

HCPV-201H-10

HumiChip Voltage Output Humidity Sensor

Features

- ◆ Linear & Calibrated RH% Voltage Output.
- ◆ Rigid & Strong Molded Package
 - for Durability and Easy Installation
- ◆ Customized Accuracy (3% or 5%)
- ◆ Optional PTFE Filter and Temperature Output

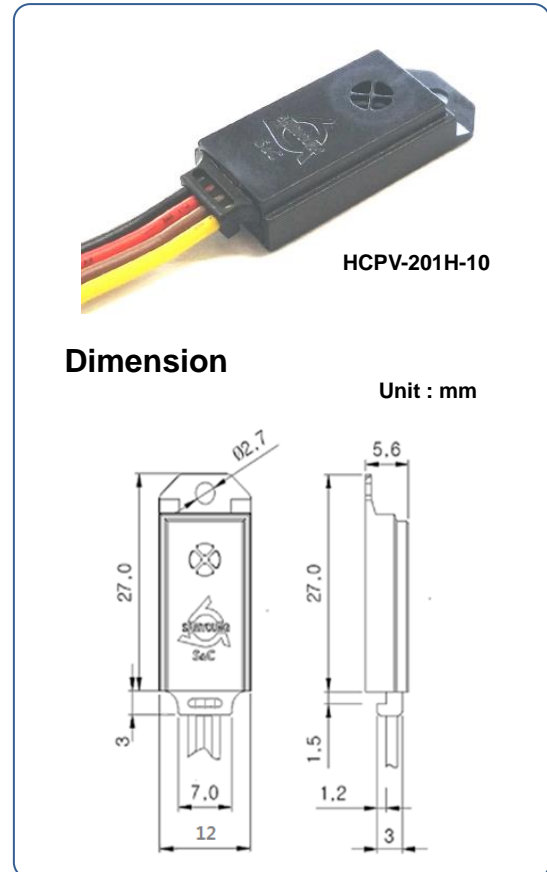
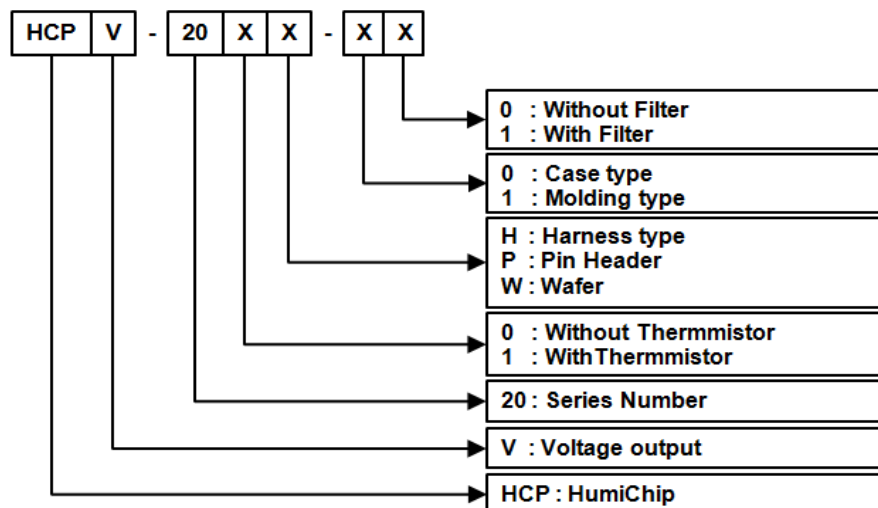
Applications

- ◆ Smart Appliances
- ◆ HVAC Control
- ◆ Industrial Process Control
- ◆ Automotive
- ◆ Environment Monitoring

Description

HCPV-200 is an accurate and reliable humidity (and temperature for HCPV-201) measuring sensor module based on **HumiChip®**. The humidity output of the sensor is temperature compensated and is in linear voltage which can be directly interfaced with a microcomputer with an ADC input. The molded package and reinforced connection between the sensor and the harness ensures durability and reliability even in harsh environment.

