



Test Report

FCC Part15.225

Product Name : DECK
Model No. : EQ700
FCC ID : IHDT6PB1

Applicant : Motorola Mobility, LLC.
Address : 8000 W. Sunrise Blvd, Suite A Plantation,
FL 33322, USA

Date of Receipt : 21/06/2013
Test Date : 22/06/2013~19/07/2013
Issued Date : 23/07/2013
Report No. : 136S051R-RF-US-P05V01
Report Version : V1.1

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :
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1. General Information

1.1. EUT Description

Product	DECK
Brand Name	Motorola
Model No.	EQ700
Working Voltage	DC 3.7V
NFC Function	13.56MHz
Antenna Type	Loop Antenna
Bluetooth Specification	3.0HS + Version 4.0
Frequency Range	2402- 2480 MHz
Channel Number	V3.0+HS: 79 V4.0: 40
Channel Separation	1MHz
Type of Modulation	V3.0+HS: GFSK, Pi/4 DQPSK, 8DPSK V4.0: GFSK
Data Rate	V3.0+HS: 1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps (8DPSK) V4.0: 1Mbps(GFSK)
Antenna Type	PCB printed antenna
Peak Antenna Gain	Reference to Antenna List
Component	
AC Adapter	Manufacturer: Ten Pao Industrial Co., Ltd M/N: S006ABD0500115 Input: 100-240V~50/60Hz 0.2A Output: 5Vdc, 1150mA

Bluetooth Antenna List

Antenna	Manufacturer	Peak Gain
PCB printed antenna	Goertek	2.4GHz: -2.08dBi

1.2. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in Mode 1: Transmit, which was shown in this test report and defined as:

Test Mode
Mode 1: NFC Transmit

Note:

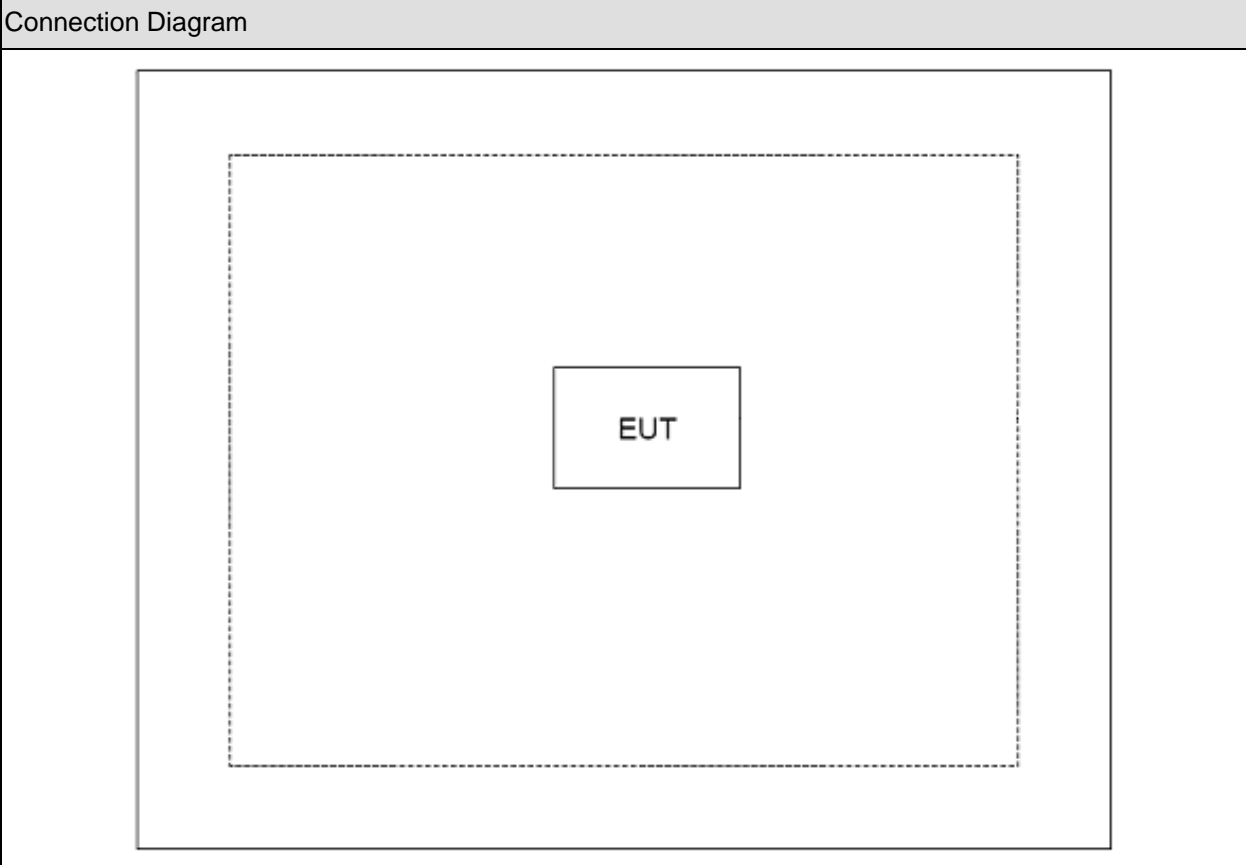
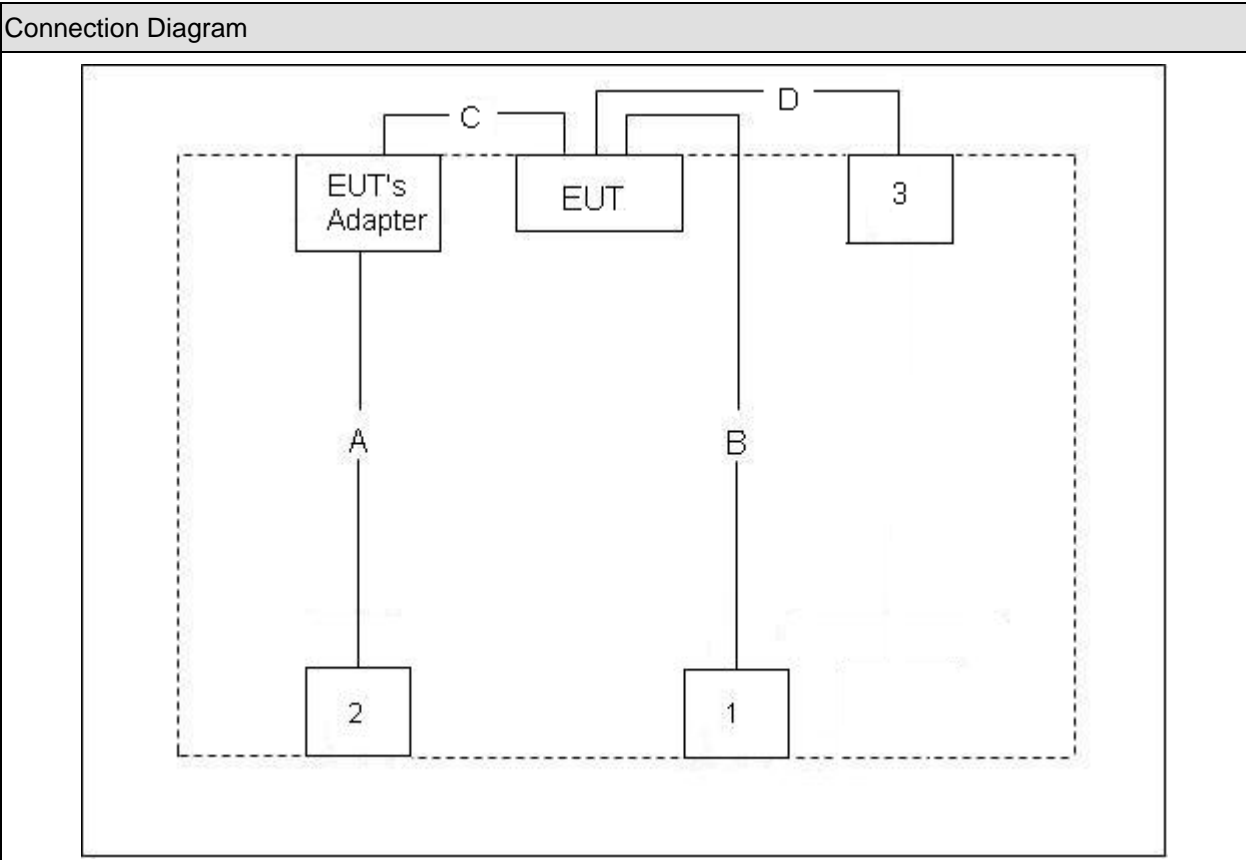
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 iPod	Apple	A1199	7J71085BVQ5	Power by EUT
2 iPod	Apple	A1199	7J7107WUVQ5	Power by EUT
3 DECK	Motorola	EQ700	N/A	N/A

1.4. Configuration of Tested System



Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 1.0m
B	USB Cable	Shielded, 1.0m
C	USB Cable	Shielded, 1.0m
D	Audio Cable	Shielded, 1.0m

1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of equipment.
3	Make the EUT work on "NFC" mode.

2. Technical Test

2.1. Summary of Test Result

- No deviations from the test standards
- Deviations from the test standards as below description:

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.207	Yes	No
In-Band Emission	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.225(a),(b),(c)	Yes	No
Out-Band Emission	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.225(d)	Yes	No
20dB Bandwidth	FCC CFR Title 47 Part 2 Subpart J: 2012 2.1049	Yes	No
Frequency Stability Tolerance	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.225(e)	Yes	No

