

HTF3223LF Temperature and Humidity Module

DESCRIPTION

Based on the rugged HS1101LF humidity sensor, HTF3223LF is a dedicated humidity and temperature transducer designed for OEM applications where a reliable and accurate measurement is needed. It features a miniature connector for easy, cost-effective mechanical mounting. Direct interface with a micro-controller is made possible with the module's linear frequency output.



FEATURES

- ◆ The best combination of cost effectiveness and performance
- ◆ Stable, linear proportional frequency output from 10 to 95% RH.
- ◆ Calibrated within +/- 5% RH @ 55% RH.
- ◆ 10 kohm +/- 3% NTC temperature sensor (1% optional)
- ◆ Stable and reproducible 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

- ◆ High Quality Thermistor
- ◆ Stable
- ◆ High Sensitivity

maximum ratings

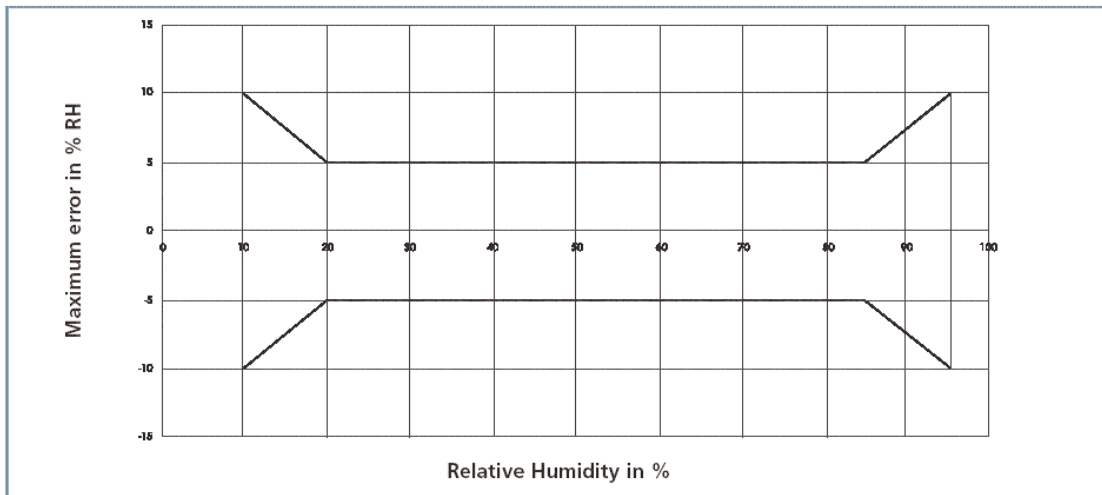
Ratings	Symbol	Value	Unit
Storage Temperature	T _{stg}	-40 to 85	°C
Storage Humidity Range	RH _{stg}	0 to 100	% RH
Supply Voltage (Peak)	V _s	7	Vdc
Humidity Operating Range	RH	0 to 99	% RH
Temperature Operating Range	T _a	-30 to 80	°C

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Characteristics Humidity sensor (Ta = 25°C, Vs = 5.0 Vdc +/- 5%, RL > 100 KΩ unless otherwise stated)

Characteristics	Symbol	Min	Typ	Max	Unit
Humidity Metrology Range	RH	1		99	% RH
Relative Humidity Accuracy (10 to 95 % RH)	RH		+/- 5	+/- 10	% RH
Voltage Supply	Vs	4.75	5.0	5.25	VdC
Nominal Output @ RH = 55 %	F _{out}	8670	8750	8830	Hz
Current Consumption	Ic			0.1	mA
Temperature Coefficient (0 to 60 °C)	Tcc		- 0.2		% RH/°C
Averaged Sensitivity from 33 % to 75 % RH	ΔF _{out} / Δ RH	-13	- 14	-16	Hz/% RH
Condensing Conditions Output (100% RH)	F _{out}	8000		8300	Hz
Recovery Time After 150 Hours of Condensation	t		10		s
Humidity Hysteresis				+/-1	% RH
Long Term Stability			+/-0.5		% RH/yr
Time Constant (33 to 76% RH, Static, @63 %)	τ			10	s

Relative Humidity Accuracy of HTF 3226LF



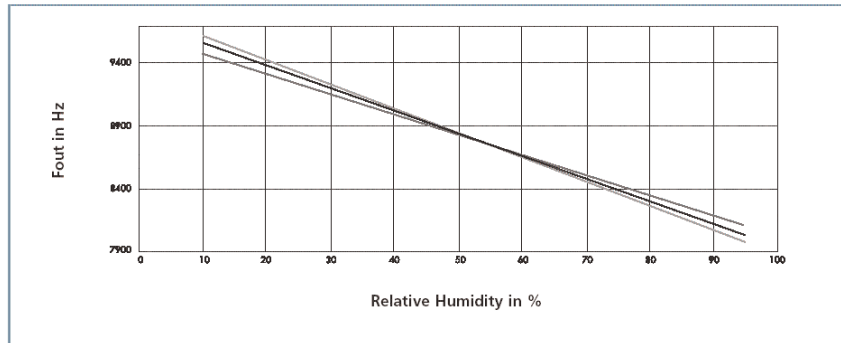
Typical response look-up table (Polynomial Reference curve)

Modeled Signal output (Linear Reference curve) : F_{out} = 9595 - 14.8*RH with F_{out} in Hz and RH in %
 Modeled Signal output (Second order curve) : F_{out} = 9659 - 18.79*RH + 0.0404*RH²

RH (%)	0	5	10	15	20	25	30	35	40	45	50
F _{out} (Hz)			9490	9390	9295	9205	9125	9040	8965	8890	8820
RH (%)	55	60	65	70	75	80	85	90	95	100	
F _{out} (Hz)	8750	8680	8615	8550	8485	8420	8355	8290	8225		

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Typical , Minimum and Maximum Frequency Values for HTF3223LF



Calibration data are traceable to NIST standards through CETIAT laboratory.

