

# FCC REPORT

Applicant: Address of Applicant:	Trane US, Inc. 6200 Troup Highway Tyler Texas 75707 United States
Equipment Under Test (E	EUT)
Product Name:	Translator HW5800 to Z - Wave
Model No.:	9125051, TRNZID1
FCC ID:	XVR-9125051
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.249:2013
Date of sample receipt:	September 26, 2014
Date of Test:	December 14-16, 2014
Date of report issued:	December 16, 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	December 16, 2014	Original

Zdward.fan Project Engineer Prepared By: Date: December 16, 2014 Check By: Date: December 16, 2014 all 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 Texas 75707 United States			
Manufacturer:	ufacturer: Computime Limited			
Address of Manufacturer:	17/F, Great Eagle Centre, 23 Harbour Road, Wanchai 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:	Translator HW5800 to Z - Wave
Model No.:	9125051, TRNZID1
Operation Frequency:	908.40MHz
Modulation type:	GFSK
Antenna Type:	Integral antenna
Antenna gain:	0dBi
Power supply:	AC120V/60Hz

## 5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Demarky During the test the test	voltage was two of from QEO( to 11EO( of the new inclusion line)

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.

#### 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	Х	Y	Z			
Field Strength(dBuV/m)	90.14	93.37	91.27			
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

## None.

## 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 fuly 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:

Rad	Radiated Emission:						
ltem	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. 4 2014	Dec. 3 2015	
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 01 2014	Jun. 30 2015	
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Jul. 01 2014	Jun. 30 2015	
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 27 2014	June 26 2015	
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. 01 2014	Jun. 30 2015	
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 01 2014	Jun. 30 2015	
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 27 2014	June 26 2015	
16	Band filter	Amindeon	82346	GTS219	Mar. 29 2014	Mar. 28 2015	

Cond	Conducted Emission:							
ltem	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)		
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS264	Sep. 07 2013	Sep. 06 2015		
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	July 01 2014	June 30 2015		
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	July 01 2014	June 30 2015		
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	July 01 2014	June 30 2015		
5	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	July 01 2014	June 30 2015		
6	Coaxial Cable	GTS	N/A	GTS227	July 01 2014	June 30 2015		
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A		

Gen	General used equipment:							
ltem	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)		
1	Barometer	ChangChun	DYM3	GTS257	July 08 2014	July 07 2015		



# 7 Test results and Measurement Data

## 7.1 Antenna requirement:

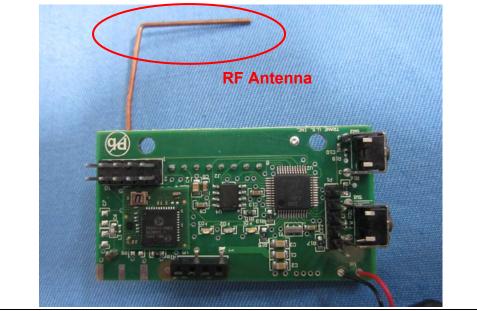
Standard requirement:	FCC Part15 C Section 15.203

#### 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:

The antenna is Internal Integral antenna, the best case gain of the antenna is 0dBi



