

Application for FCC Certificate
On Behalf of
Freescale Semiconductor, Inc.

A28 Multi-coil wireless charger Transmitter

Model No.: WCT-5WTXMULTI

FCC ID : RUN-WCT-5WTXMULTI

Prepared For : Freescale Semiconductor, Inc.
Corporate Headquarters, 6501 William Cannon Drive
West Austin, Texas 78735 USA

Prepared By : Audix Technology (Shanghai) Co., Ltd.
3F and 4F, 34Bldg 680 Guiping Rd,
Caohejing Hi-Tech Park,
Shanghai 200233, China

Tel: +86-21-64955500
Fax: +86-21-64955491

Report No. : ACI-F14176A1
Date of Test : Jul 08, 2015
Date of Report : Jul 15, 2015

TABLE OF CONTENTS

	Page
1 SUMMARY OF STANDARDS AND RESULTS.....	4
1.1 Description of Standards and Results.....	4
2 GENERAL INFORMATION.....	5
2.1 Description of Equipment Under Test.....	5
2.2 Peripherals	6
2.3 Description of Test Facility	6
2.4 Measurement Uncertainty	6
3 CONDUCTED EMISSION TEST	7
3.1 Test Equipment.....	7
3.2 Block Diagram of Test Setup	7
3.3 Conducted Emission Limit [FCC Part 18 Subpart C 18.307(b)]	8
3.4 Test Configuration.....	8
3.5 Operating Condition of EUT.....	8
3.6 Test Procedures	8
3.7 Test Results	9
4 RADIATED EMISSION TEST.....	11
4.1 Test Equipment.....	11
4.2 Block Diagram of Test Setup	11
4.3 Radiated Emission Limit [FCC Part 18 Subpart C 18.305(b)].....	13
4.4 Test Configuration.....	13
4.5 Operating Condition of EUT.....	13
4.6 Test Procedures	13
4.7 Test Results	14
5 DEVIATION TO TEST SPECIFICATIONS	16

TEST REPORT FOR FCC CERTIFICATE

Applicant : Freescale Semiconductor, Inc.
Manufacturer : Freescale Semiconductor (China) Limited Suzhou Branch
Factory : Trivo (Taicang) Technologies Co., Ltd.

EUT Description : A28 Multi-coil wireless charger Transmitter
(A) Model No. : WCT-5WTXMULTI
(B) Power Supply : AC100~240V/50-60Hz
(C) Test Voltage : AC 120V/60Hz

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 18 SUBPART C OCTOBER 2014
AND FCC OST/MP-5:1986*

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 18 limits both radiated and conducted emissions.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report shows that the EUT (M/N: Refer to Sec 2.1) which was tested in 3m anechoic chamber Jul 08, 2015 is technically compliance with the FCC official limits also.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

This report contains data that are not covered by the NVLAP accreditation.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test : Jul 08, 2015 Date of Report : Jul 15, 2015

Producer : Alan He
ALAN HE / Assistant

Review : Sammy Chen
SAMMY CHEN / Manager

 For and on behalf of
Audix Technology (Shanghai) Co., Ltd.

Signatory : Byron Kwo
Authorized Signature EMC BYRON KWO / Assistant General Manager

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Description of Test Item	Standard	Limits	Results
EMISSION			
Conducted Emission	FCC RULES AND REGULATIONS PART 18 OCTOBER 2014 AND FCC OST/MP-5:1986	18.307(b)	Pass
Radiated Emission	FCC RULES AND REGULATIONS PART 18 OCTOBER 2014 AND FCC OST/MP-5:1986	18.305(b)	Pass

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description : A28 Multi-coil wireless charger Transmitter

Type of EUT : Production Pre-product Pro-type

Model No. : WCT-5WTXMULTI

Note #1 : The modified histories of report are as follows:

Report No.	Model No.	Rev. Summary	Edition No.	Data of Rev.
ACI-F14176	WCT-5WTXMULTI	Original Report	0	Nov 12, 2014
ACI-F14176A1	WCT-5WTXMULTI	1. To change the location of the component	Rev. A1	Jul 15, 2015