2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

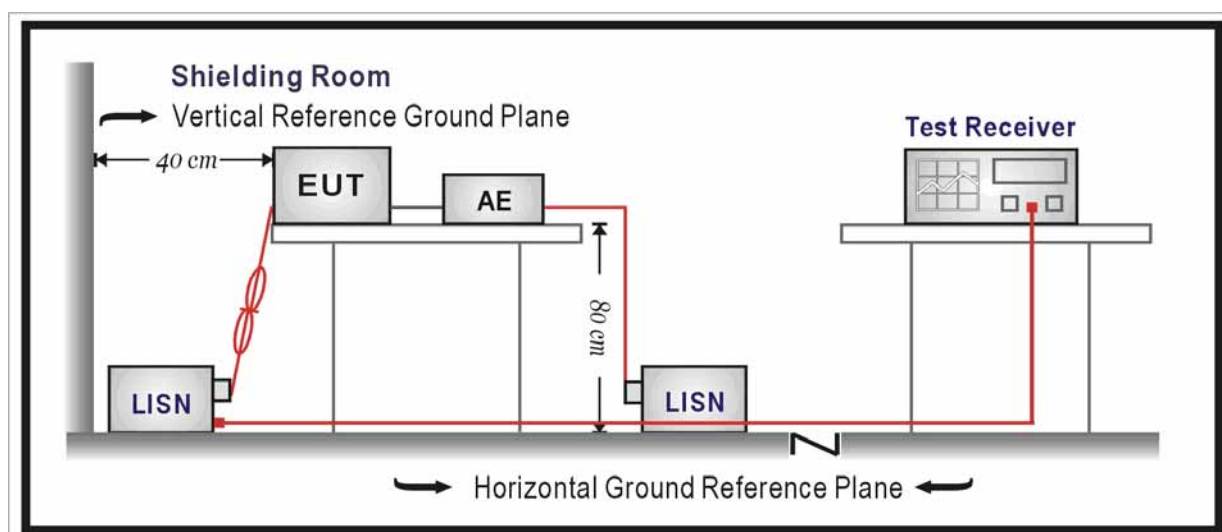
3.1. Test Equipment

Conducted Emission / TR-1

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100726	2014.03.30
Two-Line V-Network	R&S	ENV216	100043	2014.03.30
Two-Line V-Network	R&S	ENV216	100044	2013.09.17
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2014.03.01
50ohm Termination	SHX	TF2	07081401	2013.09.17
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2014.01.10

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

3.2. Test Setup



3.3. Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 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 to 0.5 MHz.

3.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2009 and tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

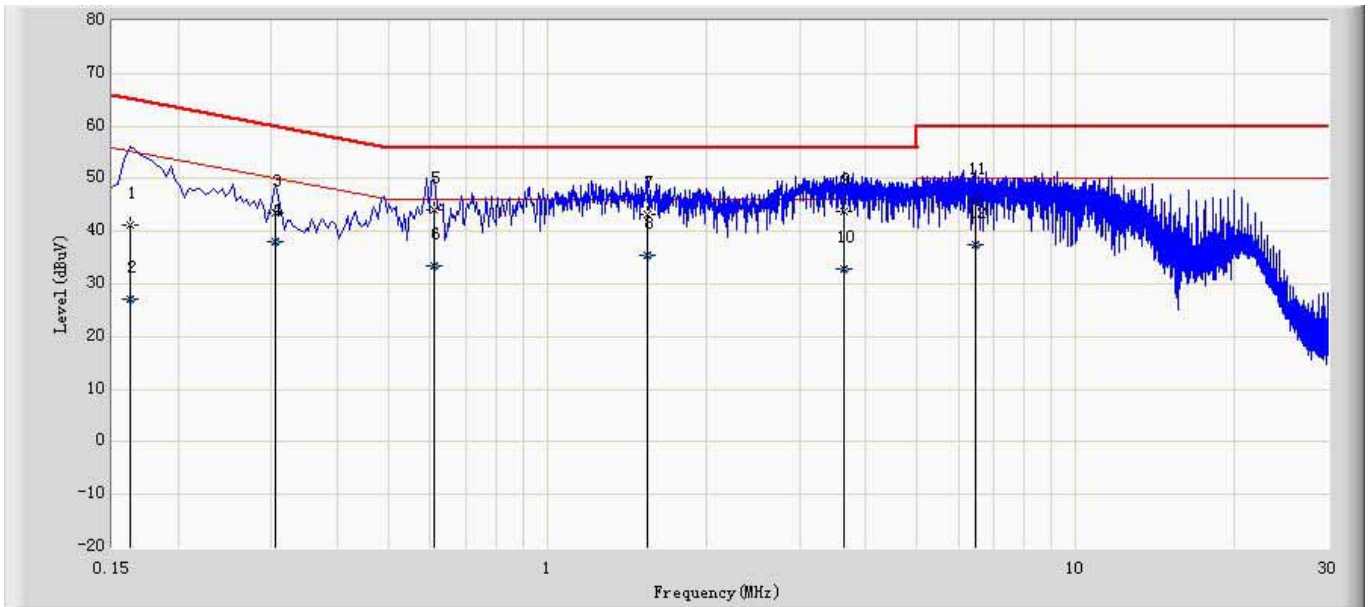
The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

