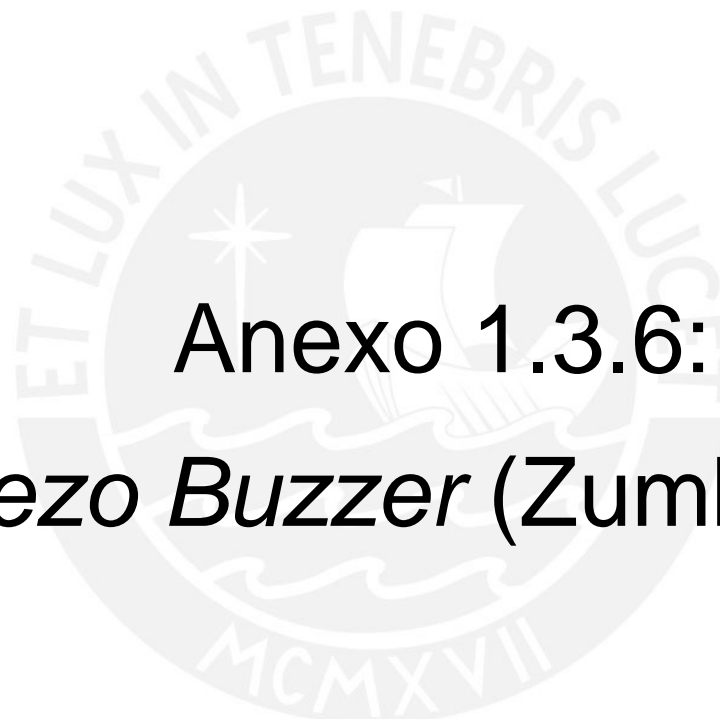
FOREVER



D2028 Pump Specifications

<i>Free Flow Range</i>	<i>12-15LPM</i>
<i>Vacuum Range</i>	<i>0-16"Hg</i>
<i>Pressure Range</i>	<i>0-32PSI</i>
<i>Standard Motor Voltage Options</i>	<i>12VDC</i>
<i>Power</i>	<i>12W</i>
<i>Motor Construction Option</i>	<i>Iron Core-Oil Bearing</i>
<i>Diaphragm Material Option</i>	<i>EPDM</i>
<i>Operating Temperature Range</i>	<i>32°-120°F (0°-50°)</i>





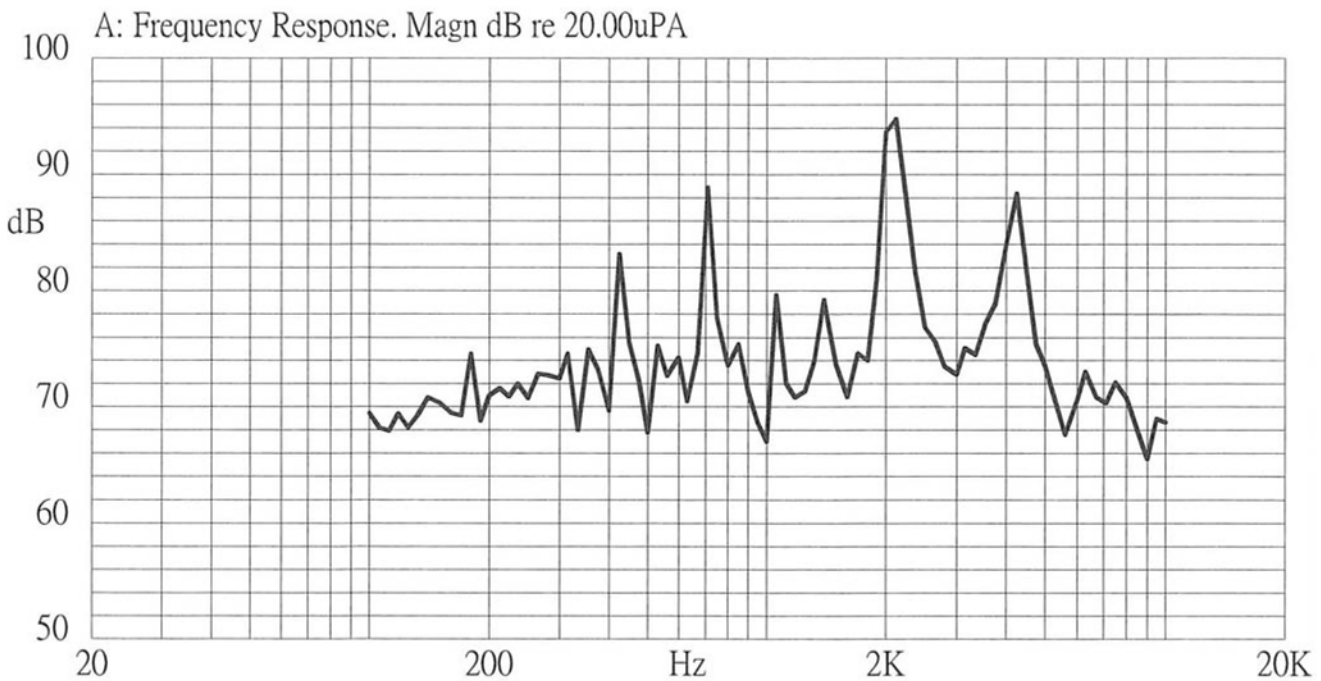
Anexo 1.3.6:
Piezo Buzzer (Zumbador)



Specifications

Rated voltage	3.5 Vo-p	
Operating voltage	3.0 - 5.0 Vo-p	
Mean current	35 mA max.	
Coil resistance	42 ±6.3 Ω	Applying rated voltage, 2048 Hz square wave, 1/2 duty
Sound output	Min. 85 (Typical 95) dBA	Distance at 10cm (A-weight free air). Applying rated voltage of 2048 Hz, square wave, 1/2 duty.
Rated frequency	2,048 Hz	
Operating temperature	-20 ~ +60° C	
Storage temperature	-30 ~ +70° C	
Dimensions	ø12.0 x H8.5 mm	See attached drawing
Weight	1.4 g	
Material	PPO (Black)	
Terminal	Pin type (AU Plating)	See attached drawing
RoHS	yes	

Frequency Response Curve





CUI INC

Part No: CEM-1203(42)

