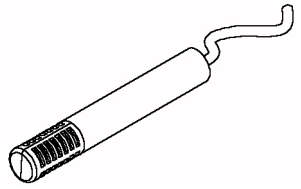
RELATIVE HUMIDITY/ TEMPERATURE MODULE

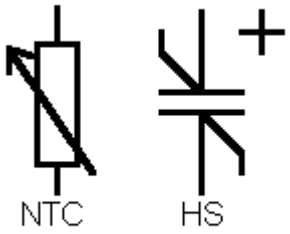
HTM2500

Based on the rugged HTS2010 humidity / temperature sensor , HTM2500 is a dedicated humidity and temperature transducer designed for OEM applications where a reliable and accurate measurement is needed. Direct interface with a micro-controller is made possible with the module's humidity linear voltage output.



MAIN FEATURES

- Small size
- Not affected by water immersion
- Full interchangeability
- High reliability and long term stability
- Typical 1 to 4 Volt DC output for 0 to 100% RH at 5 V DC supply
- Humidity calibrated within +/- 2% RH @ 55% RH
- Temperature measurement through NTC 10kohm +/- 3% direct output
- Ratiometric to voltage supply
- Suitable for 3 to 10 Volts supply voltage



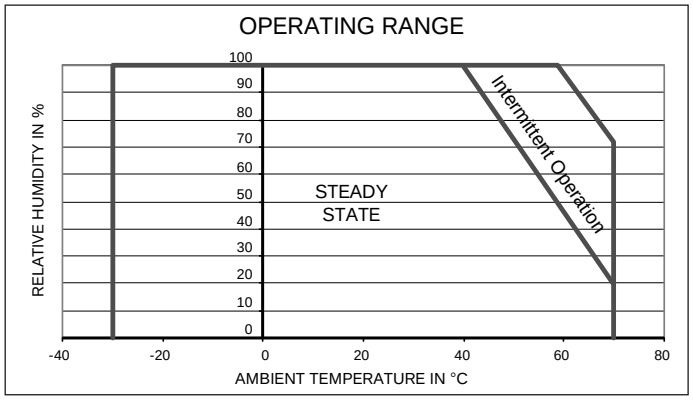
HUMIDITY SENSOR SPECIFIC FEATURES

- Instantaneous de-saturation after long periods in saturation phase.
- Patented solid polymer structure.
- High resistance to chemicals.
- Fast response time.

MAXIMUM RATINGS

Ratings	Symbol	Value	Unit
Storage Temperature	Tstg	-40 to 85	°C
Supply Voltage (peak)	Vs	12	Vdc
Humidity Operating Range	RH	0 to 100	% RH
Temperature Operating Range	Ta	-30 to 70	°C

Peak conditions: less than 10% of the operational time.



CHARACTERISTICS

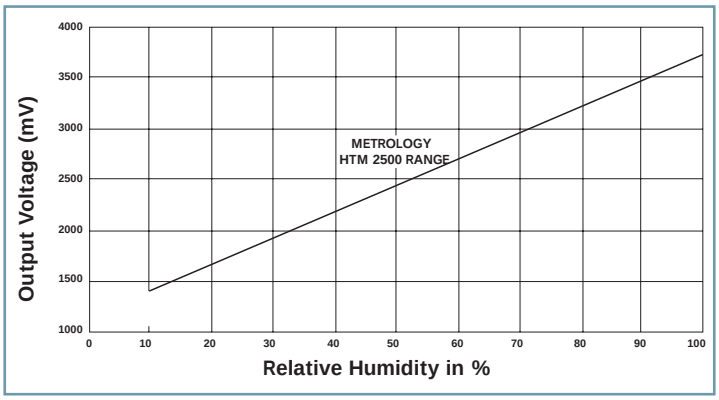
(Ta = 23°C, Vs = 5Vdc, R_L > 1MΩ otherwise stated)