3.5. Uncertainty

The measurement uncertainty is defined as ± 2.02 dB

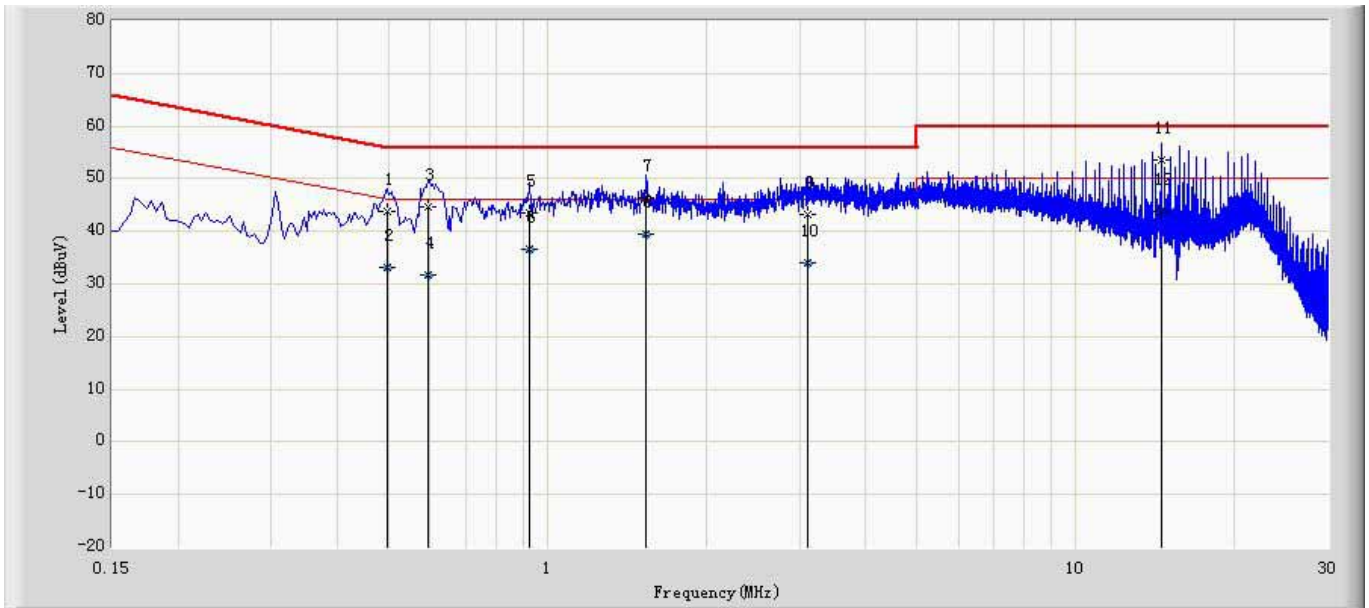
3.6. Test Result

Engineer: Milo	
Site: TR5	Time: 2013/07/19 - 17:00
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Neutral
EUT: DECK	Power: AC 120V/60Hz
Note: Mode1: NFC Transmit	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.162	41.278	31.312	-24.083	65.361	9.967	QP
2		0.162	27.159	17.192	-28.202	55.361	9.967	AV
3		0.306	43.548	33.640	-16.530	60.078	9.909	QP
4		0.306	37.954	28.045	-12.125	50.078	9.909	AV
5		0.610	44.104	34.169	-11.896	56.000	9.935	QP
6		0.610	33.571	23.637	-12.429	46.000	9.935	AV
7		1.542	43.158	33.160	-12.842	56.000	9.998	QP
8	*	1.542	35.403	25.406	-10.597	46.000	9.998	AV
9		3.646	43.822	33.800	-12.178	56.000	10.022	QP
10		3.646	32.922	22.900	-13.078	46.000	10.022	AV
11		6.458	45.745	35.600	-14.255	60.000	10.145	QP
12		6.458	37.345	27.200	-12.655	50.000	10.145	AV

Engineer: Milo	
Site: TR5	Time: 2013/07/19 - 17:10
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Line
EUT: DECK	Power: AC 120V/60Hz
Note: Mode1: NFC Transmit	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.498	43.912	34.037	-12.121	56.033	9.875	QP
2		0.498	33.211	23.336	-12.822	46.033	9.875	AV
3		0.594	44.597	34.740	-11.403	56.000	9.857	QP
4		0.594	31.658	21.801	-14.342	46.000	9.857	AV
5		0.926	43.569	33.771	-12.431	56.000	9.799	QP
6		0.926	36.497	26.699	-9.503	46.000	9.799	AV
7		1.538	46.509	36.703	-9.491	56.000	9.806	QP
8		1.538	39.540	29.735	-6.460	46.000	9.806	AV
9		3.102	43.321	33.500	-12.679	56.000	9.821	QP
10		3.102	34.021	24.200	-11.979	46.000	9.821	AV
11		14.538	53.619	43.600	-6.381	60.000	10.019	QP
12	*	14.538	43.719	33.700	-6.281	50.000	10.019	AV