Description: magnetic buzzer

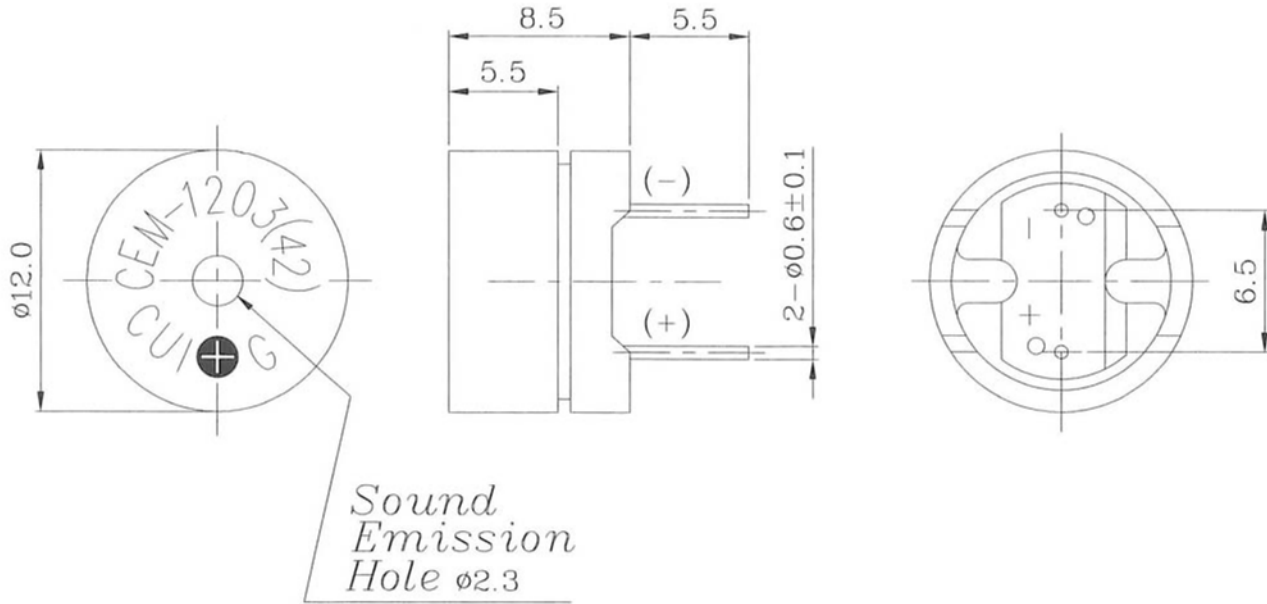
Date: 8/11/2006

Unit: mm

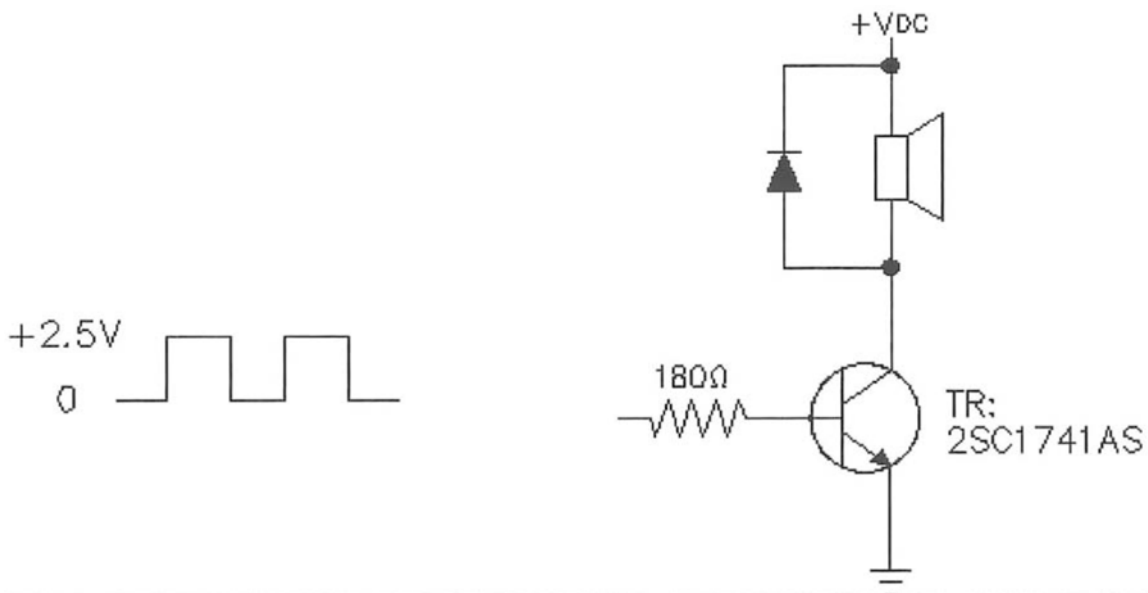
Page No: 2 of 5

Appearance Drawing

Tolerance: ± 0.5



Measurement Method





Part No: CEM-1203(42)

Description: magnetic buzzer

Date: 8/11/2006

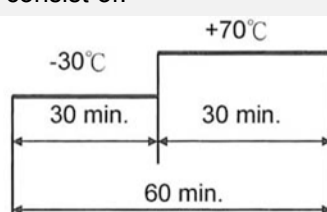
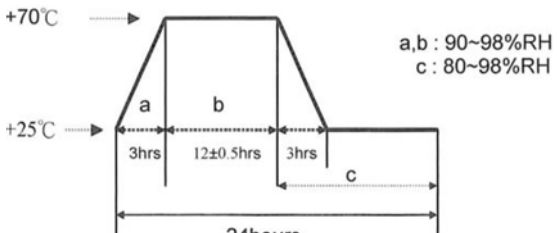
Unit: mm

Page No: 3 of 5

Item	Test Condition	Evaluation Standard
Solderability ¹	Lead terminals are immersed in rosin for 5 seconds and then immersed in solder bath of 270 ±5°C for 3 ±1 seconds.	90% min. of lead terminals should be wet with solder. (Except the edge of the terminal)
Soldering Heat Resistance	Lead terminals are immersed up to 1.5mm from the buzzer's body in solder bath of 260 ±5°C for 3 ±1 seconds.	No in interference in operation.
Terminal Mechanical Strength	Apply force of 9.8 N (1.0 kg) to each terminal in each axial direction for 10 seconds.	No damage or cutting off.
Vibration	The buzzer will be measured after applying a vibration amplitude of 1.5 mm with 10 to 55 Hz band of vibration frequency to each of the 3 perpendicular directions for 2 hours.	After the test, the part shall meet specifications without any damage to the appearance. After 4 hours at +25°C, the SPL should be within ±10 dBA of the initial SPL.
Drop Test	The part is to be dropped from a height of 75 cm onto a 40 mm thick wooden board 3 times in 3 axis (X, Y, Z) for a total of 9 drops.	

Notes: 1. Not recommended for wave soldering

Environment Test

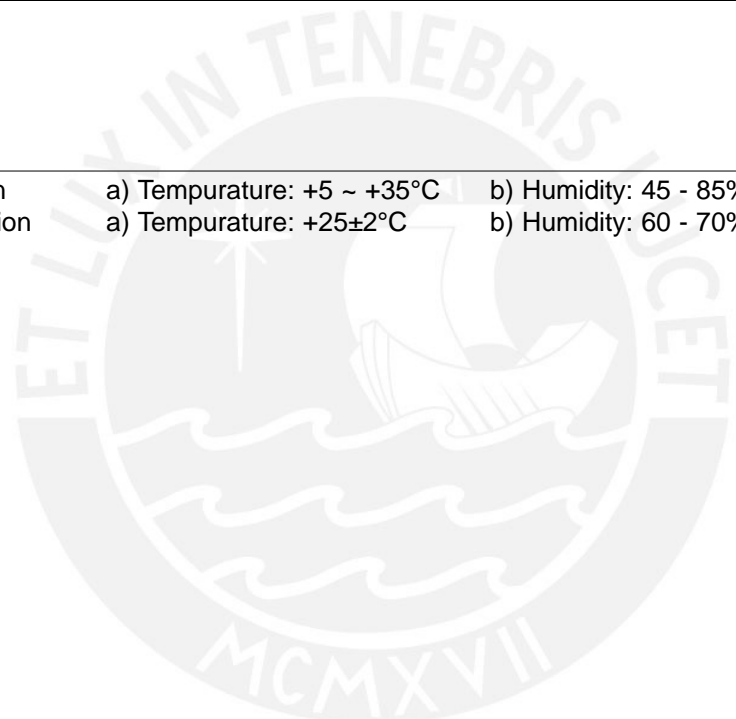
Item	Test Condition	Evaluation Standard
High temp. test	The part will be subjected to +70°C for 96 hours.	After the test, the part shall meet specifications without any damage to the appearance. After 4 hours at +25°C, the SPL should be within ±10 dBA of the initial SPL.
Low temp. test	The part will be subjected to -30°C for 96 hours	
Thermal shock	The part will be subjected to 10 cycles. One cycle will consist of: 	
Temp./Humidity cycle	The part shall be subjected to 10 cycles. One cycle will consist of: 	



Item	Test Condition	Evaluation Standard
Operating (Life Test)	<p>1. Continuous life test: The part will be subjected to 72 hours at 45°C with 3.5 V, 2048 Hz applied.</p> <p>2. Intermittent life test: A duty cycle of 1 minute on, 1 minute off, a minimum of 10,000 times at room temp. (25±10°C) with 3.5 V, 2048 Hz applied.</p>	<p>After the test, the part shall meet specifications without any damage to the appearance. After 4 hours at +25°C, the SPL should be within ±10 dBA of the initial SPL.</p>

Test Conditions

Standard Test Condition	a) Temperature: +5 ~ +35°C	b) Humidity: 45 - 85%	c) Pressure: 860 - 1060 mbar
Judgement Test Condition	a) Temperature: +25±2°C	b) Humidity: 60 - 70%	c) Pressure: 860 - 1060 mbar





CUI INC

Part No: CEM-1203(42)