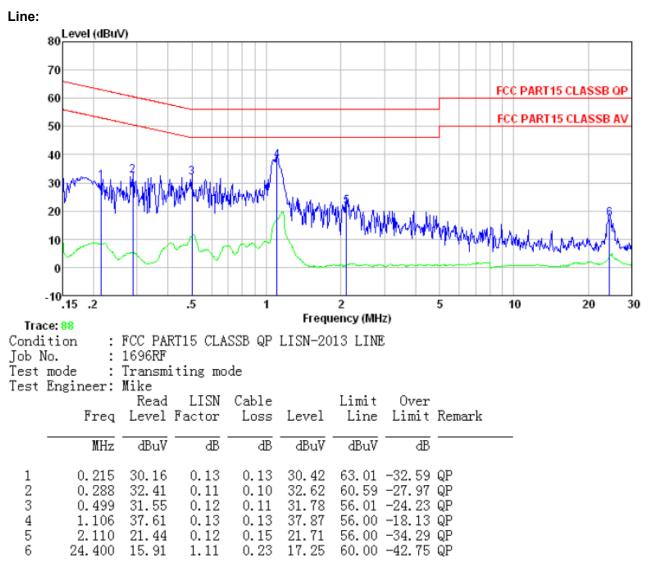


## 7.2 Conducted Emissions

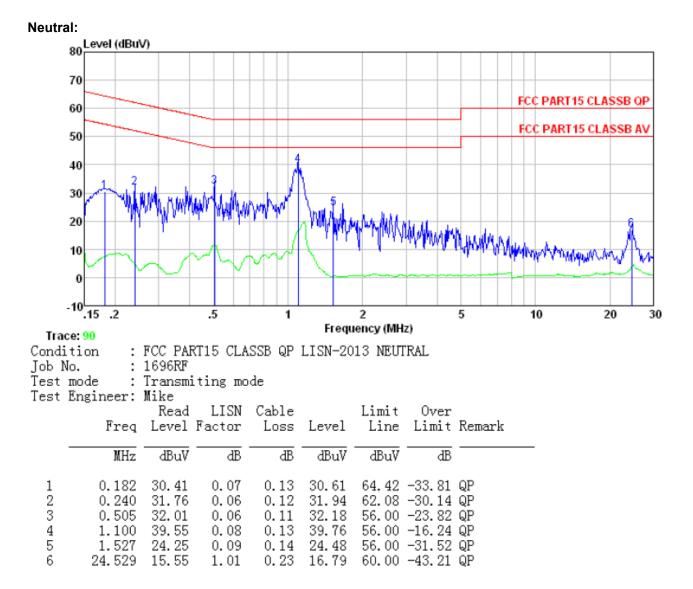
• • •							
	Test Requirement:	FCC Part15 C Section 15.207					
	Test Method:	ANSI C63.4:2003					
	Test Frequency Range:	150KHz to 30MHz					
	Class / Severity:	Class B					
	Receiver setup:	RBW=9KHz, VBW=30KHz, Sv	weep time=auto				
	Limit:		Limit (d	lBuV)			
		Frequency range (MHz)	Quasi-peak	Average			
		0.15-0.5	66 to 56*	56 to 46*			
		0.5-5	56	46			
		5-30	60	50			
		* Decreases with the logarithm	n of the frequency.				
	Test setup:	Reference Plane					
	Toot procedure:	LISN       40cm       80cm       Filter       AC power         AUX       E.U.T       Filter       AC power         Equipment       E.U.T       EMI       Receiver         Remark:       E.U.T: Equipment Under Test       LISN: Line impedence Stabilization Network         Test table height=0.8m       Ketter       Ketter					
	Test procedure:	<ol> <li>The E.U.T is commected to stabilization network (L.I.S. impedance for the measuring</li> </ol>	N.). This provides a 50				
		<ol> <li>The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.</li> </ol>					
	Test Instruments:	Refer to section 6.0 for details					
	Test mode:	Refer to section 5.3 for details					
	Test results:	Pass					

#### Measurement data:

Report No.: GTSE14090169601







Notes:

- 1. An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3. Final Level =Receiver Read level + LISN Factor + Cable Loss
- 4. 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.



## 7.3 Radiated Emission Method

Test Requirement:	FCC Part15 C S	FCC Part15 C Section 15.209					
Test Method:	ANSI C63.4:200	ANSI C63.4:2003					
Test Frequency Range:	30MHz to 10GH	30MHz to 10GHz					
Test site:	Measurement D	Distance: 3m					
Receiver setup:	Frequency	Detector	RBW	VBW	Remark		
	30MHz- 1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value		
	Above 1GHz	Peak Peak	1MHz 1MHz	3MHz 10Hz	Peak Value Average Value		
		Feak		10112	Average value		
Limit:	Freque	ency	Limit (dBuV	/m @3m)	Remark		
(Field strength of the	902MHz ~	928MHz	94.0	0	Quasi-peak Value		
fundamental signal)	-						
Limit:	Freque 30MHz-8		Limit (dBuV/ 40.0		Remark		
(Spurious Emissions)	88MHz-2		40.0		Quasi-peak Value Quasi-peak Value		
	216MHz-9		46.0		Quasi-peak Value		
	960MHz-		54.00		Quasi-peak Value		
	Above 1	GH7	54.00		Average Value		
	Above	OTIZ	74.00		Peak Value		
Limit: (band edge)	harmonics, sha	ll be attenuate to the general	ed by at least I radiated emi	50 dB belov	bands, except for w the level of the a in Section 15.209,		
Test setup:	Below 1GHz						
	Below 1GHz						



r	
	EUT Turn Table Antenna Tower Horn Antenna Spectrum Analyzer Amplifier
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.
	<ol><li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li></ol>
	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.
	<ol><li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li></ol>
	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:



## 7.3.1 Field Strength of The Fundamental Signal

## 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
908.40	92.05	23.15	4.88	31.19	88.89	94.00	-5.11	Vertical
908.40	96.53	23.15	4.88	31.19	93.37	94.00	-0.63	Horizontal