Part Number



Electrical Specification

Parameter	Symbol	Value	Unit
Supply Voltage	V_{cc}	5.0	V
Current Consumption	I_{cc}	1.5	mA

Environmental

Parameter	Symbol	Value	Unit
Storage Temperature Range	T_{stg}	-55~125	°C
Operating Temperature Range	T_s	-40~85	°C
Operating Humidity Range	RH	0~100	%RH

Sensor performance

Relative Humidity (RH%)

Humidity Characteristics	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{cc}	4.75	5	5.25	V
Nominal Output @50%RH	H_{VOUT}	2.232	2.350	2.468	V
Humidity Measuring Range	RH	0		100	%RH
Relative Humidity Accuracy		-5		5	%RH
Humidity Hysteresis		-2		2	%RH
Humidity Average Sensitivity			26.23		mV/%RH
Temperature Coefficient	T_{cc}		-0.05		%RH/°C
Response Time ($\tau_{63\%}$)			7.0		sec

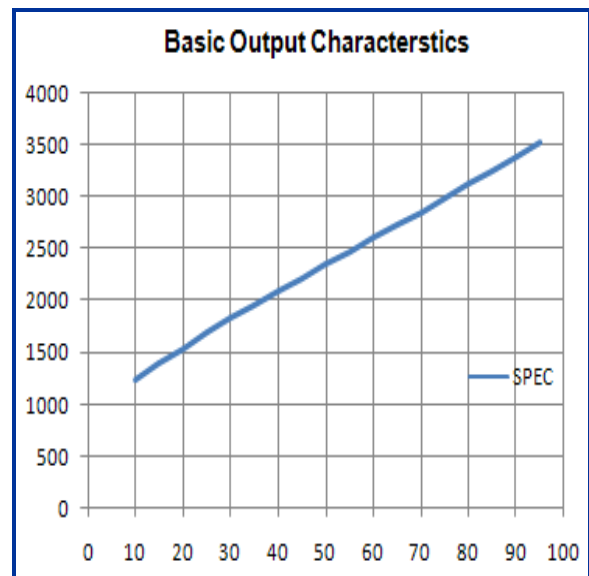
Temperature (°C)

Temperature Characteristics	Symbol	Min	Typ	Max	Unit
Temperature Measuring Range	T_a	-40		85	°C
Nominal Resistance @25°C	R	9.9	10.0	10.1	k Ω
Beat Value : B25/85	B	3401	3435	3469	K
Normal Resistance Tolerance @°C	T		1		%
B Value Tolerance	B		1		%

Humidity Look-up Table (@25°C)

- Reference Output Values (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 :

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

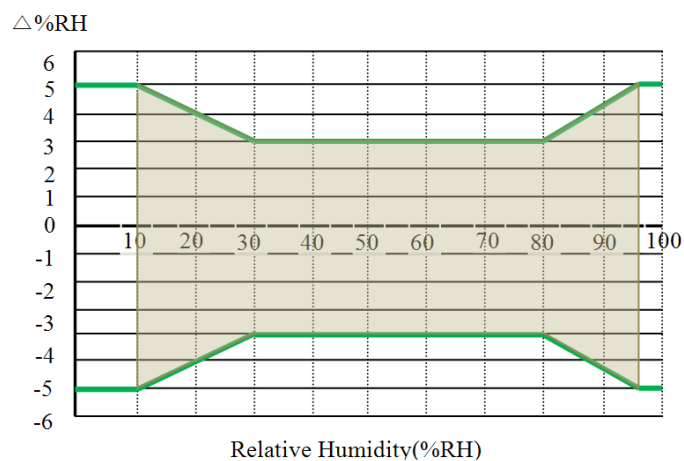
$$RH [%] = -1.56 \times 10^{-9} \times V_{out}^3 + 1.205 \times 10^{-5} \times V_{out}^2 + 8.22 \times 10^{-3} \times V_{out} - 15.6$$

- Linear Equations :

