

Humidity Sensor, Humidity to Frequency Output

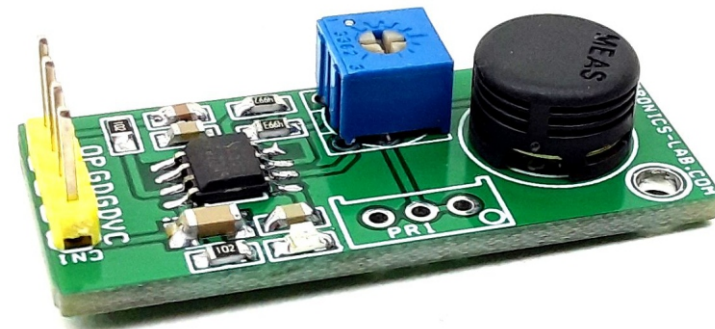
This sensor board provides frequency output as per relative humidity value. The project is based on a unique capacitive cell, this relative humidity sensor is designed for high volume, cost-sensitive applications such as office automation, automotive cabin air control, home appliances, and industrial process control systems. It is also useful in all applications where humidity compensation is needed. The circuit is built using a low-cost NE555 timer as an astable generator, humidity sensor MK1 acts as a variable capacitor and is connected to the TRIG and THRES pin. Pin 7 is used as a short circuit pin for resistor R3. The HS1101LF equivalent capacitor is charged through R2, R3, and PR1 is set the threshold voltage (approximately 0.67Vcc) and discharged through R2 only to the trigger level (approximately 0.33Vcc) since R3 is shortened to the ground by pin 7. Since the charge and discharge of the sensor run through two different resistors, R2 and R3, the duty cycle is determined by the following formulas.

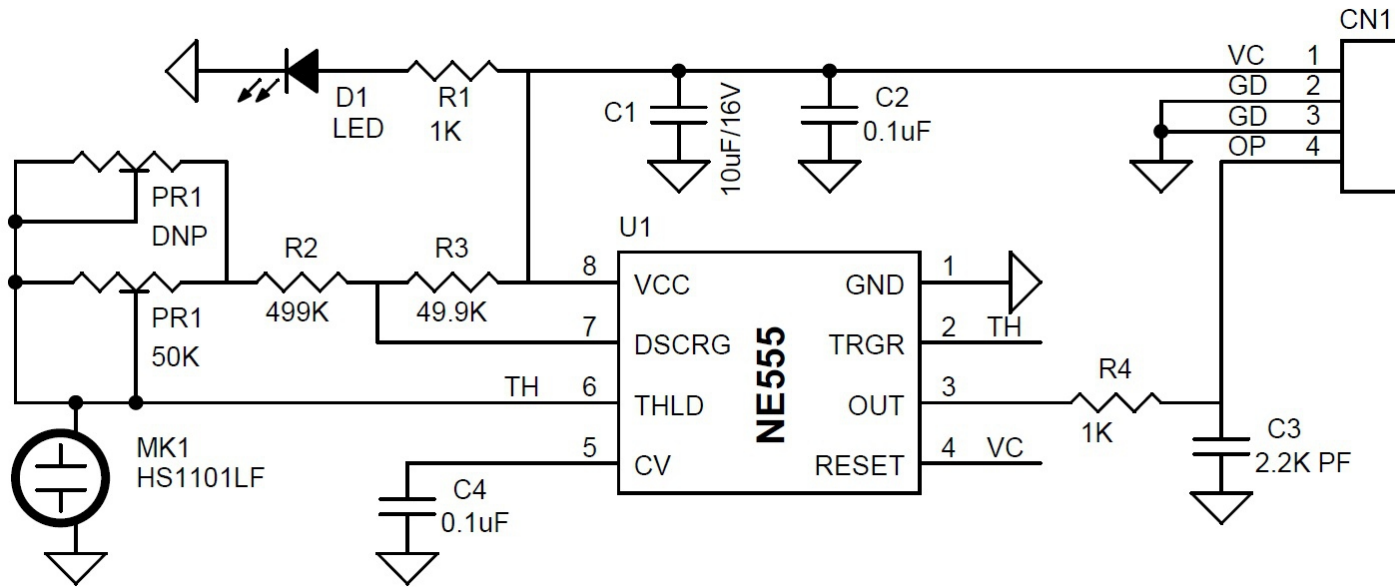
- $t_{high} = C@ \%RH * (R2 + R3) * \ln 2$
- $t_{low} = C@ \%RH * R2 * \ln 2$
- $F = 1 / (t_{high} + t_{low}) = 1 / (C@ \%RH * (R3 + 2 * R2) * \ln 2)$
- **Output duty cycle = $t_{high} * F = R2 / (R3 + 2 * R2)$**

Refer to the lookup table below for humidity RH (%) VS frequency output. PR1 Trimmer pot provided to calibrate the fine output.

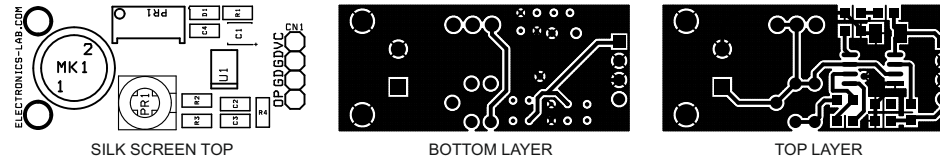
Features

- Supply 5V (Range 5 to 10V DC)
- Current 10mA
- Frequency Output 10% RH = 7155 Hz to 95% RH = 6210
- Duty Cycle Approx. 50%
- High reliability and long-term stability
- Fast response time and very low temperature coefficient
- Full interchangeability with no calibration required in standard conditic
- PCB Dimensions 38.89MM X 16.99MM





BOM						
NO.	QNTY.	REF	DESC	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	4 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5317-ND
2	1	C1	10uF/16V SMD SIZE 1206 OR 1210	MURATA/YAGEO	DIGIKEY	
3	2	C2,C4	0.1uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
4	1	C3	2.2K PF / 50M SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
5	1	D1	LED RED COLOR SMD SIZE 0805	LITE ON INC	DIGIKEY	160-1427-1-ND
6	1	MK1	HPP801A031/HS1101LF	TE CONNECTIVITY	DIGIKEY	HPP801A031-ND
7	1	PR1	OPTIONAL			
8	1	PR1	50K TRIMMER POT	NIDEC COPAL	DIGIKEY	CT6EP503-ND
9	2	R1,R4	1K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
10	1	R2	499K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
11	1	R3	49.9K 1% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
12	1	U1	NE555	TI	DIGIKEY	296-6502-1-ND



PCB Dimensions 38.89MM X 16.99MM