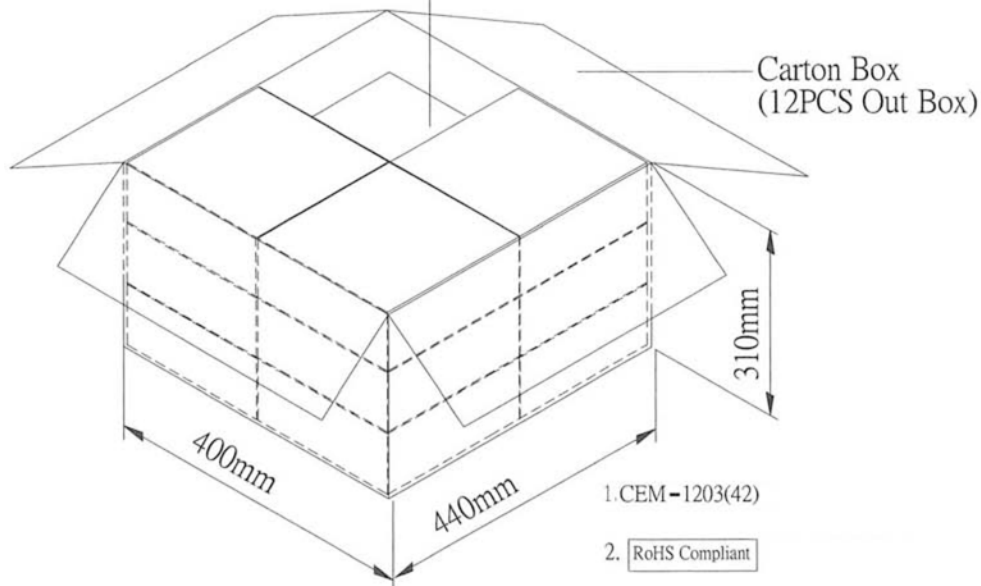
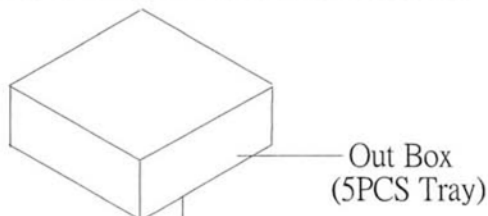
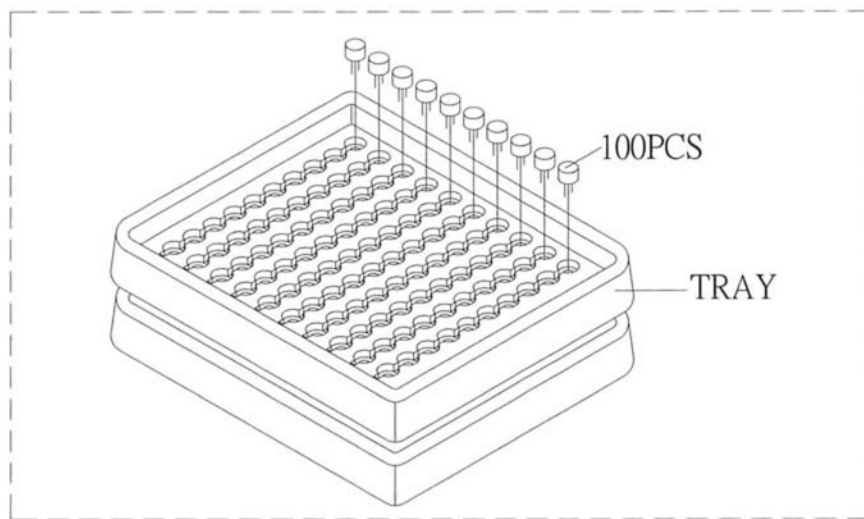
Description: magnetic buzzer

Date: 8/11/2006

Unit: mm

Page No: 5 of 5

Packaging



Tray	184mmx184mmx23mm	1x100PCS=100PCS
Out Box	200mmx190mmx100mm	5LAYERx100PCS=500PCS
Carton Box	440mmx400mmx310mm	500PCSx12=6000PCS

Anexo 1.4: Sensores

Anexo 1.4.1: Emisor IR



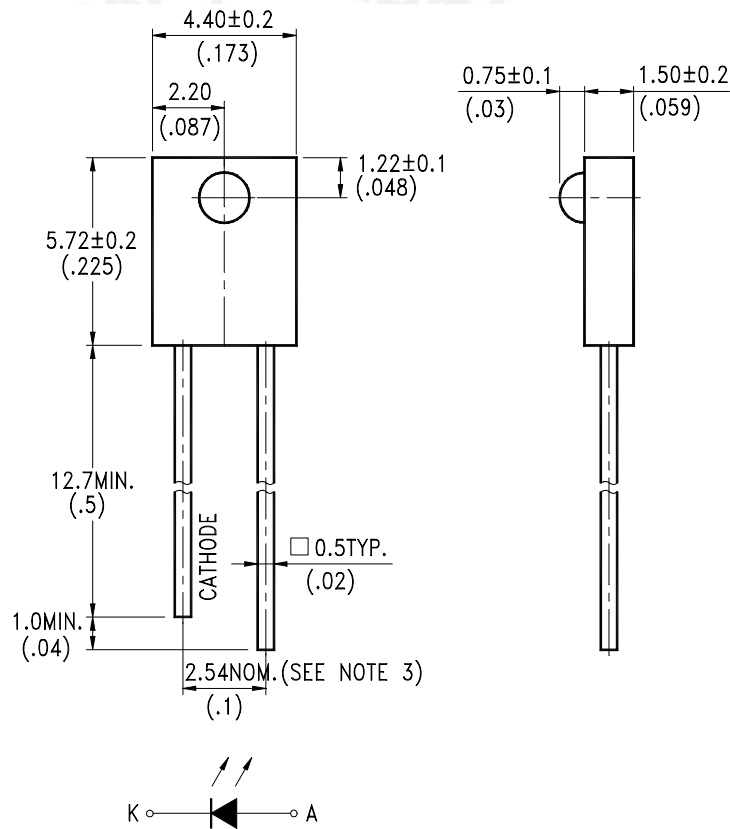
LITE-ON ELECTRONICS, INC.

Property of Lite-On Only

FEATURES

- * SELECTED TO SPECIFIC ON-LINE INTENSITY AND RADIANT INTENSITY RANGES
- * LOW COST MINIATURE PLASTIC SIDE LOOKING PACKAGE
- * MECHANICALLY AND SPECTRALLY MATCHED TO THE LTR-301 SERIES OF PHOTOTRANSISTOR

PACKAGE DIMENSIONS



NOTES:

1. All dimensions are in millimeters (inches).
2. Tolerance is $\pm 0.25\text{mm}(.010\text{'})$ unless otherwise noted.
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject to change without notice.

LITEON**LITE-ON ELECTRONICS, INC.**

Property of Lite-On Only

ABSOLUTE MAXIMUM RATINGS AT TA=25°C

PARAMETER	MAXIMUM RATING	UNIT
Power Dissipation	75	mW
Peak Forward Current (300pps, 10 μ s pulse)	1	A
Continuous Forward Current	50	mA
Reverse Voltage	5	V
Operating Temperature Range	-40°C to +85°C	
Storage Temperature Range	-55°C to +100°C	
Lead Soldering Temperature [1.6mm(.063") From Body]	260°C for 5 Seconds	

ELECTRICAL OPTICAL CHARACTERISTICS AT TA=25°C

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	BIN NO.
Aperture Radiant Incidence	E _e	0.088		0.168	mW/cm ²	I _F = 20mA	BIN B
		0.112		0.204			BIN C
		0.136		0.240			BIN D
		0.160		0.288			BIN E
		0.192					BIN F
Radiant Intensity	I _E	0.662		1.263	mW/sr	I _F = 20mA	BIN B
		0.842		1.534			BIN C
		1.023		1.805			BIN D
		1.203		2.165			BIN E
		1.444					BIN F
Peak Emission Wavelength	λ_{Peak}		940		nm	I _F = 20mA	
Spectral Line Half-Width	$\Delta \lambda$		50		nm	I _F = 20mA	
Forward Voltage	V _F		1.2	1.6	V	I _F = 20mA	
Reverse Current	I _R			100	μ A	V _R = 5V	
Viewing Angle (See FIG.6)	2 $\theta_{1/2}$		40		deg.		



LITE-ON ELECTRONICS, INC.