Characteristics	Symbol	Min	Typ	Max	Unit
Humidity measuring range	RH	1		99	% RH
Relative Humidity accuracy (10 to 95% RH)	RH		+/-3	+/- 5	% RH
Voltage supply	V_s	4.75	5.00	5.25	V
Nominal output @ RH = 55%	V_{out}	2.42	2.48	2.54	V
Current consumption	I_c		0.4	0.8	mA
Temperature coefficient (10 to 50 °C)	T_{cc}		+ 0.1		% RH/°C
Averaged Sensitivity from 33% to 75% RH	ΔmV/% RH		+25		mV/% RH
Sink current capability (R_L = 15 kΩ)	I_s			300	µA
Recovery time after 150 hours of condensation	t		10		s
Humidity Hysteresis			+/-1.5		% RH
Long term stability			0.5		%RH/yr
Response time (33 to 76% RH, static, @ 63%)	τ		5		s
Output impedance	Z		70		Ω

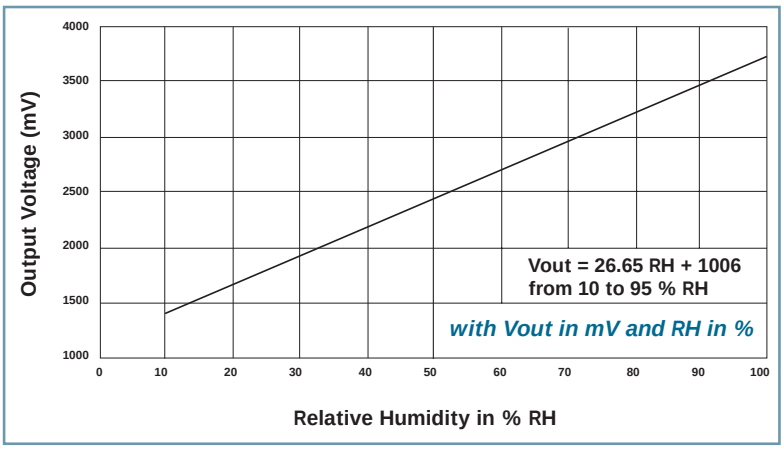
MEASUREMENT CONDITIONS

- HTM2500 is specified for accurate measurements within 10 to 95% RH.
- Excursion out of this range (< 10% or > 95% RH, including condensation) does not affect the reliability of HTM2500 characteristics.

HTM 2500 Typical Measuring Ranges in Humidity



HTM2500 MODELLED LINEAR VOLTAGE OUTPUT (VS = 5V)



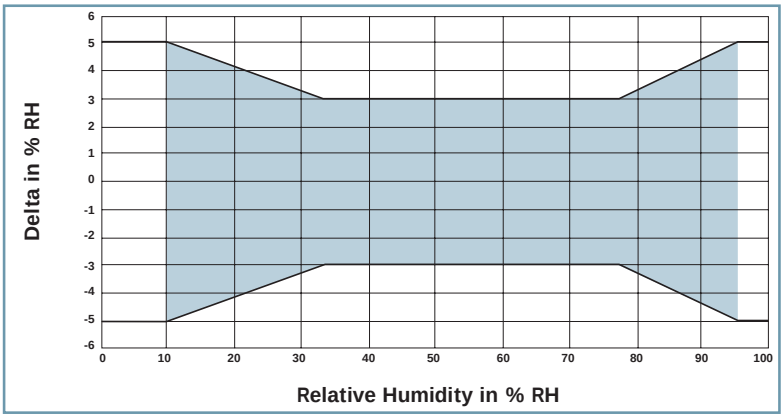
REFERENCE OUTPUT VALUES

RH (%)	V_{out}(mV)	RH (%)	V_{out}(mV)
10	1235	55	2480
15	1390	60	2605
20	1540	65	2730
25	1685	70	2860
30	1825	75	2990
35	1960	80	3125
40	2090	85	3260
45	2220	90	3405
50	2350	95	3555

