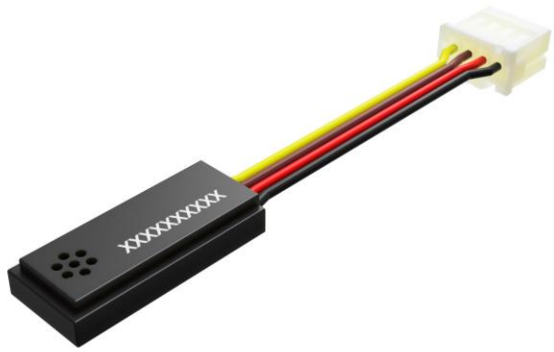

RHT1

Humidity and Temperature Module

RHT1 datasheet

Version: 2.2

Release Date: 2026-04-02

The RHT1 is an accurate and reliable temperature and humidity module. Thanks to its adaptable design, the RHT1 can be tailored to a multitude of applications.

Equipped with a state-of-the-art temperature and relative humidity sensor, the RHT1 excels in accurate humidity and temperature detection at any given location. Ideal for consumer and industrial use, it offers plug-and-play integration for OEM applications. Not only the form factor and connector type, but also cable length and output signals can be adjusted on request.

Key features & benefits

Highest quality ensured through 100 % end of line testing

Unique serial number for traceability

Water immersion resistant and dust / grease protection thanks to a **PTFE membrane**

Flexibility: Adaptable in form factors, cable lengths, data outputs and connector types

Resolution: High resolution temperature (23 mV/°C) and humidity (27 mV/%RH) reading (at V_{DD} = 5 V)

Accuracy: Temperature accuracy (±0.3°C) and relative humidity accuracy (±3 %RH)

Versatility across a variety of applications: Adjustable and easy to position in application

Analogue Interface: Ease of integration and configuration, cost-effective, real-time output

Easy, plug-and-play implementation

Applications

Its adaptability makes the RTH1 module a very suitable solution across a spectrum of applications, including:

- Regulation of door heating in refrigerators to optimize energy consumption
- Fine-tuning humidity levels in air conditioners to ensure maximum efficiency and prevent mold formation
- Ensuring optimal toner adhesion and preventing paper curling in printers and copiers.

Properties

- Industrial proven housing dimensions (W11.9 x L27 x H5.7 mm^3)
- Fully customizable in WxLxH, cable length and connector type, as well as output signals
- Temperature operating range from -40°C to 85°C
- Relative humidity operating range from 0 % to 100 %RH
- Calibrated, analog voltage output for temperature and humidity
- Supply voltage of 3.3 V or 5 V

Content Guide

1 Pin assignment

The pin assignment of the RHT1 module is shown in Figure 1 and described in Table 1.

Figure 1: RHT1 module with humidity and temperature output

Table 1: Pin description

Pin	Pin Name	Color	Pin Type	Description	Connector
4	VRH	Yellow	Output	Relative humidity output	TE-917688 (2.5 mm SIGNAL DBL-LOCK 4P PLUG HSG) Mating part: • PCB Mount Header: TE-917724 (2.5 mm SIGNAL DBL-LOCK 4P POST HEADER ASS'Y) • Wire-to-Wire: TE-316088 (2.5 mm SIGNAL DBL LOCK 4P POST CAP HSG.)
3	VT	Brown	Output	Temperature output	
2	VDD	Red	Supply	Power voltage	
1	GND	Black	Supply	Ground supply voltage	

2 Relative humidity and temperature specifications

Default conditions apply to values in Table 2, unless otherwise stated: 25°C, 50 %RH, no MSL1 pre-conditioning, default periodic measurement.

