HTW-211 Voltage output sensor module

feature

Linear & calibrated%RH voltage out-

put solid & robust molding package

The coating material is used for internal reinforcement and protection with good tolerance and easy installation

Customized PTFE filter and temperature output

Product Summary

The HTW-211 is a precise and reliable humidity measurement sensor based on the HumiChip®.

The sensor's humidity output has been temperature compensated and is a linear voltage, which can be directly connected to a microcomputer with ADC input. The specially designed molding packaging and coating materials ensure tolerance and reliability even in harsh environments.

Electrical parameters

parameter	symbol	Min.	Typ.	Max.	unit
service voltage	V_{cc}	4.75	5	5.25	V
Output voltage deviation (@ input voltage)		-50	0	+50	mV
Ambient humidity sensitivity current consumption 1)	ΔmV/RH		26.23		mV/%RH
	I_{cc}		0.75		mA

1) Typical. 25℃ 50%RH R=10⇔

enviromental parameter

parameter	symbol	price	unit
Storage temperature range	T_{stg}	-55 ~ 125	℃
operating temperature range	T_s	-40 ~ 85	℃
Working humidity range	RH	0 ~ 100	%RH

Sensor performance

RH% feature

humidity characteristic	symbol	Min.	Typ.	Max.	unit
Output @50%RH & 5V (VCC)	H_VOUT	2.274	2.350	2.428	V
Humidity measurement range 1)	RH	0		100	%RH
Relative humidity and accuracy 2)		-3		+3	%RH
Humidity lag		-2		+2	%RH
temperature coefficient	Tcc		-0.05		%RH/℃
Response time (t_{63}%) 3)			7.0		sec

1) No condensation

2) Humidity range (20~80%RH)

3) Non-PTFE filters

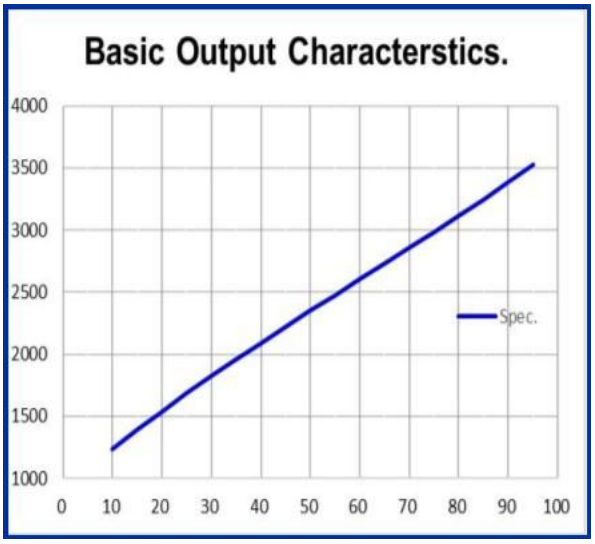
temperature characteristic

temperature characteristic		symbol	Min.	Typ.	Max.	unit
Temperature detection range nominal resistance @25℃		Ta	-40		85	℃
		R	9.9	10.0	10.1	kΩ
Beats: B25/85		B	3346	3380	3414	K
Normal resistance value deviation @ ℃ B value deviation		T		1		%
		B		1		%
response time ($t_{63\%}$)	Thermistor module 1)				<5	second
	component 2)				<115	second

1) Assessment of the time to reach 63.2% of 56.6℃ (i.e., 25℃ ε 75℃) (resistance at 56.6℃: 3.358⇔ (Ref.) -non-PTFE filter
2) Assessment of the time to reach 63.2% of 75℃ (from 72.4℃ ℃ 25℃ ε 75℃) (resistance at 72.4℃: 2.076⇔ (Ref.) -non-PTFE filter

Humidity view table (@25℃)

Reference output value (Vcc=5V)



%RH	Vout(mV)	%RH	Vout(mV)
10	1235	55	2480
15	1390	60	2605
20	1540	65	2730
25	1685	70	2860
30	1825	75	2990
35	1960	80	3125
40	2090	85	3260
45	2220	90	3400
50	2350	95	3530

polynomial equation：

$$H\_V_{out}\,[\text{mV}] = 8.439 \times 10^{-4} \times RH^{3} - 0.1485 \times RH^{2} + 34.16 \times RH + 908.5$$