$$H_V_{out} [mV] = 26.23 \times RH + 1032$$

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

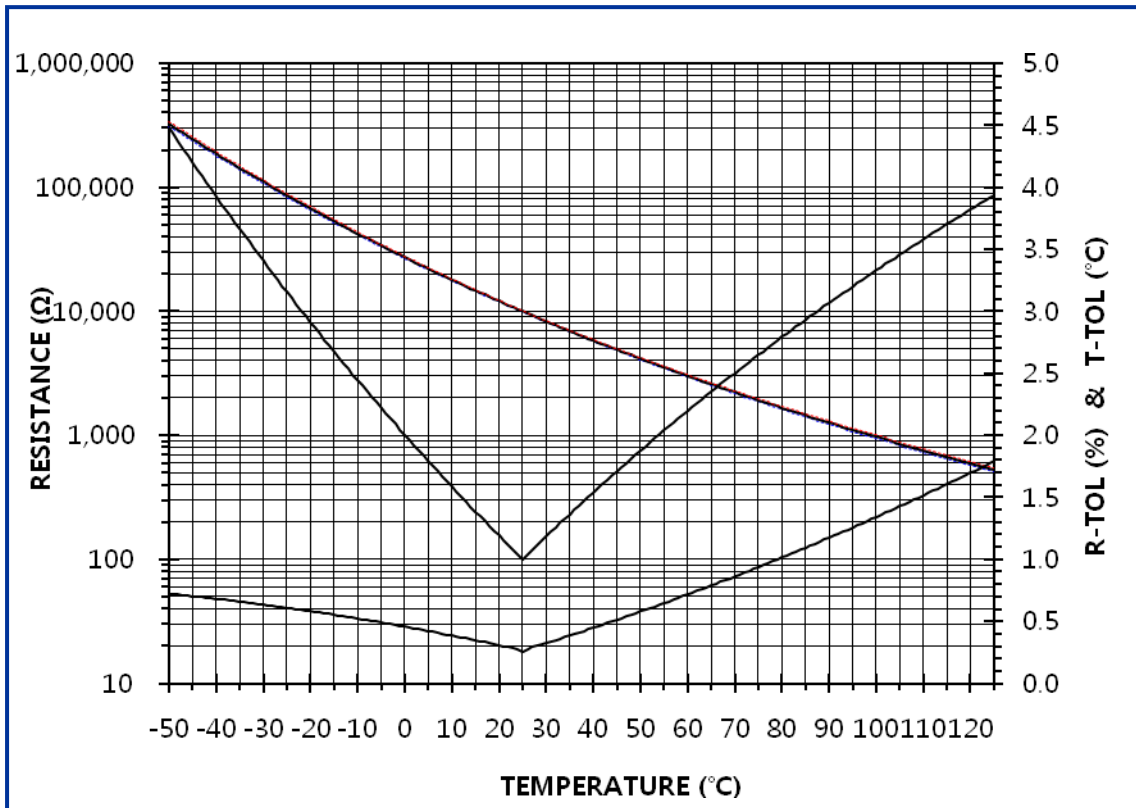
- Relative Humidity Accuracy



HCPV-20X series sensor module is able to measure accuracy humidity optimized within 10 to 95%RH. This sensor accuracy is the range $\pm 3\%$ RH in 30%~80%RH, and the range $\pm 5\%$ RH in less than 30%RH and over 80%RH.

Temperature Look-up Table

R-T Characteristics & Tolerance



TEMP.	RESISTANCE			RESIST.-TOL.		TEMP.-TOL.	
(°C)	(Ω)			(%)		(°C)	
	MIN	CENTER	MAX	MAX	MIN	MAX	MIN
-40	179350.70	186541.57	194001.4	4.00	3.85	0.69	0.67
-39	170118.14	176844.41	183818.3	3.94	3.80	0.69	0.67
-38	161406.70	167699.47	174220.1	3.89	3.75	0.69	0.66
-37	153184.75	159072.94	165170.9	3.83	3.70	0.68	0.66
-36	145422.69	150933.22	156636.9	3.78	3.65	0.68	0.65
-35	138092.81	143250.73	148586.4	3.72	3.60	0.67	0.65
-34	131169.19	135997.82	140990.1	3.67	3.55	0.67	0.64
-33	124627.53	129148.60	133820.3	3.62	3.50	0.66	0.64
-32	118445.11	122678.83	127051.2	3.56	3.45	0.66	0.63
-31	112600.62	116565.84	120658.6	3.51	3.40	0.65	0.63