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TYPICAL ELECTRICAL / OPTICAL CHARACTERISTICS CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

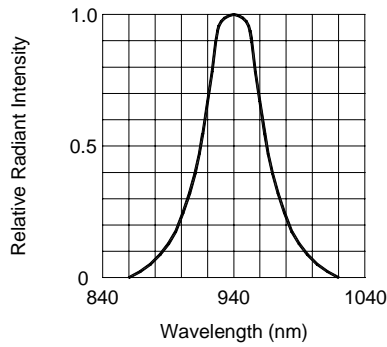


FIG.1 SPECTRAL DISTRIBUTION

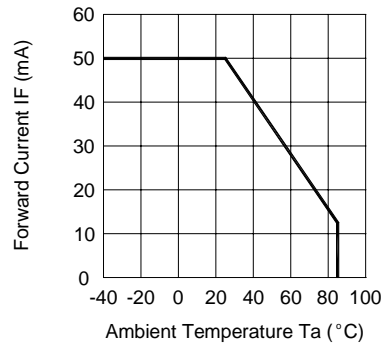


FIG.2 FORWARD CURRENT VS. AMBIENT TEMPERATURE

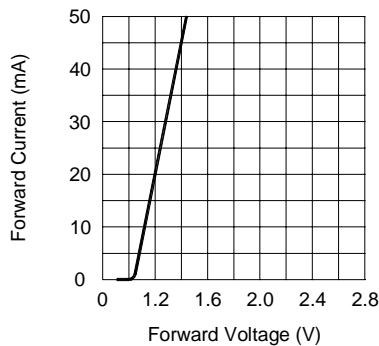


FIG.3 FORWARD CURRENT VS. FORWARD VOLTAGE

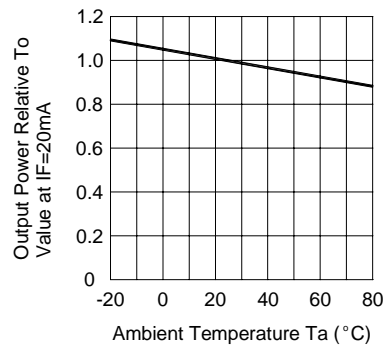


FIG.4 RELATIVE RADIANT INTENSITY VS. AMBIENT TEMPERATURE

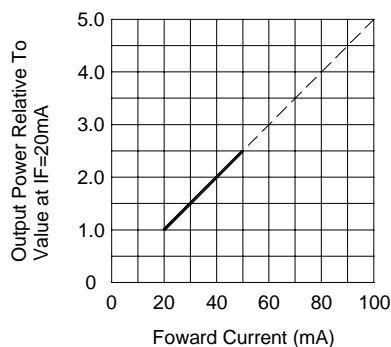


FIG.5 RELATIVE RADIANT INTENSITY VS. FORWARD CURRENT

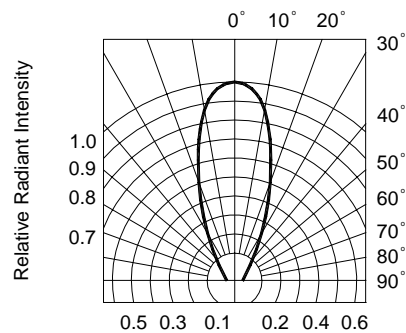


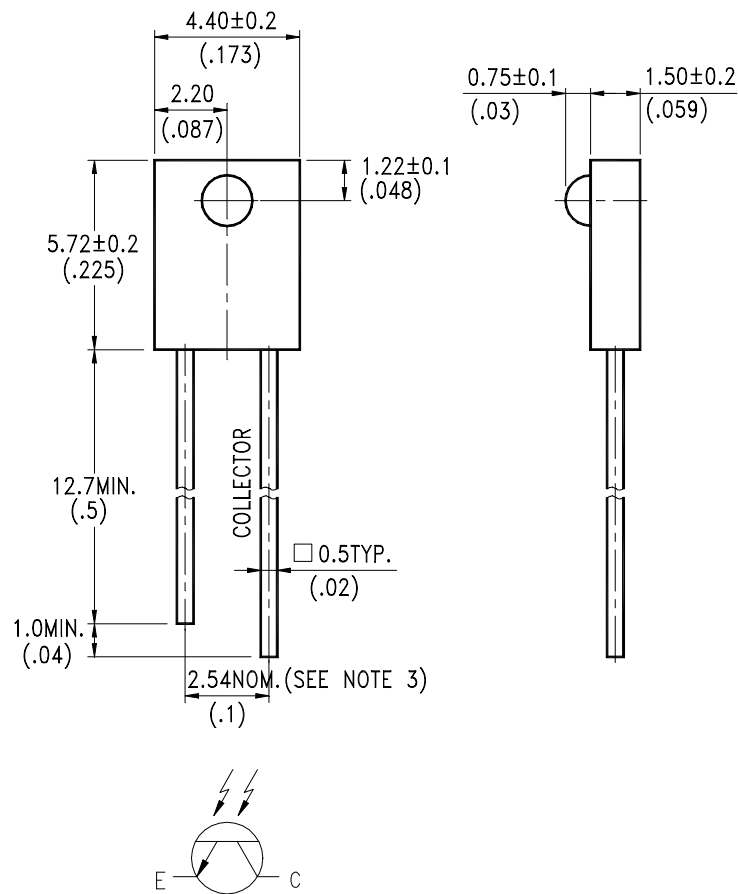
FIG.6 RADIATION DIAGRAM

Anexo 1.4.2: Detector IR

FEATURES

- * WIDE RANGE OF COLLECTOR CURRENT
- * LENSED FOR HIGH SENSITIVITY
- * LOW COST PLASTIC SIDE LOOKING PACKAGE
- * CLEAR TRANSPARENT COLOR PACKAGE

PACKAGE DIMENSIONS



NOTES:

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25 mm ($.010$ ") unless otherwise noted.
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject to change without notice.



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Property of Lite-On Only

ABSOLUTE MAXIMUM RATINGS AT TA=25°C

PARAMETER	MAXIMUM RATING	UNIT
Power Dissipation	100	mW
Collector-Emitter Voltage	30	V
Emitter-Collector Voltage	5	V
Operating Temperature Range	-40°C to + 85°C	
Storage Temperature Range	-55°C to + 100°C	
Lead Soldering Temperature [1.6mm(.063") From Body]	260°C for 5 Seconds	

ELECTRICAL OPTICAL CHARACTERISTICS AT TA=25°C

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	BIN NO.
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	$I_C = 1mA$ $E_e = 0mW/cm^2$	
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5			V	$I_E = 100 \mu A$ $E_e = 0mW/cm^2$	
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$			0.4	V	$I_C = 0.1mA$ $E_e = 1mW/cm^2$	
Rise Time	T_r		10		μs	$V_{CC} = 5V$ $I_C = 1mA$ $R_L = 1K\Omega$	
Fall Time	T_f		15		μs		
Collector Dark Current	I_{CEO}			100	nA	$V_{CE} = 10V$ $E_e = 0mW/cm^2$	
On State Collector Current	$I_{C(ON)}$	0.20		0.60	mA	$V_{CE} = 5V$ $E_e = 1mW/cm^2$ $\lambda = 940nm$	BIN A
		0.40		1.08			BIN B
		0.72		1.56			BIN C
		1.04		1.80			BIN D
		1.20		2.40			BIN E
		1.60					BIN F