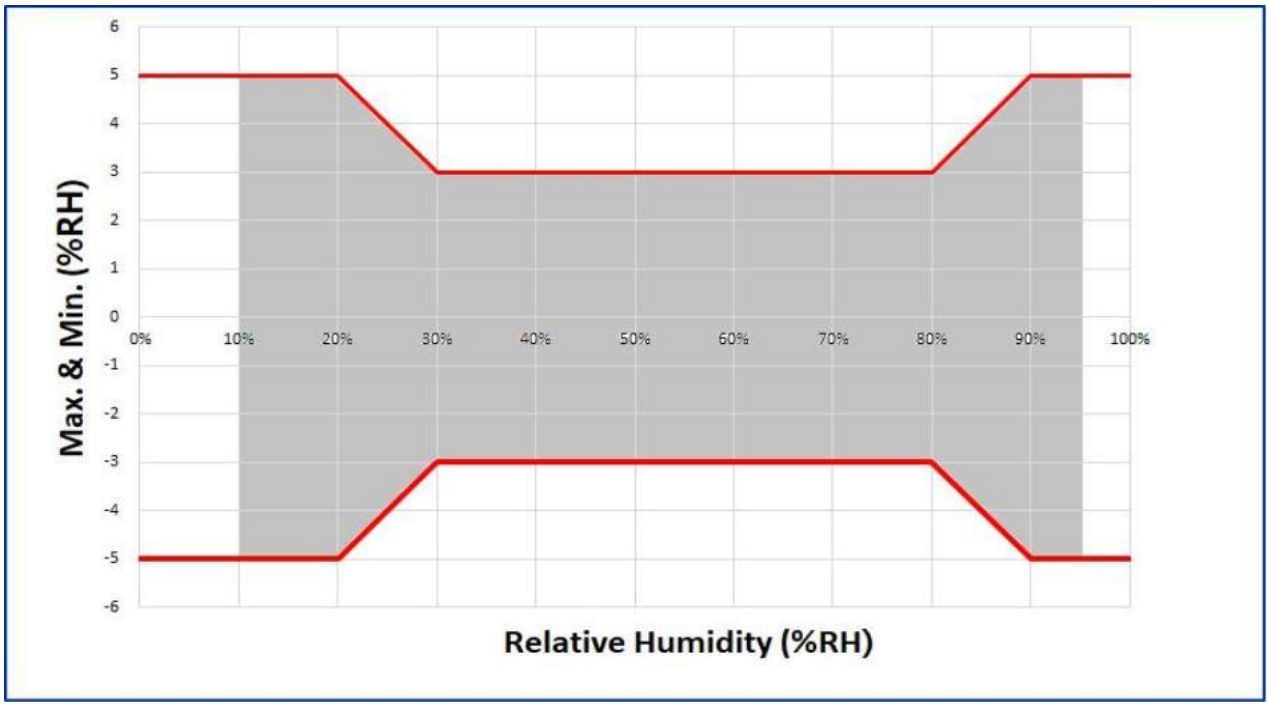
$$RH\,[\%] = -1.56 \times 10^{-9} \times V_{out}{}^{3} + 1.205 \times 10^{-5} \times V_{out}{}^{2} + 8.22 \times 10^{-3} \times V_{out} - 15.6$$