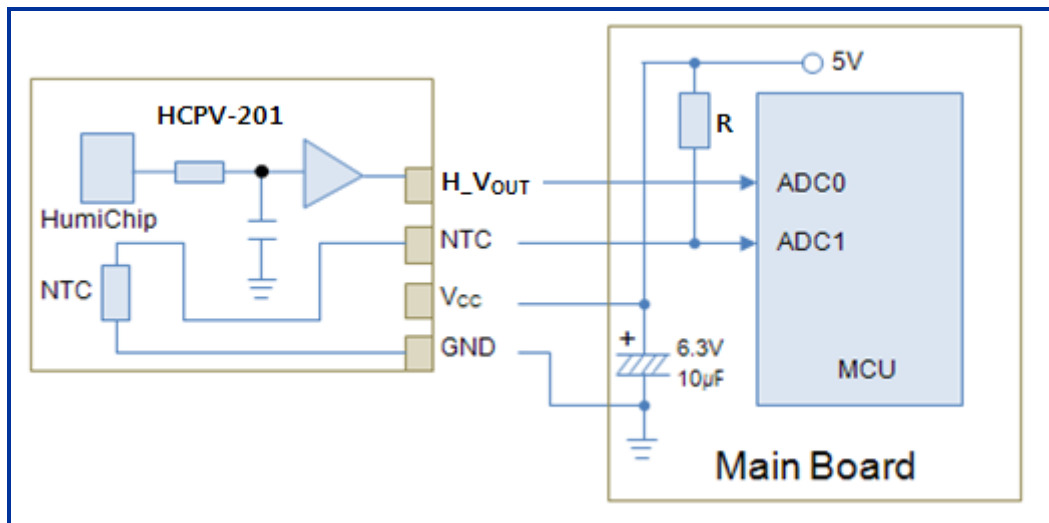
-30	107074.11	110788.38	114620.0	3.46	3.35	0.65	0.63
-29	101846.88	105326.56	108914.2	3.41	3.30	0.64	0.62
-28	96901.40	100161.74	103521.4	3.35	3.26	0.63	0.62
-27	92221.22	95276.44	98423.0	3.30	3.21	0.63	0.61
-26	87790.95	90654.31	93601.7	3.25	3.16	0.62	0.61
-25	83596.12	86279.98	89041.1	3.20	3.11	0.62	0.60
-24	79623.17	82139.07	84726.0	3.15	3.06	0.61	0.60
-23	75859.36	78218.06	80642.0	3.10	3.02	0.61	0.59
-22	72292.75	74504.31	76775.8	3.05	2.97	0.60	0.59
-21	68912.12	70985.91	73114.8	3.00	2.92	0.60	0.58
-20	65706.94	67651.72	69647.1	2.95	2.87	0.59	0.57
-19	62667.29	64491.24	66361.6	2.90	2.83	0.58	0.57
-18	59783.90	61494.66	63248.1	2.85	2.78	0.58	0.56
-17	57048.00	58652.72	60296.5	2.80	2.74	0.57	0.56
-16	54451.40	55956.74	57497.9	2.75	2.69	0.57	0.55
-15	51986.36	53398.56	54843.6	2.71	2.64	0.56	0.55
-14	49645.62	50970.51	52325.5	2.66	2.60	0.55	0.54
-13	47422.35	48665.37	49936.0	2.61	2.55	0.55	0.54
-12	45310.11	46476.37	47667.9	2.56	2.51	0.54	0.53
-11	43302.85	44397.12	45514.5	2.52	2.46	0.53	0.52
-10	41394.87	42421.62	43469.5	2.47	2.42	0.53	0.52
-9	39580.82	40544.21	41526.9	2.42	2.38	0.52	0.51
-8	37855.62	38759.58	39681.1	2.38	2.33	0.52	0.51
-7	36214.54	37062.70	37926.9	2.33	2.29	0.51	0.50
-6	34653.06	35448.88	36259.3	2.29	2.24	0.50	0.49
-5	33166.98	33913.65	34673.7	2.24	2.20	0.50	0.49
-4	31752.31	32452.83	33165.5	2.20	2.16	0.49	0.48
-3	30405.27	31062.48	31730.7	2.15	2.12	0.48	0.47
-2	29122.34	29738.86	30365.4	2.11	2.07	0.47	0.47
-1	27900.16	28478.47	29065.9	2.06	2.03	0.47	0.46
0	26735.58	27278.00	27828.6	2.02	1.99	0.46	0.45