Charge Frequency : 115-205 kHz

Applicant : Freescale Semiconductor, Inc.
Corporate Headquarters, 6501 William Cannon
Drive West Austin, Texas 78735 USA

Manufacturer : Freescale Semiconductor (China) Limited
Suzhou Branch
No. 288 Zhuyuan Road, Suzhou New District

Factory : Trivo (Taicang) Technologies Co., Ltd.
Building A10, Taicang Foreign Industry Park,
No.105 East Shanghai Road, Taicang, Jiangsu,
P.R.China.

Remark:

The EUT is a A28 Multi-coil wireless charger Transmitter which input/output ports as follows:

(1) One Micro USB Port

: Connected with Adapter

2.2 Peripherals

2.2.1 Adapter

Manufacturer : SCEPTRE POWER
Model Number : XA012AM0500240
Input : 100-240V~, 50/60Hz 0.5A
Output : 5.0V == 2.4A
Output Cable : Unshielded, Undetachable, 0.9m, with one core
(Core: TC5B, 17*7*30mm,
Three Core Electronics Co., Ltd.)

2.2.2 Peripheral Board

Manufacturer : Freescale
Model Number : 700-28519
Serial Number : TR14390039

2.2.3 Load (board with resistance)

Manufacturer : Texas Instruments
Model Number : BQ51013A

2.3 Description of Test Facility

Site Description : Sept. 17, 1998 file on
(No.3 3m Chamber) : Jan 15, 2015 Renewed
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046, USA

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

FCC registration Number : 91789

Site Location : 3F 34Bldg 680 Guiping Rd,
Caohejing Hi-Tech Park,
Shanghai 200233, China

NVLAP Lab Code : 200371-0

2.4 Measurement Uncertainty

Conducted Emission Expanded Uncertainty: $U = 2.8 \text{ dB}$

Radiated Emission Expanded Uncertainty (30-200MHz):

$U = 4.4 \text{ dB}$ (Horizontal)

$U = 4.4 \text{ dB}$ (Vertical)

Radiated Emission Expanded Uncertainty (200M-1GHz):

$U = 4.4 \text{ dB}$ (Horizontal)

$U = 5.5 \text{ dB}$ (Vertical)

3 CONDUCTED EMISSION TEST

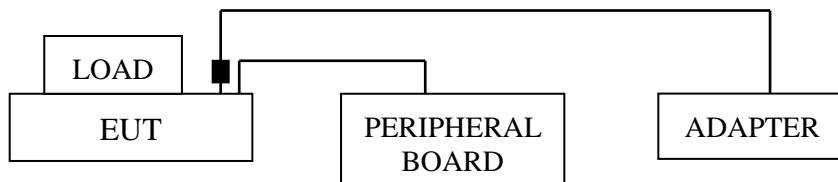
3.1 Test Equipment

The following test equipments are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	101302	Apr 27, 2015	Apr 26, 2016
2.	Artificial Mains Network (AMN)	R&S	ENV4200	100125	Jun 25, 2015	Jun 24, 2016
3.	Software	Audix	E3	6.111206	--	--