Table 2: Temperature and humidity specifications

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
	Humidity					
H_{RANGE}	Relative humidity range		0		100	%RH
H_{ACC}	Relative humidity accuracy	T = 25°C; RH = 10 % to 80 %		±3		%RH
H_{REP}	Humidity repeatability	T = -40°C to 85°C		±0.1		%RH
H_{HYS}	Relative humidity hysteresis			±1		%RH
H_{RESP-S}	Relative humidity response sensitivity	At V_{DD} = 5.0 V At V_{DD} = 3.3 V		27 18		mV/%RH
	Temperature					
T_{RANGE}	Temperature range		-40		85	°C
T_{ACC}	Temperature accuracy	T = -40°C to 85°C		±0.3		°C
T_{REP}	Temperature repeatability	T = -40°C to 85°C		±0.1		°C
T_{HYS}	Temperature hysteresis			±0.5		°C
T_{RESP-S}	Temperature response sensitivity	At V_{DD} = 5.0 V At V_{DD} = 3.3 V		23 15		mV/°C

3 Electrical characteristics

Table 3 details the electrical characteristics of the RHT1. The min and max parameter values are guaranteed by production tests or SQC (Statistical Quality Control) methods.

RHT1 is tested and validated for operation at V_{DD} 5 V or 3.3 V.

Table 3: Electrical characteristics (V_{DD} = 5 V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DD}	Positive supply		4.75	5	5.25	V
V_{RH}	Output voltage	%RH = 55%		2.47		V
V_{T}		T = 25°C		2.10		V
I_{DD}	Operating Current			3		mA

Table 4: Electrical characteristics (V_{DD} = 3.3 V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DD}	Positive supply		3.135	3.3	3.465	V
V_{RH}	Output voltage	%RH = 55%		1.63		V
V_{T}		T = 25°C		1.386		V
I_{DD}	Operating Current			3		mA

4 Absolute maximum ratings

Table 5: Absolute maximum ratings

Symbol	Parameter	Min	Max	Units	Comments
Electrical Parameters					
V_{DD}	Supply Voltage	-0.30	6	V	
I_{SCR}	Input Current (latch-up immunity)	−50	+50	mA	
Electrostatic Discharge					
ESD_{HBM}	Electrostatic Discharge HBM	± 4000		V	JEDEC JS-001
ESD_{CDM}	Electrostatic Discharge CDM	± 750		V	JEDEC JS-002
Operating and Storage Conditions					
MSL	Moisture Sensitivity Level	1			Maximum floor lifetime is unlimited
T_{STRG}[1]	Storage Temperature	−40	+85	°C	
T_{AMB}	Operating Ambient Temperature	−40	+85	°C	
$T_{LIFETIME}$	Sensor lifetime	10		years	Under typical operating conditions

Stresses beyond those listed in Table 5 may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated under Table 3 and Table 4 are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability and lifetime.

[1] The RHT1 moisture sensitivity level is 1 (MSL1), which corresponds to an unlimited out-of-bag lifetime at T = 30 °C; RH = 85 %RH maximum. The recommended storage conditions are 10 - 50°C and 20 - 60 % relative humidity, preferably in the original sealed ESD bag.

5 Relative humidity and temperature output characteristics

The physical humidity and temperature measurements are translated into a ratiometric voltage output, proportional to the supply voltage. The humidity output ranges between 19.7 % and 73.7 % of the supply voltage, while the temperature output spans from 10 % to 90 % of the supply voltage. Before being converted into a voltage signal, the sensor module linearizes the physical values and compensates for both temperature and supply voltage variations. This method makes it possible to describe the relationship between the physical values (humidity resp. temperature) and the corresponding output voltage (V_{RH} resp. V_T) using a general linear equation.

5.1 Relative humidity look-up table

The humidity output can be described using the generic linear formula depicted in Equation 1, where V_{RH} is the output voltage of the module and V_{DD} the supply voltage. Equation 1 is graphically illustrated in Figure 2 and converted into look-up tables presented in Table 6 (assuming $V_{DD} = 5\ \mathrm{V}$) and Table 7 (assuming $V_{DD} = 3.3\ \mathrm{V}$).

$$RH = -\frac{19.7}{0.54} + \frac{100}{0.54} \cdot \frac{V_{RH}}{V_{DD}}$$

Equation 1: Relative humidity conversion formula (result in %RH)

