

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**Product Name:** CDMA TSI11

**Brand Name:** N/A

**Model No.:** TSI11

**Model Differences:** N/A

**FCC ID:** YUW-TSI11

**Report No.:** EH/2011/60015

**Issue Date:** July 12, 2011

**FCC Rule Part:** §15.225

**Prepared for:** Fujitsu Toshiba Mobile Communications Limited  
1-1, Kamiodanaka 4, Nakahara, Kawasaki, 211-8588,  
JAPAN

**Prepared by:** SGS Taiwan Ltd.  
Electronics & Communication Laboratory  
No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei  
County, Taiwan



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## VERIFICATION OF COMPLIANCE

**Applicant:** Fujitsu Toshiba Mobile Communications Limited  
1-1, Kamiodanaka 4, Nakahara, Kawasaki, 211-8588, JAPAN

**Equipment Under Test:** CDMA TSI11

**FCC ID:** YUW-TSI11

**Brand Name:** N/A

**Model No.:** TSI11

**Model Difference:** N/A

**File Number:** EH/2011/60015

**Date of Test:** June 06, 2011 ~ July 11, 2011

**Date of EUT Received:** June 06, 2011

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.225

The test results of this report relate only to the tested sample identified in this report.

Test By:

Jazz Huang

Date:

July 12, 2011

Jazz Huang / Engineer

Prepared By:

Celine Chou

Date:

July 12, 2011

Celine Chou / Clerk

Approved By

Jim Chang

Date:

July 12, 2011

Jim Chang / Supervisor

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## Version

Version No.	Date	Description
00	July 12, 2011	Initial creation of document

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## Table of Contents

<b>1</b>	<b>GENERAL INFORMATION .....</b>	<b>5</b>
1.1	PRODUCT DESCRIPTION .....	5
1.2	RELATED SUBMITTAL(S) / GRANT (S).....	5
1.3	TEST METHODOLOGY .....	6
1.4	TEST FACILITY .....	6
1.5	SPECIAL ACCESSORIES .....	6
1.6	EQUIPMENT MODIFICATIONS .....	6
<b>2</b>	<b>SYSTEM TEST CONFIGURATION .....</b>	<b>7</b>
2.1	EUT CONFIGURATION .....	7
2.2	EUT EXERCISE.....	7
2.3	TEST PROCEDURE .....	7
2.4	LIMITATION.....	8
2.5	CONFIGURATION OF TESTED SYSTEM .....	10
<b>3</b>	<b>SUMMARY OF TEST RESULTS.....</b>	<b>11</b>
<b>4</b>	<b>DESCRIPTION OF TEST MODES.....</b>	<b>11</b>
<b>5</b>	<b>CONDUCTED EMISSIONS TEST.....</b>	<b>12</b>
5.1	MEASUREMENT PROCEDURE: .....	12
5.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	12
5.3	MEASUREMENT EQUIPMENT USED:.....	12
5.4	MEASUREMENT RESULT: .....	12
<b>6</b>	<b>RADIATED EMISSION TEST .....</b>	<b>15</b>
6.1	MEASUREMENT PROCEDURE .....	15
6.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	15
6.3	MEASUREMENT EQUIPMENT USED:.....	16
6.4	FIELD STRENGTH CALCULATION .....	16
6.5	MEASUREMENT RESULT .....	17
<b>7</b>	<b>FREQUENCY TOLERANCE .....</b>	<b>20</b>
7.1	MEASUREMENT PROCEDURE .....	21
7.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	21
7.3	MEASUREMENT EQUIPMENT USED:.....	21
7.4	MEASUREMENT RESULTS .....	21
	<b>APPENDIX 1 PHOTOGRPHS OF SET UP.....</b>	<b>23</b>
	<b>APPENDIX 2 PHOTOGRPHS OF EUT .....</b>	<b>26</b>

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## 1 GENERAL INFORMATION

### 1.1 Product Description

Product Name	CDMA TSI11	
Brand Name	N/A	
Model Name	TSI11	
Model Difference	N/A	
Hardware Version:	CS1.0	
Software Version:	6002.0102.0061	
Power Supply	3.9 Vdc re-chargeable battery	
	Battery:	Model No.: 1UF42426F-TB, Supplier: SANYO

#### RFID:

Operating Frequency	13.56MHz
Transmit Power	< 123dBuV/m at 3m.
Number of Channels	1
Operating Mode	Point-to-Point
Antenna Type	Loop Antenna
Module Type	ASK

This report applies for RFID.

