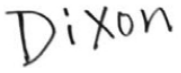
FCC TEST REPORT

47 CFR FCC Part 15 Subpart B

Report Reference No.....:	**MWR1411000406**	
FCC ID.....:	**RQQHLT-E425**	
Compiled by (position+printed name+signature)..:	File administrators Martin Ao	
Supervised by (position+printed name+signature)..:	Test Engineer Martin Ao	
Approved by (position+printed name+signature)..:	Manager Dixon Hao	
Date of issue.....:	Nov 19, 2014	
Representative Laboratory Name.:	**Maxwell International Co., Ltd.**	
Address.....:	Room 509, Hongfa Center Building, Baoan District, Shenzhen, Guangdong, China	
Testing Laboratory Name.....:	**Shenzhen CTL Testing Technology Co., Ltd.**	
Address.....:	Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan,Shenzhen,China	
Applicant's name.....:	**HYUNDAI CORPORATION**	
Address.....:	140-2, Kye-dong, Chongro-ku, Seoul, South Korea	
Test specification.....:		
Standard.....:	**47 CFR FCC Part 15 Subpart B - Unintentional Radiators**	
	ANSI C63.4: 2009	
TRF Originator.....:	Maxwell International Co., Ltd.	
Master TRF.....:	Dated 2011-05	

Test item description.....:	Mobile Phone
Trade Mark.....:	HYUNDAI
Manufacturer.....:	**WASAM TECHNOLOGY (SHEN ZHEN) CO.,LTD.**
Model/Type reference.....:	E425
Listed Models .....:	E420
Rating.....:	DC 3.70V
Hardware version.....:	DR315 V0.1
Software version .....:	S11P_HS_W412_HYUNDAI_B24859_2014-10-22_64P8_32P8_FWVGA_W25[D]_GpsL_DC_FL_GS_LED_170552
Result.....:	**PASS**

TEST REPORT

Test Report No. :	MWR1411000406	Nov 19, 2014 Date of issue

Equipment under Test	:	Mobile Phone
Model /Type	:	E425
Listed Models	:	E420
Applicant	:	**HYUNDAI CORPORATION**
Address	:	140-2, Kye-dong, Chongro-ku, Seoul, South Korea
Manufacturer		**WASAM TECHNOLOGY (SHEN ZHEN) CO.,LTD.**
Address	:	B,F Building, (Hengqiang Industrial Park), Bogang Taifeng Industrial Zone, Shajing Town, Bao'an District, Shenzhen, China.

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

47 CFR FCC Part 15 Subpart B - Unintentional Radiators

ANSI C63.4: 2009 – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the
Range of 9 kHz to 40GHz

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Oct 10, 2014
Testing commenced on	:	Oct 11, 2014
Testing concluded on	:	Nov 17, 2014

2.2. Product Description

The **HYUNDAI CORPORATION**'s Model: E425 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Mobile Phone
Model Number	E425
FCC ID	RQQHLT-E425
Modilation Type	GMSK for GSM/GPRS;QPSK for WCDMA
Antenna Type	Internal
GSM/EDGE/GPRS	Supported GPRS
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	3.40VDC to 4.20VDC (nominal: 3.70VDC)
GSM Operation Frequency Band	GSM 850MHz/ PCS 1900MHz
GSM Release Version	R99
GPRS operation mode	Class B
GPRS Multislot Class	12
EGPRS Multislot Class	Only support downlink mode

2.3. Equipment under Test

Power supply system utilised

Power supply voltage	:	○	120V / 60 Hz	○	115V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 3.70V

2.4. Short description of the Equipment under Test (EUT)

2.4.1 General Description

E425 is subscriber equipment in the WCDMA/GSM system. The HSPA/UMTS frequency band is Band II, Band V; The GSM/GPRS/EDGE (EDGE downlink only) frequency and includes GSM850 and GSM900 and DCS1800 and PCS1900, but only Band II and Band V and GSM850 and PCS1900 bands test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and SIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

2.4.2 Test Environments

NOTE: The values used in the test report maybe stringent than the declared.

Environment Parameter	Selected Values During Tests		
NTNV	Temperature	Voltage	Relative Humidity
	Ambient	3.7VDC	Ambient

2.5. EUT operation mode

The EUT has been tested under typical operating condition.

2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: RQQHLT-E425** filing to comply with the FCC Part 15, Subpart B Rules.