4. In-band Emission

4.1. Test Equipment

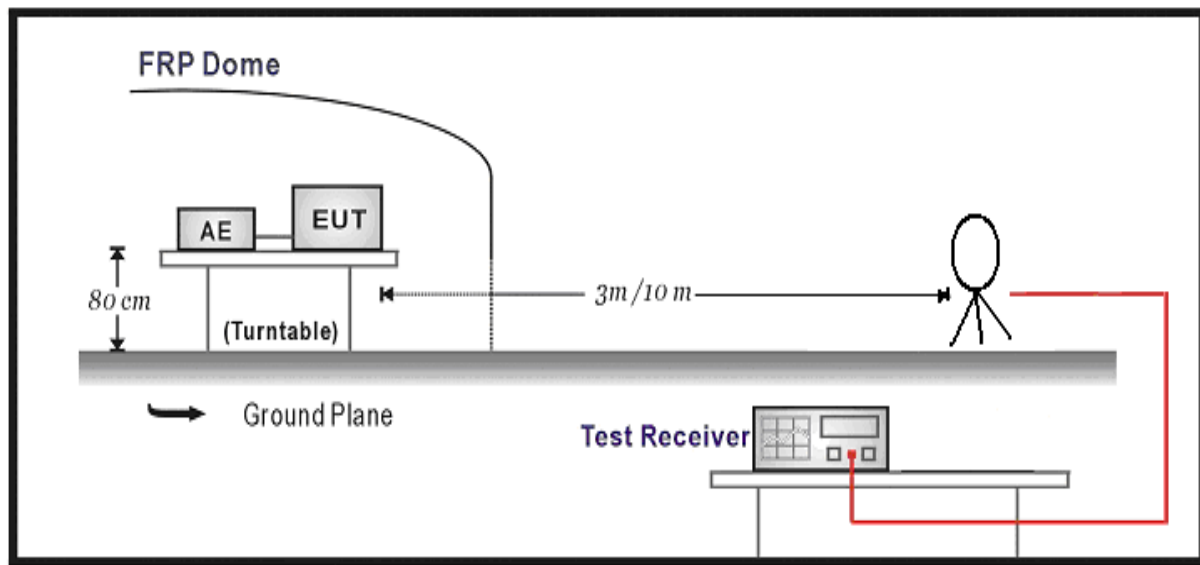
In-band Emission / AC-2

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2014.04.30
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2013.10.15
Loop Antenna	R&S	HFH2-Z2	833799/003	2013.11.17
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2014.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2014.05.08

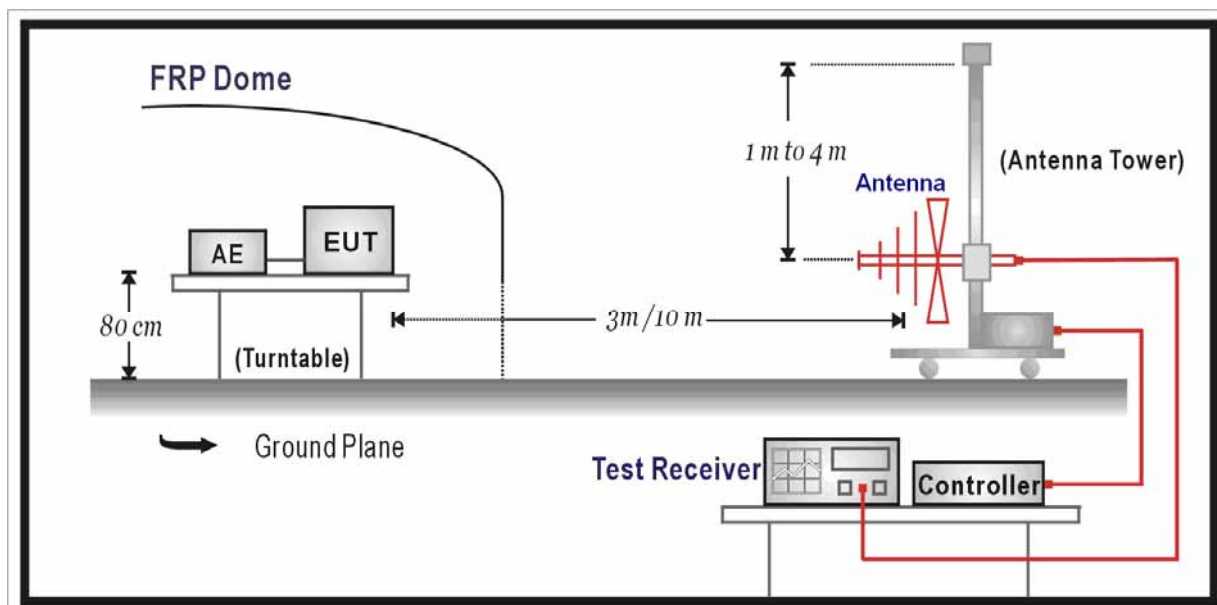
Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

4.2. Test Setup

Below 30MHz Test Setup:



Below 1GHz Test Setup:



4.3. Limit

FCC Part 15 Subpart C Paragraph 15.225		
Frequency (MHz)	Distance (m)	Level (uV/m)
13.553 ~13.567	30	15,848
13.410 ~13.553 13.567 ~13.710	30	334.5
13.110 ~13.410 13.710 ~14.010	30	106

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2009 and tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2009 on radiated measurement.

The EUT should be operate in transmission mode.

4.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
below 1G is defined as ± 3.8 dB

4.6. Test Result

All of the test result shown indicates the worst case.