Reversed Polynomial Equation

$$Vout = 1.05E^{-3}RH^3 - 1.76E^{-1}RH^2 + 35.2RH + 898.6$$

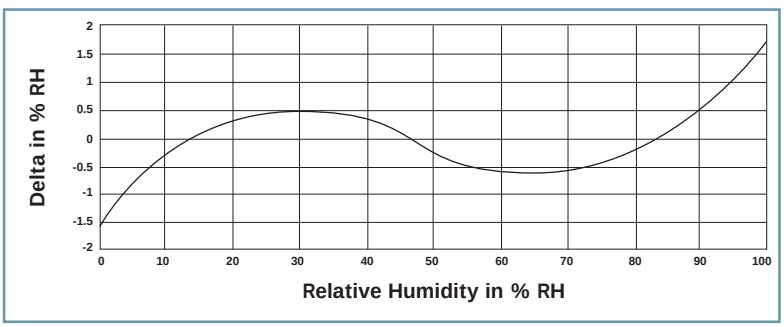
ERROR BUDGET AT 23°C



HTM2500 ERROR LIMITS

Temperature coefficient compensation

$$RH_{Cor}\% = RH\%_{Read} * (1 - (Ta - 23) * 2.4E^{-3})$$



Non linearity and temperature compensation

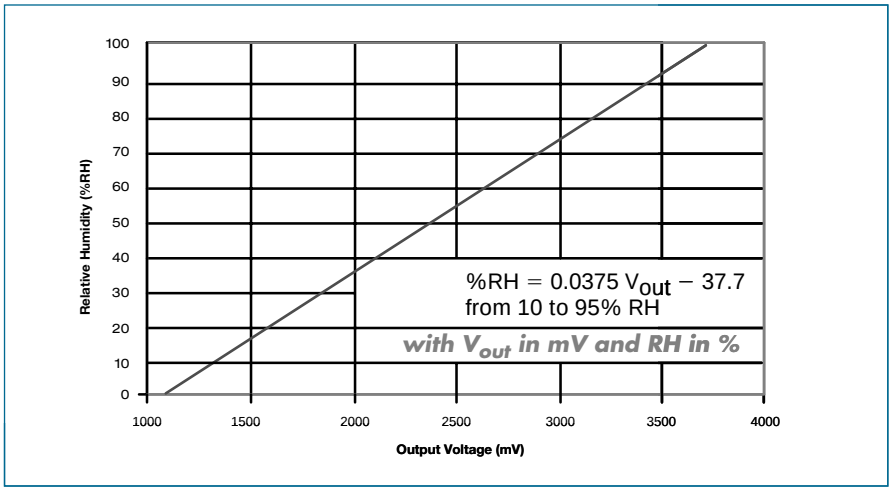
$$RH\% = \frac{-1.9206E^{-9}V_{out}^3 + 1.437E^{-5}V_{out}^2 + 3.421E^{-3}V_{out} - 12.4}{1 + (Ta-23) * 2.4E^{-3}}$$

All equations V_{out} in mV, RH in %, Ta in °C.

LINEARITY ERROR OF HTM2500

Humidity Measurement using HTM2500

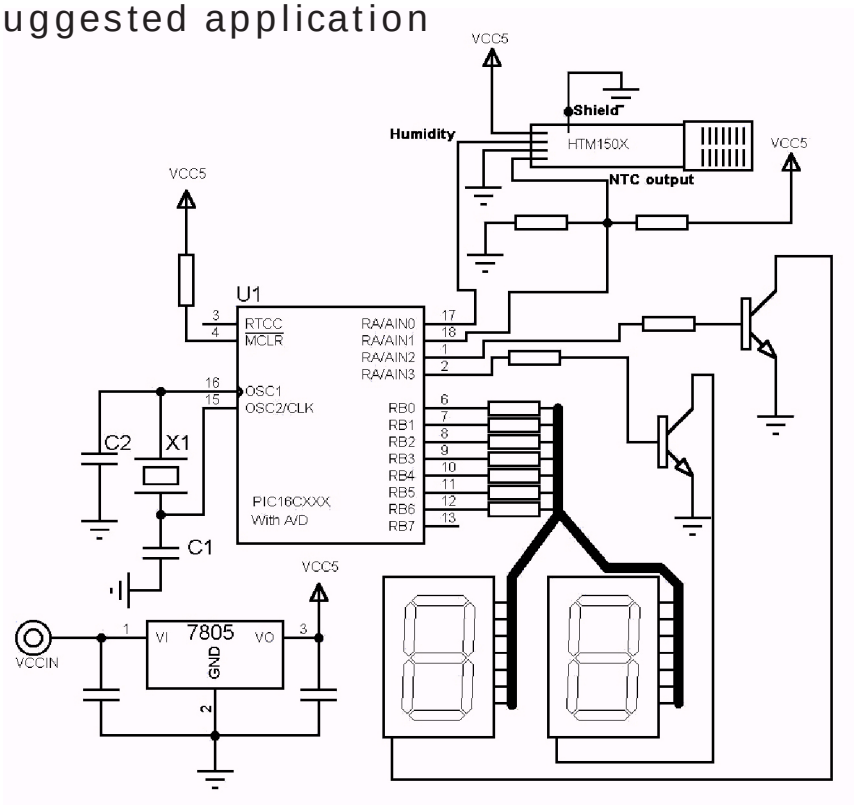
Typical HTM 2500 relative Humidity measurement