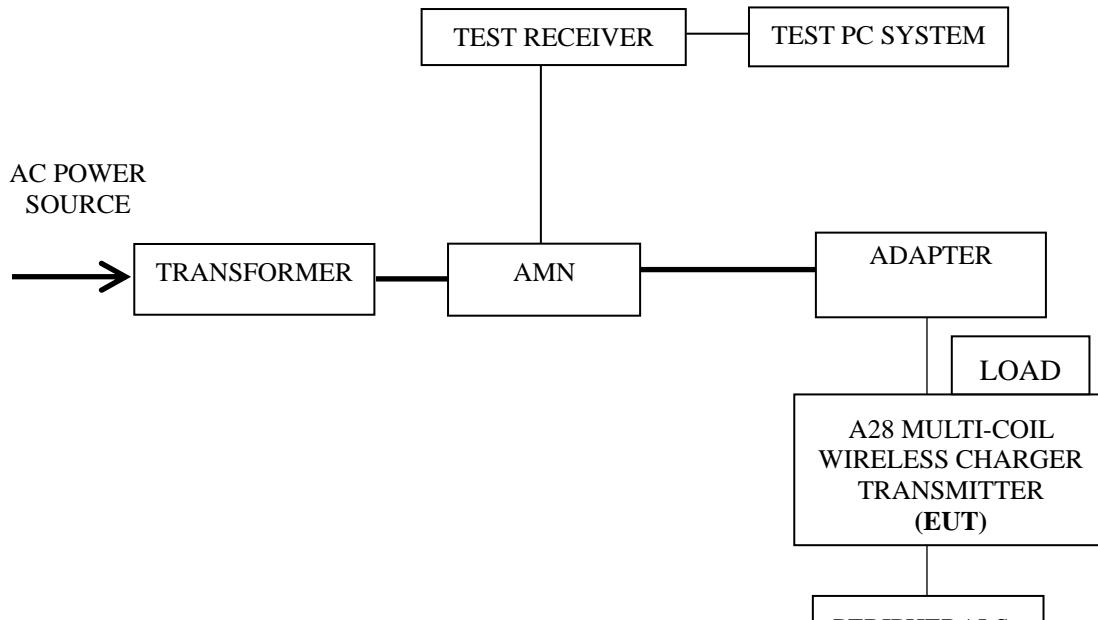
3.2 Block Diagram of Test Setup

3.2.1 EUT & Peripherals



■ : Ferrite core

3.2.2 Conducted Disturbance Test Setup



— : Signal Line

— : Power Line

3.3 Conducted Emission Limit [FCC Part 18 Subpart C 18.307(b)]

Frequency Range (MHz)	Limits dB (μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE 1 – The lower limit shall apply at the transition frequencies.
 NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz

3.4 Test Configuration

The EUT (listed in Sec.2.1) and the peripherals (listed in Sec 2.2) were installed as shown on Sec.3.2 to meet FCC requirement and operating in a manner that tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT and peripherals as shown in Sec. 3.2.

3.5.2 Turn on the power of all equipments and the EUT.

3.5.3 Set the EUT on the test mode and then test.

3.6 Test Procedures

The EUT and peripherals were connected to the power mains through an Artificial Mains Network (AMN). This provided a 50 ohm coupling impedance for the measuring equipment.

Both sides of AC line (Line & Neutral) were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed or manipulated according to MP-5:1986 during conducted emission test.

The bandwidth of R&S Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

The test modes were done on conducted disturbance test and all the test results are listed in Sec. 3.7.

3.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative to the limit is reported. All emissions not reported below are too low against the prescribed limits.

Test Mode	Data Page
Charging	P10

NOTE 1 – Factor = Cable Loss + AMN Factor.

NOTE 2 – Emission Level = Meter Reading + Factor.

NOTE 3 – “QP” means “Quasi-Peak” values, “AV” means “Average” values.

NOTE 4 – The worst emission is detected at 8.612 MHz (Average Value) with corrected signal level of 45.27 dB (μ V) (limit is 50.00 dB (μ V)), when the Line of the Adapter is connected to AMN.