1	25625.62	26134.32	26650.5	1.97	1.95	0.45	0.45
2	24567.46	25044.49	25528.2	1.93	1.90	0.45	0.44
3	23558.45	24005.71	24459.0	1.89	1.86	0.44	0.43
4	22596.08	23015.38	23440.1	1.85	1.82	0.43	0.43
5	21677.98	22070.99	22468.9	1.80	1.78	0.42	0.42
6	20801.91	21170.22	21542.9	1.76	1.74	0.42	0.41
7	19965.75	20310.83	20659.8	1.72	1.70	0.41	0.41
8	19167.50	19490.76	19817.5	1.68	1.66	0.40	0.40
9	18405.27	18708.00	19013.8	1.63	1.62	0.40	0.39
10	17677.27	17960.70	18246.8	1.59	1.58	0.39	0.38
11	16981.80	17247.08	17514.8	1.55	1.54	0.38	0.38
12	16317.25	16565.48	16815.8	1.51	1.50	0.37	0.37
13	15682.12	15914.30	16148.3	1.47	1.46	0.36	0.36
14	15074.97	15292.05	15510.7	1.43	1.42	0.36	0.35
15	14494.42	14697.32	14901.6	1.39	1.38	0.35	0.35
16	13939.21	14128.75	14319.4	1.35	1.34	0.34	0.34
17	13408.09	13585.09	13763.0	1.31	1.30	0.33	0.33
18	12899.93	13065.12	13231.1	1.27	1.26	0.32	0.32
19	12413.62	12567.70	12722.4	1.23	1.23	0.32	0.32
20	11948.11	12091.75	12235.9	1.19	1.19	0.31	0.31
21	11502.44	11636.24	11770.4	1.15	1.15	0.30	0.30
22	11075.65	11200.22	11325.0	1.11	1.11	0.29	0.29
23	10666.87	10782.74	10898.8	1.08	1.07	0.28	0.28
24	10275.25	10382.95	10490.7	1.04	1.04	0.28	0.28
25	9900.00	10000.00	10100.0	1.00	1.00	0.26	0.26
26	9533.22	9633.12	9733.1	1.04	1.04	0.28	0.28
27	9181.89	9281.55	9381.4	1.08	1.07	0.29	0.29
28	8845.27	8944.59	9044.1	1.11	1.11	0.30	0.30
29	8522.70	8621.56	8720.7	1.15	1.15	0.31	0.31
30	8213.51	8311.83	8410.5	1.19	1.18	0.33	0.33
31	7917.10	8014.78	8112.9	1.22	1.22	0.34	0.34

32	7632.87	7729.85	7827.3	1.26	1.25	0.35	0.35
33	7360.27	7456.47	7553.2	1.30	1.29	0.36	0.36
34	7098.78	7194.14	7290.0	1.33	1.33	0.38	0.37
35	6847.89	6942.35	7037.4	1.37	1.36	0.39	0.39
36	6607.12	6700.63	6794.8	1.41	1.40	0.40	0.40
37	6376.02	6468.54	6561.7	1.44	1.43	0.41	0.41
38	6154.15	6245.64	6337.9	1.48	1.46	0.43	0.42
39	5941.11	6031.54	6122.7	1.51	1.50	0.44	0.43
40	5736.51	5825.85	5916.0	1.55	1.53	0.45	0.45
41	5539.97	5628.19	5717.2	1.58	1.57	0.46	0.46
42	5351.14	5438.22	5526.2	1.62	1.60	0.48	0.47
43	5169.68	5255.60	5342.4	1.65	1.63	0.49	0.49
44	4995.28	5080.02	5165.7	1.69	1.67	0.50	0.50
45	4827.62	4911.18	4995.7	1.72	1.70	0.52	0.51
46	4666.41	4748.78	4832.1	1.75	1.73	0.53	0.52
47	4511.39	4592.55	4674.7	1.79	1.77	0.54	0.54
48	4362.27	4442.24	4523.2	1.82	1.80	0.56	0.55
49	4218.82	4297.58	4377.4	1.86	1.83	0.57	0.56
50	4080.80	4158.34	4236.9	1.89	1.86	0.58	0.58
51	3947.96	4024.30	4101.7	1.92	1.90	0.60	0.59
52	3820.10	3895.24	3971.5	1.96	1.93	0.61	0.60
53	3697.01	3770.95	3846.0	1.99	1.96	0.62	0.62
54	3578.48	3651.23	3725.1	2.02	1.99	0.64	0.63
55	3464.33	3535.89	3608.6	2.06	2.02	0.65	0.64
56	3354.38	3424.76	3496.3	2.09	2.06	0.67	0.66
57	3248.45	3317.67	3388.0	2.12	2.09	0.68	0.67
58	3146.38	3214.44	3283.6	2.15	2.12	0.70	0.68
59	3048.02	3114.93	3183.0	2.18	2.15	0.71	0.70
60	2953.20	3018.97	3085.9	2.22	2.18	0.72	0.71
61	2861.80	2926.44	2992.3	2.25	2.21	0.74	0.73
62	2773.66	2837.19	2901.9	2.28	2.24	0.75	0.74