2.7. Internal Identification of AE used during the test

AE ID*	Description
AE1	Charger

AE1

Model：E425
INPUT: 100-300V 50/60HZ 0.15A
OUTPUT: DC 5.0V,500mAh

*AE ID: is used to identify the test sample in the lab internally.
We not used AE2 when for FCC Part 15B test.

2.8. Modifications

No modifications were implemented to meet testing criteria.

2.9. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

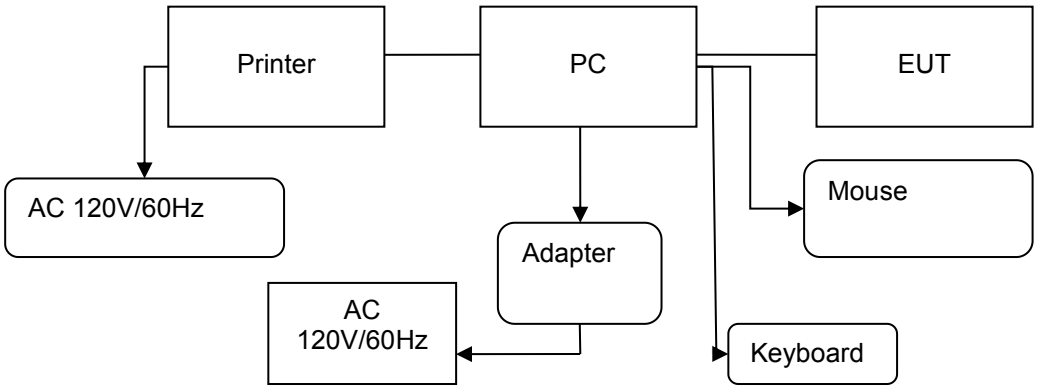
● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/

2.10. Configuration of Tested System

Configuration of Tested System



Equipment Used in Tested System

No.	Equipment	Manufacturer	Model No.	Serial No.	Length	shielded/unshielded	Notes
1	PC	Acer	E1-571G	1RNN42X	/	/	DOC
2	Printer	HP	C3990	C3990A	/	/	DOC
3	Mouse	DELL	MO56UOA	G0E02SY7	1.00m	unshielded	DOC
4	Keyboard	DELL	L100	CNRH65665890726009L	/	/	DOC
5	USB Cable (EUT to PC)	Genshuo	USB 2.0	N/A	0.60m	unshielded	N/A
6	USB Cable (Printer to PC)	Genshuo	USB 2.0	N/A	1.20m	unshielded	N/A
7	Power line	/	/	N/A	1.00m	unshielded	N/A
8	Adapter	HIPRO	HP-A0904A3	F1120709016S404	1.50m	unshielded	DOC

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen,China
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Test Facility

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

FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. 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 our files. Registration 970318, Dec 19, 2013

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTL Testing Technology Co., Ltd. is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.24 dB	(1)
Radiated Emission	1~18GHz	5.16 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.39 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5. Equipments Used during the Test

AC Power Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Artificial Mains	Rohde&Schwarz	ENV216	101316	2014/07/02
2	EMI Test Receiver	Rohde&Schwarz	ESCI3	103710	2014/07/02
3	Pulse Limiter	Com-Power	LIT-153	53226	2014/07/01
4	EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	N/A
5	RF Cable4	/	Cable000004	/	2014/07/06

