

HTF3000LF PVH-3.3

TEMPERATURE AND HUMIDITY MODULE

Compliant with RoHS recommendations

Based on the rugged HS1101LF humidity sensor, HTF3000LF PVH-3.3 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**
- ⇒ **Compliant with RoHS regulation and most of Lead Free Soldering Process**
- ⇒ **Stable, proportional frequency output from 0 to 100% RH**
- ⇒ **Calibrated within +/- 3% RH @ 55% RH at 3.30 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
- ⇒ Part could be washed with distilled water
- ⇒ Patented solid polymer structure

TEMPERATURE SENSOR SPECIFIC FEATURES

- ⇒ **10 k Ω +/- 1% 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 100	% RH
Temperature Operating Range	Ta	-40 to 85	°C

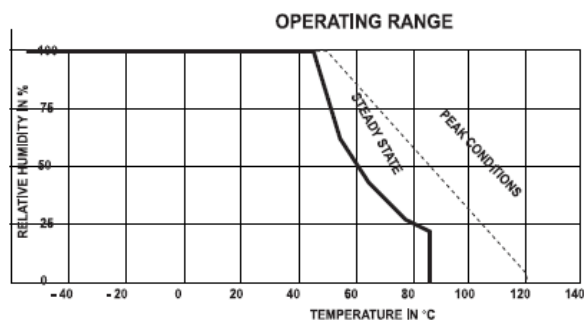


Chart1

CHARACTERISTICS

Humidity sensor ($T_a = 23^\circ\text{C}$, $V_s = 5\text{Vdc}$, $R_L > 100\text{K}\Omega$ unless otherwise stated)

Characteristics	Symbol	Min	Typ	Max	Unit
Relative Humidity accuracy (0 to 100 % RH)	RH	Refer to Chart 2 on page 2			
Voltage supply	Vs	3.1	3.3	3.6	VdC
Nominal output @ RH = 55 % and 5 Vdc	Fout	6419	6455	6491	Hz
Current consumption (Max at 16Vdc)	Ic			0.1	mA
Voltage supply influence (3 to 7 Vdc)	RH		+/-1		% RH
Averaged Sensitivity from 10% to 95% RH	$\Delta F_{\text{out}} / \Delta \text{RH}$	-9	- 11	-12	Hz/% RH
Humidity Hysteresis				+/-1	% RH
Long term stability			0.5		% RH/yr
Time constant (40 to 95% RH, 2m/s, @63 %)	τ			10	s

Relative Humidity Accuracy of HTF 3000LF PVH-3.3 @ 23°C

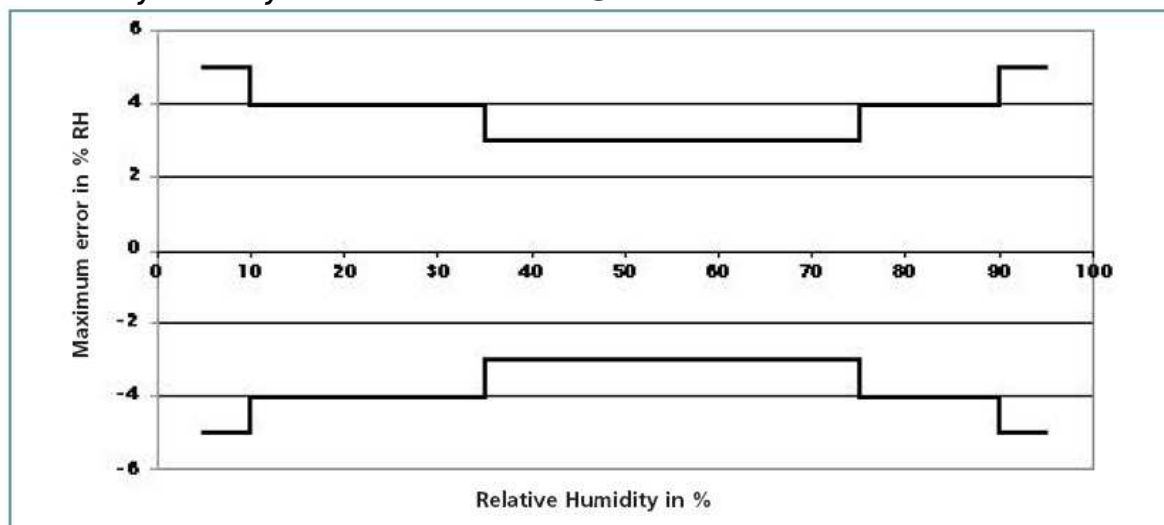


Chart 2

Suggested modeled Signal output:

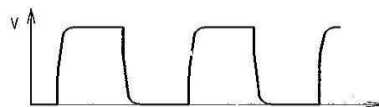
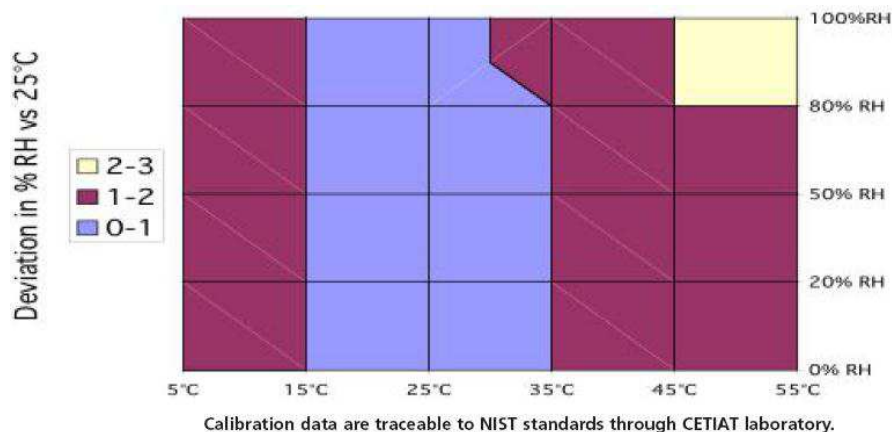
$$F_{out} = 7083 - 14.47 \cdot RH + 0.0736 \cdot RH^2 - 0.0003 \cdot RH^3$$

(F_{out} in Hz and RH in %)

Typical response look-up table at 3.3V (Polynomial Reference curve)

RH (%)	0	5	10	15	20	25	30	35	40	45	50
F _{out} (Hz)	-	7015	6945	6880	6820	6765	6705	6655	6600	6550	6505
RH (%)	55	60	65	70	75	80	85	90	95	100	
F _{out} (Hz)	6455	6410	6360	6315	6270	6225	6180	6135	6085	-	

Output Voltage: High 4.8 V Min / Low 0.2 V Max with a duty cycle of 50% ±5%


Temperature influence on HTF3000LF PVH-3.3 humidity measurement

CHARACTERISTICS
Temperature sensor

Characteristics	Symbol	Min	Typ	Max	Unit
Nominal resistance @ 25°C			10		kΩ
Beta value : B25/50	B	3600	3730	3800	
Temperature measuring range	T _a	-40		85	°C
Nominal Resistance Tolerance at 25°C	R _n		1		%
B value tolerance	B		1		%
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

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

R_T NTC resistance in Ω at temperature T in K

R_N NTC resistance in Ω 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.

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.

