



FCC REPORT

Applicant: Trane US, Inc.
Address of Applicant: 6200 Troup Highway Tyler TX 75707
Equipment Under Test (EUT)
Product Name: Color Touchscreen Wi-Fi Thermostat
Model No.: TCONT850AC52UAA, ACONT850AC52UAA
FCC ID: XVR-CONT8501
Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.249:2013
Date of sample receipt: April 25, 2014
Date of Test: April 25-29, 2014
Date of report issued: April 29, 2014
Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo

Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

Version No.	Date	Description
00	April 29, 2014	Original

Prepared By:



Date:

April 29, 2014

Project Engineer

Check By:



Date:

April 29, 2014

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Field strength of the fundamental signal	15.249 (a)	Pass
Spurious emissions	15.249 (a) (d)/15.209	Pass
Band edge	15.249 (d)/15.205	Pass
20dB Occupied Bandwidth	15.215 (c)	Pass

Pass: The EUT complies with the essential requirements in the standard.

5 General Information

5.1 Client Information

Applicant:	Trane US, Inc.
Address of Applicant:	6200 Troup Highway Tyler TX 75707
Manufacturer:	COMPUTIME LTD.
Address of Manufacturer:	9/F, Tower One, Lippo Centre, 89 Queensway, Hong Kong
Factory:	Computime Electronics (shenzhen) Company Limited
Address of Factory:	YueKenguanyu Industrial Park, Kangqiao Road 88#, Danzhutou Community, Nanwan Street Office Longgang District, Shenzhen, China

5.2 General Description of EUT

Product Name:	Color Touchscreen Wi-Fi Thermostat
Model No.:	TCONT850AC52UAA, ACONT850AC52UAA
Operation Frequency:	908.42MHz
Modulation type:	GFSK
Antenna Type:	Integral antenna
Antenna gain:	0dBi
Power supply:	AC 24V

5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	82.13	84.76	83.42

Final Test Mode:

According to ANSI C63.4 standards, the test results are both the "worst case" and "worst setup":

Y axis (see the test setup photo)

5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC approval
ET	AC/AC Linear Transformer	ETE40310F	N/A	Verification

5.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS —Registration No.: CNAS L5775**

CNAS has accredited Global United Technology Services Co., Ltd. To ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 28, 2013.

- **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, June 26, 2013.

5.6 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China

Tel: 0755-27798480

Fax: 0755-27798960

5.7 Other Information Requested by the Customer

None.

6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Mar. 28 2014	Mar. 27 2015
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	Dec. 5, 2013	Dec. 4 2014
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 02 2013	Jul. 01 2014
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Feb. 23 2014	Feb. 22 2015
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 28 2013	June 27 2014
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 28 2014	Mar. 27 2015
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	Mar. 29 2014	Mar. 28 2015
10	Coaxial Cable	GTS	N/A	GTS211	Mar. 29 2014	Mar. 28 2015
11	Coaxial cable	GTS	N/A	GTS210	Mar. 29 2014	Mar. 28 2015
12	Coaxial Cable	GTS	N/A	GTS212	Mar. 29 2014	Mar. 28 2015
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 02 2013	Jul. 01 2014
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 02 2013	Jul. 01 2014
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 28 2013	June 27 2014
16	Band filter	Amindeon	82346	GTS219	Mar. 29 2014	Mar. 28 2015

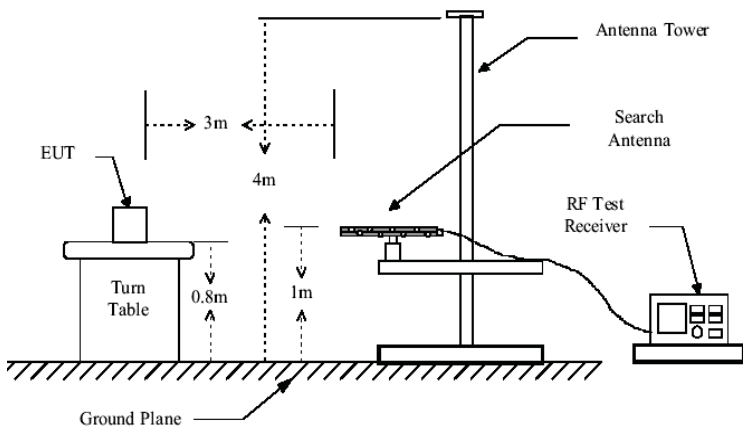
General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	July 09 2013	July 08 2014

