Data Sheet

WTS3535 Temp & Humidity Sensor

wujung Hightech

Revision History

Revision	Revision Date	Description
Rev. 1	2018. 01. 12	First Draft

■ CONTENTS

1. Description

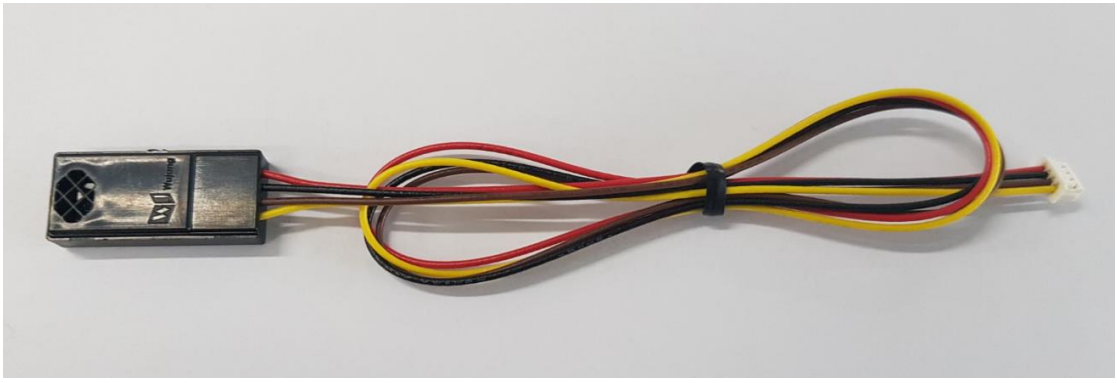
- Relative Temperature & Humidity Sensor with fully calibrated.
- Direct interface with a micro-controller is made possible with the modules humidity linear voltage outputs
- Relative humidity sensor is compensated by the temperature.

2. Summarized Specifications

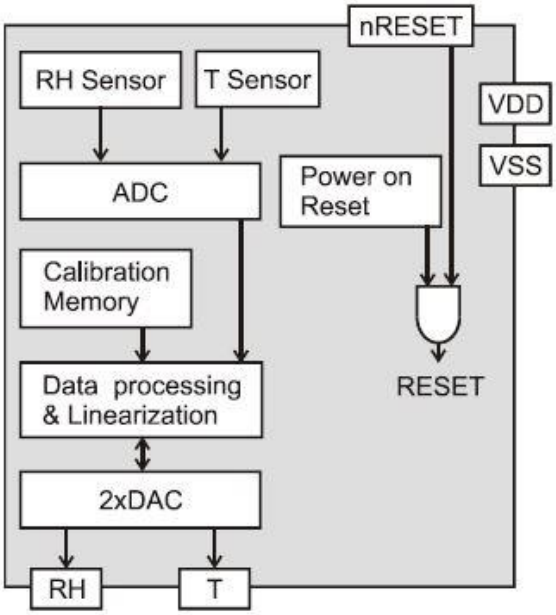
- Excellent long term stability

- ESD Performance
  - ESD HBM (human body model) : 4KV
  - ESD CDM (charge device model) : 750V

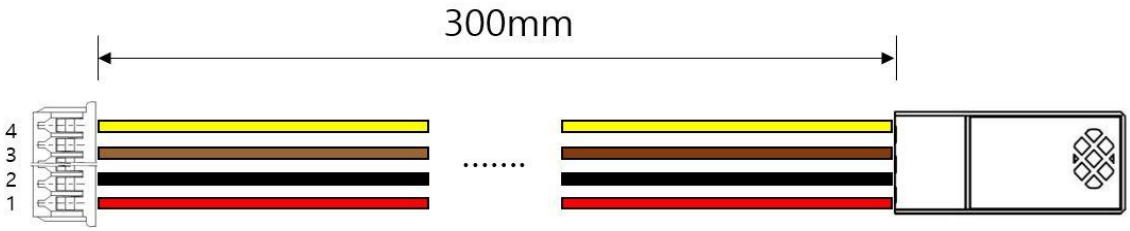
- Power consumption
  - Supply voltage : -0.3 to 6V
  - Input current on any pin : ±100 mA
  - Operating temperature range : -40 to 125 ˚C
  - Storage temperature range : -40 to 150 ˚C