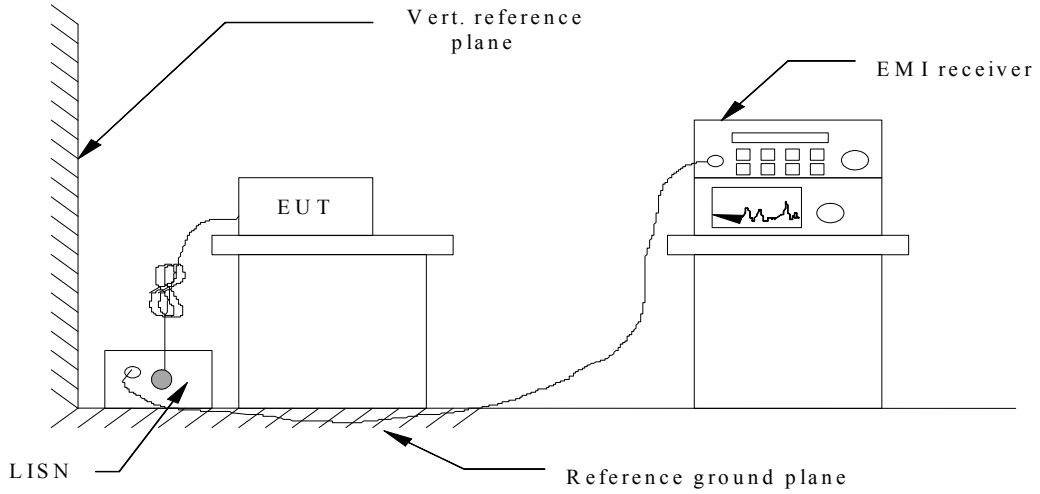
Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2014/07/12
2	EMI TEST Receivcer	Rohde&Schwarz	ESCI3	103710	2014/07/02
3	EMI TEST Software	Audix	E3	N/A	N/A
4	EMI TEST Software	Rohde&Schwarz	ESK1	N/A	N/A
5	HORN ANTENNA	Sunol Sciences Corp.	DRH-118	A062013	2014/07/12
6	Amplifer	HP	8447D	3113A07663	2014/10/26
7	Preamplifier	HP	8349B	3155A00882	2014/07/03
8	Amplifer	Compliance Direction systems	PAP1-4060	129	2014/07/03
9	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2014/06/29
10	TURNTABLE	MATURO	TT2.0	----	N/A
11	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
12	Horn Antenna	SCHWARZBECK	BBHA9170	25849	2014/06/21
13	Spectrum Analyzer	Rohde&Schwarz	FSU26	201148	2014/07/02
14	RF Cable 5	/	Cable000005	/	2014/07/06
15	RF Cable 6	/	Cable000006	/	2014/07/06

The Cal.Interval was one year

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emissions Test

TEST CONFIGURATION



TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4-2009.
2. Support equipment, if needed, was placed as per ANSI C63.4-2009.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4-2009.
4. The EUT received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

