

## TEMPERATURE AND HUMIDITY MODULE

**HTF 3130**

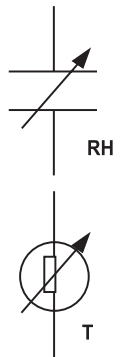
Based on the rugged HTS2030SMD humidity sensor, HTF3130 is a dedicated **humidity and temperature transducer** designed for OEM applications where a reliable and accurate measurement is needed. It features a very small size for easy, cost-effective mechanical mounting. Direct interface with a micro-controller is made possible with the module's linear **frequency output**.

### MAIN FEATURES

- One of the smallest humidity / temperature modules on the market.
- Stable,proportional frequency output from 0 to 99% RH.
- Calibrated within +/- 3% RH @ 55% RH at 5.00 VDC.
- High quality thermistor
- Stable characteristics with temperature.
- High reliability and long term stability.

### HUMIDITY SENSOR SPECIFIC FEATURES

- Instantaneous de-saturation after long periods in saturation phase.
- Fast response time.
- High resistance to chemicals.
- Not affected by water immersion.
- Patented solid polymer structure.

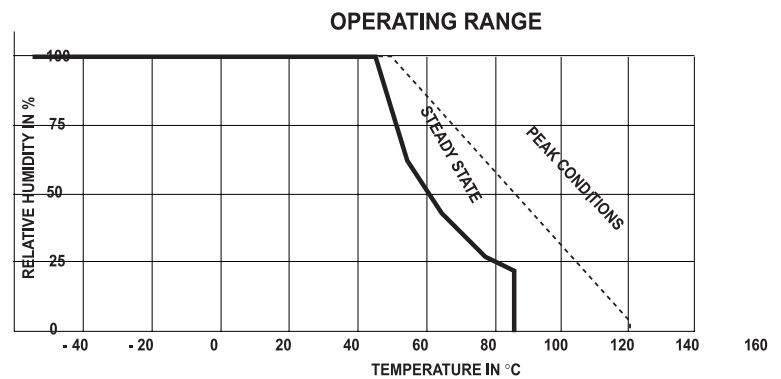


### TEMPERATURE SENSOR SPECIFIC FEATURES

- 10 K +/- 3% NTC temperature sensor
- Stable
- High sensitivity

### MAXIMUM RATINGS

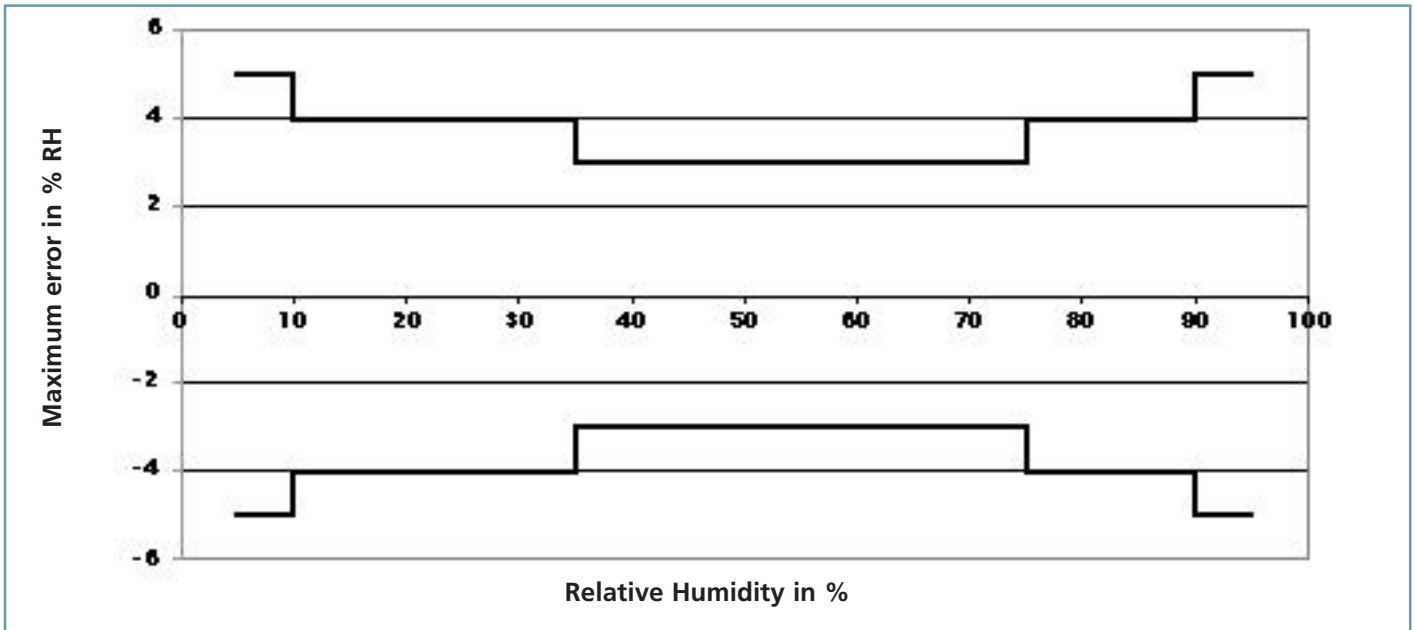
Ratings	Symbol	Value	Unit
Storage Temperature	Tstg	-40 to 105	°C
Storage Humidity Range	RHstg	0 to 100	% RH
Supply Voltage (Peak)	Vs	16	Vdc
Humidity Operating Range	RH	0 to 99	% RH
Temperature Operating Range	Ta	-40 to 85	°C