63	2688.66	2751.10	2814.7	2.31	2.27	0.77	0.75
64	2606.68	2668.03	2730.5	2.34	2.30	0.78	0.77
65	2527.59	2587.87	2649.3	2.37	2.33	0.80	0.78
66	2451.28	2510.50	2570.89	2.41	2.36	0.81	0.80
67	2377.64	2435.81	2495.16	2.44	2.39	0.83	0.81
68	2306.56	2363.71	2422.03	2.47	2.42	0.84	0.82
69	2237.95	2294.08	2351.39	2.50	2.45	0.86	0.84
70	2171.70	2226.84	2283.14	2.53	2.48	0.87	0.85
71	2107.74	2161.89	2217.20	2.56	2.50	0.89	0.87
72	2045.96	2099.14	2153.48	2.59	2.53	0.90	0.88
73	1986.28	2038.51	2091.90	2.62	2.56	0.92	0.90
74	1928.63	1979.92	2032.36	2.65	2.59	0.93	0.91
75	1872.92	1923.29	1974.81	2.68	2.62	0.95	0.93
76	1819.09	1868.54	1919.15	2.71	2.65	0.96	0.94
77	1767.05	1815.62	1865.33	2.74	2.67	0.98	0.96
78	1716.75	1764.44	1813.27	2.77	2.70	1.00	0.97
79	1668.12	1714.95	1762.91	2.80	2.73	1.01	0.99
80	1621.10	1667.07	1714.18	2.83	2.76	1.03	1.00
81	1575.62	1620.76	1667.03	2.85	2.79	1.04	1.02
82	1531.63	1575.95	1621.39	2.88	2.81	1.06	1.03
83	1489.07	1532.59	1577.22	2.91	2.84	1.08	1.05
84	1447.89	1490.62	1534.46	2.94	2.87	1.09	1.06
85	1408.05	1450.00	1493.05	2.97	2.89	1.11	1.08

Basic Circuits (Application Circuit)

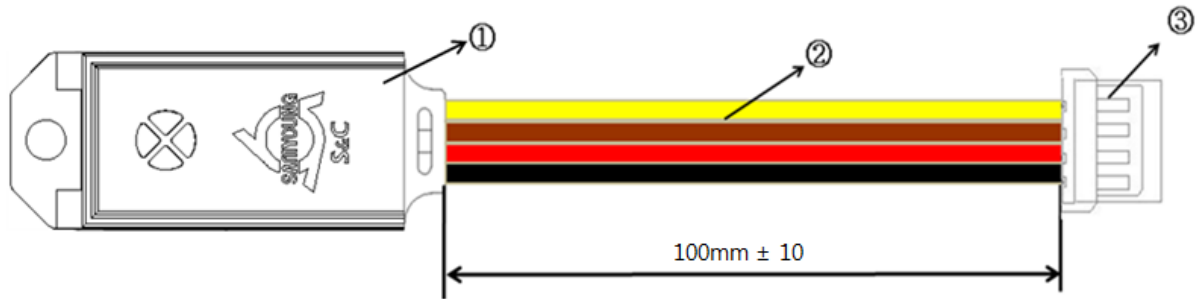


Reliability

No.	Test Item	Test Condition	Test Criterion
1	High Temperature Storage Life	After Stressing 500 hours at 90°C, and after leaving for 24 hours at the normal temperature, and confirm the operation.	Deviation < ±5%RH
2	Low Temperature Storage Life	After Stressing 500 hours at -30°C, and after leaving for 24 hours at the normal temperature, and confirm the operation.	Deviation < ±5%RH
3	Temperature & Humidity Storage	After Stressing 500 hours at 85°C, 85%RH, with bias applied to the device, and after leaving for 24 hours at the normal temperature, and confirm the operation	Deviation < ±5%RH
4	Thermal shock	A cycle is exposed to -40°C, 100°C with 30minutes period time, undergo 500 cycles, (Transition time : max 10 sec.) and after leaving for 24 hours at the normal temperature, and confirm the operation.	Deviation < ±5%RH