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## 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **YUW-TSI11** filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.

## 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance 3 meters.

## 1.4 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-04.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

## 1.5 Special Accessories

Not available for this EUT intended for grant.

## 1.6 Equipment Modifications

Not available for this EUT intended for grant.

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## 2 System Test Configuration

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. the Tx frequency was fixed which was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

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## 2.4 Limitation

### (1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range MHz	Limits dB (uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note		
1.The lower limit shall apply at the transition frequencies		
2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

### (2) Radiated Emission

- The field strength of any emission within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- The field strength of any emissions appearing outside of the 13.110-14.010 MHz shall not exceed the general radiated emission limits in section 15.209(Intentional Radiators general limit).as below.

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance (m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

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- Remark:
1. Emission level in dBuV/m=20 log (uV/m)
  2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
  3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of  $\xi$  15.205
  4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of  $\xi$  15.205, then the general radiated emission limits in  $\xi$  15.209 apply.

### (3) Frequency Tolerance

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

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## 2.5 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**

EUT

**Table 2-1 Equipment Used in Tested System**

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	N/A					

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### 3 Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207	Conducted Emission	Compliant
§15.225 (a)-(d)	Radiated Emission	Compliant
§15.225 (e)	Frequency Stability	Compliant

### 4 Description of test modes

The EUT was tested when placed horizontally on the EUT table as on a counter, and also when placed vertically on the table as when mounted on a wall. This report shows the results from testing in the worst-case emission configuration

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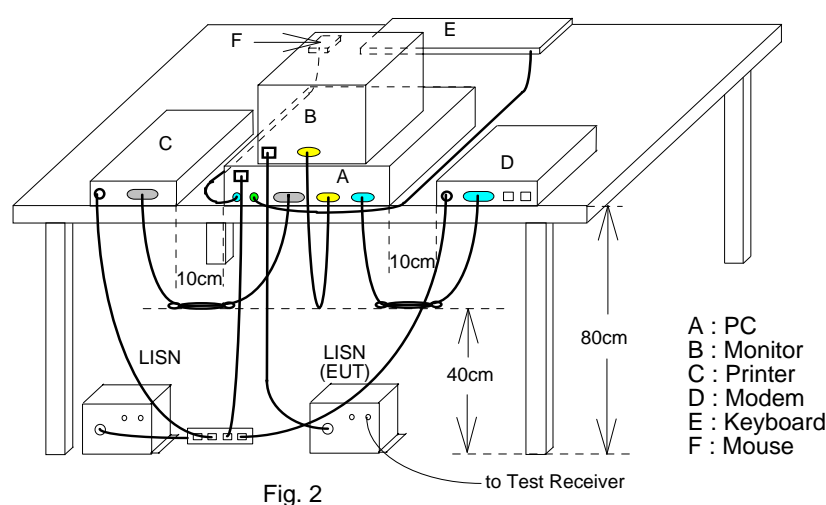
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## 5 Conducted Emissions Test

### 5.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### 5.2 Test SET-UP (Block Diagram of Configuration)



### 5.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	828985/004	09/23/2010	09/22/2011
LISN	Rolf-Heine	NNB-2/16Z	99012	03/31/2011	03/30/2012
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/31/2011	03/30/2012
Coaxial Cables	N/A	WK CE Cable	N/A	11/28/2010	11/27/2011