linear equation：

$$H\_V_{out}\,[\text{mV}] = 26.23 \times RH + 1032$$

$$RH\,[\%] = 0.03812 \times V_{out} - 39.36$$

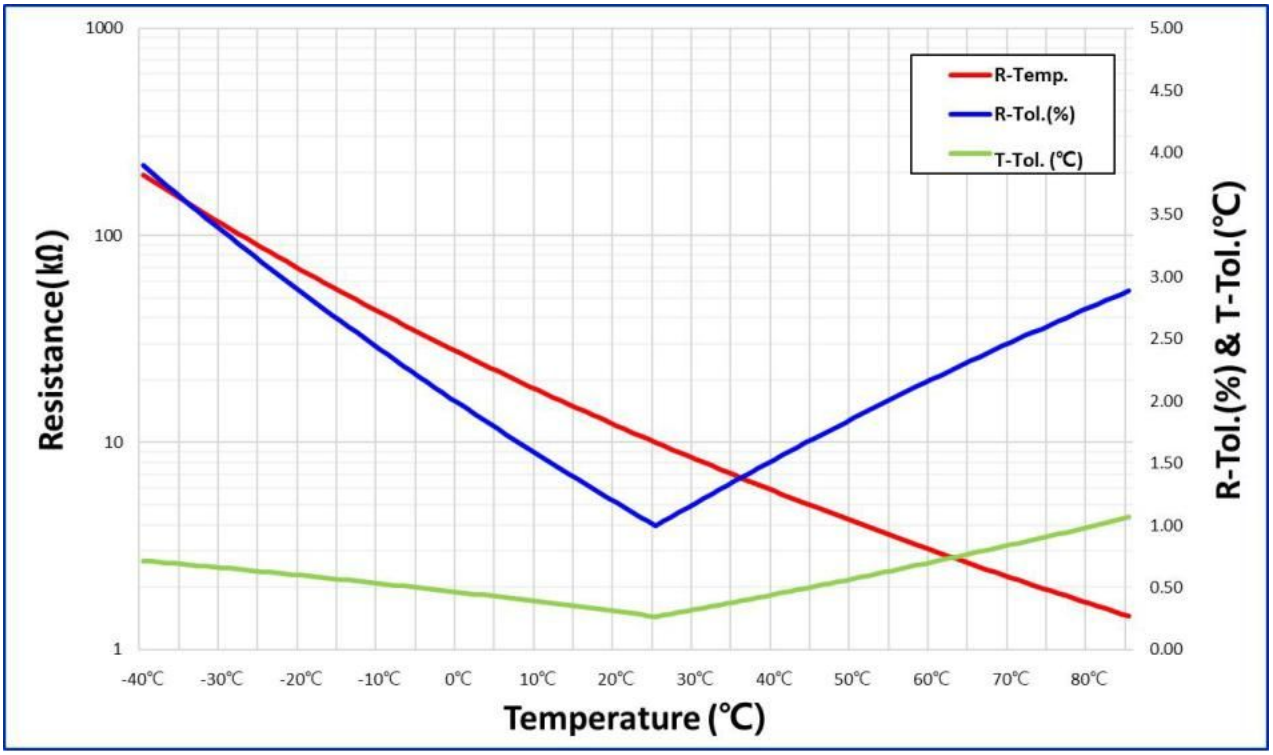
Relative humidity and accuracy



The HTW-211 sensor module can detect and optimize to a precise humidity within 10 to 95%RH. The sensor has an accuracy of ±3% in the range of 30% to 80%RH and an accuracy of ±5%RH in the range of less than 3 0%RH and more than 80%RH.