Temperature Measurement using HTM2500 (NTC output values)

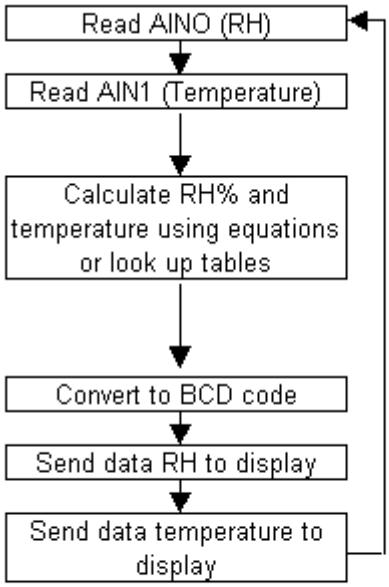
Temp in °C	R in ohms	Temp in °C	R in ohms
-30	169149	**+20**	12474
-25	125546	**+25**	10000
-20	94143	**+30**	8080
-15	71172	**+35**	6569
-10	54308	**+40**	5372
-5	41505	**+45**	4424
0	32014	**+50**	3661
+5	25011	**+55**	3039
+10	19691	**+60**	2536
+15	15618	**+65**	2128

Suggested application



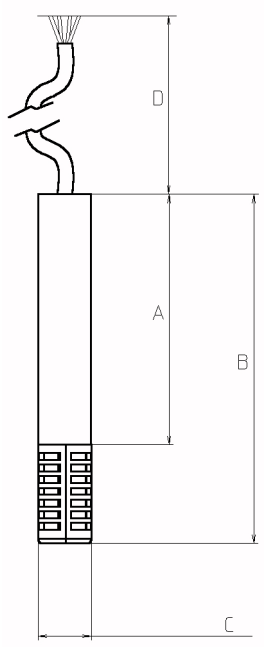
Steps of 1% RH are achievable by using 8-bit A/D.

If more resolution is required a 10 -bit A/D needs to be used and a third display will be added, giving steps of 0.2% RH



- RESISTANCE TO PHYSICAL AND CHEMICAL STRESSES.
  - HTM2500 has passed through qualification processes of HUMIREL including vibration, shock, storage, high temperature and humidity, ESD.
  - Additional tests under harsh chemical conditions demonstrate good operation in presence of salt atmosphere, SO_2 (O.5%), H_2S (0.5%), O_3, NO_x, NO, CO, CO_2, Softener, Soap, Toluene, acids (H_2SO_4, HNO_3, HCl), HMDS, Insecticide, Cigarette smoke, a non exhaustive list.
  - HTM1500 is not light sensitive.

- SPECIFIC PRECAUTIONS
  - HTM2500 is not protected against reversed polarity - Check carefully when connecting the device.
  - If you wish to use HTM1500 in a chemical atmosphere not listed above, consult us.