EUT : A28 Multi-coil wireless
 charger Transmitter Temperature : 23°C

 Model No. : WCT-5WTXMULTI Humidity : 52% RH

 Test Mode : Charging Date of Test : Jul 08, 2015

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	0.394	36.89	10.43	47.32	57.97	10.65	QP
	0.695	36.81	10.38	47.19	56.00	8.81	
	1.529	35.50	10.39	45.89	56.00	10.11	
	1.806	34.80	10.40	45.20	56.00	10.80	
	7.639	36.40	10.46	46.86	60.00	13.14	
	8.612	39.10	10.47	49.57	60.00	10.43	
	0.394	18.39	10.43	28.82	47.97	19.15	
	0.695	29.91	10.38	40.29	46.00	5.71	
	1.529	27.20	10.39	37.59	46.00	8.41	
	1.806	27.20	10.40	37.60	46.00	8.40	
Neutral	7.639	31.70	10.46	42.16	50.00	7.84	AV
	8.612	34.80	10.47	45.27	50.00	4.73	
	0.400	34.90	10.41	45.31	57.86	12.55	
	0.695	34.11	10.37	44.48	56.00	11.52	
	1.249	30.60	10.40	41.00	56.00	15.00	
	7.636	34.10	10.54	44.64	60.00	15.36	
	8.197	35.60	10.55	46.15	60.00	13.85	
	8.613	37.00	10.55	47.55	60.00	12.45	
	0.400	20.10	10.41	30.51	47.86	17.35	
	0.695	27.21	10.37	37.58	46.00	8.42	
Neutral	1.249	23.70	10.40	34.10	46.00	11.90	AV
	7.636	29.80	10.54	40.34	50.00	9.66	
	8.197	31.70	10.55	42.25	50.00	7.75	
	8.613	33.50	10.55	44.05	50.00	5.95	

TEST ENGINEER: ERIC TANG

4 RADIATED EMISSION TEST

4.1 Test Equipment

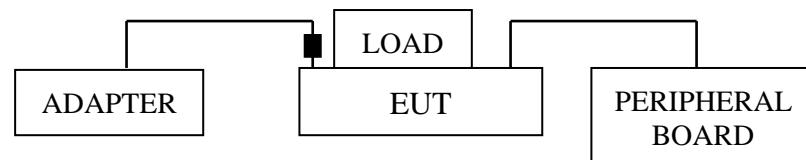
The following test equipments are used during the radiated emission test in a semi-anechoic chamber:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	101303	May 07, 2015	May 06, 2016
2.	Preamplifier	Agilent	8447D	2944A10548	Mar 18, 2015	Sep 17, 2015
3.	Loop Antenna	Schaffner	HLA6120	1193	Apr 13, 2015	Apr 13, 2016
4.	Bi-log Antenna	TESEQ	CBL6112D	23192	Nov 25, 2014	Nov 24, 2015
5.	Spectrum Analyzer	Agilent	E7405A	MY45106600	Apr 27, 2015	Apr 26, 2016
6.	50Ω Coaxial Switch	Anritsu	MP59B	6200426390	Mar 18, 2015	Sep 17, 2016
7.	Software	Audix	E3	6.2007-9-10	--	--