## 7.3.2 Spurious emissions

## Below 1GHz

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
46.67	40.47	15.45	0.74	31.99	24.67	40.00	-15.33	Vertical
89.59	39.96	13.76	1.11	31.72	23.11	43.50	-20.39	Vertical
155.91	43.01	10.51	1.60	32.00	23.12	43.50	-20.38	Vertical
824.60	38.06	22.33	4.55	31.28	33.66	46.00	-12.34	Vertical
55.03	37.75	15.02	0.82	31.95	21.64	40.00	-18.36	Horizontal
98.83	37.25	15.10	1.18	31.76	21.77	43.50	-21.73	Horizontal
192.42	40.24	12.56	1.80	32.12	22.48	43.50	-21.02	Horizontal
550.95	38.59	19.57	3.53	31.28	30.41	46.00	-15.59	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
1816.80	39.02	25.37	4.87	34.14	35.12	74.00	-38.88	Vertical
2725.20	54.18	28.21	5.69	33.63	54.45	74.00	-19.55	Vertical
3633.60	40.48	29.18	7.23	32.60	44.29	74.00	-29.71	Vertical
4542.00	37.11	31.42	8.38	31.96	44.95	74.00	-29.05	Vertical
5450.40	31.75	31.89	9.42	32.41	40.65	74.00	-33.35	Vertical
6358.80	32.93	33.39	10.70	32.08	44.94	74.00	-29.06	Vertical
7267.20	33.77	36.28	11.69	31.96	49.78	74.00	-24.22	Vertical
8175.60	31.98	36.99	12.39	31.59	49.77	74.00	-24.23	Vertical
9084.00	27.76	37.28	13.76	32.17	46.63	74.00	-27.37	Vertical
1816.80	39.84	25.37	4.87	34.14	35.94	74.00	-38.06	Horizontal
2725.20	53.96	28.21	5.69	33.63	54.23	74.00	-19.77	Horizontal
3633.60	40.90	29.18	7.23	32.60	44.71	74.00	-29.29	Horizontal
4542.00	37.60	31.42	8.38	31.96	45.44	74.00	-28.56	Horizontal
5450.40	31.92	31.89	9.42	32.41	40.82	74.00	-33.18	Horizontal
6358.80	34.04	33.39	10.70	32.08	46.05	74.00	-27.95	Horizontal
7267.20	33.64	36.28	11.69	31.96	49.65	74.00	-24.35	Horizontal
8175.60	31.37	36.99	12.39	31.59	49.16	74.00	-24.84	Horizontal
9084.00	28.23	37.23	13.71	32.23	46.94	74.00	-27.06	Horizontal

#### Average 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
1816.80	*	25.37	4.87	34.14	*	54.00	*	Vertical
2725.20	49.53	28.21	5.69	33.63	49.80	54.00	-4.20	Vertical
3633.60	*	29.18	7.23	32.60	*	54.00	*	Vertical
4542.00	*	31.42	8.38	31.96	*	54.00	*	Vertical
5450.40	*	31.89	9.42	32.41	*	54.00	*	Vertical
6358.80	*	33.39	10.70	32.08	*	54.00	*	Vertical
7267.20	*	36.28	11.69	31.96	*	54.00	*	Vertical
8175.60	*	36.99	12.39	31.59	*	54.00	*	Vertical
9084.00	*	37.28	13.76	32.17	*	54.00	*	Vertical
1816.80	*	25.37	4.87	34.14	*	54.00	*	Horizontal
2725.20	49.17	28.21	5.69	33.63	49.44	54.00	-4.56	Horizontal
3633.60	*	29.18	7.23	32.60	*	54.00	*	Horizontal
4542.00	*	31.42	8.38	31.96	*	54.00	*	Horizontal
5450.40	*	31.89	9.42	32.41	*	54.00	*	Horizontal
6358.80	*	33.39	10.70	32.08	*	54.00	*	Horizontal
7267.20	*	36.28	11.69	31.96	*	54.00	*	Horizontal
8175.60	*	36.99	12.39	31.59	*	54.00	*	Horizontal
9084.00	*	37.23	13.71	32.23	*	54.00	*	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. (\*) The test result on peak is lower than average limit, then average measurement needn't be performed.

## 7.3.3 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	36.12	23.12	4.87	31.18	32.93	46.00	-13.07	Horizontal
928.00	34.73	23.28	4.96	31.20	31.77	46.00	-14.23	Horizontal
960.00	35.65	23.49	5.08	31.22	33.00	46.00	-13.00	Horizontal
902.00	35.00	23.12	4.87	31.18	31.81	46.00	-14.19	Vertical
928.00	35.01	23.28	4.96	31.20	32.05	46.00	-13.95	Vertical
960.00	36.13	23.49	5.08	31.22	33.48	46.00	-12.52	Vertical
Pomork:								

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.