3. Block Diagram



4. User Interface



Pin Out Assignment

Pin	Function	Description	Color
1	GND	Ground	RED
2	VCC	Supply Voltage	BLACK
3	TEMP OUT	Temperature	BROWN
4	HUMI OUT	Humidity	YELLOW

5. Specifications

5-1. Electrical Specifications

Parameter	Symbol	Min	Typ.	Max	Unit
Supply voltage	VDD	2.4	3.3	5.5	V
Power-up/down level	V_{POR}	2.22	2.35	2.4	V
Supply current	IDD		250	400	V/ms
Output current	AO_{IOUT}	-100		100	uA
Capacitive load	CL			5	nF

5-2. Timing Specification for the Sensor System

Parameter	Condition	Conditions	Min	Typ.	Max	Unit
Power-up time	t_{PU}	After hard reset, $V_{DD} \geq V_{POR}$			17	ms
Analog output setting time	AO_{settle}	For a step of 0.8xVDD/2		0.3	1	ms
Duration of reset pulse	t_{RESETN}		350			ns

6. TYPICAL PERFORMANCE CURVES

6-1. Temperature Look-up Tables

T (°C)	Vout (mv)	T (°C)	Vout(mv)	T (°C)	Vout(mv)	T (°C)	Vout(mv)	T (°C)	Vout(mv)
1	1551	21	2007	41	2463	61	2919	81	3375
2	1574	22	2030	42	2486	62	2942	82	3398
3	1597	23	2053	43	2509	63	2965	83	3421
4	1620	24	2076	44	2532	64	2988	84	3444
5	1643	25	2099	45	2555	65	3011	85	3467
6	1665	26	2121	46	2577	66	3033	86	3489
7	1688	27	2144	47	2600	67	3056	87	3512
8	1711	28	2167	48	2623	68	3079	88	3535
9	1734	29	2190	49	2646	69	3102	89	3558
10	1757	30	2213	50	2669	70	3125	90	3581
11	1779	31	2235	51	2691	71	3147	91	3603
12	1802	32	2258	52	2714	72	3170	92	3626
13	1825	33	2281	53	2737	73	3193	93	3649
14	1848	34	2304	54	2760	74	3216	94	3672
15	1871	35	2327	55	2783	75	3239	95	3695
16	1893	36	2349	56	2805	76	3261	96	3717
17	1916	37	2372	57	2828	77	3284	97	3740
18	1939	38	2395	58	2851	78	3307	98	3763
19	1962	39	2418	59	2874	79	3330	99	3786
20	1985	40	2441	60	2897	80	3353	100	3809

POLYNOMIAL EQUATIONS

$$T\,[^{\circ}C] = -66.875 + 218.75 * \frac{VT}{VDD}$$

6-2. Humidity Look-up Tables

RH (%)	Vout (mv)	RH (%)	Vout(mv)	RH (%)	Vout(mv)	RH (%)	Vout(mv)	RH (%)	Vout(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

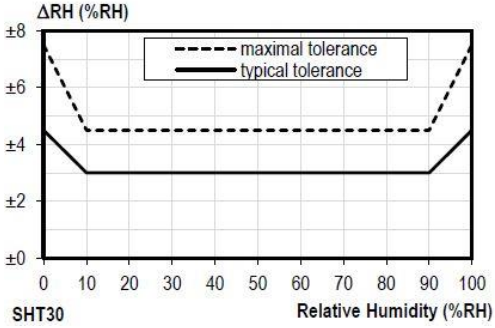
POLYNOMIAL EQUATIONS

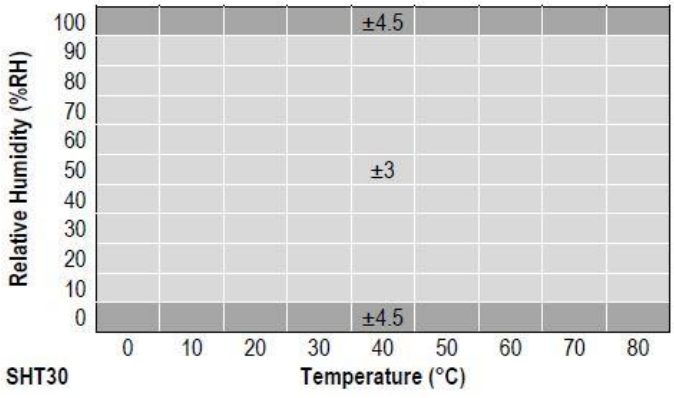
$$RH = -\frac{19.7}{0.54} + \frac{100}{0.54} \cdot \frac{V_{RH}}{V_{DD}}$$