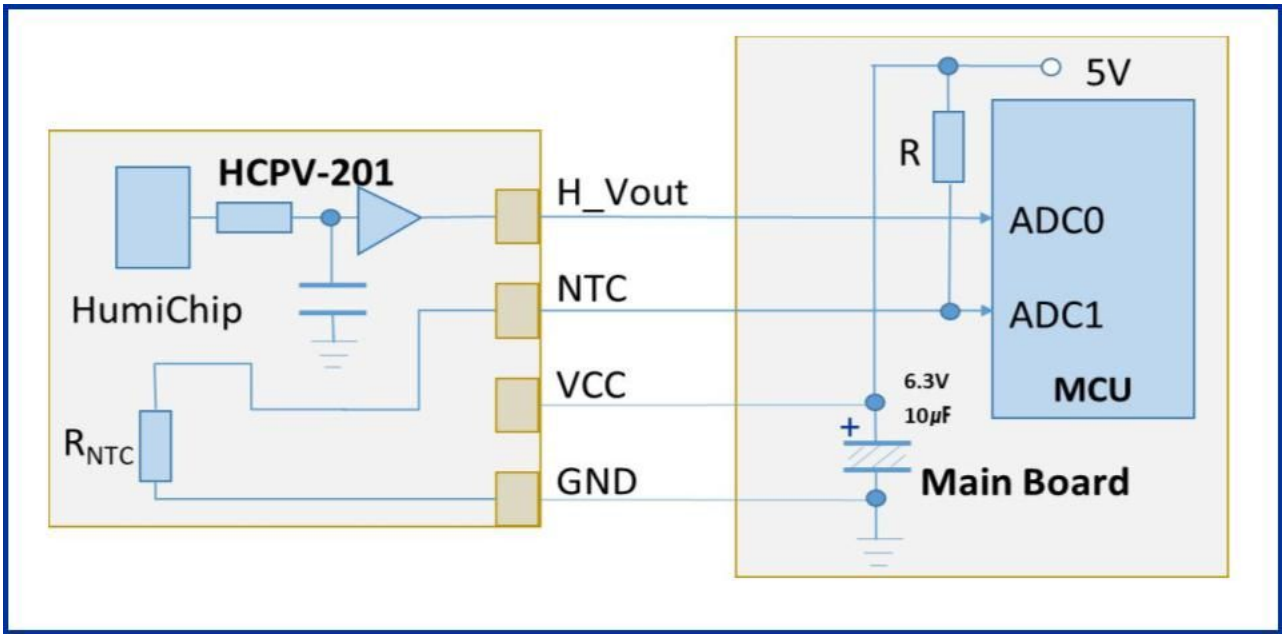
Temperature check sheet

R-T characteristics & tolerance



temperature .	resistance value			Residual deviation.		temperature departure	
(℃)	(kΩ)			(%)		(℃)	
	MIN.	CENTER	MAX.	MAX.	MIN.	MAX.	MIN.
-40	188.0202	195.652	203.5731	3.89	3.90	0.71 0.69	0.72 0.73
-39	177.8044	184.9171	192.2951	3.84	3.85	0.66 0.64	0.74 0.76
-38	168.2141	174.8452	181.7195	3.78	3.79	0.62 0.60	0.77 0.78
-37	159.2069	165.391	171.7981	3.73	3.74	0.58 0.56	0.79 0.80
-36	150.7435	156.5125	162.486	3.68	3.69	0.54 0.52	0.80 0.81
-35	142.7877	148.171	153.7418	3.62	3.63	0.50 0.49	0.82 0.82
-34	135.3055	140.3304	145.5274	3.57	3.58	0.47 0.46	0.82 0.82
-33	128.2659	132.9576	137.8071	3.52	3.53	0.44 0.43	0.83 0.83
-32	121.6397	126.0215	130.5481	3.47	3.48	0.42 0.41	0.83 0.83
-31	115.4001	119.4936	123.7198	3.42	3.43	0.40 0.39	0.82 0.82
-30	109.5221	113.3471	117.294	3.36	3.37	0.38 0.37	0.82 0.81
-29	103.9894	107.5649	111.2522	3.31	3.32	0.36 0.36	0.81 0.80
-28	98.7725	102.1155	105.5611	3.26	3.27	0.35 0.35	0.79 0.79
-27	93.8512	96.9776	100.1981	3.21	3.22	0.34 0.34	0.78 0.77
-26	89.2071	92.1315	95.1423	3.16	3.17	0.33	0.76
-25	84.8227	87.5588	90.3741	3.12	3.12		
-24	80.6819	83.2424	85.8755	3.07	3.08		
-23	76.7698	79.1663	81.6295	3.02	3.03		
-22	73.0722	75.3157	77.6204	2.97	2.98		
-21	69.5761	71.6768	73.8336	2.92	2.93		
-20	66.2694	68.2367	70.2554	2.87	2.88		
-19	63.1477	64.9907	66.8807	2.83	2.84		
-18	60.1923	61.919	63.6889	2.78	2.79		
-17	57.3933	59.0113	60.6689	2.73	2.74		
-16	54.7415	56.2579	57.8105	2.69	2.70		
-15	52.2283	53.6496	55.104	2.64	2.65		
-14	49.8456	51.1779	52.5406	2.59	2.60		
-13	47.5859	48.8349	50.1117	2.55	2.56		
-12	45.4422	46.6132	47.8097	2.50	2.51		
-11	43.4078	44.5058	45.6271	2.46	2.47	0.33	0.75