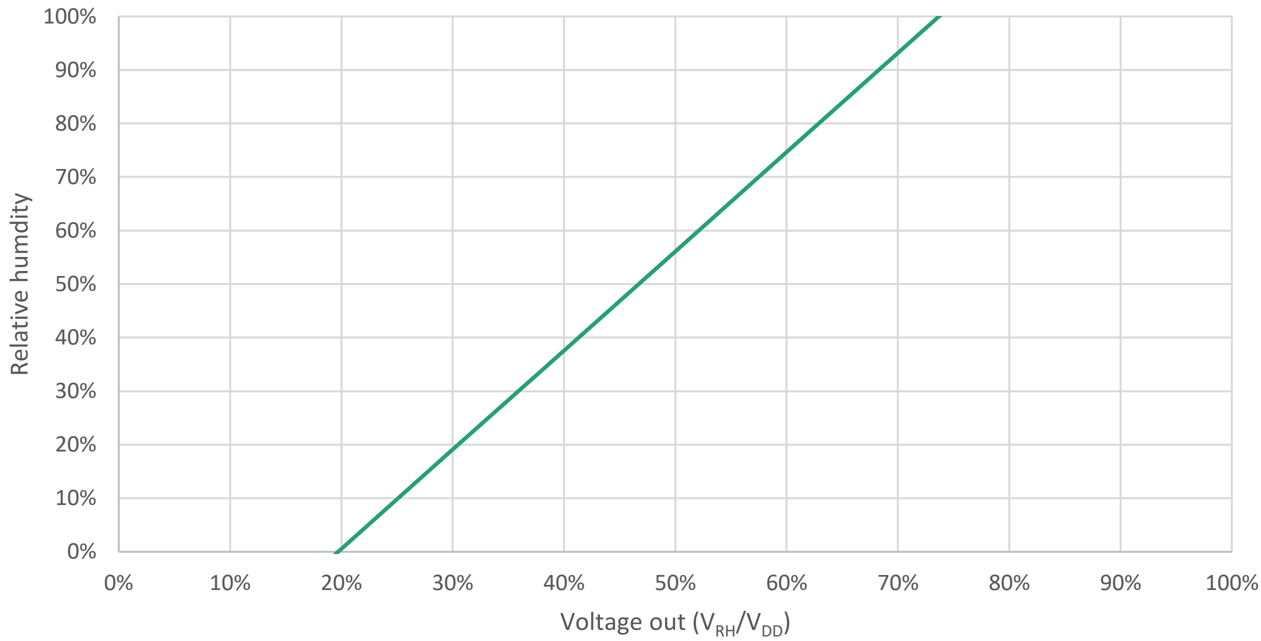

Figure 2: Relationship between the ratiometric analog voltage output and the measured relative humidity

Table 6: Relative humidity sensor output lookup table (if V_{DD} = 5 V)

RH (%)	V_{RH} (mV)	RH (%)	V_{RH} (mV)	RH (%)	V_{RH} (mV)	RH (%)	V_{RH} (mV)	RH (%)	V_{RH} (mV)
1	1012	21	1552	41	2092	61	2632	81	3172
2	1039	22	1579	42	2119	62	2659	82	3199
3	1066	23	1606	43	2146	63	2686	83	3226
4	1093	24	1633	44	2173	64	2713	84	3253
5	1120	25	1660	45	2200	65	2740	85	3280
6	1147	26	1687	46	2227	66	2767	86	3307
7	1174	27	1714	47	2254	67	2794	87	3334
8	1201	28	1741	48	2281	68	2821	88	3361
9	1228	29	1768	49	2308	69	2848	89	3388
10	1255	30	1795	50	2335	70	2875	90	3415
11	1282	31	1822	51	2362	71	2902	91	3442
12	1309	32	1849	52	2389	72	2929	92	3469
13	1336	33	1876	53	2416	73	2956	93	3496
14	1363	34	1903	54	2443	74	2983	94	3523
15	1390	35	1930	55	2470	75	3010	95	3550
16	1417	36	1957	56	2497	76	3037	96	3577
17	1444	37	1984	57	2524	77	3064	97	3604
18	1471	38	2011	58	2551	78	3091	98	3631
19	1498	39	2038	59	2578	79	3118	99	3658
20	1525	40	2065	60	2605	80	3145	100	3685

