HTF3227LF – Temperature and Humidity Module

- **Full Lead free product**
- **Calibrated within +/-3% @55%RH at 5Vdc**
- **Small size product**
- **Stable, proportional frequency output from 0 to 99%RH**
- **High quality thermistor**

DESCRIPTION

Based on the rugged HS1101LF humidity sensor, HTF3227LF 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.**

FEATURES

- One of the smallest humidity/temperature modules on the market
- 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

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

APPLICATIONS

- Printers
- Hygrostat

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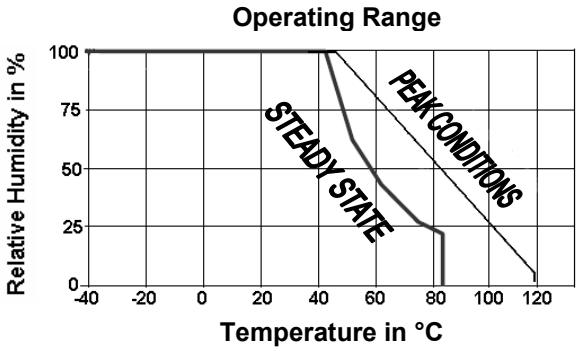
HTF3227LF - Temperature and Humidity Module

PERFORMANCE SPECS

MAXIMUM RATINGS

Ratings	Symbol	Value	Unit
Storage Temperature	Tstg	-40 to 105	°C
Storage Humidity	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

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



ELECTRICAL CHARACTERISTICS

(Ta=25°C, Vs=5Vdc +/-5%, R_L>100kΩ unless otherwise stated)

Humidity Characteristics	Symbol	Min	Typ	Max	Unit
Humidity Measuring Range	RH	10		95	%RH
Relative Humidity Accuracy (10 to 95% RH)	RH		+/-3	+/-5	%RH
Supply Voltage	Vs	4	5	16	Vdc
Nominal Output @55%RH (at 5Vdc)	Fout	6620	6660	6700	Hz
Current consumption	Ic			0.1	mA
Supply Voltage Influence (4 to 7 Vdc)	RH		+/-1		%RH
Average Sensitivity from 33% to 75%RH	ΔFout/ΔRH	-10	-11	-12	Hz/%RH
Sink Current Capability	Is		100		µA
Recovery time after 150 hours of condensation	tr		10		s
Humidity Hysteresis			+/-1.5		%RH
Long term stability	T		+/-0.5		%RH/yr
Time Constant (at 63% of signal, static) 33% to 76%RH	τ		10		s

(Ta=25°C)

Temperature Characteristics	Symbol	Min	Typ	Max	Unit
Nominal Resistance @25°C	R		10		kΩ
Beta value: B25/100	β	3600	3730	3800	
Temperature Measuring Range	Ta	-40		85	°C
Nominal Resistance Tolerance @25°C	R_N		2	3	%
Beta Value Tolerance	β		3		%
Response Time	τ		10		s

TYPICAL PERFORMANCE CURVES

HUMIDITY SENSOR

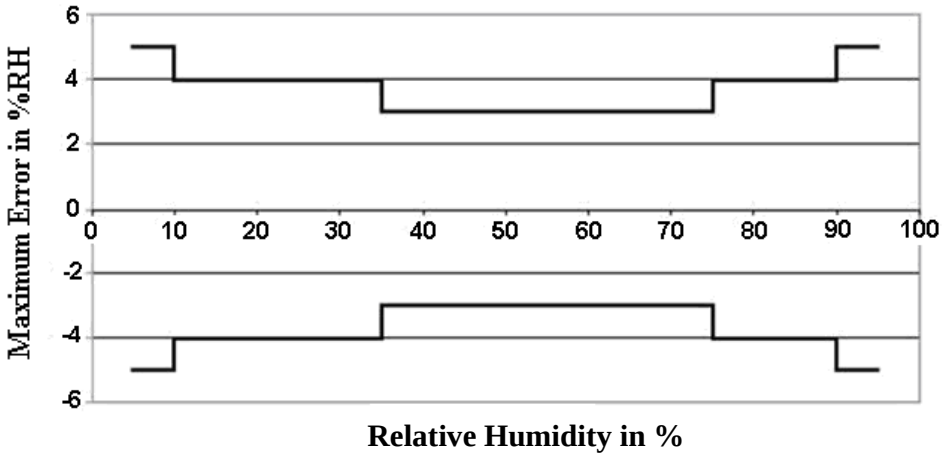
- **Modeled signal output**

  Fout = 7374 - 16.86*RH + 0.09058*RH^2 – 0.000374*RH^3 with Fout in Hz and RH in %