Temp °C	Resistance (Ohm)	Max. deviation	Temp °C	Resistance (Ohm)	Max. deviation	Temp °C	Resistance (Ohm)	Max. deviation	Temp °C	Resistance (Ohm)	Max. deviation
-40	262960	35403	-5	38279	2756	30	8178	296	65	2304	171
-39	247217	32777	-4	36455	2568	31	7866	294	66	2229	168
-38	232539	30358	-3	34731	2393	32	7568	292	67	2158	165
-37	218845	28130	-2	33100	2230	33	7283	290	68	2089	161
-36	206064	26075	-1	31557	2078	34	7011	287	69	2022	158
-35	194110	24178	0	30029	1932	35	6734	284	70	1960	155
-34	182852	22416	1	28627	1799	36	6484	281	71	1898	152
-33	172332	20791	2	27299	1675	37	6244	278	72	1839	149
-32	162498	19290	3	26042	1560	38	6015	275	73	1782	146
-31	153299	17905	4	24852	1452	39	5796	271	74	1727	143
-30	144790	16636	5	23773	1355	40	5575	267	75	1673	140
-29	136664	15444	6	22708	1261	41	5373	264	76	1622	138
-28	129054	14343	7	21698	1174	42	5180	260	77	1573	135
-27	121925	13325	8	20739	1093	43	4995	257	78	1526	132
-26	115243	12383	9	19829	1017	44	4817	253	79	1480	130
-25	109030	11516	10	18959	946	45	4636	248	80	1432	127
-24	103115	10705	11	18128	879	46	4473	245	81	1390	124
-23	97565	9953	12	17338	817	47	4316	241	82	1349	122
-22	92354	9257	13	16588	759	48	4166	237	83	1310	119
-21	87460	8612	14	15876	705	49	4021	233	84	1272	117
-20	82923	8020	15	15207	654	50	3874	229	85	1235	115
-19	78581	7463	16	14569	607	51	3737	225	86	1199	112
-18	74497	6947	17	13962	563	52	3606	221	87	1163	110
-17	70655	6468	18	13384	522	53	3481	217	88	1130	108
-16	67039	6023	19	12834	484	54	3360	213	89	1097	106
-15	63591	5606	20	12280	447	55	3237	208	90	1067	104
-14	60381	5222	21	11777	413	56	3126	204	91	1038	102
-13	57356	4865	22	11297	382	57	3019	200	92	1009	100
-12	54503	4533	23	10840	353	58	2917	197	93	982	98
-11	51813	4225	24	10404	325	59	2819	193	94	955	96
-10	49204	3932	25	10000	300	60	2720	189	95	927	94
-9	46767	3662	26	9600	300	61	2629	185	96	901	92
-8	44467	3411	27	9218	300	62	2542	182	97	877	90
-7	42296	3177	28	8853	299	63	2458	178	98	853	89
-6	40247	2960	29	8506	297	64	2378	175	99	830	87

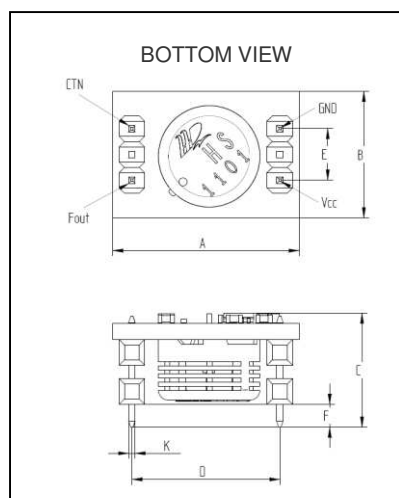
QUALIFICATION PROCESS

Resistance to physical and chemical stresses

- ⇒ HTF3000LF PVH-3.3 has passed through qualification processes of MEAS FRANCE including vibration, shock, storage, high temperature and humidity
- ⇒ 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,....
- ⇒ ESD : HTF3000LF PVH-3.3 is able to sustain a minimum of ±8KV (contact discharge)

PACKAGE OUTLINE

HTF3000LF PVH-3.3

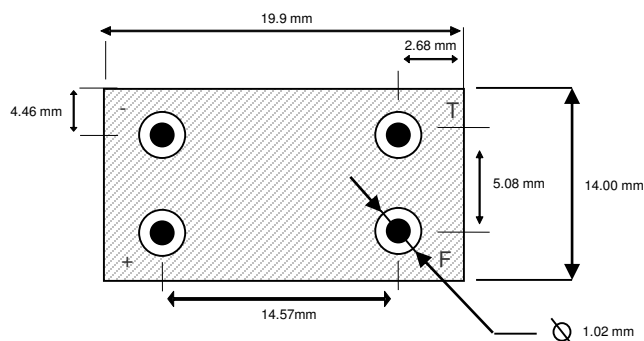


Weight: 2.1g

Dim	A	B	C	D	E	F	K
Min	17.9	12.0	10.7	14.25	4.80	1.76	0.54
Max	18.9	13.0	11.7	14.95	5.40	3.76	0.74

Dimensions in millimeters

Recommended Through Hole FootPrint



Ordering information: HPP808H035 for HTF3000LF PVH-3.3

Storage: Tube M.Q.P of 48 parts; Box M.Q.P of 1008 parts (21 tubes)

SOLDERING INFORMATION

HTF3000LF PVH-3.3:

Hand soldering or wave soldering.

EUROPE

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