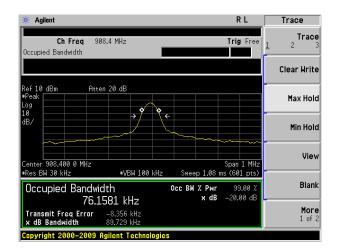
## 7.4 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.249/15.215			
Test Method:	ANSI C63.4:2003			
Limit:	Operation Frequency range 2400MHz~2483.5MHz			
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane			
Test Instruments:	Refer to section 6.0 for details			
Test mode:	Refer to section 5.3 for details			
Test results:	Pass			

## **Measurement Data**

Operation Frequency	20dB bandwidth(MHz)	Result
908.40MHz	0.0897	Pass

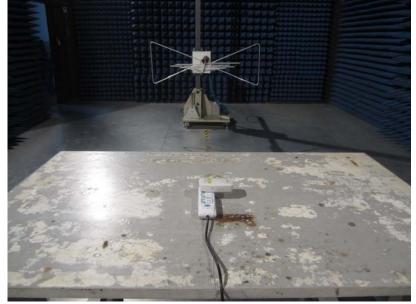
Test plot as follows:

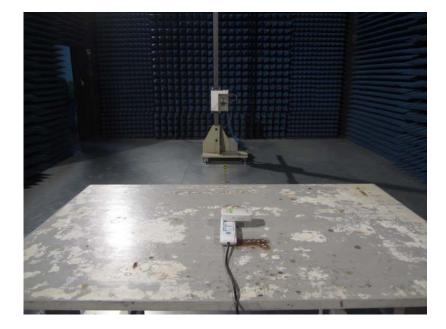




# 8 Test Setup Photo

Radiated Emission







**Conducted Emissions** 





# 9 EUT Constructional Details









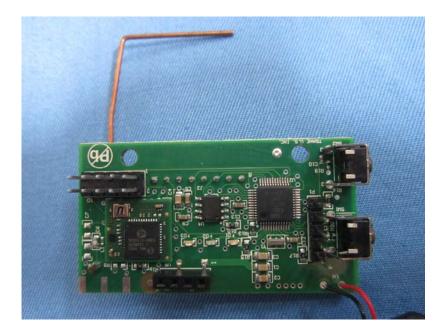


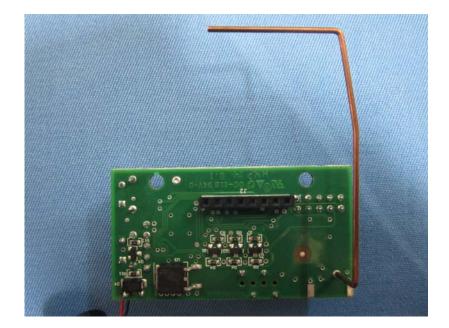








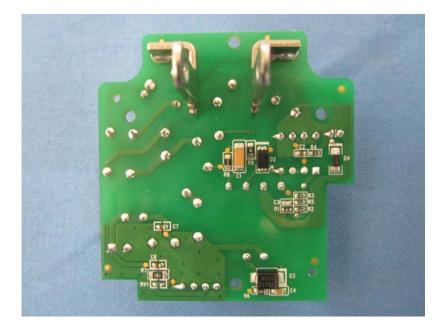




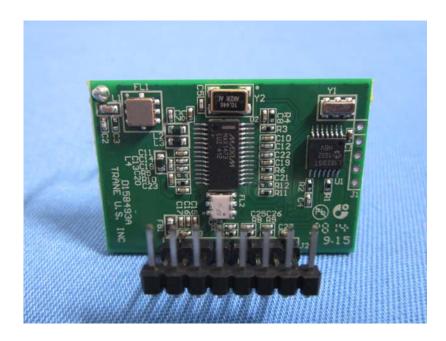
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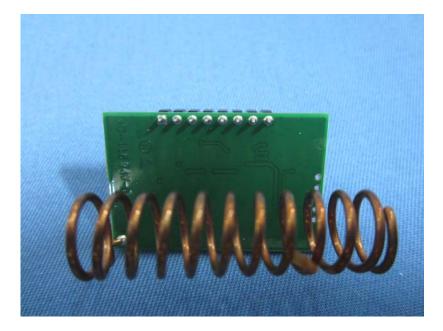












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