### 5.4 Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peak.

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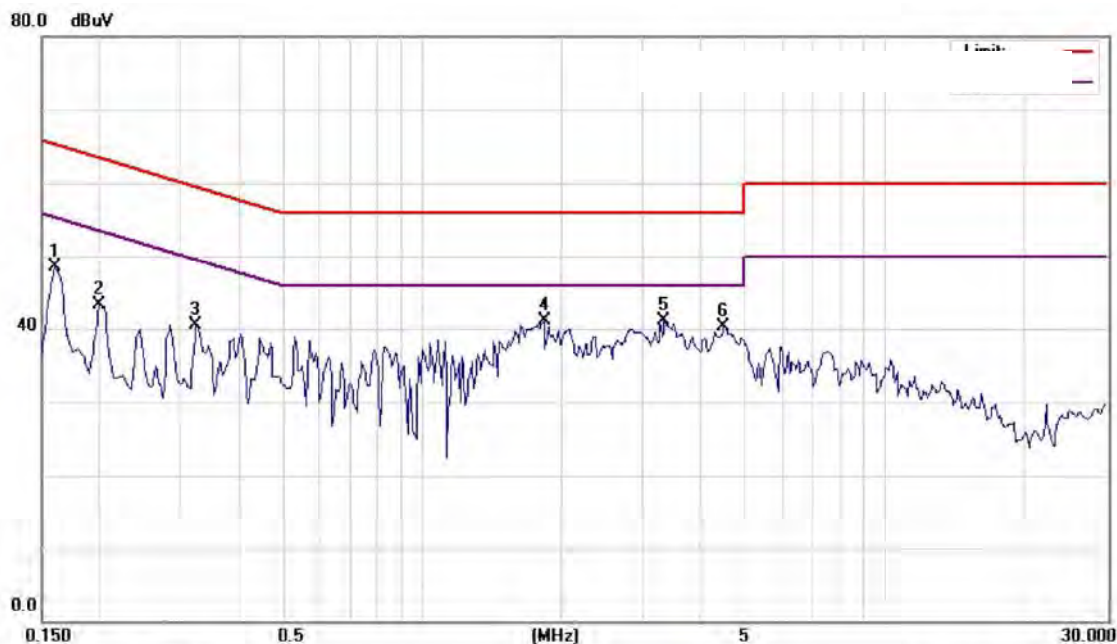
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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	RFID Mode	Test Date:	July 11, 2011
		Test By:	Jazz



Site SGS CONDUCTED #1

Limit: FCC Class B Conduction(QP)

EUT: CDMA TSI11

M/N: TSI11

Note: RFID mode

Phase: L1

Power: AC 120V/60Hz

Distance:

Temperature: 26 °C

Humidity: 59%

Air Pressure: hpa

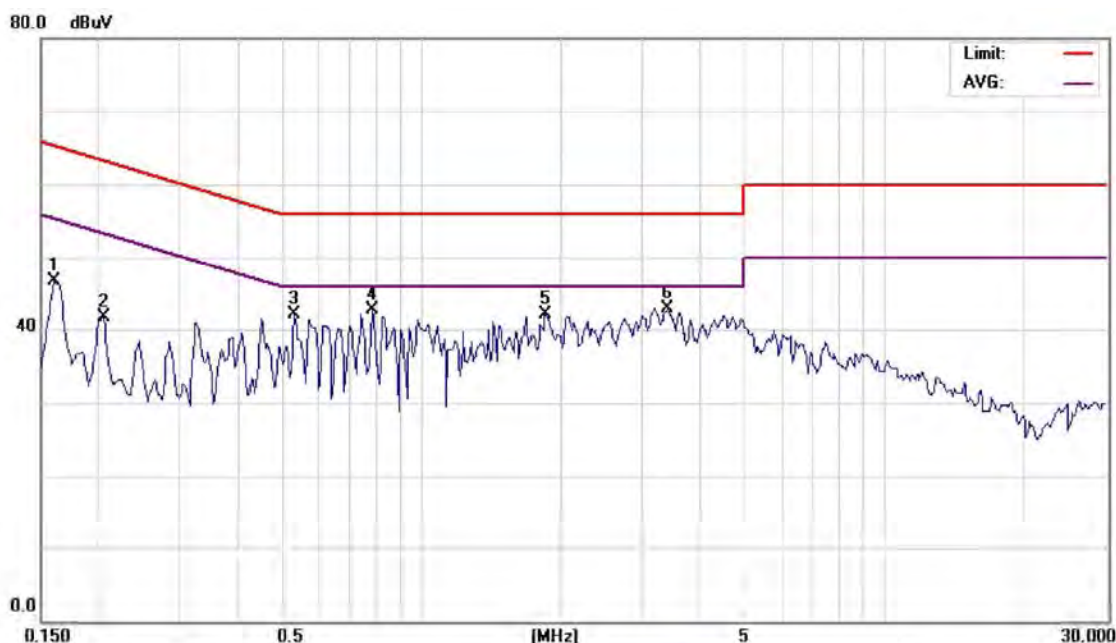
No.	Mk.	Freq.	Reading Level	Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBμV	dB	dBμV	dBμV	dB		
1		0.1600	48.47	0.13	48.60	65.46	-16.86	peak	
2		0.2000	43.13	0.12	43.25	63.61	-20.36	peak	
3		0.3250	40.40	0.11	40.51	59.58	-19.07	peak	
4	*	1.8300	40.96	0.14	41.10	56.00	-14.90	peak	
5		3.3400	40.94	0.16	41.10	56.00	-14.90	peak	
6		4.4900	40.05	0.17	40.22	56.00	-15.78	peak	