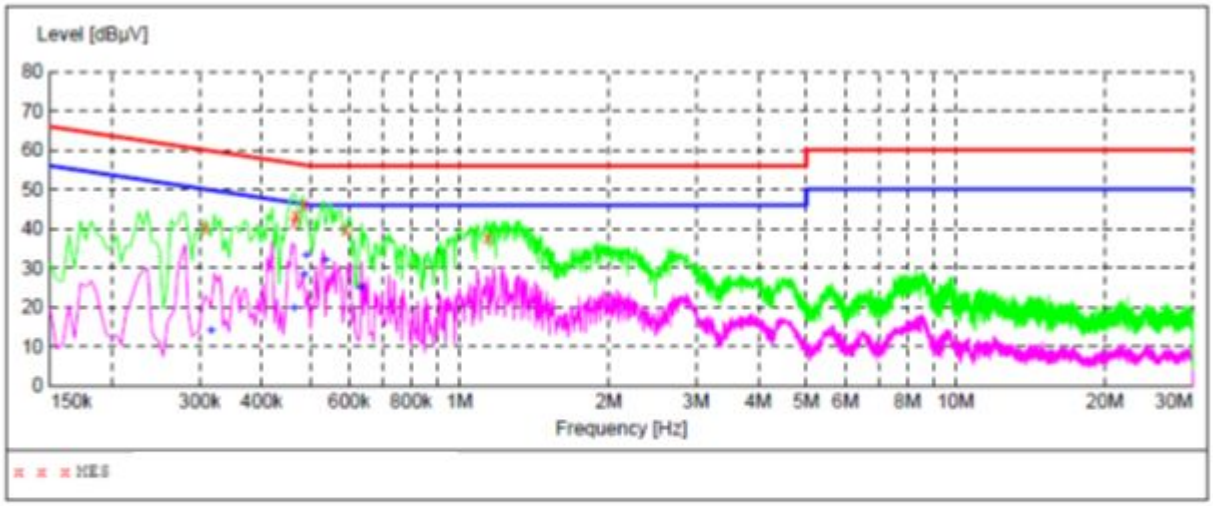
CONDUCTED POWER LINE EMISSION LIMIT

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following：

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

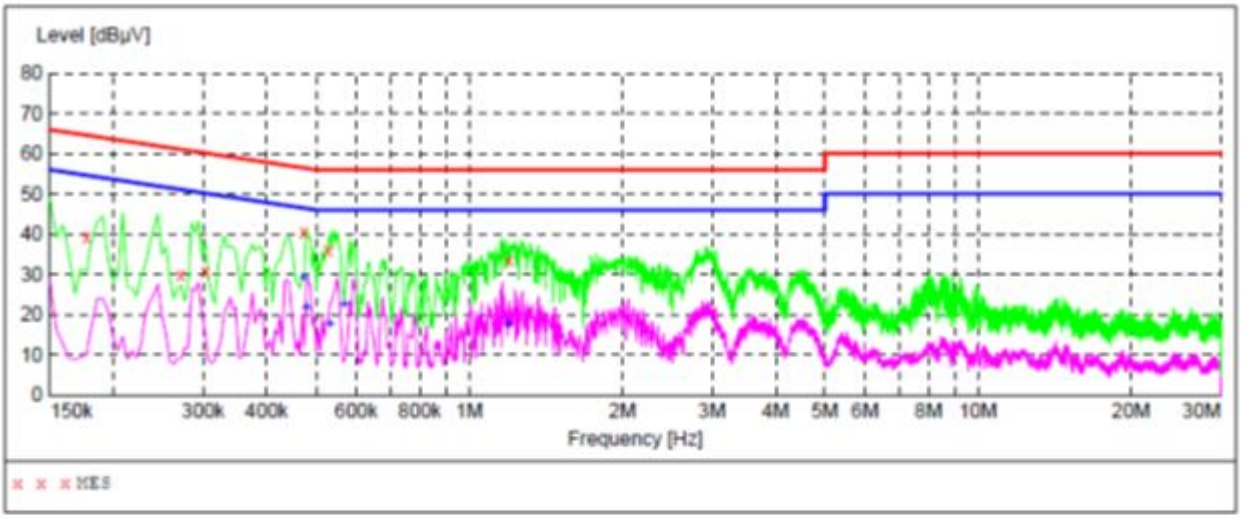


MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.307500	40.30	10.1	60	19.7	QP	L1	GND
0.465000	41.70	10.1	57	14.9	QP	L1	GND
0.469500	43.50	10.1	57	13.0	QP	L1	GND
0.487500	46.10	10.1	56	10.1	QP	L1	GND
0.591000	39.80	10.1	56	16.2	QP	L1	GND
1.140000	37.50	10.3	56	18.5	QP	L1	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.316500	13.90	10.1	50	35.9	AV	L1	GND
0.465000	19.80	10.1	47	26.8	AV	L1	GND
0.487500	28.20	10.1	46	18.0	AV	L1	GND
0.492000	33.00	10.1	46	13.1	AV	L1	GND
0.537000	31.90	10.1	46	14.1	AV	L1	GND
0.631500	24.90	10.2	46	21.1	AV	L1	GND



MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.177000	39.10	10.1	65	25.5	QP	N	GND
0.271500	29.80	10.1	61	31.3	QP	N	GND
0.303000	30.80	10.1	60	29.4	QP	N	GND
0.474000	40.50	10.1	56	15.9	QP	N	GND
0.528000	36.20	10.1	56	19.8	QP	N	GND
1.198500	33.60	10.3	56	22.4	QP	N	GND

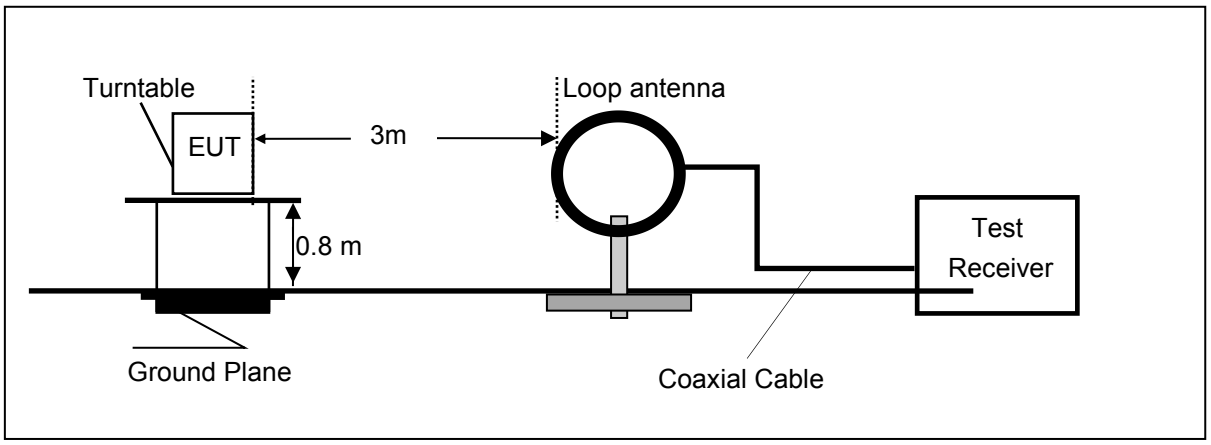
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.474000	29.20	10.1	46	17.2	AV	N	GND
0.478500	21.60	10.1	46	24.8	AV	N	GND
0.532500	17.80	10.1	46	28.2	AV	N	GND
0.568500	22.40	10.1	46	23.6	AV	N	GND
1.194000	17.50	10.3	46	28.5	AV	N	GND