Frequency: 13.56MHz

Measurement Distance: 3 Meters

Face On					
Frequency	Reading Level(dBuV/m)	Factor	Measure Level(dBuV/m)	Limit(3m) [dBuV/m]	Margin [dB]
13.163	8.61	21.04	29.65	80.51	-50.86
13.437	8.57	21.08	29.65	90.47	-60.82
13.538	8.79	21.09	29.89	90.47	-60.59
13.560	17.23	21.09	38.32	124.00	-85.68
13.698	8.76	21.12	29.88	90.47	-60.59
Face Off					
Frequency	Reading Level(dBuV/m)	Factor	Measure Level(dBuV/m)	Limit(3m) [dBuV/m]	Margin [dB]
13.210	9.58	21.05	30.63	80.51	-49.88
13.450	7.46	21.08	28.54	90.47	-61.93
13.557	12.49	21.09	33.58	124.00	-90.42
13.568	10.57	21.10	31.67	90.47	-58.80
13.693	9.21	21.12	30.33	90.47	-60.14

Notes:

1. All measurements were performed using a loop antenna. The antenna was positioned in two orthogonal (face on and face off) and the position with the highest emission level was recorded.
2. Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear extrapolation factor (40 dB/decade) as specified in &15.31(f)(2).

$$\text{Extrapolation Factor} = 40 * \text{LOG}(30/3) = 40 \text{ dB}$$
3. All measurements were recorded using a EMI test receiver employing a peak detector.

5. Out-band Spurious

5.1. Test Equipment

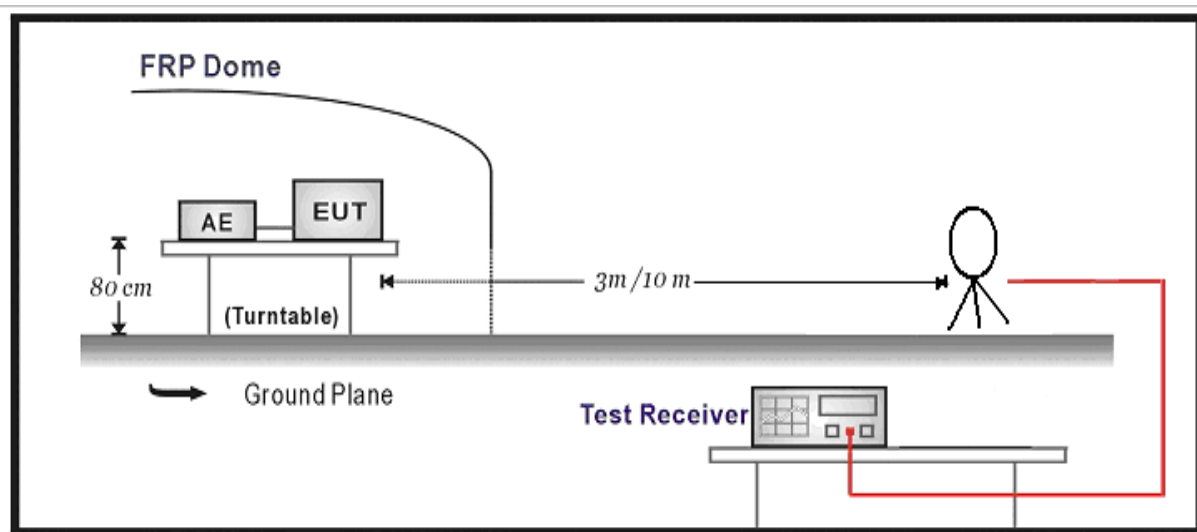
Out-band Emission / AC-2

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2014.04.30
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2013.10.15
Loop Antenna	R&S	HFH2-Z2	833799/003	2013.11.17
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2014.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2014.05.08

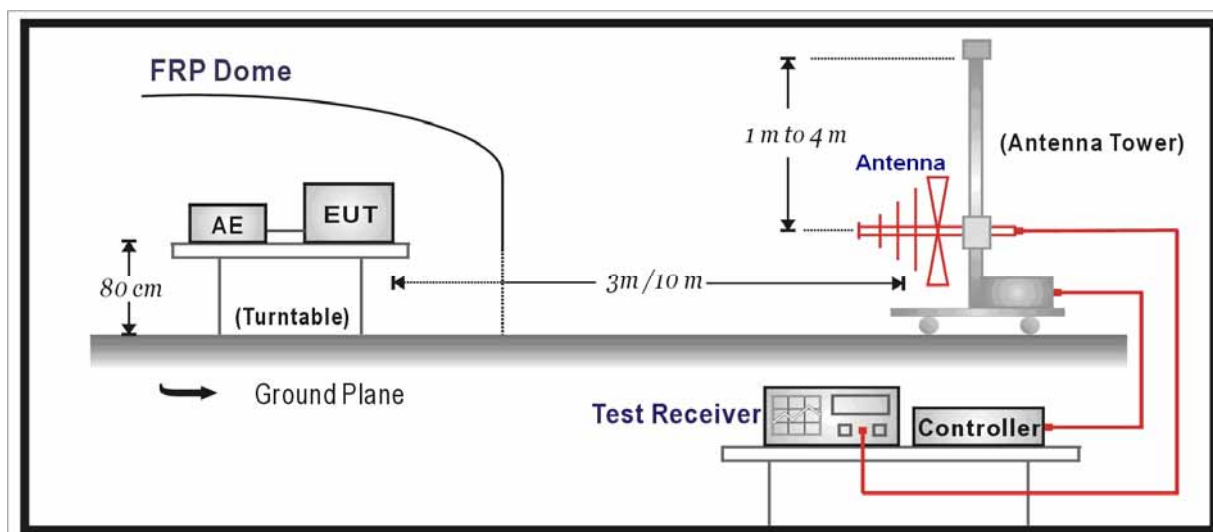
Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