Table 7: Relative humidity sensor output lookup table (if V_{DD} = 3.3 V)

RH (%)	V_{RH} (mV)	RH (%)	V_{RH} (mV)	RH (%)	V_{RH} (mV)	RH (%)	V_{RH} (mV)	RH (%)	V_{RH} (mV)
1	668	21	1024	41	1381	61	1737	81	2094
2	686	22	1042	42	1399	62	1755	82	2111
3	704	23	1060	43	1416	63	1773	83	2129
4	721	24	1078	44	1434	64	1791	84	2147
5	739	25	1096	45	1452	65	1808	85	2165
6	757	26	1113	46	1470	66	1826	86	2183
7	775	27	1131	47	1488	67	1844	87	2200
8	793	28	1149	48	1505	68	1862	88	2218
9	810	29	1167	49	1523	69	1880	89	2236
10	828	30	1185	50	1541	70	1898	90	2254
11	846	31	1203	51	1559	71	1915	91	2272
12	864	32	1220	52	1577	72	1933	92	2290
13	882	33	1238	53	1595	73	1951	93	2307
14	900	34	1256	54	1612	74	1969	94	2325
15	917	35	1274	55	1630	75	1987	95	2343
16	935	36	1292	56	1648	76	2004	96	2361
17	953	37	1309	57	1666	77	2022	97	2379
18	971	38	1327	58	1684	78	2040	98	2396
19	989	39	1345	59	1701	79	2058	99	2414
20	1007	40	1363	60	1719	80	2076	100	2432

5.2 Relative humidity accuracy

The corresponding relative humidity accuracy is shown in the graph below.