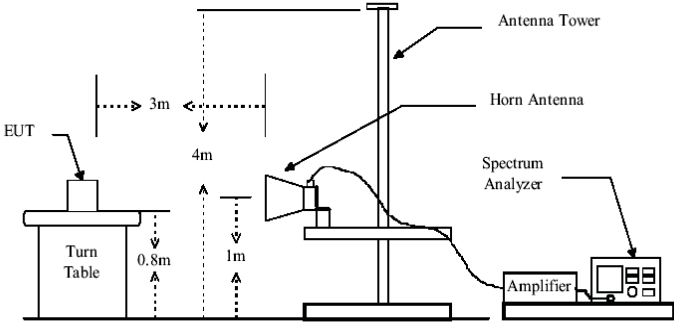
7 Test results and Measurement Data

7.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
E.U.T Antenna: <i>The antenna is Internal Integral antenna, the best case gain of the antenna is 0dBi</i>	
	

7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.4:2003				
Test Frequency Range:	30MHz to 10GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
For the field strength test, the RBW and VBW were set to 300kHz and 1MHz.					
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark	
	2400MHz-2483.5MHz	94.00		Average Value	
		114.00		Peak Value	
Limit: (Spurious Emissions)	Frequency	Limit (dBuV/m @3m)		Remark	
	30MHz-88MHz	40.00		Quasi-peak Value	
	88MHz-216MHz	43.50		Quasi-peak Value	
	216MHz-960MHz	46.00		Quasi-peak Value	
	960MHz-1GHz	54.00		Quasi-peak Value	
	Above 1GHz	54.00		Average Value	
		74.00		Peak Value	
Limit: (band edge)	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.				
Test setup:	Below 1GHz				
					
	Above 1GHz				

	 The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a Turn Table at a height of 0.8m. The Turn Table is 3m away from an Antenna Tower. The Antenna Tower has a Horn Antenna at a height of 4m. A Spectrum Analyzer is connected to the Antenna Tower via an Amplifier. The Spectrum Analyzer is also connected to the Antenna Tower. The distance between the Turn Table and the Antenna Tower is 3m. The height of the Antenna Tower is 4m. The height of the Turn Table is 0.8m. The height of the Antenna is 1m.
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement data:

7.2.1 Field Strength of The Fundamental Signal

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
908.42	87.20	23.15	4.88	31.19	84.04	114.00	-29.96	Vertical
908.42	87.92	23.15	4.88	31.19	84.76	114.00	-29.24	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
908.42	81.91	23.15	4.88	31.19	78.75	94.00	-15.13	Vertical
908.42	81.26	23.15	4.88	31.19	78.10	94.00	-15.90	Horizontal

7.2.2 Spurious emissions

■ Below 1GHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
47.16	45.90	15.42	0.74	31.99	30.07	40.00	-9.93	Vertical
102.72	48.43	14.92	1.22	31.77	32.80	43.50	-10.70	Vertical
124.57	52.38	11.80	1.40	31.88	33.70	43.50	-9.80	Vertical
148.44	47.96	10.25	1.56	31.98	27.79	43.50	-15.71	Vertical
246.82	43.87	14.08	2.11	32.16	27.90	46.00	-18.10	Vertical
872.18	38.20	22.82	4.74	31.22	34.54	46.00	-11.46	Vertical
115.32	47.91	13.31	1.32	31.84	30.70	43.50	-12.80	Horizontal
133.62	55.40	10.67	1.46	31.92	35.61	43.50	-7.89	Horizontal
206.40	49.83	12.77	1.88	32.14	32.34	43.50	-11.16	Horizontal
336.04	51.48	15.99	2.55	32.07	37.95	46.00	-8.05	Horizontal
390.72	53.75	16.87	2.81	31.91	41.52	46.00	-4.48	Horizontal
916.07	38.20	23.21	4.91	31.19	35.13	46.00	-10.87	Horizontal