4.2 Block Diagram of Test Setup

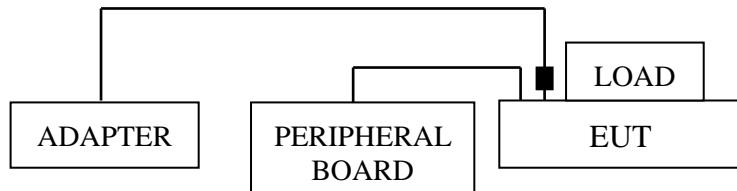
4.2.1 EUT & Peripherals

4.2.1.1 9kHz~30MHz



■ : Ferrite core

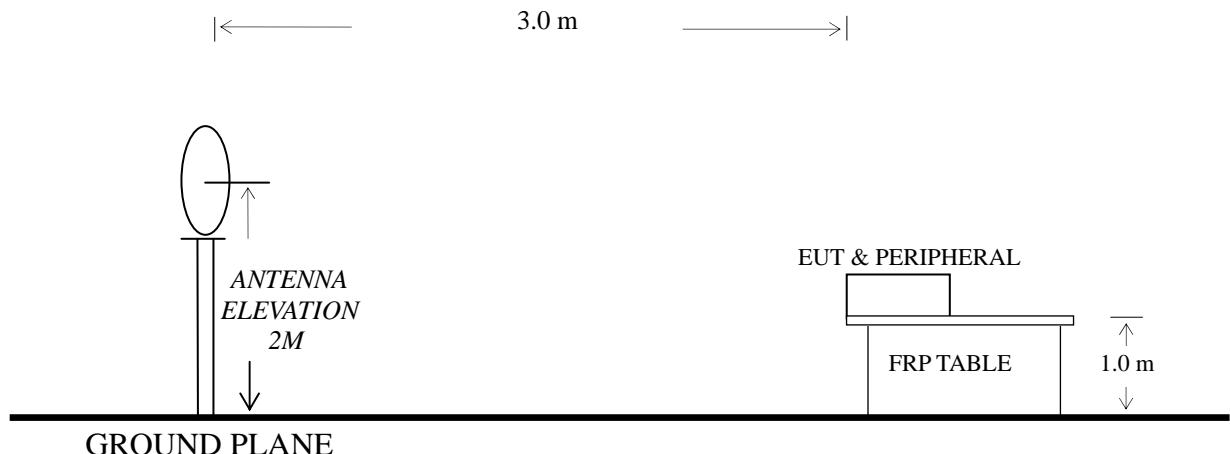
4.2.1.1 30MHz~1GHz



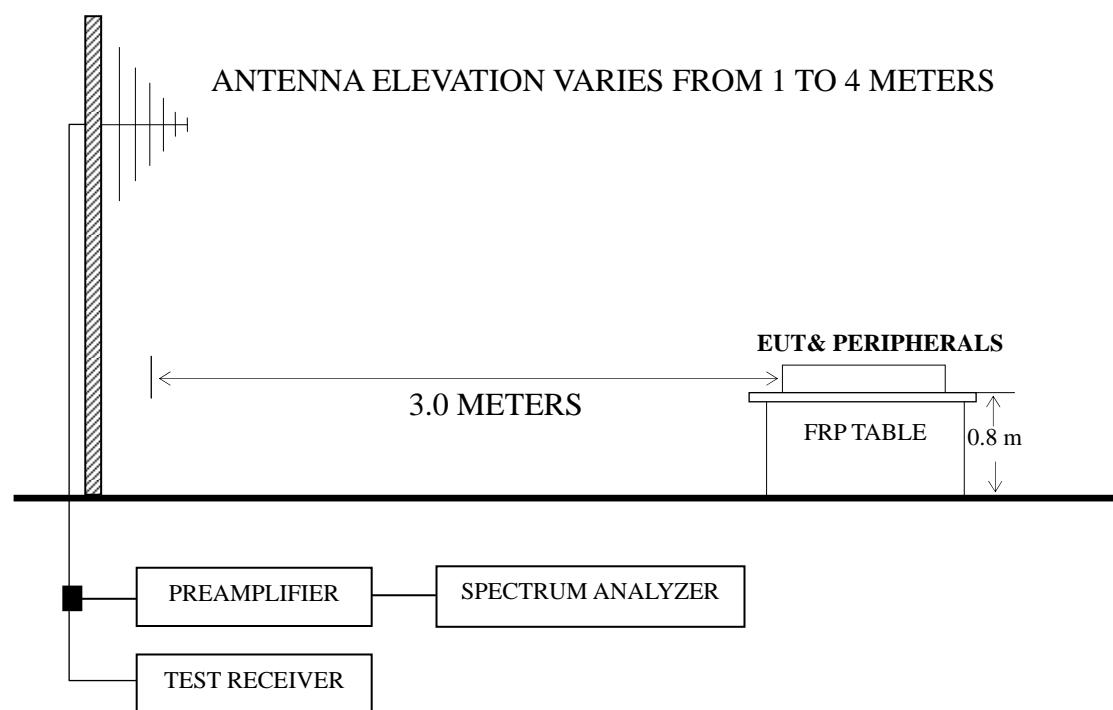
■ : Ferrite core

4.2.2 Radiated emission test setup

For 9kHz to 30MHz



For 30MHz to 1000MHz



█ : 50 ohm Coaxial Switch

4.3 Radiated Emission Limit [FCC Part 18 Subpart C 18.305(b)]

All emanations from Non-ISM frequency devices or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

Frequency (MHz)	Distance (m)	Field Strength Limits (μ V/m)	Converted Field Strength Limits By 3 Meters Measuring Distance dB (μ V/m)
0.009~1000	300	15	63.5

NOTE 1 - Distance refers to the distance in meters between the test antenna and the closed point of any part of the EUT.