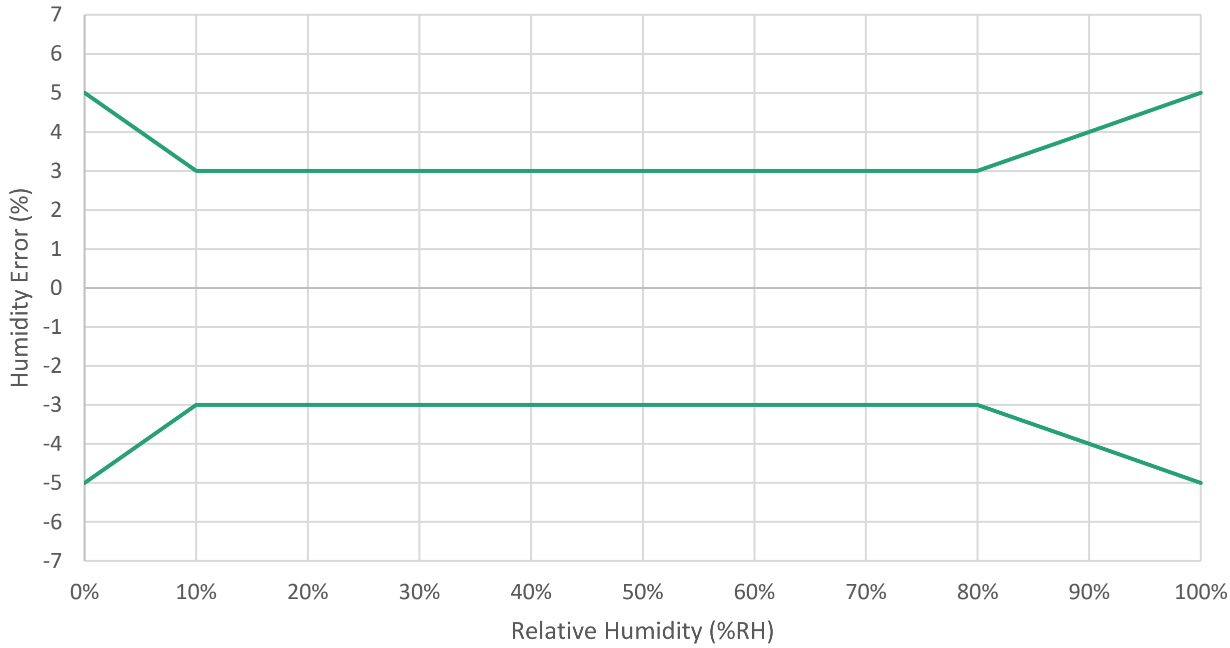

Figure 3: Relative humidity accuracy

5.3 Temperature look-up table

The temperature output can be described using the generic linear formula depicted in Equation 2, where V_T is the output voltage of the module and V_{DD} the supply voltage. Equation 2 (for T [°C]) is converted into look-up tables presented in Table 8 (assuming $V_{DD} = 5\ \mathrm{V}$) and Table 9 (assuming $V_{DD} = 3.3\ \mathrm{V}$).

$$T\,[°\mathrm{C}] = -66.875 + 218.75 \cdot \frac{V_T}{V_{DD}} = -45 - \frac{17.5}{0.8} + \frac{175}{0.8} \cdot \frac{V_T}{V_{DD}}$$

$$T\,[°\mathrm{F}] = -88.375 + 393.75 \cdot \frac{V_T}{V_{DD}} = -49 - \frac{31.5}{0.8} + \frac{315}{0.8} \cdot \frac{V_T}{V_{DD}}$$

Equation 2: Temperature conversion formula (result in °C and °F respectively)

Table 8: Temperature (in °C) sensor output lookup table (if V_{DD} = 5 V)

T (°C)	V_T (mV)	T (°C)	V_T (mV)	T (°C)	V_T (mV)	T (°C)	V_T (mV)	T (°C)	V_T (mV)
1	1551	21	2009	41	2466	61	2923	81	3380
2	1574	22	2031	42	2489	62	2946	82	3403
3	1597	23	2054	43	2511	63	2969	83	3426
4	1620	24	2077	44	2534	64	2991	84	3449
5	1643	25	2100	45	2557	65	3014	85	3471
6	1666	26	2123	46	2580	66	3037	86	3494
7	1689	27	2146	47	2603	67	3060	87	3517
8	1711	28	2169	48	2626	68	3083	88	3540
9	1734	29	2191	49	2649	69	3106	89	3563
10	1757	30	2214	50	2669	70	3129	90	3586
11	1780	31	2237	51	2694	71	3151	91	3609
12	1803	32	2260	52	2717	72	3174	92	3631
13	1826	33	2283	53	2740	73	3197	93	3654
14	1849	34	2306	54	2763	74	3220	94	3677
15	1871	35	2329	55	2786	75	3243	95	3700
16	1894	36	2351	56	2809	76	3266	96	3723
17	1917	37	2374	57	2831	77	3289	97	3746
18	1940	38	2397	58	2854	78	3311	98	3769
19	1963	39	2420	59	2877	79	3334	99	3791
20	1986	40	2443	60	2900	80	3357	100	3814

Table 9: Temperature (in °C) sensor output lookup table (if V_{DD} = 3.3 V)

T (°C)	V_T (mV)	T (°C)	V_T (mV)	T (°C)	V_T (mV)	T (°C)	V_T (mV)	T (°C)	V_T (mV)
1	1024	21	1326	41	1627	61	1929	81	2231
2	1039	22	1341	42	1642	62	1944	82	2246
3	1054	23	1356	43	1658	63	1959	83	2261
4	1069	24	1371	44	1673	64	1974	84	2276
5	1084	25	1386	45	1688	65	1989	85	2291
6	1099	26	1401	46	1703	66	2005	86	2306
7	1114	27	1416	47	1718	67	2020	87	2321
8	1130	28	1431	48	1733	68	2035	88	2336
9	1145	29	1446	49	1748	69	2050	89	2351
10	1160	30	1461	50	1763	70	2065	90	2367
11	1175	31	1477	51	1778	71	2080	91	2382
12	1190	32	1492	52	1793	72	2095	92	2397
13	1205	33	1507	53	1808	73	2110	93	2412
14	1220	34	1522	54	1823	74	2125	94	2427
15	1235	35	1537	55	1839	75	2140	95	2442
16	1250	36	1552	56	1854	76	2155	96	2457
17	1265	37	1567	57	1869	77	2170	97	2472
18	1280	38	1582	58	1884	78	2186	98	2487
19	1295	39	1597	59	1899	79	2201	99	2502
20	1311	40	1612	60	1914	80	2216	100	2517