■ Above 1GHz

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1816.84	44.67	25.34	4.87	34.14	40.74	74.00	-33.26	Vertical
2725.26	41.51	28.20	5.69	33.64	41.76	74.00	-32.24	Vertical
3633.68	36.34	29.17	7.23	32.60	40.14	74.00	-33.86	Vertical
4542.10	34.79	31.40	8.37	31.96	42.60	74.00	-31.40	Vertical
5450.52	32.97	31.89	9.45	32.41	41.90	74.00	-32.10	Vertical
6358.94	31.41	33.39	10.70	32.08	43.42	74.00	-30.58	Vertical
7267.36	31.77	36.28	11.69	31.94	47.80	74.00	-26.20	Vertical
8175.78	29.72	36.99	12.39	31.59	47.51	74.00	-26.49	Vertical
9084.20	30.83	37.25	13.74	32.21	49.61	74.00	-24.39	Vertical
1816.84	44.31	25.34	4.87	34.14	40.38	74.00	-33.62	Horizontal
2725.26	43.01	28.20	5.69	33.64	43.26	74.00	-30.74	Horizontal
3633.68	35.93	29.17	7.23	32.60	39.73	74.00	-34.27	Horizontal
4542.10	34.06	31.40	8.37	31.96	41.87	74.00	-32.13	Horizontal
5450.52	32.65	31.89	9.45	32.41	41.58	74.00	-32.42	Horizontal
6358.94	31.36	33.39	10.70	32.08	43.37	74.00	-30.63	Horizontal
7267.36	31.48	36.28	11.69	31.94	47.51	74.00	-26.49	Horizontal
8175.78	31.13	36.99	12.39	31.59	48.92	74.00	-25.08	Horizontal
9084.20	31.24	37.25	13.74	32.21	50.02	74.00	-23.98	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1816.84	37.42	25.37	4.87	34.14	33.52	54.00	-20.48	Vertical
2725.26	34.55	28.21	5.69	33.63	34.82	54.00	-19.18	Vertical
3633.68	29.23	29.18	7.23	32.60	33.04	54.00	-20.96	Vertical
4542.10	27.61	31.42	8.38	31.96	35.45	54.00	-18.55	Vertical
5450.52	25.94	31.89	9.42	32.41	34.84	54.00	-19.16	Vertical
6358.94	24.66	33.39	10.70	32.08	36.67	54.00	-17.33	Vertical
7267.36	24.88	36.28	11.69	31.96	40.89	54.00	-13.11	Vertical
8175.78	22.40	36.99	12.39	31.59	40.19	54.00	-13.81	Vertical
9084.20	24.08	37.28	13.76	32.17	42.95	54.00	-11.05	Vertical
1816.84	36.78	25.37	4.87	34.14	32.88	54.00	-21.12	Horizontal
2725.26	35.76	28.21	5.69	33.63	36.03	54.00	-17.97	Horizontal
3633.68	28.54	29.18	7.23	32.60	32.35	54.00	-21.65	Horizontal
4542.10	26.95	31.42	8.38	31.96	34.79	54.00	-19.21	Horizontal
5450.52	25.40	31.89	9.42	32.41	34.30	54.00	-19.70	Horizontal
6358.94	24.40	33.39	10.70	32.08	36.41	54.00	-17.59	Horizontal
7267.36	24.37	36.28	11.69	31.96	40.38	54.00	-13.62	Horizontal
8175.78	24.24	36.99	12.39	31.59	42.03	54.00	-11.97	Horizontal
9084.20	24.21	37.23	13.71	32.23	42.92	54.00	-11.08	Horizontal

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *“**”, means this data is the too weak instrument of signal is unable to test.*

7.2.3 Bandedge emissions

All of the restriction bands were tested, and only the data of worst case was exhibited.