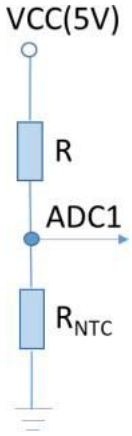
Basic circuit (application circuit)



Temperature Calculator

$$.(℃) = \frac{1}{8.61393E\text{-}04 + (2.56377E\text{-}04 \times \ln(R_{NTC})) + (1.68055E\text{-}07 \times (\ln(R_{NTC}))^{-3})} - 273.15$$

R=10 kΩ



$$(\ )\text{mV} = \frac{R_{NTC}}{R+R_{NTC}} \times VCC(\text{mV})$$

Temp.(℃)	$Temp_{cal.}$	Dev.	R_{NTC}(kΩ)	ADC1(mV)
-40	-40.000	0.000	195.652	4757
-30	-29.846	0.154	113.347	4595
-20	-19.781	-0.219	68.237	4361
-10	-9.793	-0.207	42.506	4048
0	0.195	-0.195	27.219	3657
10	10.117	-0.117	17.926	3210
20	20.042	-0.042	12.081	2736
25	25.000	0.000 0.025	10.000	2500
30	29.975	0.076 0.066	8.315	2270
40	39.924	-0.002	5.834	1842
50	49.934	0.068 0.087	4.161	1469
60	60.002	0.094	3.014	1158
70	69.932		2.228	911
80	79.913		1.669	715
85	84.906		1.452	634

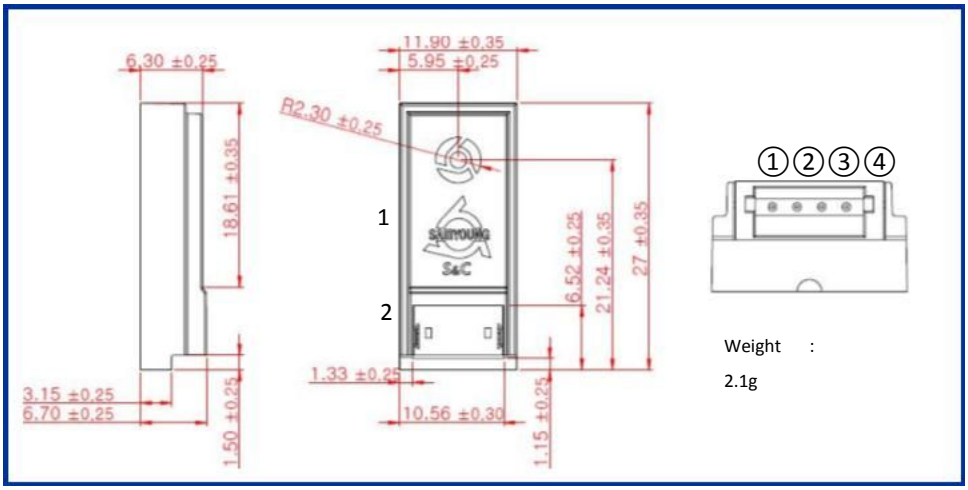
reliability

No.	test item	test condition	test standard
1	High temperature storage life	Store in the 90Ȳ environment for 500 hours, then leave it at normal temperature for 24 hours, and then confirm its working performance.	bias in statistics <± 5%RH
2	Low temperature storage life	Store in-30Ȳ for 500 hours, then leave at normal temperature for 24 hours, and confirm its working performance.	bias <± 5%RH
3	Temperat-ure & humid-ity storage	The storage was biased for 500 hours at 85Ȳ and 85%RH, and then left at normal temperature for 24 hours to confirm its working performance.	bias in statistics <± 5%RH
4	thermal shock	A cycle of 30 minutes at-40Ȳ and 100Ȳ was placed for 500 cycles (conversion time: up to 10s), then placed at normal temperature for 24 hours, and then confirmed its working performance.	bias in statistics <± 5%RH