5.2. Test Setup

Below 30MHz Test Setup:



Below 1GHz Test Setup:



5.3. Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Distance (m)	Level (uV/m)
0.009 – 0.490	300	2400/F (kHz)
0.490 – 1.705	30	2400/F (kHz)
1.705 – 30	30	30
30 - 88	3	100
88 - 216	3	150
216 - 960	3	200
Above 960	3	500

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

5.4. Test Procedure

The EUT was tested from 9kHz up to the 1GHz excluding the band 13.110-14.010 MHz. All measurements were recorded with a spectrum analyzer employing an average detector for emissions below 30MHz. Above 30MHz a Quasi-peak detector was used. All out-of-band emissions must not exceed the limits shown as stated per Section 15.209. A loop antenna was used for searching for emissions below 30MHz.

5.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

5.6. Test Result

All of the test result shown indicates the worst case.

Measure Level = Reading Level +Factor.

Below 30MHz

Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Face On						
27.12	6.28	21.16	27.44	69.54	-42.10	QP
Face Off						
27.12	4.97	21.16	26.13	69.54	-43.41	QP

Above 30MHz

Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.364	4.77	24.19	28.96	40	-11.04	QP
H	37.033	5.58	20.34	25.92	40	-14.08	QP
H	41.882	5.86	17.74	23.60	40	-16.40	QP
H	119.846	5.71	18.74	24.45	43.5	-19.05	QP
H	252.251	5.04	19.62	24.66	46	-21.34	QP
H	407.33	4.83	24.18	29.01	46	-16.99	QP
V	30.849	5.30	23.85	29.15	40	-10.85	QP
V	32.061	5.64	23.03	28.67	40	-11.33	QP
V	38.245	5.21	19.67	24.88	40	-15.12	QP
V	96.566	5.53	16.88	22.41	43.5	-21.09	QP
V	122.029	5.24	18.76	24.00	43.5	-19.50	QP
V	346.341	6.38	22.05	28.43	46	-17.57	QP

6. 20dB Bandwidth

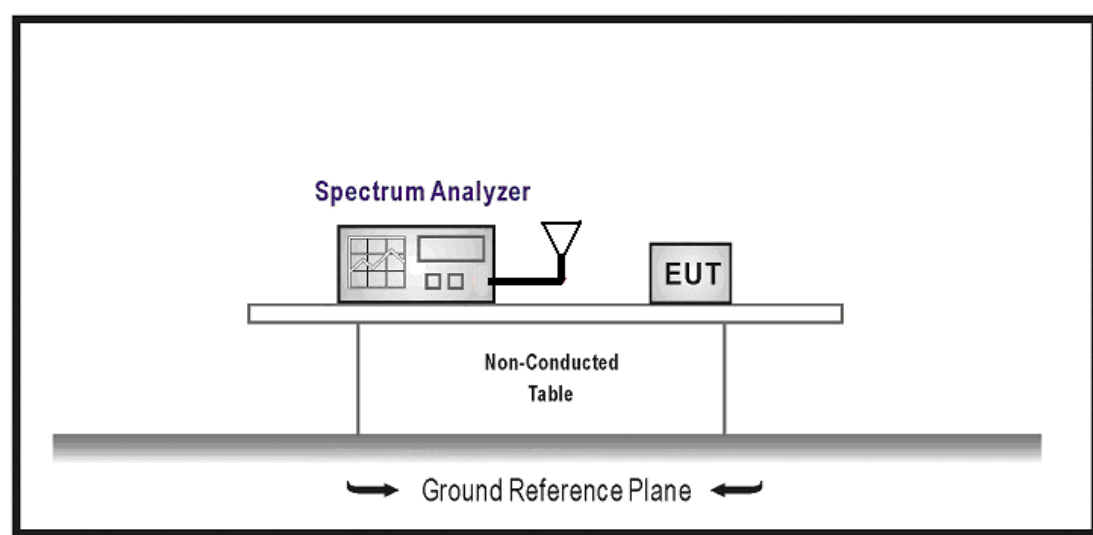
6.1. Test Equipment

20dB Bandwidth / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2014.05.08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