Quasi-peak value:

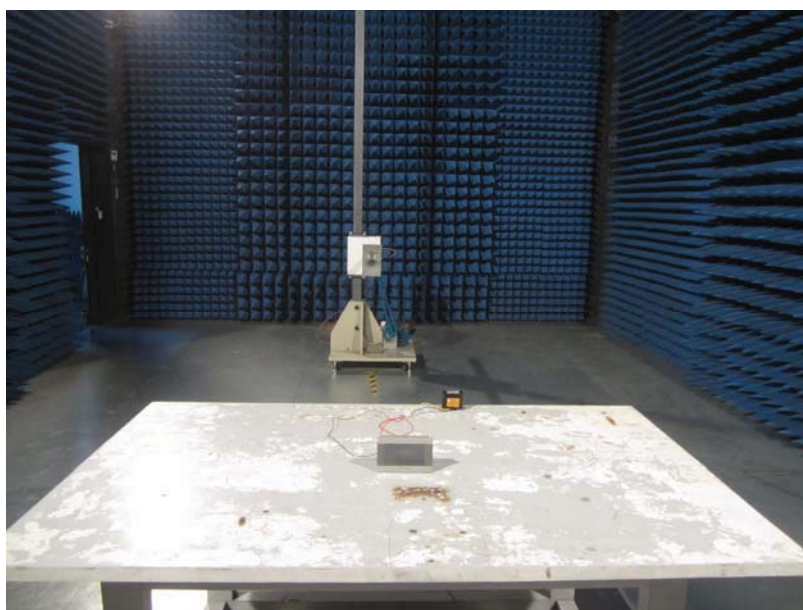
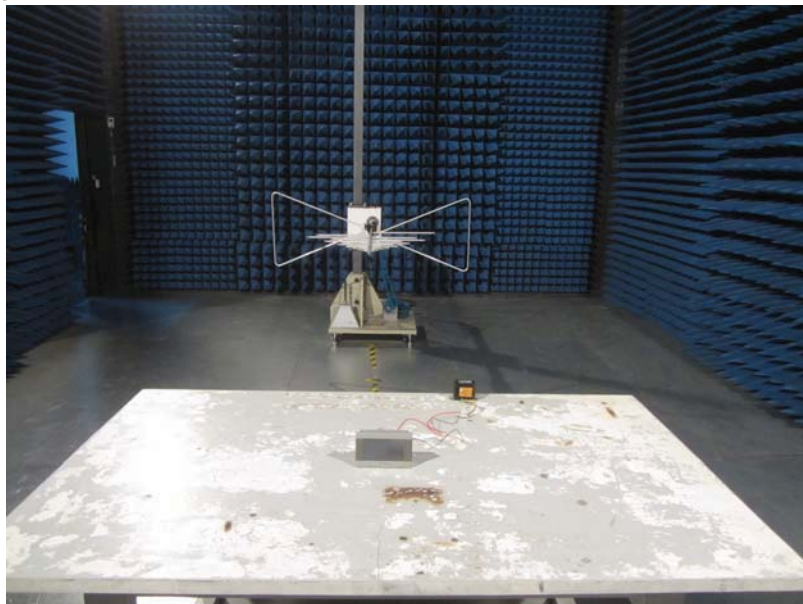
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
902.00	38.06	23.12	4.87	31.18	34.87	46.00	-11.13	Horizontal
928.00	39.45	23.28	4.96	31.20	36.49	46.00	-9.51	Horizontal
960.00	39.10	23.49	5.08	31.22	36.45	46.00	-9.55	Horizontal
902.00	37.62	23.12	4.87	31.18	34.43	46.00	-11.57	Vertical
928.00	39.07	23.28	4.96	31.20	36.11	46.00	-9.89	Vertical
960.00	38.92	23.49	5.08	31.22	36.27	46.00	-9.73	Vertical

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

8 Test Setup Photo

Radiated Emission



Conducted Emission



9 EUT Constructional Details

Reference to the test report No. GTSE14040061501

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