TYPICAL ELECTRICAL / OPTICAL CHARACTERISTICS CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

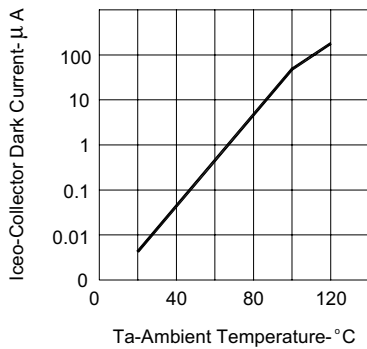


FIG.1 COLLECTOR DARK CURRENT VS AMBIENT TEMPERATURE

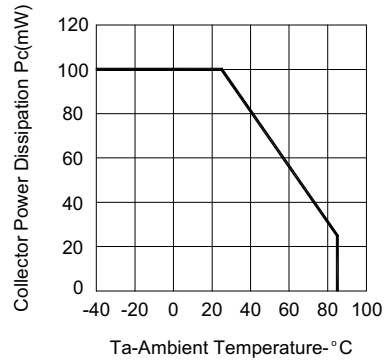


FIG.2 COLLECTOR POWER DISSIPATION VS AMBIENT TEMPERATURE

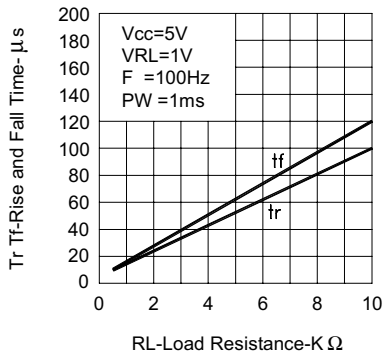


FIG.3 RISE AND FALL TIME VS LOAD RESISTANCE

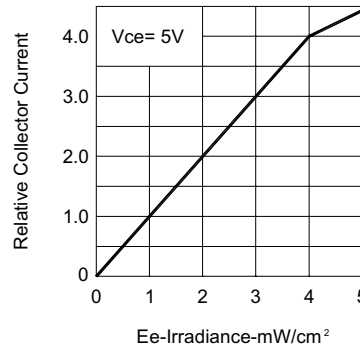


FIG.4 RELATIVE COLLECTOR CURRENT VS IRRADIANCE

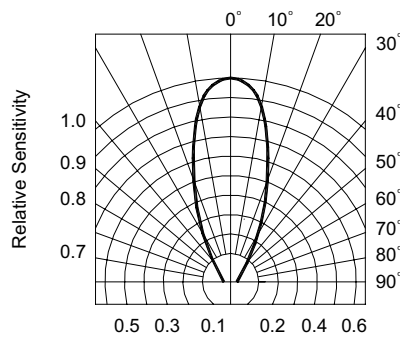


FIG.5 SENSITIVITY DIAGRAM



Anexo 1.4.3:
Sensor de Proximidad

SHARP

GP2Y0D805Z0F

Distance Measuring Sensor Unit
Digital output (50 mm) type



■ Description

GP2Y0D805Z0F is a distance measuring sensor unit, composed of an integrated combination of PD (photo diode), IRED (infrared emitting diode) and signal processing circuit.

The variety of the reflectivity of the object, the environmental temperature and the operating duration are not influenced easily to the distance detection because of adopting the triangulation method.

The output voltage of this sensor stays high in case an object exists in the specified distance range. So this sensor can also be used as proximity sensor.

■ Features

1. Digital output type
2. Short distance type
Detecting distance : Typ. 50 mm
3. Low profile
Package size : 13.6×7×7.95 mm
4. Consumption current : Typ. 5 mA
5. Battery drive possible
Supply voltage : 2.7 to 6.2 V
6. Sunlight tolerance
7. Add Vin terminal, and an external transistor of Vcc line is unnecessary at intermittent operating.

■ Agency approvals/Compliance

1. Compliant with RoHS directive (2002/95/EC)

■ Applications

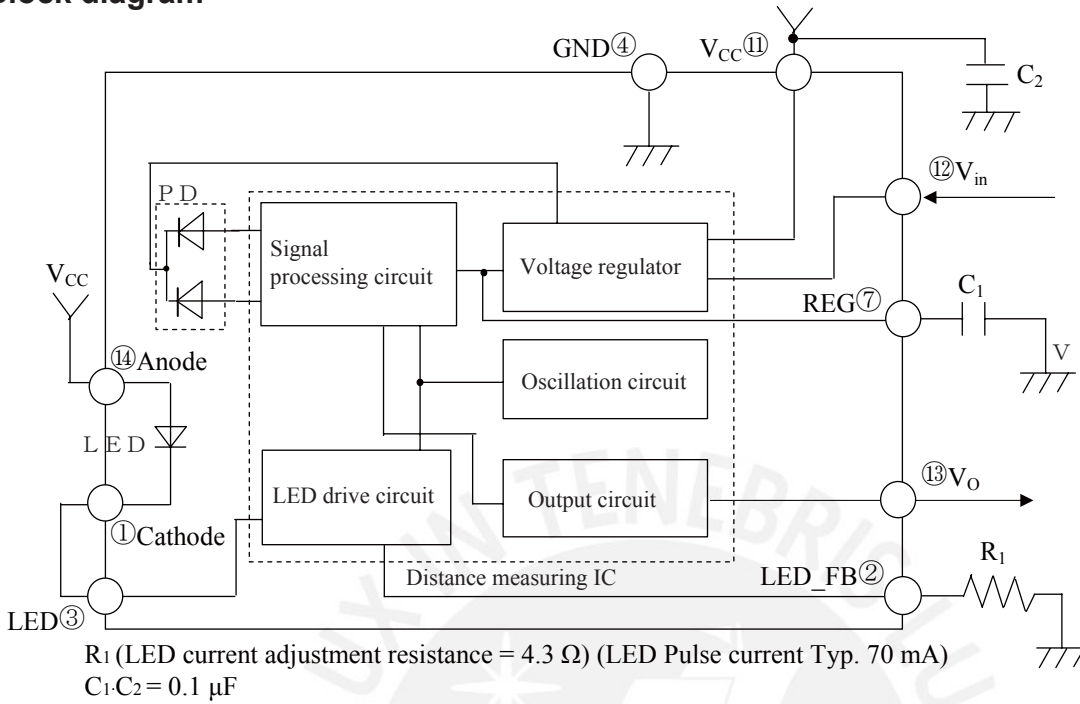
1. Touch-less switch
(Sanitary equipment, Control of illumination, etc.)
2. Robot cleaner

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■ Block diagram



■ Outline Dimensions

(Unit : mm)

Material	A	B	C	D
Case	PC (Color:Black)			
Lens	PC(Visible light cut type)			
Device coating	PPS(Color:Black)			
Lead pin	42ALLOY(Pd-Au plating)			

year	Mark
2006	U
2007	V
2008	W
2009	X
...	...
2025	T
2026	U

Symbol	Function
①	Cathode
②	LED_FB
③	LED
④	GND
⑤	—
⑥	—
⑦	REG
⑧	—
⑨	—
⑩	—
⑪	V _{CC}
⑫	V _{in}
⑬	V _O
⑭	Anode

— : No contact

(Note1) Unspecified tolerances shall be ± 0.3 mm.
(Note2) () : Reference value

Product mass : approx. 0.7g

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.3 to +7	V
Output terminal voltage	V_O	-0.3 to $V_{CC}+0.3$	V
Input terminal voltage	V_{in}	-0.3 to $V_{CC}+0.3$	V
Operating temperature	T_{opr}	-10 to +60	°C
Storage temperature	T_{stg}	-20 to +70	°C
* Soldering temperature	T_{sol}	260	°C

* 5s or less/time up 2times

t = 1.0 mm One side board mounting

■ Electro-optical Characteristics

($T_a=25^{\circ}C, V_{CC}=5V$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Average supply current	I_{CC1}	$V_{CC}=5V, V_{in}=5V, R_1=4.3\Omega$ (*1)	—	5	6.5	mA
Average supply current	I_{CC2}	$V_{CC}=5V, V_{in}=5V, R_1=4.3\Omega$ (*1)	—	9	10.5	mA
Stand-by supply current	I_{CC3}	$V_{CC}=5V, V_{in}=0V$	—	5	8	μA
Output voltage	V_{OH}	Output voltage at high level	$V_{CC}-0.6$	—	—	V
	V_{OL}	Output voltage at low level	—	—	0.6	V
Detecting distance	L	(*2)(*3)	40	50	60	mm

(*1) I_{CC1} : (LED Emitting time : Typ. 20 $\mu s \times 8$ times), I_{CC2} : (Emitting time : Typ. 20 $\mu s \times 15$ times),
LED Pulse Current : Typ. 70 mA

(*2) Using reflective object : White paper (Made by Kodak Co., Ltd. gray cards R-27·white face, reflectance ; 90%)

(*3) Output voltage switch has a hysteresis width. The distance specified by L should be
the distance which the output turns from L to H in case an object moves to the sensor.