### CHARACTERISTICS

**Humidity sensor** (Ta = 25°C, Vs = 5.00Vdc, R<sub>L</sub> > 100 KΩ unless otherwise stated)

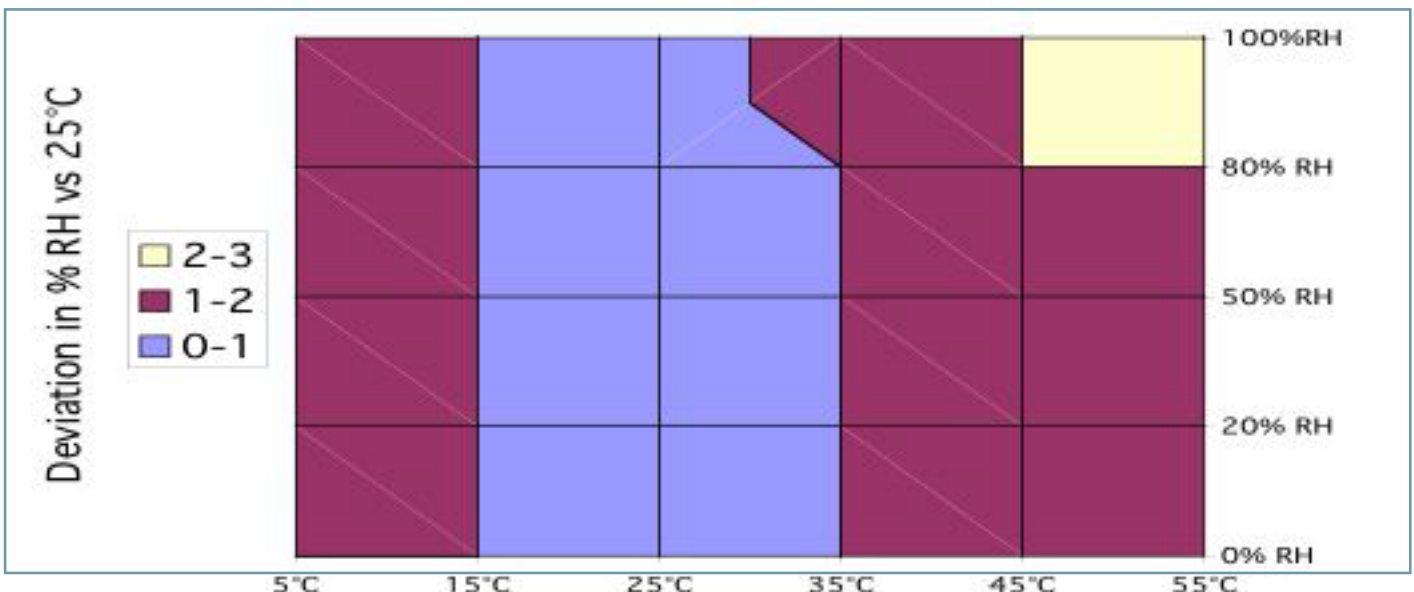
Characteristics	Symbol	Min.	Typ.	Max.	Unit.
Humidity metrology range	RH	10		95	% RH
Relative Humidity accuracy (10 to 95 % RH)	RH		+/- 3	+/- 5	% RH
Voltage supply	Vs	4	5.00	16	VdC
Nominal output @ RH = 55 % and 5.00VDC	Fout	6560	6600	6640	Hz
Current consumption	Ic			0.1	mA
Voltage supply influence (4 to 7 VDC)	RH		+/-1		% RH
Averaged Sensitivity from 33 % to 75 % RH	$\Delta F_{out} / \Delta RH$	-10	- 11	-12	Hz/% RH
Sink current capability	Is		100		μA
Recovery time after 150 hours of condensation	t		10		s
Humidity Hysteresis			+/-1.5		% RH
Long term stability			0.5		% RH/yr
Time constant (33 to 76% RH, static, @63 %)	$\tau$		10		s