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Site SGS CONDUCTED #1

Phase: **N**

Temperature: 26 °C

Limit: FCC Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 59%

EUT: CDMA TSI11

Distance:

Air Pressure: hpa

M/N: TSI11

Note: RFID mode

No.	Mk.	Freq. MHz	Reading Level dBuV	Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1600	46.60	0.18	46.78	65.46	-18.68	peak	
2		0.2050	41.56	0.16	41.72	63.41	-21.69	peak	
3		0.5300	41.91	0.16	42.07	56.00	-13.93	peak	
4		0.7800	42.55	0.15	42.70	56.00	-13.30	peak	
5		1.8483	41.92	0.18	42.10	56.00	-13.90	peak	
6	*	3.4000	42.69	0.20	42.89	56.00	-13.11	peak	

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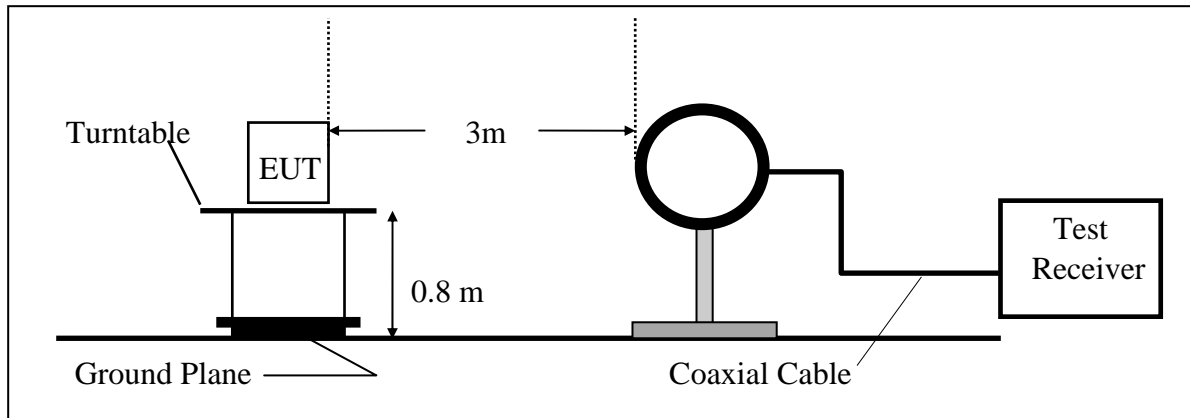
## 6 Radiated Emission Test