6 Mechanical dimensions

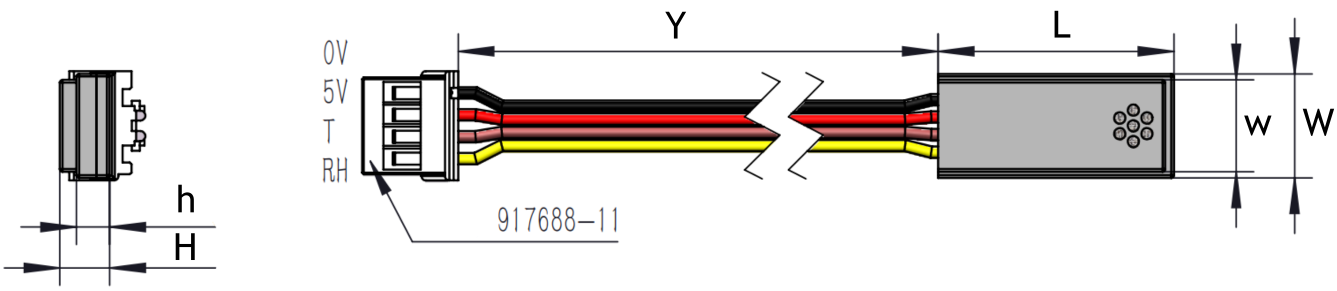

Figure 4: Outline dimensions RHT1

Figure 4 and Table 10 illustrate the mechanical outline and dimensions of the RHT1 module. The specified dimensions correspond to ScioSense's standard model (Material-ID 503701201).

Customization options are available to meet specific application requirements, including adjustments to the module's width, length, height, cable length, and connector type. The module can also be supplied without housing if needed.

The cable length is fully adaptable to the application, with a recommended range of 10 mm to 2000 mm for optimal performance.

Moreover, the housing and connector can also be customized according to the final application and specific requirements.

Symbol	Parameter	Min	Typ	Max	Unit
L	Length	26.8	27.0	27.2	mm
W	Width	11.7	11.9	12.1	mm
H	Height	5.2	5.7	6.2	mm
Y	Cable Length	95	100	105	mm
w			10.5		mm
h			3.8		mm

Table 10: Module dimensions of standard model

6.1 Connector drawing

The RHT1 is equipped with a TE-917688 (2.5 mm SIGNAL DBL-LOCK 4P PLUG HSG) connector, which is depicted in Figure 5. Possible mating parts are:

- PCB Mount Header: TE-917724 (2.5 mm SIGNAL DBL-LOCK 4P POST HEADER ASS'Y)
- Wire-to-Wire: TE-316088 (2.5 mm SIGNAL DBL LOCK 4P POST CAP HSG.)