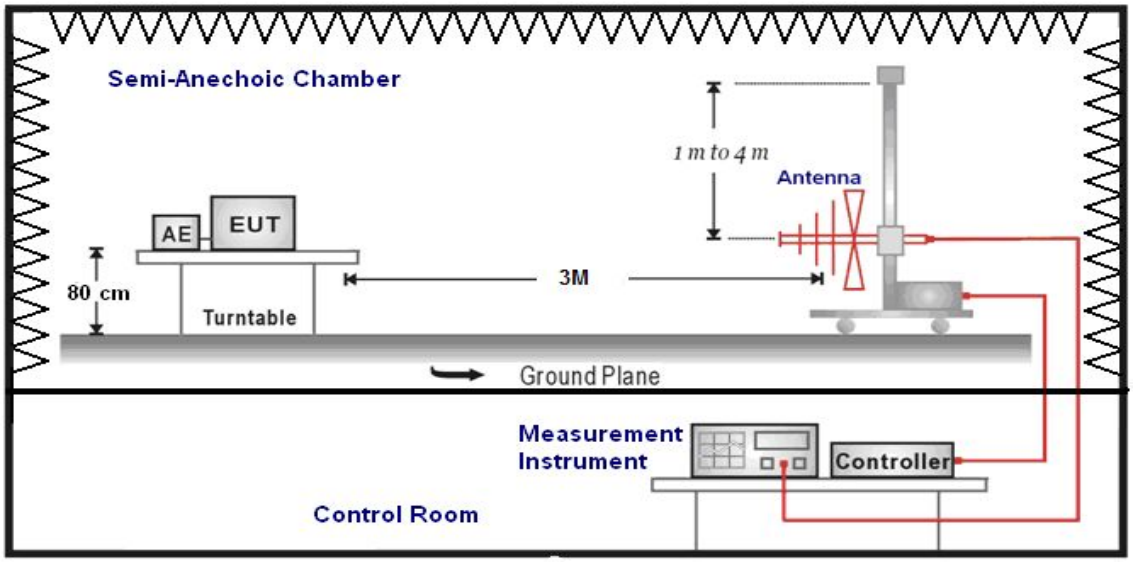
4.2. Radiated Emission Test

TEST CONFIGURATION

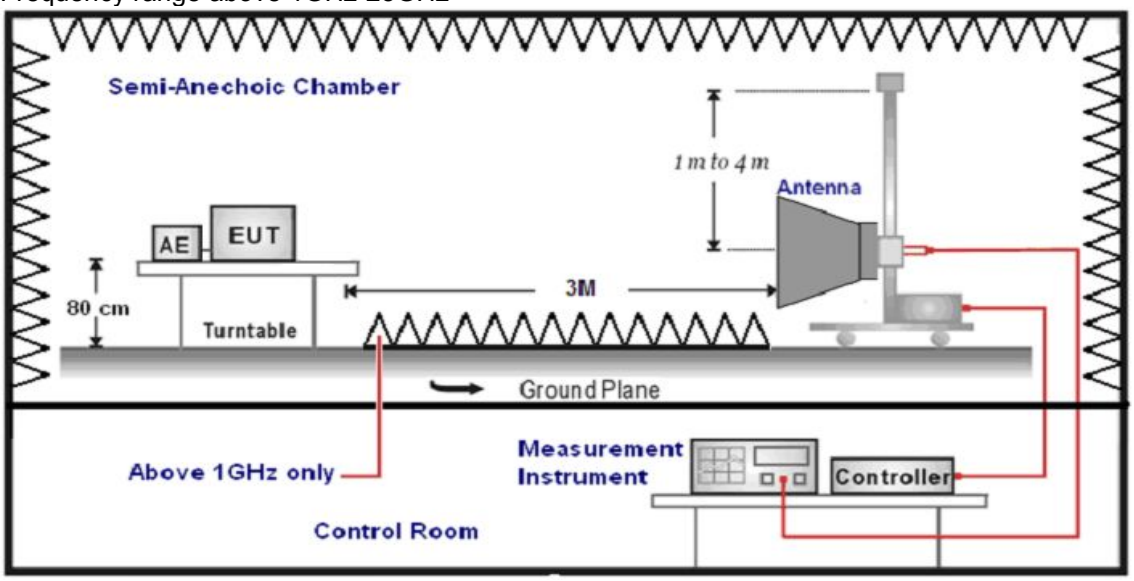
Frequency range: 9 KHz – 30MHz



Frequency range: 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The maximum operation frequency was 512MHz, the radiated emission test frequency from 9 KHz to 18GHz.

