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 kΩ+/- 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

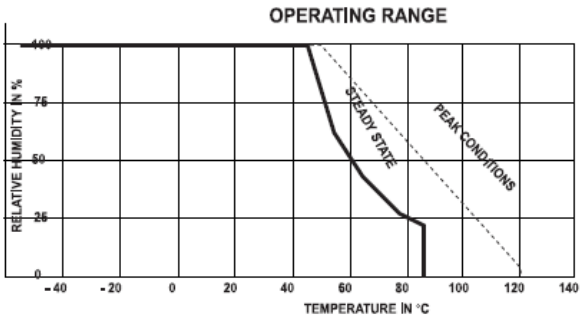


Chart1

CHARACTERISTICS

Humidity sensor (Ta =23°C, Vs=5Vdc, R_L >100KΩ 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	ΔFout /ΔRH	-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

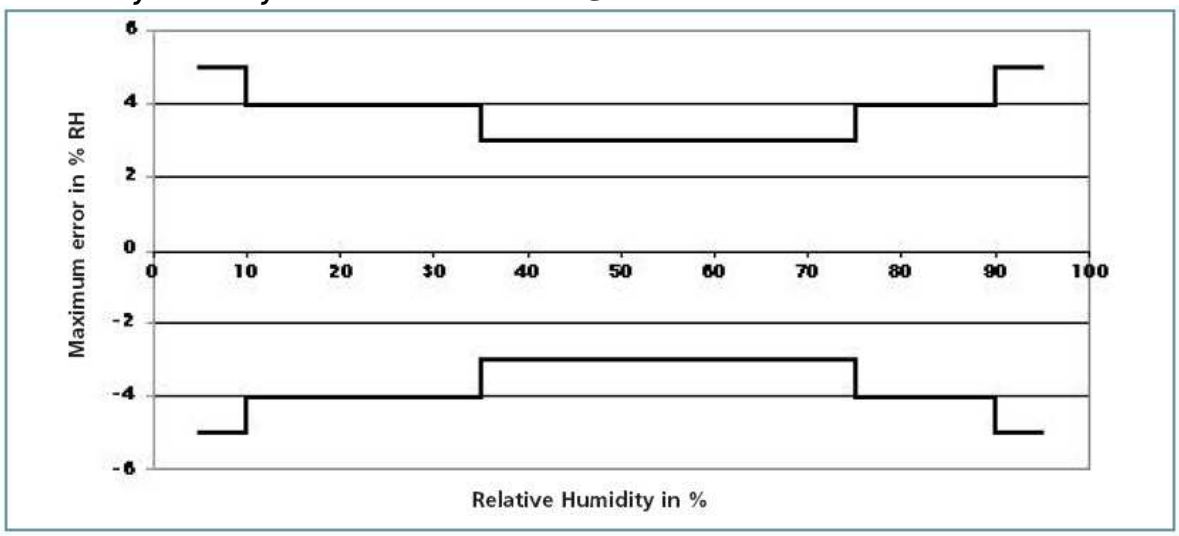


Chart 2

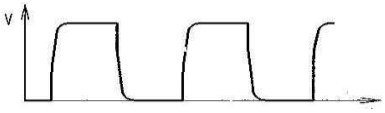
Suggested modeled Signal output:

Fout = 7083 – 14.47*RH + 0.0736*RH²-0.0003* RH³
(Fout in Hz and RH in %)

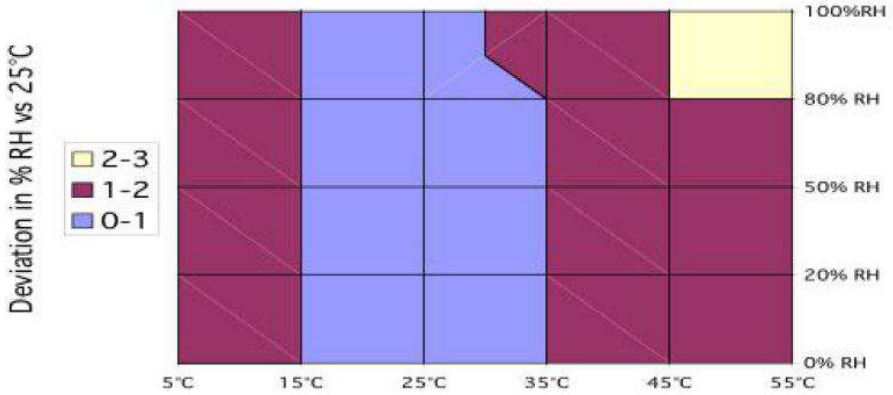
Typical response look-up table at 3.3V (Polynomial Reference curve)

RH (%)	0	5	10	15	20	25	30	35	40	45	50
Fout (Hz)	-	7015	6945	6880	6820	6765	6705	6655	6600	6550	6505
RH (%)	55	60	65	70	75	80	85	90	95	100	
Fout (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



Calibration data are traceable to NIST standards through CETIAT laboratory.

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	Ta	-40		85	°C
Nominal Resistance Toleranceat 25°C	Rn		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 Ωat temperature T in K
R_N	NTC resistance in Ωat 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 parame ter 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

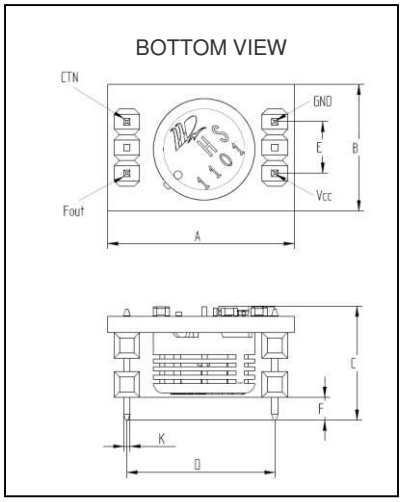
QUALIFICATION PROCESS

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%), 03, NOx, 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

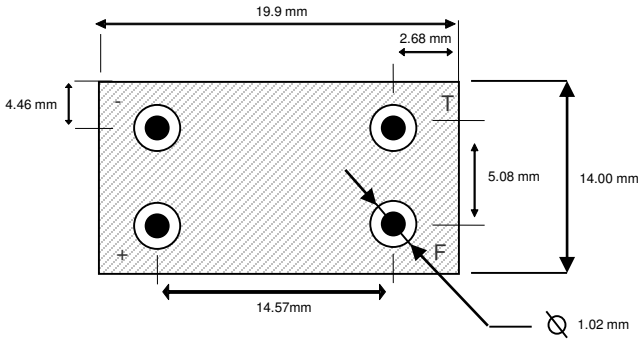


Dim	A	B	C	D	E	F	K
Min	17.9	12.0	10.7	14.25	4.80	1.76	0.54
Max	18.9	13.0	11.7	14.95	5.40	3.76	0.74

Dimensions in millimeters

Weight: 2.1g

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)