size

Component dimensions

unit : mm



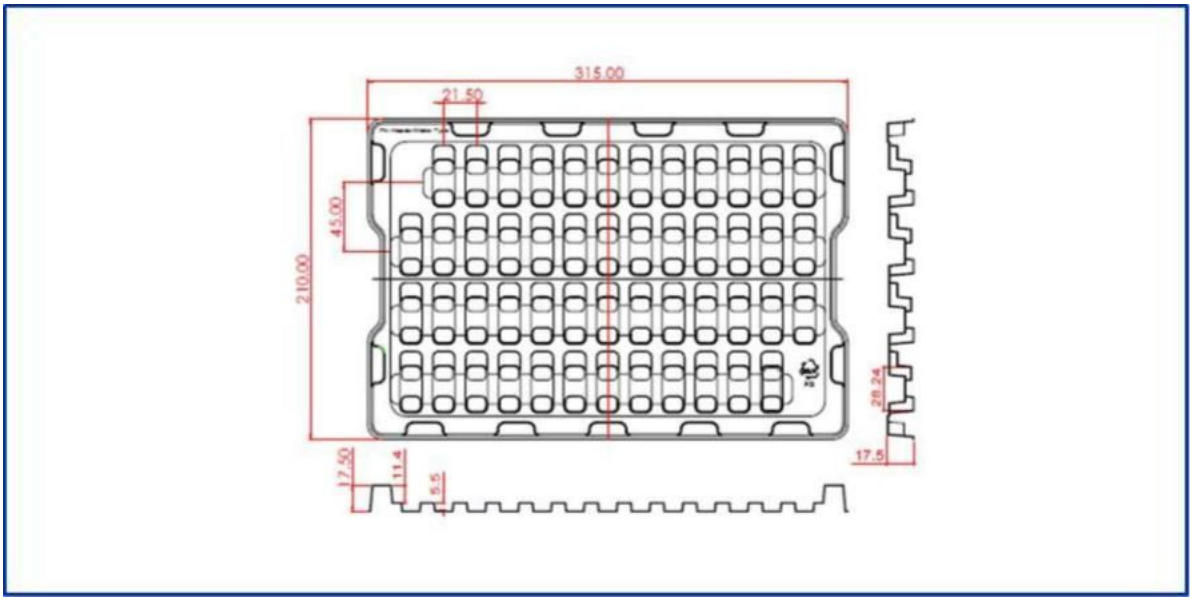
NO.	assembly	specifications	quantity .	pigment	manufacturer	remarks
1	hull	PC (polycarbonate)	1	black		
	PCB	FR4	1			
	sensor	HumiChip	1	SAMYOUNG S&C		
2	wafer	15001WR-04	1	white	YEONHO	①GND ②VCC ③NTC ④H_Vout

pack

model	quantity (pcs.)		Si pallet	
	pallet	outer container		outer container
HTW-211	50	800 (50×16)	315×210×17.5	350×260×230

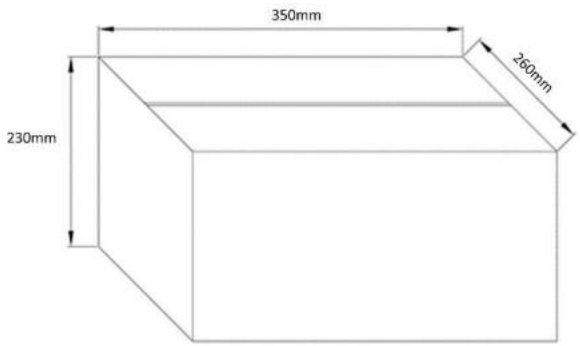
pallet

50 pcs / 1 tray (PS, 315×210×17.5 ㎤)



chest

Outer
Container



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