6.2. Test Setup



6.3. Limit

N/A

6.4. Test Procedure

The 20dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

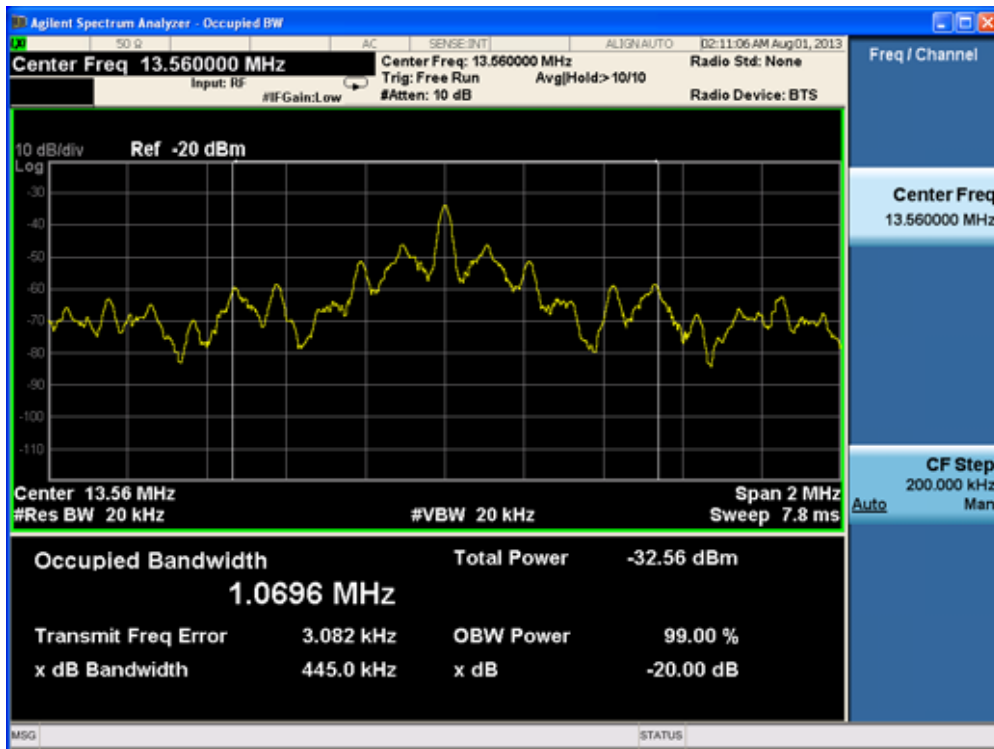
6.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB

6.6. Test Result

Product	:	DECK
Test Item	:	20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit

Frequency (MHz)	20dB Occupied Bandwidth(kHz)	99% Occupied Bandwidth(kHz)
13.56	445.0	1069.6



7. Frequency Tolerance

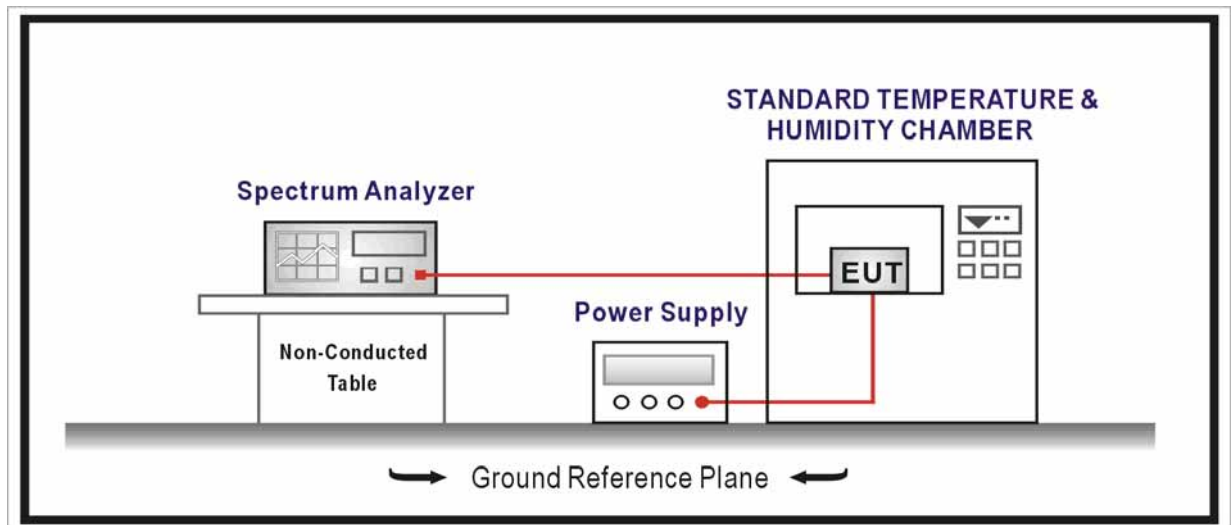
7.1. Test Equipment

Frequency Tolerance / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2013/11/10
Power Sensor	Anritsu	MA2411B	0846014	2013/11/10
DC Power Supply	IDRC	CD-035-020PR	977272	2013/09/17
Programmable Temperature & Humidity Chamber	Gaoyu	TH-1P-B	WIT-05121302	2014/01/10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2014/05/08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

7.2. Test Setup



7.3. Limit

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

7.4. Test Procedure

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

7.5. Uncertainty

The measurement uncertainty is defined as ± 1 kHz

7.6. Test Result

Product	:	DECK
Test Item	:	Transmitter carrier output levels
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit

Operating Frequency: 13.56MHz					
Reference Voltage: 3.7Vdc					
Deviation Limit: +/- 0.01% = 1356Hz					
Voltage (%)	Power Battery	TEMP (°C)	FREQ. (Hz)	FREQ.Dev. (Hz)	Deviation (%)
100%	3.70	+25(Ref)	13,560,466	466	0.003436
100%		-10	13,560,466	466	0.003436
100%		0	13,560,468	468	0.003451
100%		+10	13,560,467	467	0.003444
100%		+20	13,559,467	467	0.003444
100%		+30	13,560,467	467	0.003444
100%		+40	13,560,467	467	0.003444
100%		+50	13,559,467	467	0.003444
85%	3.20	+20	13,560,466	466	0.003436
115%	4.20	+20	13,560,467	467	0.003444

The End