7. SENSOR PERFORMANCE

7-1. Relative Humidity Sensor

Parameter	Conditions	Value	Units
SHT30 Accuracy tolerance[1]	Typ.	±3	%RH
	Max.	Figure 2	%RH
SHT31 Accuracy tolerance[1]	Typ.	±2	%RH
	Max.	Figure 4	%RH
Repeatability[2]	Low		%RH
	Medium		%RH
	High	0.1	%RH
Resolution	Typ.	14	bit
Hysteresis	at 25°C	±0.8	%RH
Specified range[3]	extended[4]	0 to 100	%RH
Response time[5]	$\tau_{63\%}$	8	s
Long-term drift	Typ.[6]	<0.25	%RH/yr
Sensitivity	V_{DD}=2.4V	13	mV/%RH
	V_{DD}=3.3V	17.8	mV/%RH
	V_{DD}=5.5V	29.7	mV/%RH

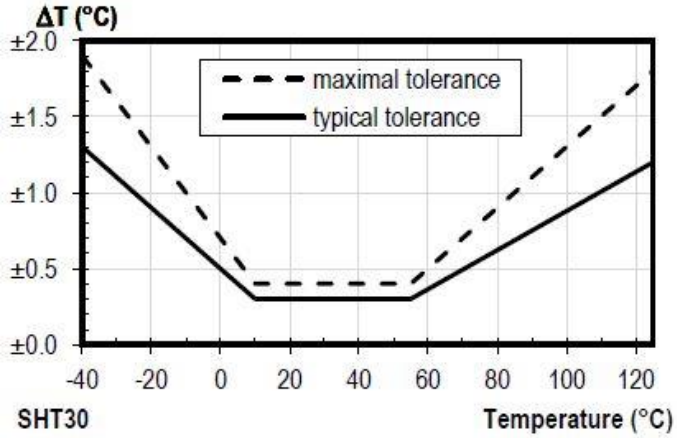




Typical and maximal tolerance at 25˚C for relative humidity.

7-1. Relative Temperature Sensor

Parameter	Condition	Value	Units
Accuracy tolerance Fehler! Textmarke nicht definiert.1	Typ. 10 to +55	±0.3	°C
Repeatability[1]		0.1	°C
Resolution	Typ.	14	bit
Specified Range	-	-40 to 125	°C
Response time [7]	$\tau_{63\%}$	>2	s
Long Term Drift	-	<0.03	°C/yr
Sensitivity	V_{DD}=2.4V	11.6	mV/°C
	V_{DD}=3.3V	16	mV/°C
	V_{DD}=5.5V	26.7	mV/°C



Typical and maximal tolerance at 25˚C for relative humidity.