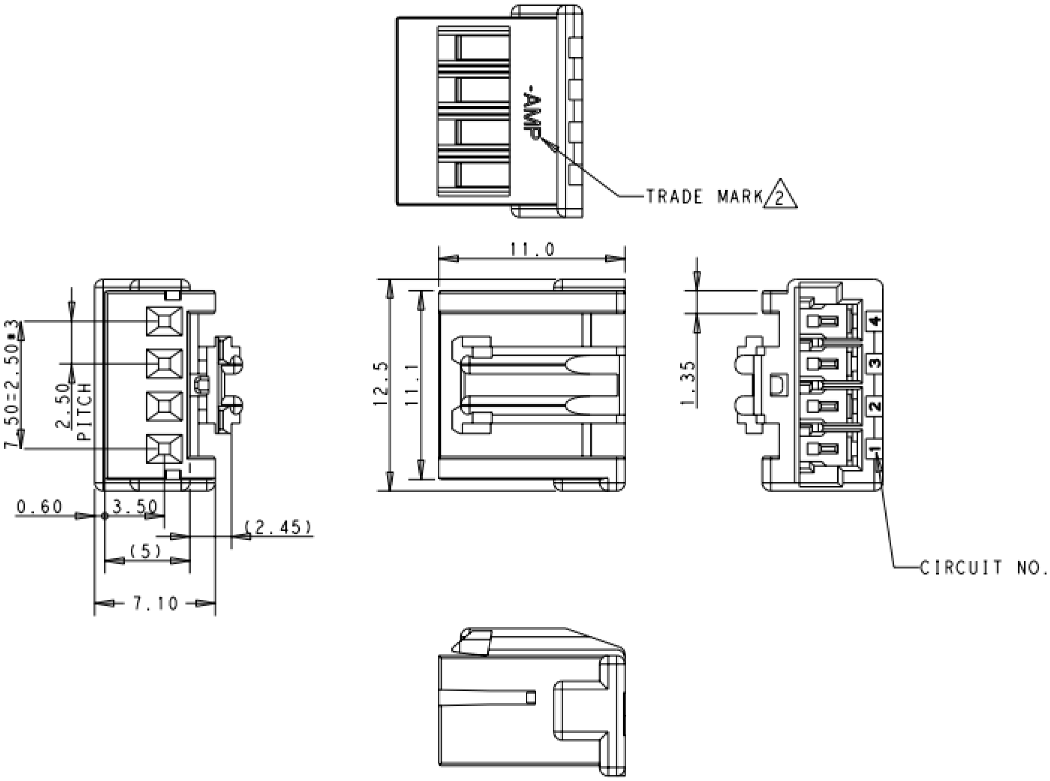

Figure 5: TE-917688 connector drawing[2]

[2] Source: TE-917688 product drawing, downloaded in Nov 2024.

7 Device markings

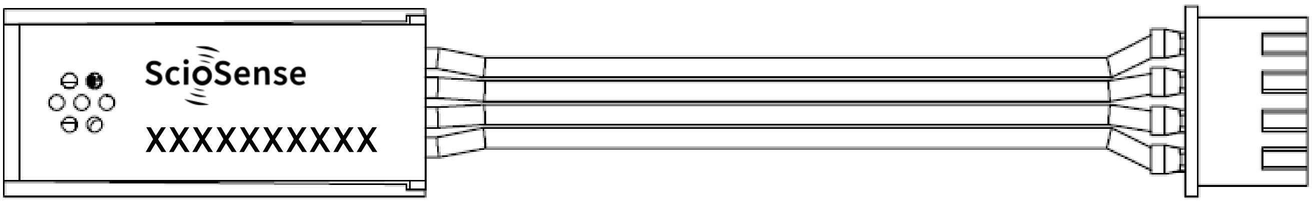

Figure 6: Device markings

Each RHT1 module is equipped with a serial number consisting of 8 digits, which is printed directly on the device. This serial number encodes the manufacturing date and is unique to each device.

Table 11: Serial number breakdown

Serial number	Description
YYMMDDxxxx	YY: Production year MM: Production month DD: Production day xxxx: Unique number

8 Ordering information

Table 12: Ordering information

Ordering Code	Material ID	Delivery Form	Delivery Quantity
RHT1-F3535W100G26TE_AV	503701201	Box	1000 pcs

9 Shipment & Packaging

The RHT1 modules are shipped in boxes of 1000 pieces containing 25+2 trays. Each box contains 2 vacuum sealed plastic bags. One bag holds 10 trays (40 modules each) and an empty cover tray, while the other bag holds 15 trays (40 modules each) and an empty cover tray. The top layer trays serve as a protective limit function and do not contain any modules. Refer to Figure 7 for the box outline and packaging details.