Parts

HCPV-201H-10

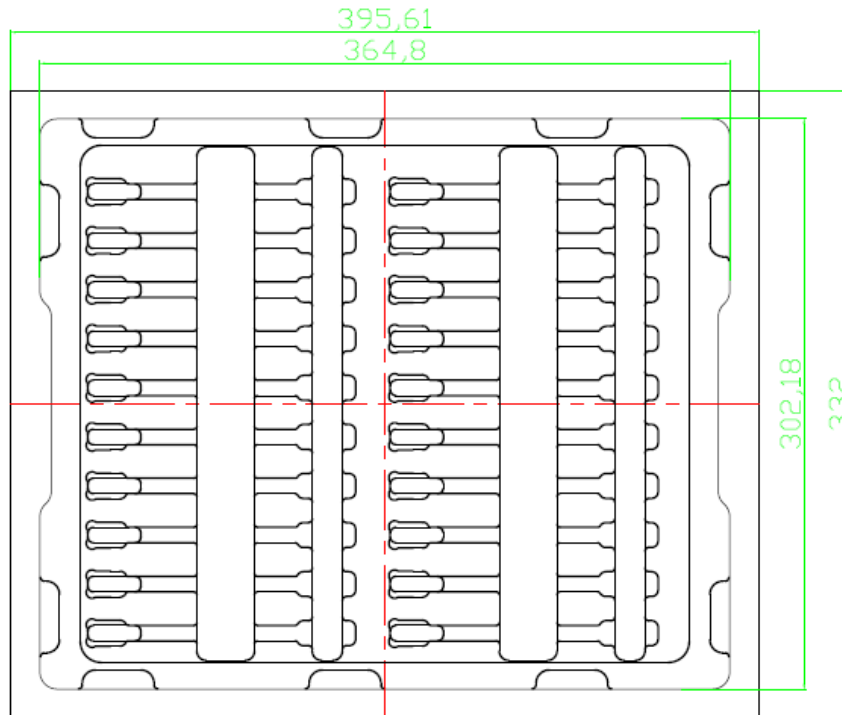


NO.	Component parts	Spec.	Qty.	color	Maker.	Remark.
1	Case	PC (Polycarbonate)	1	BLACK		
	PCB	FR4	1			
	Sensor	HumiChip	1		SAMYOUNG S&C	
2	Harness	UL 1007-AWG#24	1	YELLOW		H-Vout
		UL 1007-AWG#24	1	BROWN		NTC
		UL 1007-AWG#24	1	RED		VCC
		UL 1007-AWG#24	1	BLACK		GND
3	Housing	SMH250-04	1	WHITE	YEONHO	
	Terminal	YST025	4		YEONHO	

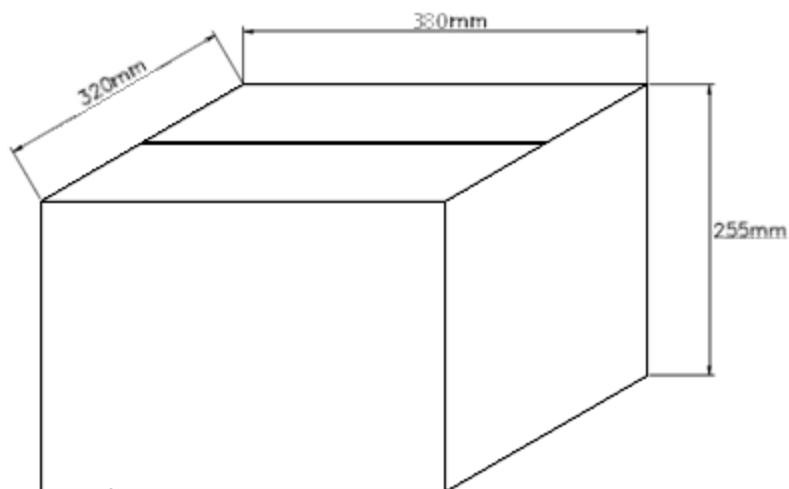
Packaging

Type	Quantity(pcs.)		Size (W × L × H mm)	
	Tray	Out box	Tray	Out box
HCPV-201H	20	400	364.8×302.18×17	380×320×255

Tray : 20pcs / 1 Tray(PS, 364.8×302.18×17 mm)



Outlet box(380×320×255 mm): 20 Trays (400pcs)



Revision History

Date	Version	Page(s)	Changes
Oct. 28, 2014	1.8		First Release



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