■ Recommended operating conditions

Parameter	Symbol	Conditions	Rating	Unit
Supply voltage	V_{CC}		2.7 to 6.2	V
High level input voltage	V_{inH}	CMOS level signal. Operating	MIN $V_{CC}-0.2$	V
Low level input voltage	V_{inL}	CMOS level signal. Standby state	MAX 0.2	V

Fig. 1 Timing chart

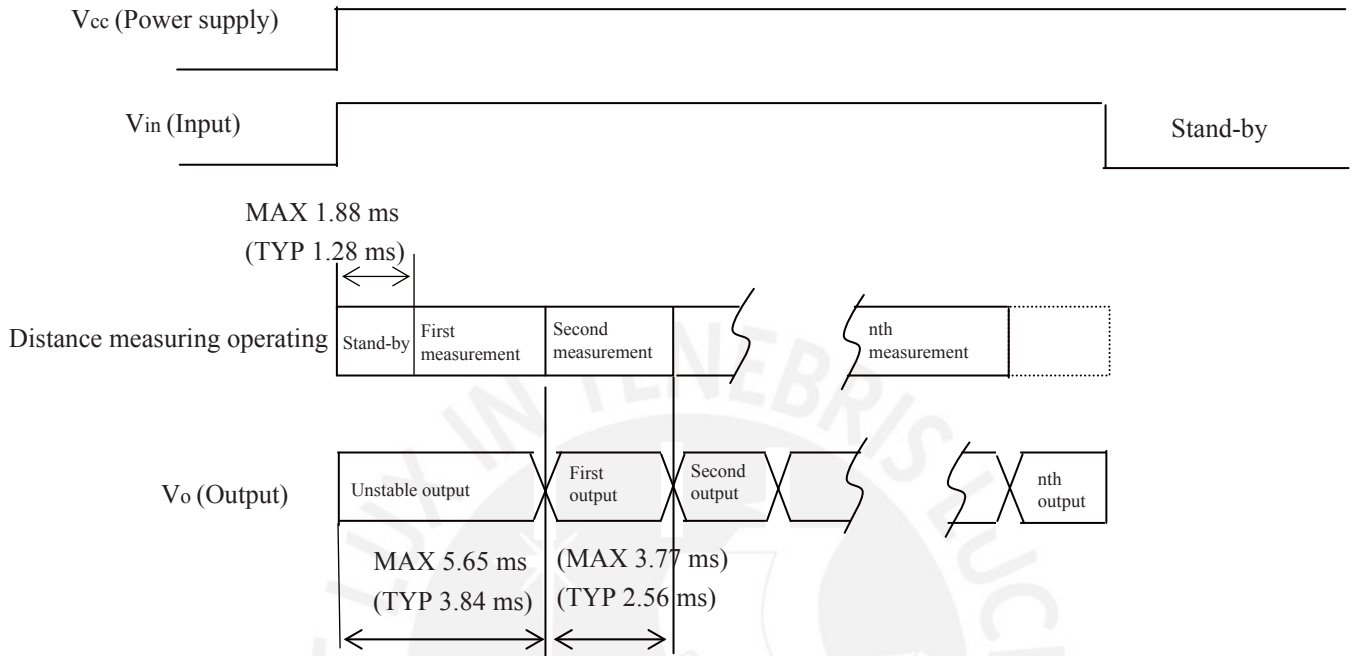
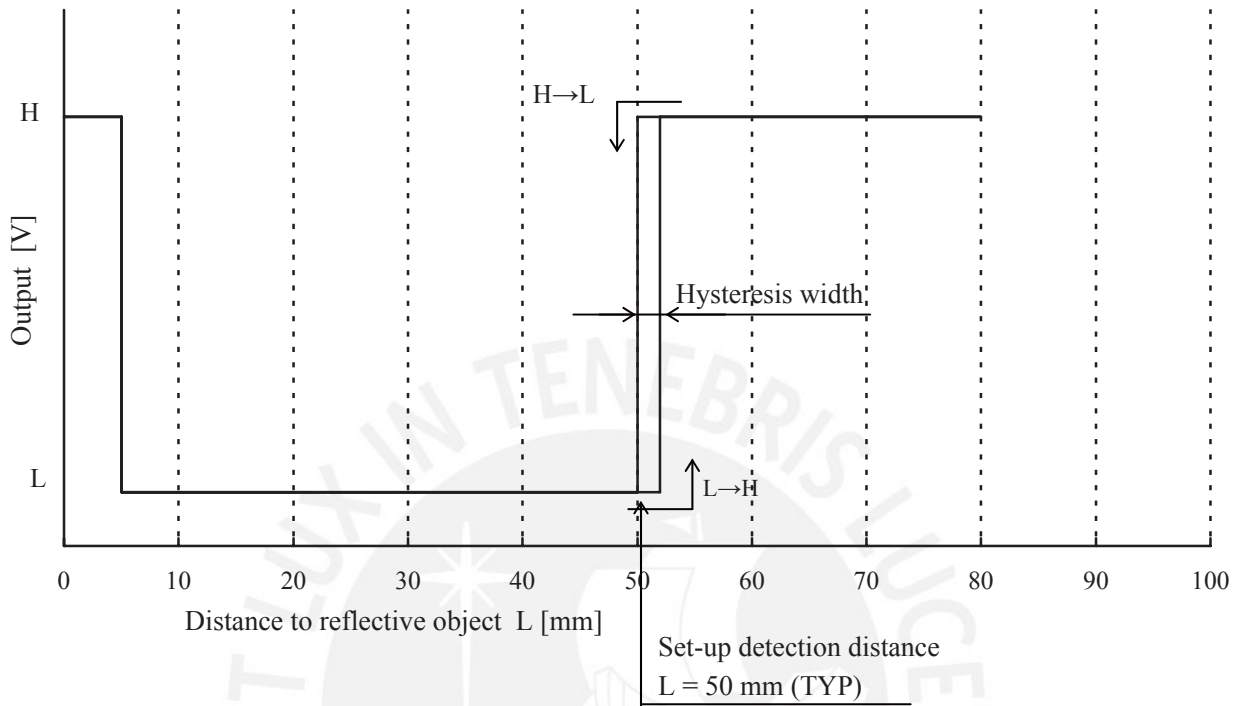


Fig. 2 Example of distance measuring characteristics (output)



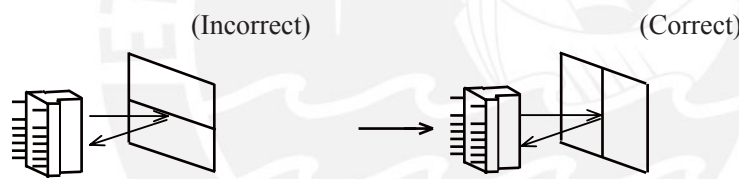
■ Notes

● Advice for the optics

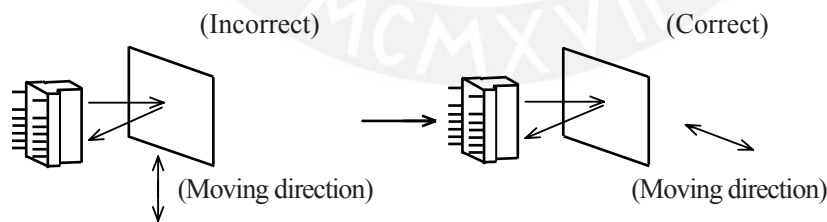
- The lens of this device needs to be kept clean. There are cases that dust, water or oil and so on deteriorate the characteristics of this device. Please consider in actual application.
- Please don't do washing. Washing may deteriorate the characteristics of optical system and so on. Please confirm resistance to chemicals under the actual usage since this product has not been designed against washing.

● Advice for the characteristics

- In case that an optical filter is set in front of the emitter and detector portion, the optical filter which has the most efficient transmittance at the emitting wavelength range of LED for this product ($\lambda = 870 \pm 70\text{nm}$), shall be recommended to use. Both faces of the filter should be mirror polishing. Also, as there are cases that the characteristics may not be satisfied according to the distance between the protection cover and this product or the thickness of the protection cover, please use this product after confirming the operation sufficiently in actual application.
- In case that there is an object near to emitter side of the sensor between sensor and a detecting object, please use this device after confirming sufficiently that the characteristics of this sensor do not change by the object.
- When the detector is exposed to the direct light from the sun, tungsten lamp and so on, there are cases that it can not measure the distance exactly. Please consider the design that the detector is not exposed to the direct light from such light source.
- Distance to a mirror reflector can not be sometimes measured exactly. In case of changing the mounting angle of this product, it may measure the distance exactly.
- In case that reflective object has boundary line which material or color etc. are excessively different, in order to decrease deviation of measuring distance, it shall be recommended to set the sensor that the direction of boundary line and the line between emitter center and detector center are in parallel.



- In order to decrease deviation of measuring distance by moving direction of the reflective object, it shall be recommended to set the sensor that the moving direction of the object and the line between emitter center and detector center are vertical.



● Notes on handling

- There are some possibilities that the internal components in the sensor may be exposed to the excessive mechanical stress. Please be careful not to cause any excessive pressure on the sensor package and also on the PCB while assembling this product.
- Soldering shall be done with a soldering iron and below 260°C, less than 5s and maximum 2 times. Also, please pay attention not to put out force on lead terminals while soldering. Please do not apply flow soldering because it may damage optical lens of the device.

● Presence of ODC etc.

This product shall not contain the following materials.

And they are not used in the production process for this product.