Characteristics Temperature sensor (Ta = 25°C)

Characteristics	Symbol	Min	Typ	Max	Unit
Nominal Resistance @ 25°C			10		kΩ
Beta value : B25/100	B	3600	3730	3800	
Temperature Measuring Range	Ta	- 30		80	°C
Nominal Resistance Tolerance at 25°C	Rn		2	3	%
B Value Tolerance	B		3		%
Response Time	τ		10		s

Typical temperature output

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

$$① \quad R_T = R_0 \cdot e^{B \left(\frac{1}{T} - \frac{1}{T_0} \right)}$$

R_T NTC resistance in Ωat temperature T in K

R_0 NTC resistance in Ωat rated temperature in K

T, T_0 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.

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.

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Temperature °C	Resistance (ohm)	Max. Deviation
-30	144790	16636
-29	136664	15444
-28	129054	14343
-27	121925	13325
-26	115243	12383
-25	109030	11516
-24	103115	10705
-23	97565	9953
-22	92354	9257
-21	87460	8612
-20	82923	8020
-19	78581	7463
-18	74497	6947
-17	70655	6468
-16	67039	6023
-15	63591	5606
-14	60381	5222
-13	57356	4865
-12	54503	4533
-11	51813	4225
-10	49204	3932
-9	46767	3662
-8	44467	3411
-7	42296	3177
-6	40247	2960
-5	38279	2756
-4	36455	2568
-3	34731	2393

Temperature °C	Resistance (ohm)	Max. Deviation
-2	33100	2230
-1	31557	2078
0	30029	1932
1	28627	1799
2	27299	1675
3	26042	1560
4	24852	1452
5	23773	1355
6	22708	1261
7	21698	1174
8	20739	1093
9	19829	1017
10	18959	946
11	18128	879
12	17338	817
13	16588	759
14	15876	705
15	15207	654
16	14569	607
17	13962	563
18	13384	522
19	12834	484
20	12280	447
21	11777	413
22	11297	382
23	10840	353
24	10404	325
25	10000	300

Temperature °C	Resistance (ohm)	Max. Deviation
26	9600	300
27	9218	300
28	8853	299
29	8506	297
30	8178	296
31	7866	294
32	7568	292
33	7283	290
34	7011	287
35	6734	284
36	6484	281
37	6244	278
38	6015	275
39	5796	271
40	5575	267
41	5373	264
42	5180	260
43	4995	257
44	4817	253
45	4636	248
46	4473	245
47	4316	241
48	4166	237
49	4021	233
50	3874	229
51	3737	225
52	3606	221
53	3481	217

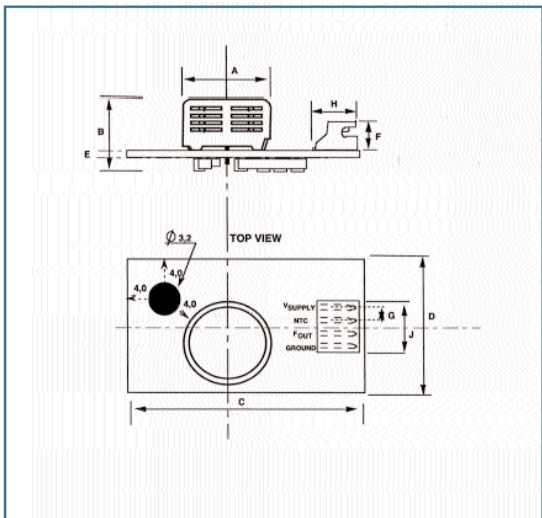
Temperature °C	Resistance (ohm)	Max. Deviation
54	3360	213
55	3237	208
56	3126	204
57	3019	200
58	2917	197
59	2819	193
60	2720	189
61	2629	185
62	2542	182
63	2458	178
64	2378	175
65	2304	171
66	2229	168
67	2158	165
68	2089	161
69	2022	158
70	1960	155
71	1898	152
72	1839	149
73	1782	146
74	1727	143
75	1673	140
76	1622	138
77	1573	135
78	1526	132
79	1480	130
80	1432	127

Qualification Process

Resistance to physical and chemical stresses

- HTF3223LF 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, SO₂ (0.5%), H₂S (0.5%), O₃, NO_x, NO, CO, CO₂, Softener, Soap, Toluene, acids (H₂SO₄, HNO₃, HCl), HMDS, Insecticide, Cigarette smoke, this is not an exhaustive list.
- HTF3223LF is not light sensitive.

Package Outline HTF3223LF



Connector type : JST model S4B-ZR
to be mated with ZHR or 04ZR type female connectors

Dim	A	B	C	D	E	F	G
Min	9.7	8.5	33.5	21.5	1.55	3.5	1.45
Max	10.8	9.5	34.5	22.5	1.65	3.9	1.55

Dim	H	J	K	L	M	N	÷
Min	5.5	7.3	29.5	13.8	3.5	3.5	3.0
Max	6.5	7.7	30.5	14.2	4.5	4.5	3.4

Dimensions in millimeters

Ordering Information: HPP808B031

(Multiple Package Quantity of 50 pieces)
HTF3223HT : Humidity Frequency output + NTC (Temperature direct output)