**Relative Humidity Accuracy of HTF 3130 @ 25°C**


**Modeled Signal output** :  $F_{out} = 7314 - 16.79 \cdot RH + 0.0886RH^2 - 0.000358RH^3$  with  $F_{out}$  in Hz and  $RH$  in %

**Typical response look-up table (Polynomial Reference curve)**

RH (%)	0	5	10	15	20	25	30	35	40	45	50
Fout (Hz)			7155	7080	7010	6945	6880	6820	6760	6705	6650
RH (%)	55	60	65	70	75	80	85	90	95	100	
Fout (Hz)	6600	6550	6500	6450	6400	6355	6305	6260	6210		

**Temperature influence on HTF3130 humidity measurement**


Calibration data are traceable to NIST standards through CETIAT laboratory.

## CHARACTERISTICS

### Temperature sensor (Ta = 25°C)

Characteristics	Symbol	Min.	Typ.	Max.	Unit.
<b>Nominal resistance @ 25°C</b>			<b>10</b>		<b>kΩ</b>
<b>Beta value : B25/100</b>	<b>B</b>	<b>3600</b>	<b>3730</b>	<b>3800</b>	
<b>Temperature measuring range</b>	<b>Ta</b>	<b>- 40</b>		<b>85</b>	<b>°C</b>
<b>Nominal Resistance Tolerance at 25°C</b>	<b>Rn</b>		<b>2</b>	<b>3</b>	<b>%</b>
<b>B value tolerance</b>	<b>B</b>		<b>3</b>		<b>%</b>
<b>Response Time</b>	$\tau$		<b>10</b>		<b>s</b>

### Typical temperature output

Depending on the needed temperature measurement range and associated accuracy, we suggest two methods to access to the NTC resistance values.

$$\textcircled{1} \quad R_T = R_N * e^{B \left( \frac{1}{T} - \frac{1}{T_N} \right)}$$

- $R_T$  NTC resistance in  $\Omega$  at temperature T in K
- $R_N$  NTC resistance in  $\Omega$  at rated temperature in K
- T,  $T_N$  Temperature in K
- B B value, material-specific constant of the NTC thermistor
- e Base of natural logarithm (e = 2.71828)

The actual characteristic of an NTC thermistor can, however, only be roughly described by the exponential relation, as the material parameter B in reality also depends on temperature. So this approach is only suitable for describing a restricted range around the rated temperature or resistance with sufficient accuracy.

$\textcircled{2}$  For practical applications a more precise description of the real R/T curve may be required. Either more complicated approaches (e.g. the Steinhart-Hart equation) are used or the resistance/temperature relation as given in tabulated form. The below table has been experimentally determined with utmost accuracy for temperature increments of 1 degree.