Regulation substances : CFCs, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform)

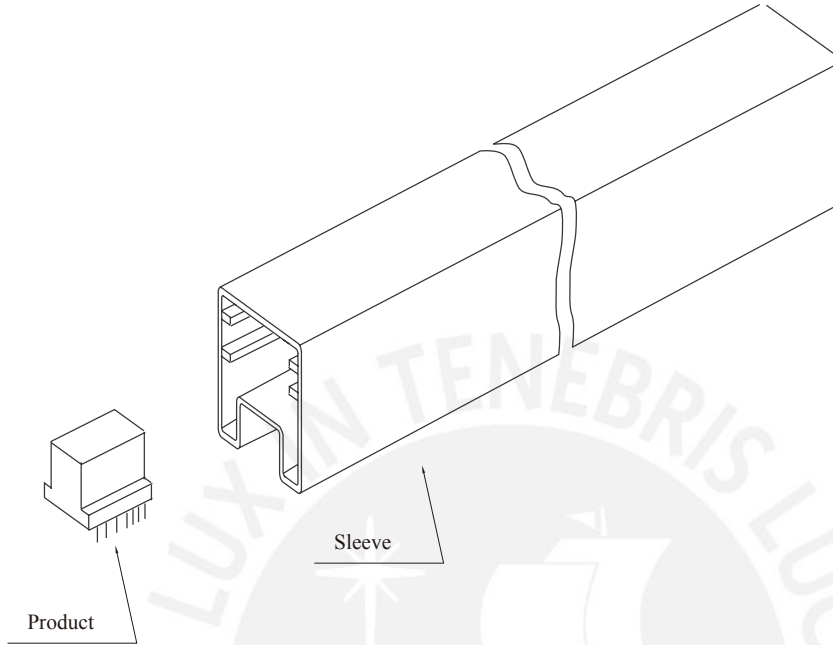
Specific brominated flame retardants such as the PBB and PBDE are not used in this product at all.

This product shall not contain the following materials banned in the RoHS Directive (2002/95/EC).

- Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE).



■ Package specification



Put products of 40 pieces in sleeve.

■ Important Notices

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(i) The devices in this publication are designed for use in general electronic equipment designs such as:

- Personal computers
- Office automation equipment
- Telecommunication equipment [terminal]
- Test and measurement equipment
- Industrial control
- Audio visual equipment
- Consumer electronics

(ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection

with equipment that requires higher reliability such as:

- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
- Traffic signals
- Gas leakage sensor breakers
- Alarm equipment
- Various safety devices, etc.

(iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:

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- Telecommunication equipment [trunk lines]
- Nuclear power control equipment
- Medical and other life support equipment (e.g., scuba).

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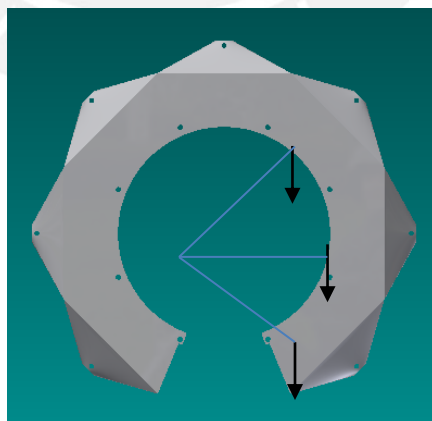
Anexo 2: Planos



Anexo 3: Cálculos

Anexo 3.1: Selección de Motor a Pasos

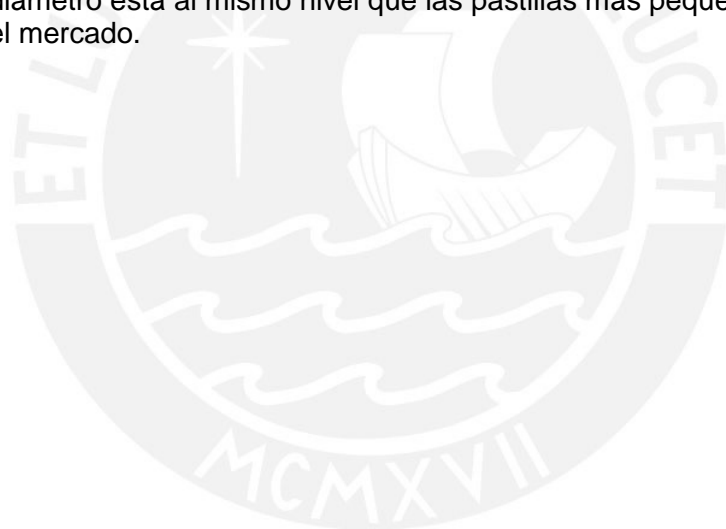
- Se estableció como velocidad deseada para los contenedores el de 1 vuelta cada 2 segundos, esto implica que de acuerdo a la relación de transmisión el motor a pasos debe dar 15.5 vueltas en esos dos segundos, también se sabe de acuerdo a las características del motor, que cada una de sus vueltas equivale a 200 pasos ($1,8^\circ$), esto significa que para hacer que los contenedores den una vuelta completa y regresen a su posición inicial en el lapso de tiempo establecido, se deben enviar 3100 pulsos al motor a pasos en 2 segundos. Esta velocidad está dentro de los límites del motor utilizado.
- El motor a pasos posee un torque máximo de 2.3 kg.cm, pero reflejado en el torque suministrado a los contenedores se eleva a $(2.3 \cdot 15)$ kg.cm = 34.5 kg.cm. Por otra parte para el caso más desfavorable del torque requerido por la carga tenemos el que se muestra en la figura adjunta, de acuerdo a la capacidad de los contenedores, en promedio se pueden almacenar 40 pastillas, las cuales para esas dimensiones (promedio) poseen un máximo peso de 5 g, entonces de acuerdo a esto, tenemos que el peso total en cada uno de los 3 contenedores sería igual a 200 g. Con una distancia al centro aproximada de 9 cm se tiene que para las 3 cargas el torque resultante máximo es igual a $(\sqrt{2} + 1) (9 \text{ cm}) (0.2 \text{ kg}) = 4.35$ kg.cm, como se observa el torque máximo que puede producir el motor a pasos supera ampliamente al de la carga, principalmente debido a la relación de transmisión; sin embargo se debe tomar en cuenta y dar un factor de seguridad debido a las fuerzas de fricción y a las producidas en el mecanismo de transmisión. Aun así esta opción (el tipo de motor a pasos) porque dentro de los precios del mercado posee uno de los accesibles.

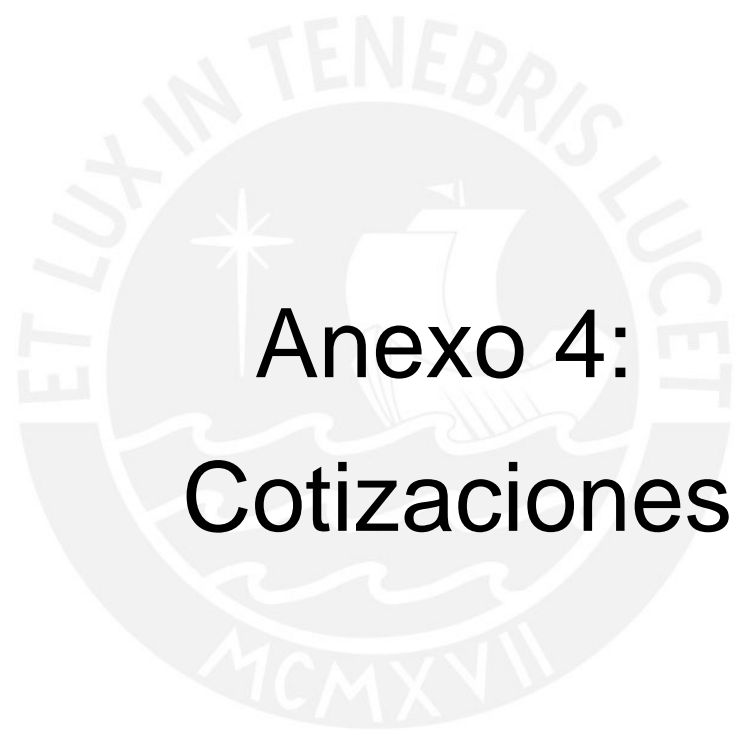


Anexo 3.2: Selección de Bomba de Vacío

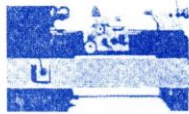
- La bomba de vacío fue escogida básicamente porque es una de las pocas disponible en el mercado, que no están dirigidas a un uso industrial, ya que estas suelen poseer mayor tamaño y peso; sin embargo, obviamente es necesario comprobar que cumplan con los requerimientos necesarios, lo cual se mostrará a continuación.