8. APPLICATIONS

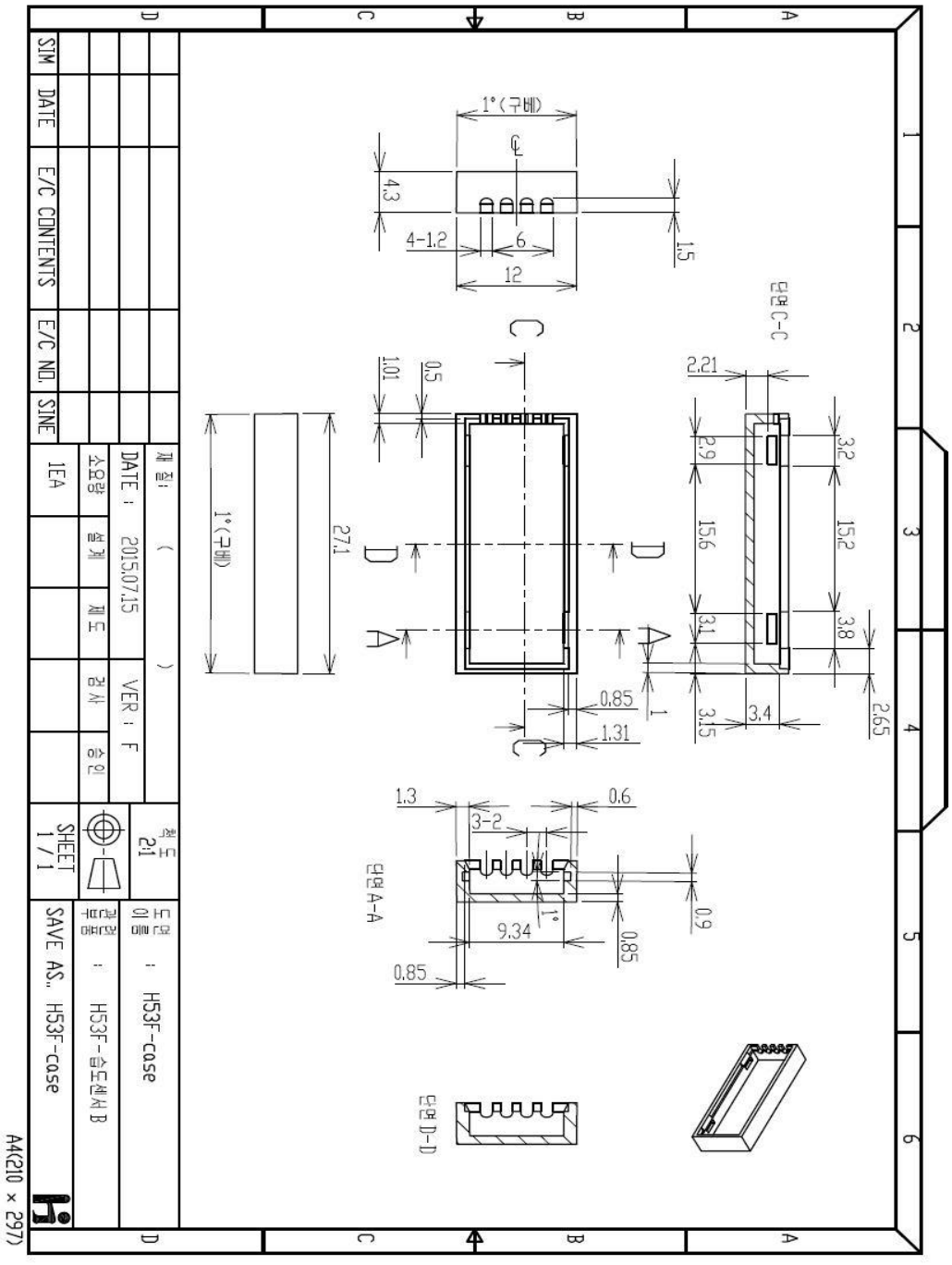
8-1. Storage instruction

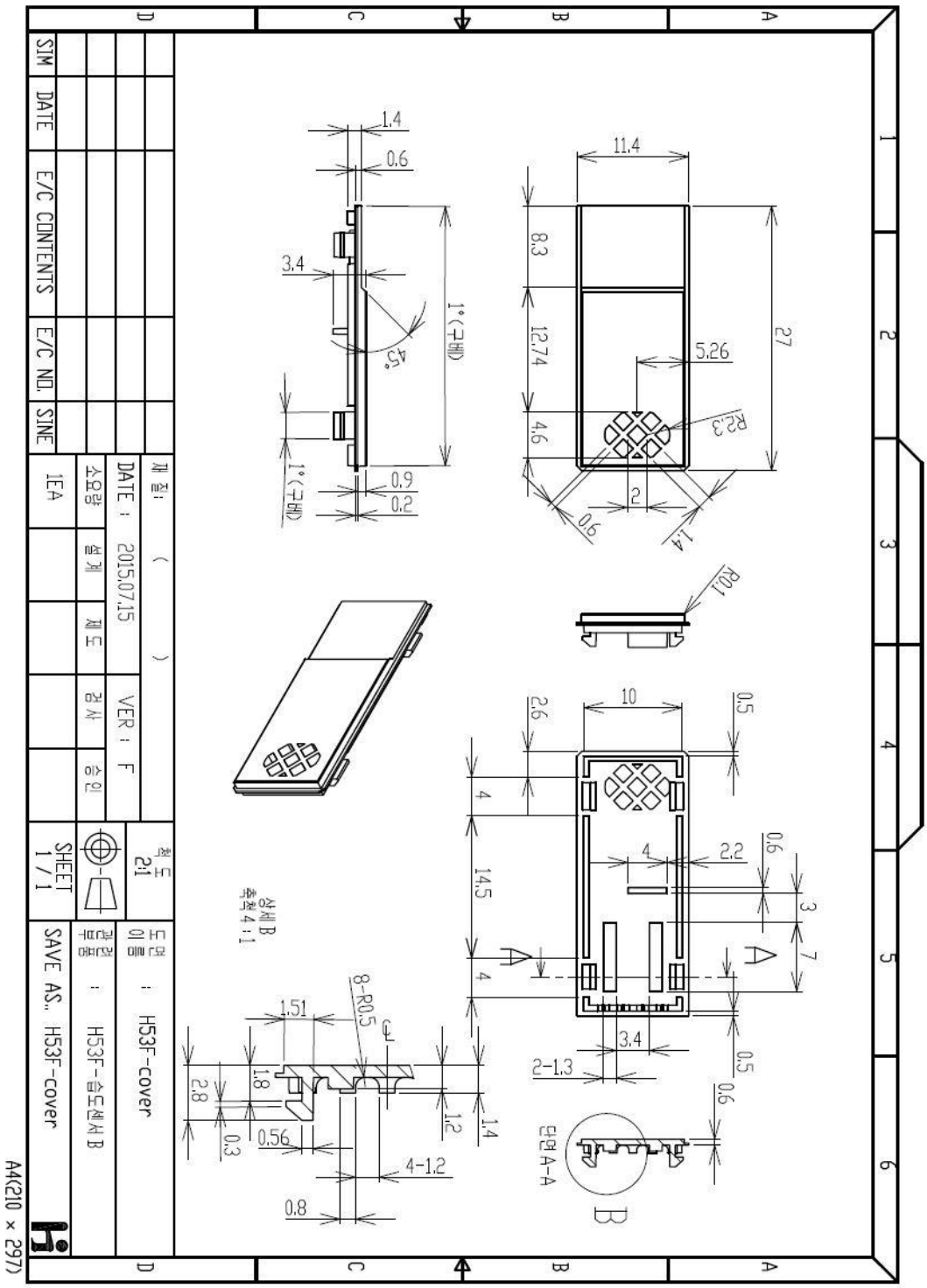
Moisture Sensitivity Level (MSL) is 1, according to IPC/JEDEC J-STD-020. At the same time, it is recommended to further process the sensors within 1 year after date of delivery.
It is of great importance to understand that a humidity sensor is not a normal electronic component and needs to be handled with care. Chemical vapors at high concentration in combination with long exposure times may offset the sensor reading.
For this reason it is recommended to store the sensors in original packaging including the sealed ESD bag at following conditions: Temperature shall be in the range of 10˚C –50˚C and humidity at 20 – 60%RH (sensors that are not stored in ESD bags).

8-2. Recommended Operating Condition

The sensor shows best performance when operated within recommended normal temperature and humidity range of 5 – 60 ˚C and 20 – 80 %RH, respectively. Long term exposure to conditions outside normal range, especially at high humidity, may temporarily offset the RH signal (e.g.+3%RH after 60h at >80%RH). After returning into the normal temperature and humidity range the sensor will slowly come back to calibration state by itself. Prolonged exposure to extreme conditions may accelerate ageing. To ensure stable operation of the humidity sensor, the conditions described in the document “SHTxx Assembly of SMD Packages”, section “Storage and Handling Instructions” regarding exposure to volatile organic compounds have to be met.

9. Package Outline




SIM
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VER : F
1EA
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설 계
제 도
검 사
승 인
척 도 2:1
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관련문서 : H53F-슬도센서 B
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단면 A-A
8-R0.5
4-1.2
R0.1