### 6.1 Measurement Procedure

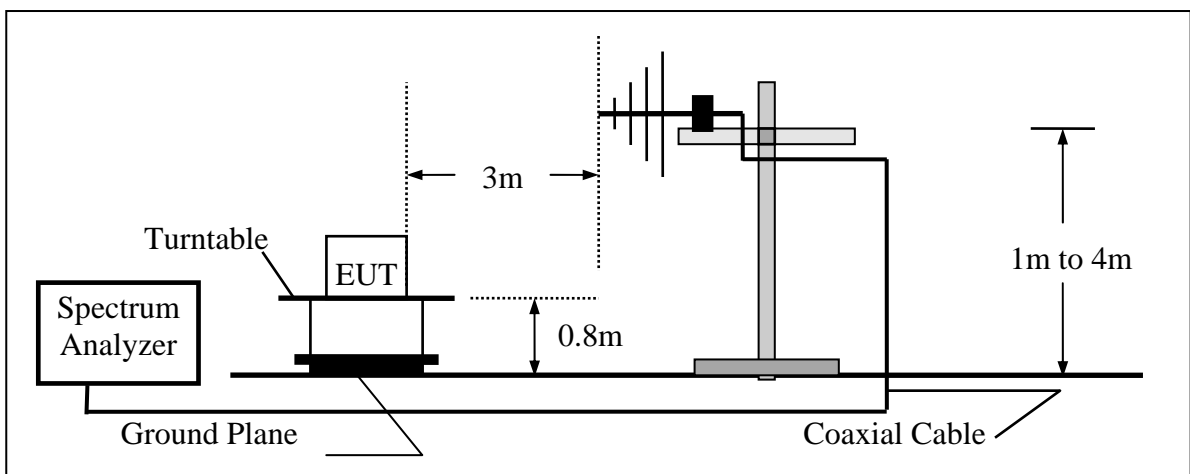
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

### 6.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



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### 6.3 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	03/30/2011	03/29/2012
Bilog Antenna	SCHWAZBECK	VULB9160	3136	11/19/2010	11/18/2011
Horn antenna	SCHWAZBECK	BBHA 9120D	309/320	01/22/2010	01/21/2012
Pre-Amplifier	Agilent	8447D	1937A02834	11/28/2010	11/27/2011
Pre-Amplifier	Agilent	8449B	3008A01973	01/05/2011	01/04/2012
Radio Communication Analyzer	R & S	CMU200	102189	08/12/2010	08/11/2012
DC Block	Agilent	BLK-18	155452	01/05/2011	01/04/2012
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	01/05/2011	01/04/2012
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2011	01/04/2012
3m Site	SGS	966 chamber	N/A	09/06/2010	09/05/2011

### 6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

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## 6.5 Measurement Result

Operation Mode: Transmitting Mode  
 Fundamental Frequency: 13.56 MHz  
 Temperature : 25 °C  
 Humidity : 65 %

Test Date : July 11, 2011  
 Test By: Jazz  
 Pol: Vertical

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/AV/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit@3m (dBuV/m)	Safe Margin (dB)	Note
13.56	V	Peak	71.73	-5.30	61.13	124.00	-62.87	F
27.12	V	Peak	58.57	-0.24	58.33	69.54	-11.21	H
40.68	V	Peak	--					
54.24	V	Peak	--					
67.80	V	Peak	--					
81.36	V	Peak	--					
94.92	V	Peak	--					
108.48	V	Peak	--					
122.04	V	Peak	--					
135.60	V	Peak	--					
76.56	V	Peak	50.41	-17.29	33.12	40.00	-6.88	E
90.14	V	Peak	45.74	-17.62	28.12	43.50	-15.38	E
216.24	V	Peak	38.54	-15.05	23.49	46.00	-22.51	E
306.45	V	Peak	37.90	-12.87	25.03	46.00	-20.97	E
352.04	V	Peak	35.65	-11.73	23.92	46.00	-22.08	E
852.56	V	Peak	34.14	-1.95	32.19	46.00	-13.81	E

### Remark :

- (1) Measuring frequencies from 25 MHz to the 1GHz .
- (2) Radiated emissions measured in frequency range from 25 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of SPA between 25MHz to 30MHz was 10KHz; 30MHz to 1GHz was 100KHz.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Operation Mode: Transmitting Mode  
 Fundamental Frequency: 13.56 MHz  
 Temperature : 25 °C  
 Humidity : 65 %