PACKAGE OUTLINE HTM2500

Dim	Min (mm)	Max (mm)
A	53	55
B	74.3	76.3
C	11.2	11.6
D*	200	250

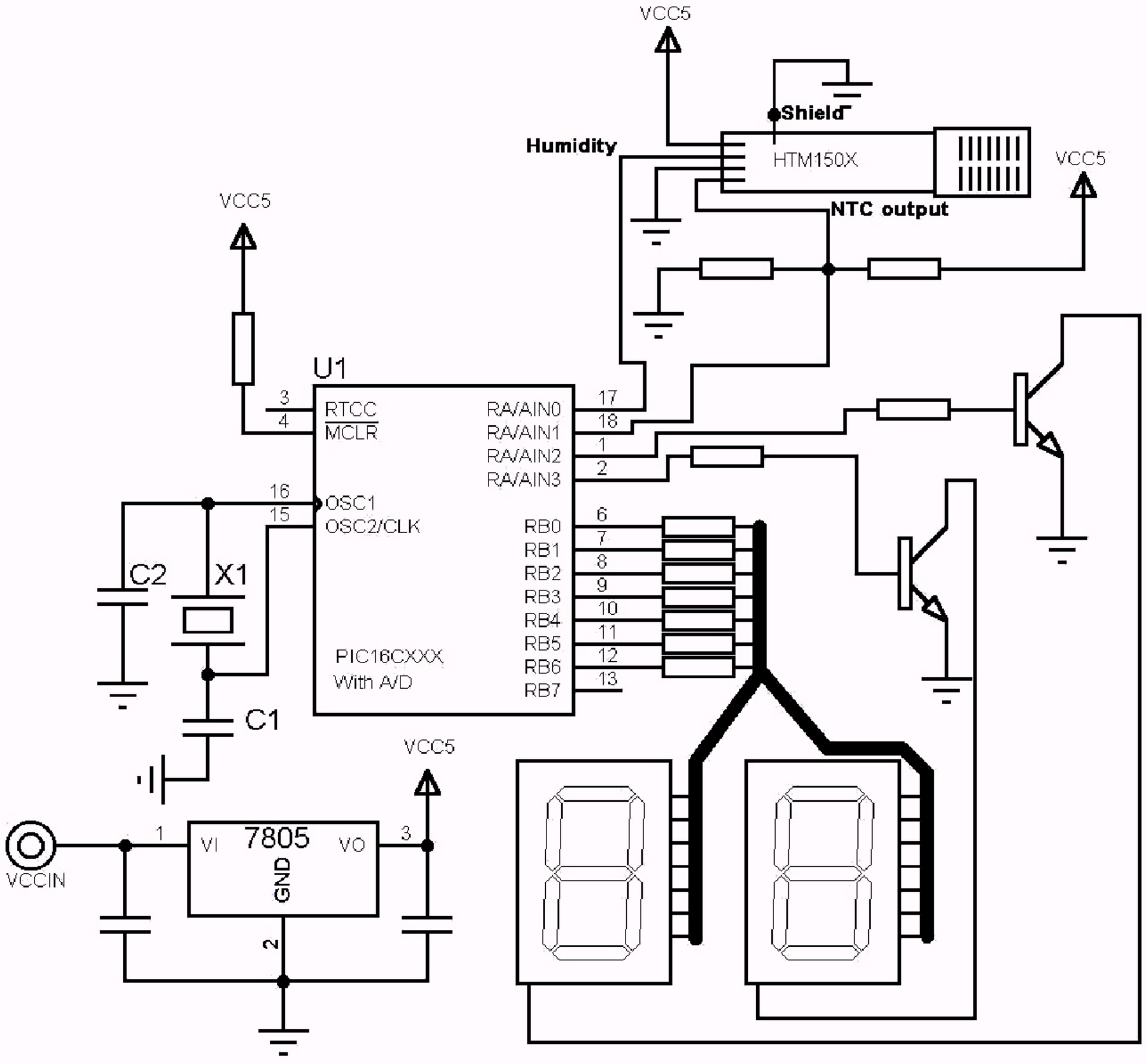
** specific lenght available on request*

Wire	Color	Function
W1	Brown	Ground
W2	White	Supply Voltage
W3	Yellow	Humidity Voltage
W4	Green	NTC Resistance
W5	Black	Shield

ORDERING INFORMATION (MULTIPLE PACKAGE QUANTITY OF 10 PIECES).
HTM 2500 HUMIDITY ANALOG VOLTAGE OUTPUT MODULE.

www.humirel.com

email: sales@humirel.com


VCC5
Shield
Humidity
HTM150X
VCC5
NTC output
VCC5
U1
3
4
RTCC
MCLR
RA/AIN0
RA/AIN1
RA/AIN2
RA/AIN3
17
18
1
2
16
15
OSC1
OSC2/CLK
RB0
RB1
RB2
RB3
RB4
RB5
RB6
RB7
6
7
8
9
10
11
12
13
C2
X1
C1
PIC16CXXX
With A/D
VCC5
VCCIN
1
VI
7805
VO
3
GND
2