NOTE 2 - Audix Technology (Shanghai) Co., Ltd. only has a 3 meters Semi-anechoic Chamber to do the radiated disturbance test, therefore, Audix Shanghai used 3 meters measuring distance and converted limits to judge the EUT compliance with or not.

4.4 Test Configuration

The configuration of the EUT and peripherals are same as those used in conducted emission test.

Please refer to Sec.3.4.

4.5 Operating Condition of EUT

Same as conducted emission test which is listed in Sec.3.5, except for the test setup replaced by Sec.4.2.

4.6 Test Procedures

For 9kHz to 30MHz:

The EUT and peripherals were placed on a table, which is 1.0 meter above ground. Measurements are performed at distance 3.0m with a 0.6m loop antenna as described in 2.2.4 of MP-5. The antenna shall be height 2m above the floor. Both horizontal and vertical polarizations of the antenna were set on measurement.

The bandwidth setting on the test receiver is 200Hz from 9kHz to 150kHz and 9kHz from 150kHz to 30MHz.

For 30MHz to 1000MHz:

The EUT and peripherals were placed on a FRP turntable that is 0.8 meter above ground. The FRP turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. Broadband antenna (Calibrated Bilog Antenna) was used as receiving antenna. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarizations of the antenna were set on measurement.

The I.F. bandwidth of Test Receiver R&S ESCI was set at 120 kHz.

The frequency range from 9kHz to 1000MHz was checked for all test modes.

The test mode was done on radiated disturbance test and all the test results are listed in Sec.4.7.

4.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Test Mode	Data Page
Charging	P15

NOTE 1 – Emission Level = Antenna Factor + Cable Loss + Meter Reading.

NOTE 2 – All readings are Quasi-Peak values.

NOTE 3 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

NOTE 4 – The worst emission was detected at 0.719 MHz with corrected signal level of 52.88 dB (μ V/m) (limit is 63.50 dB (μ V/m)), when the antenna was at horizontal polarization

EUT : A28 Multi-coil wireless
 charger Transmitter Temperature : 22°C

 Model No. : WCT-5WTXMULTI Humidity : 45% RH

 Test Mode : Charging Date of Test : Jul 08, 2015

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)
Horizontal	0.011	17.08	20.44	0.03	37.55	63.50	25.95
	0.016	15.93	20.47	0.03	36.43	63.50	27.07
	0.031	11.37	20.51	0.03	31.91	63.50	31.59
	0.151	5.78	20.58	0.03	26.39	63.50	37.11
	0.719	32.45	20.38	0.05	52.88	63.50	10.62
	2.487	16.04	20.60	0.06	36.70	63.50	26.80
	34.037	1.65	16.40	0.68	18.73	40.00	21.27
	100.934	4.66	12.34	1.33	18.33	43.50	25.17
	164.908	19.46	11.30	1.75	32.51	43.50	10.99
	230.099	21.70	11.20	2.09	34.99	46.00	11.01
Vertical	291.036	9.62	13.60	2.52	25.74	46.00	20.26
	965.542	1.59	22.33	4.75	28.67	46.00	17.33
	0.013	21.52	20.47	0.03	42.02	63.50	21.48
	0.023	15.62	20.47	0.03	36.12	63.50	27.38
	0.031	12.60	20.51	0.03	33.14	63.50	30.36
	0.047	7.15	20.47	0.03	27.65	63.50	35.85
	0.182	8.06	20.12	0.03	28.21	63.50	35.29
	0.719	14.33	20.38	0.05	34.76	63.50	28.74
	30.962	7.24	18.15	0.64	26.03	40.00	13.97
	49.014	15.75	8.25	0.80	24.80	40.00	15.20

TEST ENGINEER: BILL WU

5 DEVIATION TO TEST SPECIFICATIONS

None.