El diámetro interior de la ventosa es de 5 mm, esto significa que posee 78.54 mm^2 de área, la bomba; por otra parte, puede producir hasta 16''Hg de vacío lo cual es equivalente $54\,182 \text{ Pa}$. Esto significa que el sistema puede levantar un equivalente a $(78.54 \text{ mm}^2 * 54\,182 \text{ Pa}) = 4.25 \text{ N}$, para una aceleración de la gravedad de 9.81 m/s^2 esto se traduce en 434 g , lo cual está muy por encima del rango de valores del peso de un pastilla. Esto es algo positivo porque permite que no sea necesario que la pastilla esté completamente pegada al agujero interior de la ventosa, sino que exista un rango permisible de separación entre la pastilla y esta, aun cuando el agujero interior de la ventosa es bastante pequeño, principalmente debido a que es necesario que solo succione una pastilla y 5 mm de diámetro está al mismo nivel que las pastillas más pequeñas que se encuentran en el mercado.





Anexo 4: Cotizaciones



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Señor(es) : José Luis Sánchez Noriega Fecha: 26.11.19
Dirección : R.U.C.

CANT.	DESCRIPCION	P. Unit.	IMPORTE
01	fábrica. Stepper Mount	25	25
01	/ / Sujetador Bomba	30	30
01	11 Acople Actuador	15	15
01	11 Soporte Servo	28	28
01	11 Soportote Soporte	20	20
10	11 Bracket 01	10	100
4	11 Bracket 2	10	40
2	11 Bracket 4	10	20

Gracias por su Preferencia

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acrilar_2@hotmail.com

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PROFORMA CONTRATO

001- N° 000480

DIA	MES	AÑO
10	11	2019

Sr.(es): José Luis Sánchez Noriega R.U.C.
Dirección: Telf:

ITEM	CANT.	DESCRIPCION	P. UNIT.	TOTAL
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	01	TAPA		45,00
	01	02 mkr 115		30,00

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ORDER SUMMARY

SECURE CHECKOUT →

QTY	PRODUCT	UNIT PRICE	LINE TOTAL
1	Aluminum Single Arm Product # 55701	\$6.99 \$0.00 Discount	\$6.99 \$0.00 Discount
1	64T, 1/4 inch Bore, 32 Pitch Plain Bore Gear Product # SPB032-34-64	\$3.33 \$0.00 Discount	\$3.33 \$0.00 Discount
1	.250 inch ID x .375 inch OD Flanged Ball Bearing (Stainless Steel) 2 pack Product # 535042	\$1.99 \$0.00 Discount	\$1.99 \$0.00 Discount
1	1/4 inch Bore Flat Bearing Mount Product # 535110	\$5.99 \$0.00 Discount	\$5.99 \$0.00 Discount
8	1/8 inch x3 inch Precision Shaft Product # 634118	\$0.59 \$0.00 Discount	\$4.72 \$0.00 Discount
1	1/4 inch x2 inch Precision Shaft Product # 634160	\$0.89 \$0.00 Discount	\$0.89 \$0.00 Discount
1	16 Tooth, 32 Pitch, 5mm Bore Pinion Gear Product # 615342	\$7.99 \$0.00 Discount	\$7.99 \$0.00 Discount
1	HS-B1 Servo Product # 31081500	\$12.69 \$0.00 Discount	\$12.69 \$0.00 Discount
1	1/8 inch x 1 inch Precision Shaft Product # 634114	\$0.39 \$0.00 Discount	\$0.39 \$0.00 Discount

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thamesmail (204229) ★ %

99.8%

Seguir a este vendedor

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Envíos y pagos
Imprimir | Informar sobre un artículo

El vendedor asume toda la responsabilidad de este anuncio.

Última actualización el 24 oct 2014 01:13:09 H.Esp. [Ver todas las actualizaciones](#)

Características del artículo

Estado:	Nuevo: Un artículo nuevo, sin usar, sin abrir, sin desperfectos y en el paquete original (en caso de venir ... Más información	Brand:	thamesmail
MPN:	others	Model:	others
Country of Manufacture:	China		



IMPRESIÓN 3D



PUCP

Lima 27 de Noviembre de 2014

SOLICITUD DE COTIZACIÓN

Estimado

Jose Sanchez

 Ref. Impresión 3d de prototipo en plástico ABS
 Lima.-

NOMBRE / EMPRESA	PIEZA	TOTAL	MATERIAL / IMPRESORA
Jose Sanchez	Contenedor3, rodamiento interior con engranes, rodamiento_interior, rodamiento_exterior	S/. 700	Fortus/PC-ISO

Forma de pago

- Adelantado

- Tesorería de la Pontificia Universidad Católica del Perú

Tiempo de entrega referencial

Atentamente,

Jennifer Wong Poggi

Responsable del área de Impresión 3D

Pontificia Universidad Católica del Perú



Brass Straight Male 1/4" Hose ID Barb - 10-32 UNF Male Nickel Plated, Single Barb Design

Availability: In stock

\$1.25

Buy 10 for \$0.66 each and save 32%

Qty: [ADD TO CART](#) [OR Add to Wishlist](#)
[Add to Compare](#)

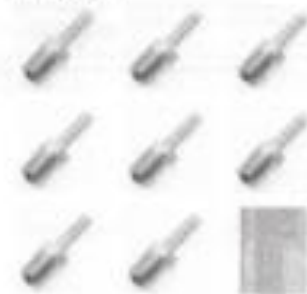
Quick Overview

125NP-4U10-SB

Double click on above image to view full picture



More Views



Details

Product Features

- Part #: 125NP-4U10-SB
- Tubing ID: 1/4"
- Thread: 10-32 UNF
- Material: Nickel Plated Brass
- Type: Male x Hose Barb

Product Description

IMPORTANT NOTE: "Pipe Thread Size" DOES NOT directly correspond to Actual Dimensions of the thread.

Please ensure that your tubing/hose inner diameter matches the Hose ID before ordering

Quantity: 1 (One) piece

Our quality barbed connectors/couplers are manufactured to the highest standards. They are perfect for connecting lines for air, water, fuel, oil and inert gases.

Additional Information

SKU	125NP-4U10-SB
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Be the first to review this product.


ITEM DESCRIPTION	QTY	EACH	TOTAL
 L124 Linear Actuator - 50mm - 50:1 - 12 volts	<input type="text" value="1"/>	\$90.00	\$90.00

Click to remove an item from your cart
Empty My Entire Cart

Shipping Rates: (change my address)
Canada Post Airmail - 1-4 Weeks USA - 6-8 Weeks International - No Tracking \$10.6
Peru, Lima, LIMA11

Tax: \$0.00
Total: **\$100.67**

Coupon Code:

Product	Quantity	Price	Total Price
 #1132 Pololu Carrier with Sharp GP2Y0D805Z0F Digital Distance Sensor 5cm	<input type="text" value="1"/>	\$5.95	\$5.95
Subtotal			\$5.95

Your total will be computed during the checkout process.

Comprar por categoría Todas las categorías Búsqueda avanzada

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100 1/8 de pulgada pulgadas G25 Precision Cromo De Acero De Cromo Rodamiento Bolas Aisi 52100 - mostrar título original | [Agregar a lista de artículos que sigo](#)

Vendedor: **bctrade** (6206) **100% Comentarios positivos**
 Vendedor excelente
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Estado del artículo: **Nuevo**

Cantidad: Más de 10 disponibles / 127 vendido(s)

Precio: **US \$4.69**
 Aproximadamente \$/. 13.89

21 artículos que sigo

100% comentarios positivos	127 vendido(s)	Nuevo
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Envío: **USD6.55 (aprox. \$/. 19.49)** USPS First Class Mail Intl / First Class Package Intl Service | [Ver detalles](#)

Review and Place Order

Jameco#	Item	Qty	In Stock?	Unit Price	Total
42042	PWR CORD,6',AWG 18/2,SPT-2,BLK W/STRAIN RELIEF UL/CSA	1	Yes	\$2.95	\$2.95
2207970	BEAGLEBONE BLACK,1GHZ,REV.C 4GB eMMC,uSD CARD SLOT,USB	1	Yes	\$54.95	\$54.95
2215697	PWR SPLY,SW,OPEN FRAME,40W +5V@4A,+12V@2A,UL/CSA/CE	1	Yes	\$12.95	\$12.95
Subtotal:					\$70.85
*Shipping:					\$22.23
Total:					\$93.08