Test Date : July 11, 2011  
 Test By: Jazz  
 Pol: Horizontal

Freq. (MHz)	Ant.Pol. H/V	Detecter Mode (PK/AV/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit@3m (dBuV/m)	Safe Margin (dB)	Note
13.56	H	Peak	77.98	-5.30	72.68	124.00	-51.32	F
27.12	H	Peak	57.39	-0.23	57.16	69.54	-12.38	H
40.68	H	Peak	--					
54.24	H	Peak	--					
67.80	H	Peak	--					
81.36	H	Peak	--					
94.92	H	Peak	--					
108.48	H	Peak	--					
122.04	H	Peak	--					
135.60	H	Peak	--					
102.75	H	Peak	45.72	-16.78	28.94	43.50	-14.56	E
202.66	H	Peak	40.42	-15.51	24.91	43.50	-18.59	E
345.25	H	Peak	35.29	-11.90	23.39	46.00	-22.61	E
461.65	H	Peak	32.99	-8.61	24.38	46.00	-21.62	E
604.24	H	Peak	33.66	-5.92	27.74	46.00	-18.26	E
752.65	H	Peak	33.27	-4.24	29.03	46.00	-16.97	E

Remark :

- (1) Measuring frequencies from 25 MHz to the 1GHz .
- (2) Radiated emissions measured in frequency range from 25 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of SPA between 25MHz to 30MHz was 10KHz; 30MHz to 1GHz was 100KHz.

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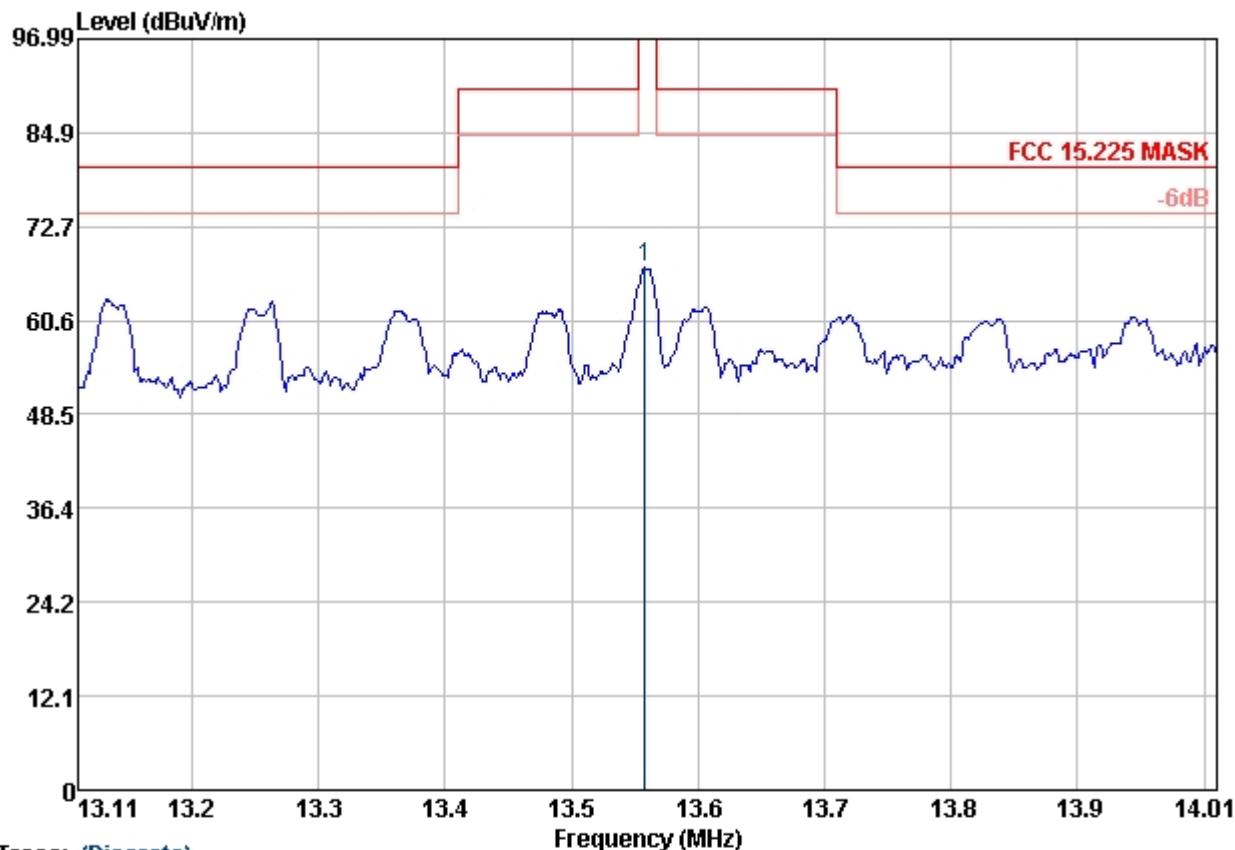
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## Radiated Mask