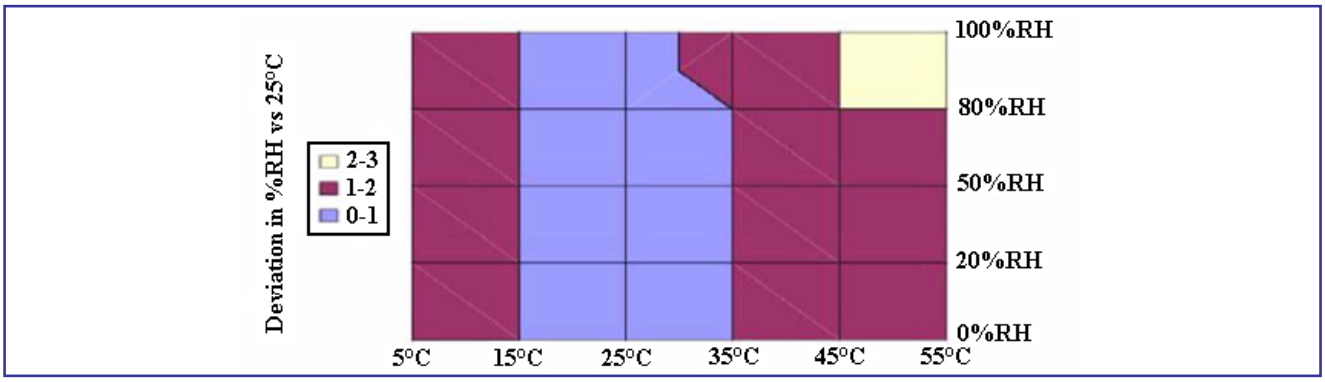
- **Typical response look-up table**

RH (%)	0	5	10	15	20	25	30	35	40	45	50
Fout (Hz)			7215	7140	7070	7005	6940	6880	6820	6765	6710
RH (%)	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**	
Fout (Hz)	6660	6610	6560	6510	6460	6415	6365	6320	6270		

- **Relative Humidity Accuracy of HTF3227LF @ 25°C**



- **Temperature influence on HTF3227LF humidity measurement**



Calibration data are traceable to NIST standards through CETIAT laboratory.

TEMPERATURE SENSOR

- **Typical temperature output**

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

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

R_T	NTC resistance in Ω at temperature T in K
R_N	NTC resistance in Ω at rated temperature T in K
T, T_N	Temperature in K
β	Beta value, material specific constant of NTC
e	Base of natural logarithm (e=2.71828)

① The exponential relation only roughly describes the actual characteristic of an NTC thermistor can, however, as the material parameter β in reality also depend on temperature. So this approach is 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 tabulation form. The below table has been experimentally determined with utmost accuracy for temperature increments of 1 degree.

Actual values may also be influenced by inherent self-heating properties of NTCs. Please refer to MEAS-France Application Note HPC106 “Low power NTC measurement”.

- **Temperature look-up table**

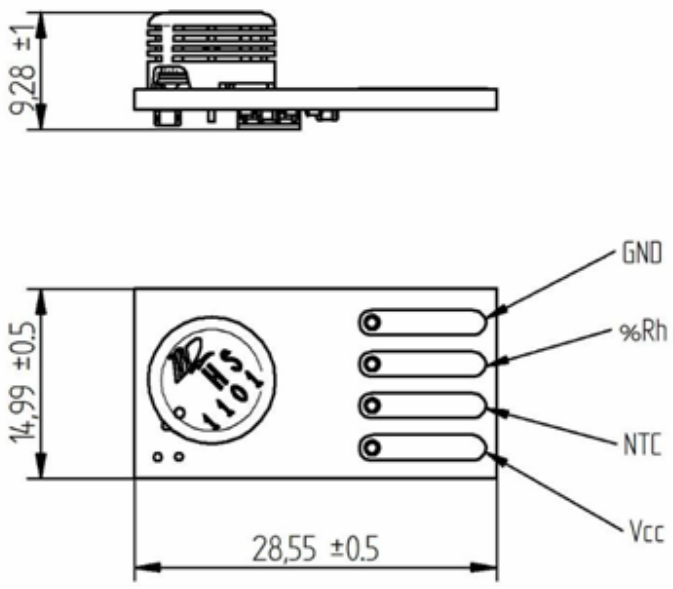
Temp (°C)	Resistance (Ω)	Max Deviation (Ω)	Temp (°C)	Resistance (Ω)	Max Deviation (Ω)	Temp (°C)	Resistance (Ω)	Max Deviation (Ω)	Temp (°C)	Resistance (Ω)	Max Deviation (Ω)
-40	262960	35403	-2	33100	2230	26	9600	300	54	3360	213
-38	232539	30358	-1	31557	2078	27	9218	300	55	3237	208
-36	206064	26075	0	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	25	10000	300	53	3481	217			

QUALIFICATION PROCESS

RESISTANCE TO PHYSICAL AND CHEMICAL STRESSES

- HTF3227LF has passed through qualification processes of MEAS-France 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%), 03, NOx, NO, CO, CO2, Softener, Soap, Toluene, acids (H2SO4, HNO3, HCI), HMDS, Insecticide, Cigarette smoke, this is not an exhaustive list.
- HTF3227LF is not light sensitive.

PACKAGE OUTLINE



Dimensions in millimeters

ORDERING INFORMATION

HPP808F003 (MULTIPLE PACKAGE QUANTITY OF 50 PIECES)

HTF3227LF – HUMIDITY FREQUENCY OUTPUT + NTC (TEMPERATURE DIRECT OUTPUT)

Sample kit of HTF3227LF is available through MEAS-France web site:
www.meas-spec.com

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Revision	Comments	Who	Date
B	Standardized datasheet format	D. LE GALL	April 08

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