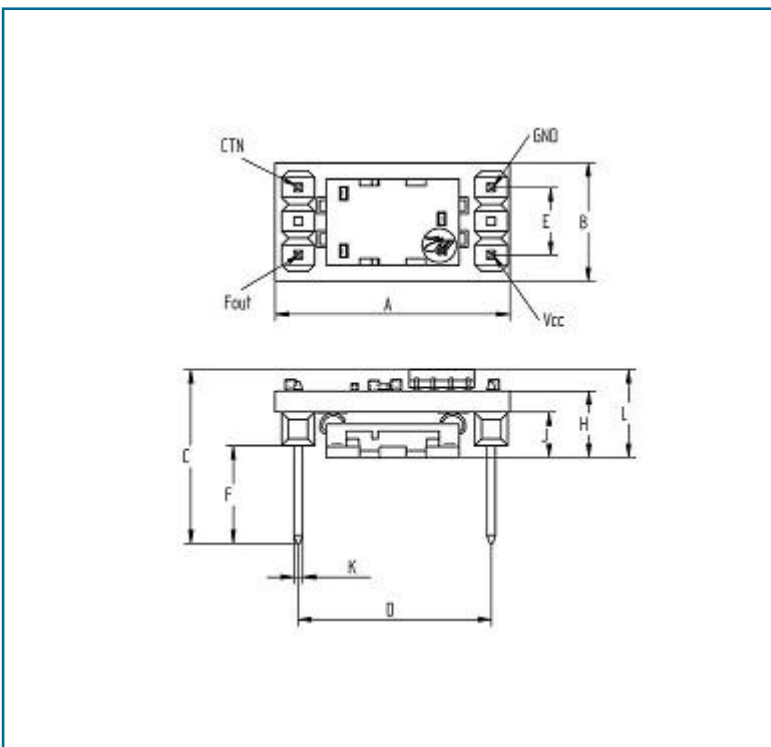
Temperature °C	Resistance (ohm)	Max. Deviation	Temperature °C	Resistance (ohm)	Max. Deviation	Temperature °C	Resistance (ohm)	Max. Deviation	Temperature °C	Resistance (ohm)	Max. Deviation
-40	262960	35403	-2	33100	2230	26	9600	300	54	3360	213
-38	232539	30358	-1	31557	2078	27	9218	300	55	3237	208
-36	206064	26075	0	30029	1932	28	8853	299	56	3126	204
-34	182852	22416	1	28627	1799	29	8506	297	57	3019	200
-32	162498	19290	2	27299	1675	30	8178	296	58	2917	197
-30	144790	16636	3	26042	1560	31	7866	294	59	2819	193
-28	129054	14343	4	24852	1452	32	7568	292	60	2720	189
-26	115243	12383	5	23773	1355	33	7283	290	61	2629	185
-24	103115	10705	6	22708	1261	34	7011	287	62	2542	182
-22	92354	9257	7	21698	1174	35	6734	284	63	2458	178
-20	82923	8020	8	20739	1093	36	6484	281	64	2378	175
-19	78581	7463	9	19829	1017	37	6244	278	65	2304	171
-18	74497	6947	10	18959	946	38	6015	275	66	2229	168
-17	70655	6468	11	18128	879	39	5796	271	67	2158	165
-16	67039	6023	12	17338	817	40	5575	267	68	2089	161
-15	63591	5606	13	16588	759	41	5373	264	69	2022	158
-14	60381	5222	14	15876	705	42	5180	260	70	1960	155
-13	57356	4865	15	15207	654	43	4995	257	71	1898	152
-12	54503	4533	16	14569	607	44	4817	253	72	1839	149
-11	51813	4225	17	13962	563	45	4636	248	73	1782	146
-10	49204	3932	18	13384	522	46	4473	245	74	1727	143
-9	46767	3662	19	12834	484	47	4316	241	75	1673	140
-8	44467	3411	20	12280	447	48	4166	237	77	1573	135
-7	42296	3177	21	11777	413	49	4021	233	79	1480	130
-6	40247	2960	22	11297	382	50	3874	229	81	1390	124
-5	38279	2756	23	10840	353	51	3737	225	83	1310	119
-4	36455	2568	24	10404	325	52	3606	221	85	1235	115
-3	34731	2393	<b>25</b>	<b>10000</b>	<b>300</b>	53	3481	217			

## QUALIFICATION PROCESS

### Resistance to physical and chemical stresses

- **HTF3130** 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<sub>2</sub> (0.5%), H<sub>2</sub>S (0.5%), O<sub>3</sub>, NO<sub>x</sub>, NO, CO, CO<sub>2</sub>, Softener, Soap, Toluene, acids (H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub>, HCl), HMDS, Insecticide, Cigarette smoke, a non exhaustive list.
- **HTF3130** is not light sensitive.

## PACKAGE OUTLINE HTF3130



Dim	A	B	C	D	E	F	G
<b>Min</b>	17.5	8.5	12.7	14.37	4.88	6.9	
<b>Max</b>	18.5	9.5	13.7	14.77	5.28	7.9	

Dim	J	H	L	K
<b>Min</b>	2.4	4.0	5.4	0.5
<b>Max</b>	3.4	5.0	6.8	0.7

Dimensions in millimeters

**Connector type** : upon request, customized connectors are available to be mated with your female connector or PCB

**ORDERING INFORMATION** : HPP808D033

**HTF3130** : Humidity Frequency output + NTC (Temperature direct output)

**HUMIREL WEB SITE**

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