## Vertical:



Trace: (Discrete)

Condition : FCC 15.225 MASK VERTICAL

Project No. : EH/2011/60015

Applicant : Fujitsu Toshiba Mobile Communications Limited

EUT Description: CDMA TSI11

EUT Model : TSI11

Test Mode : e2 Plan//Tx Mode//Mask

Temp./Humid. : 25/65

Operator : Jazz

	Read	Antenna	Cable			Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB/m	dBuV/m	dBuV/m	dB	
1 p 13.56	72.70	22.82	0.38	-5.30	67.40	124.00	-56.60	Peak

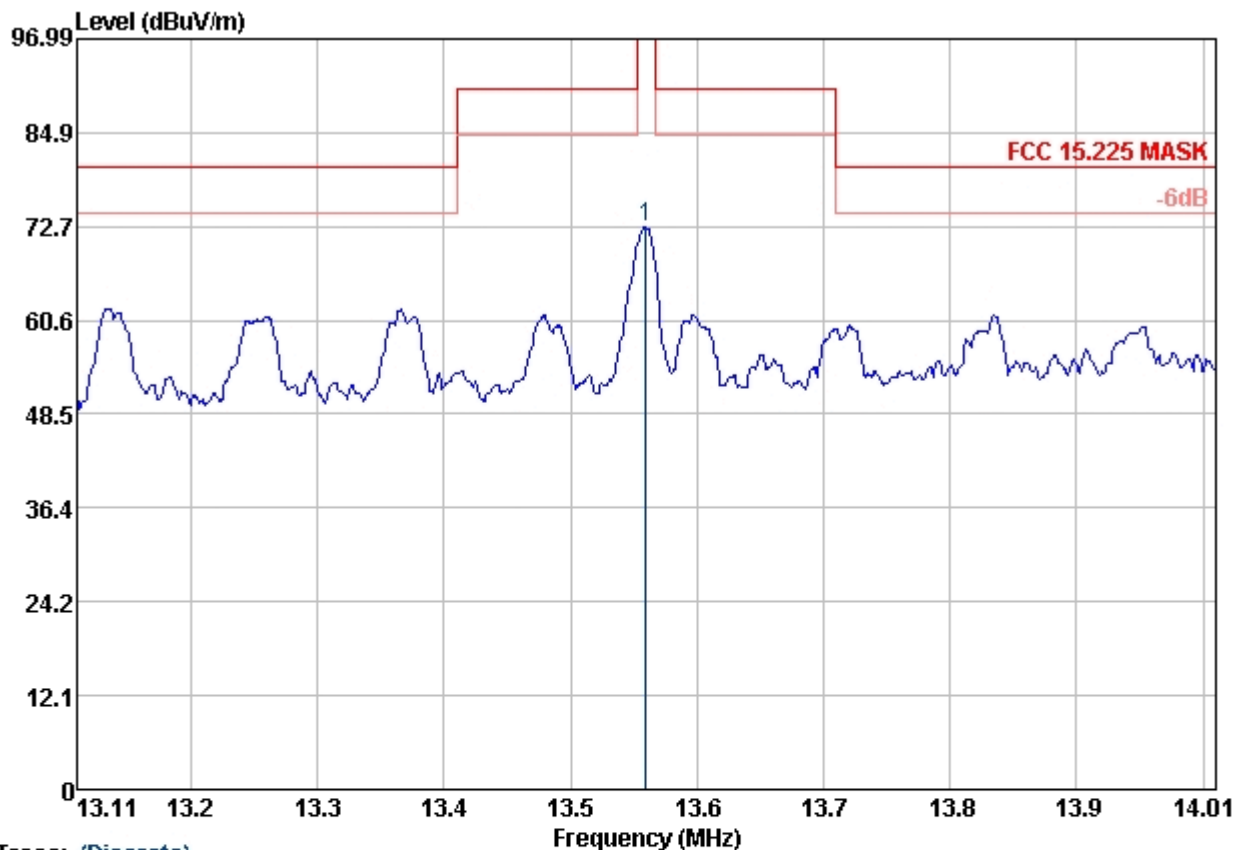
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## Horizontal:



Trace: (Discrete)

Condition : FCC 15.225 MASK HORIZONTAL

Project No. : EH/2011/60015

Applicant : Fujitsu Toshiba Mobile Communications Limited

EUT Description: CDMA TSI11

EUT Model : TSI11

Test Mode : e2 Plan//Tx Mode//Mask

Temp./Humid. : 25/65

Operator : Jazz

	Read	Antenna	Cable			Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB/m	dBuV/m	dBuV/m	dB	
1 p 13.56	77.98	22.82	0.38	-5.30	72.68	124.00	-51.32	Peak

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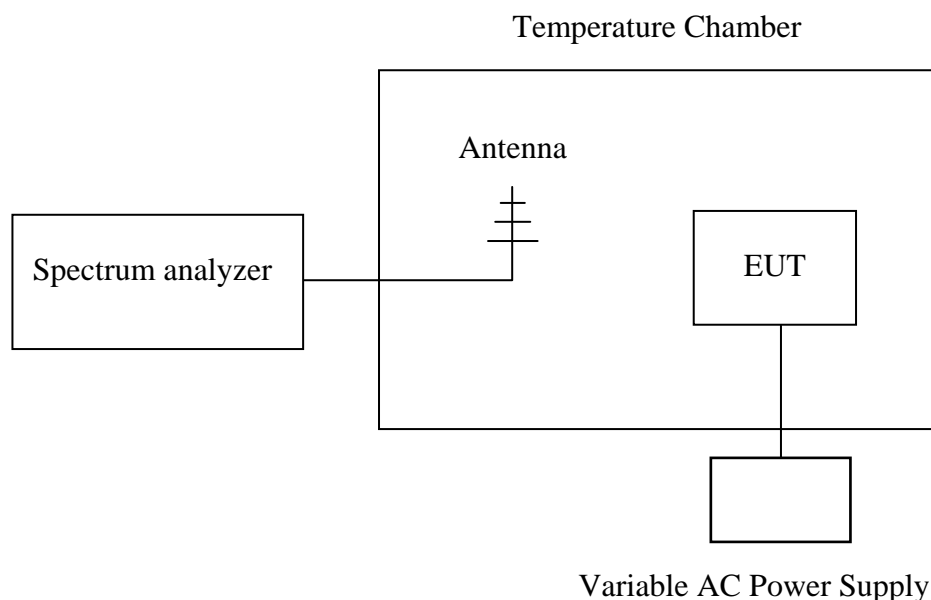
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## 7 Frequency Tolerance

### 7.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 10kHz, Span =100kHz.
4. Set SPA Max hold. Mark peak.

### 7.2 Test SET-UP (Block Diagram of Configuration)



### 7.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2010	04/18/2012
Temperature Chamber	TERCHY	MHG-120LF	911009	04/30/2010	04/29/2012
AC Power Supply	APW-105N	887592	All Power	N/A	N/A

### 7.4 Measurement Results

Refer to attached data chart.

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**A. Temperature Variation**

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
V AC	Temperature (°C)	(MHz)		
3.7	-20	13.559483	221.00	+/- 1.356
3.7	-10	13.559575	129.00	+/- 1.356
3.7	0	13.559588	116.00	+/- 1.356
3.7	10	13.559658	46.00	+/- 1.356
3.7	20	13.559704	0.00	+/- 1.356
3.7	30	13.559691	13.00	+/- 1.356
3.7	40	13.559573	131.00	+/- 1.356
3.7	50	13.55949	214.00	+/- 1.356

**B. Supply Voltage Variation**

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
V AC	Temperature (°C)	(MHz)		
4.255	20	13.559689	15.00	+/- 1.356
3.7	20	13.559704	0.00	+/- 1.356
3.145	20	13.559679	25.00	+/- 1.356

*~End of Report ~*

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