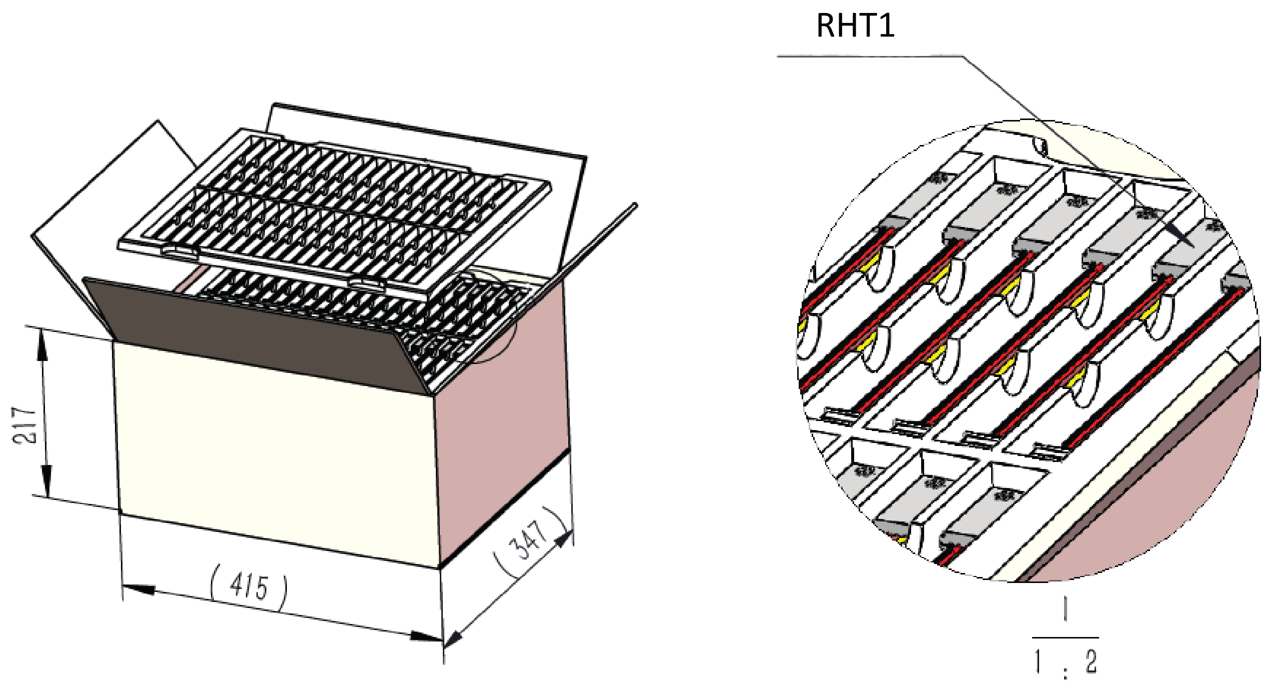

Figure 7: Packaging details

10 RoHS Compliance & ScioSense Green Statement

RoHS: The term RoHS compliant means that Sciosense B.V. products fully comply with current RoHS directives. Our semiconductor products do not contain any chemicals for all 6 substance categories, including the requirement that lead does not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, RoHS compliant products are suitable for use in specified lead-free processes.

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12 Revision information

Table 13: Revision history

Revision	Date	Comment	Pages
2.2	2026-04-02	Add 3.3V operation specs and lookup tables Harmonized pin labeling to match the connector pin labeling Updated packaging information	4,5,6,8, 10,11, 13,17
2.1	2025-01-07	Added connector information Updated product drawings and markings	4, 15 14-16
2.0	2024-09-30	Second version	All
0.9	2024-07-18	Initial version	All

Note(s) and/or Footnote(s):

1. Page and figure numbers for the previous version may differ from page and figure numbers in the current revision.
2. Correction of typographical errors is not explicitly mentioned.

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