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	

For example

Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

Transd=AF +CL-AG

RADIATION LIMIT

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	300	20log(2400/F(KHz))+80	2400/F(KHz)
0.49-1.705	30	20log(24000/F(KHz))+40	24000/F(KHz)
1.705-30	30	20log(30)+40	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

Remark: 1. We not recorded emission level for 10GHz to 18GHz as emissio level was at least 10dB below emission level.

For 9KHz to 30MHz

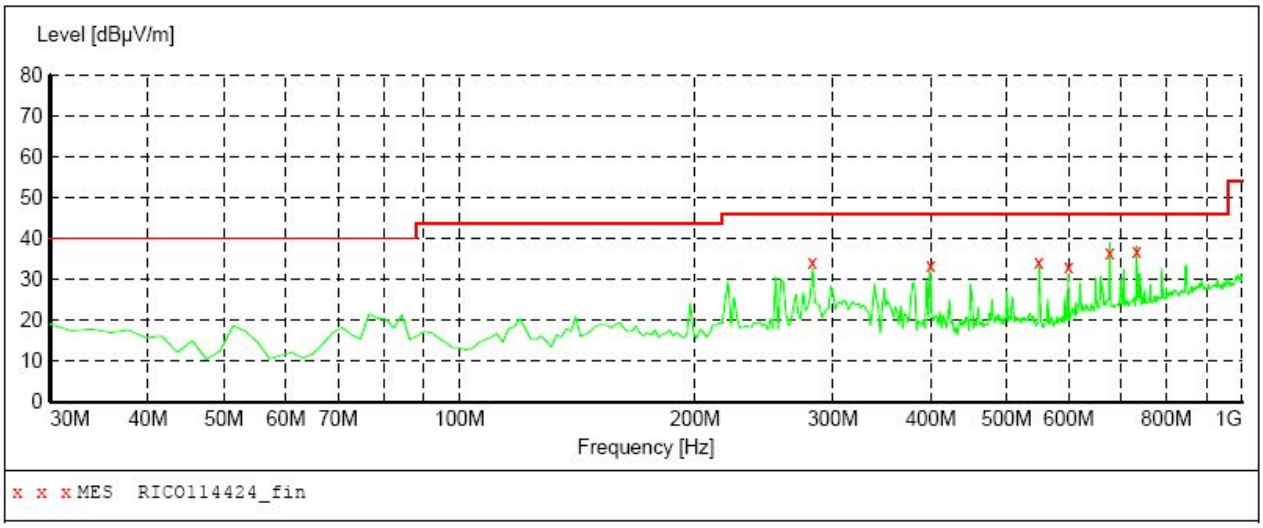
Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Result
12.00	45.32	69.54	24.22	QP	PASS
24.00	43.71	69.54	25.83	QP	PASS

For 30MHz-1GHz

SCAN TABLE: "test Field(30M-1G)QP"

Short Description: Field Strength(30M-1G)

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	60.0 kHz	QuasiPeak	1.0 s	120 kHz	HL562



MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
282.240000	34.20	-16.3	46.0	11.8	QP	100.0	47.00	HORIZONTAL
400.020000	33.50	-13.4	46.0	12.5	QP	100.0	316.00	HORIZONTAL
550.020000	34.30	-11.8	46.0	11.7	QP	132.0	65.00	HORIZONTAL
600.000000	33.00	-10.6	46.0	13.0	QP	123.0	342.00	HORIZONTAL
677.340000	36.60	-7.5	46.0	9.4	QP	323.0	0.00	HORIZONTAL
733.800000	36.90	-7.3	46.0	9.1	QP	100.0	0.00	HORIZONTAL

SCAN TABLE: "test Field(30M-1G)QP"

```
Short Description:              Field Strength(30M-1G)
Start       Stop        Step        Detector  Meas.     IF       Transducer
Frequency   Frequency   Width                 Time      Bandw.
30.0 MHz    1.0 GHz     60.0 kHz    QuasiPeak 1.0 s     120 kHz  HL562
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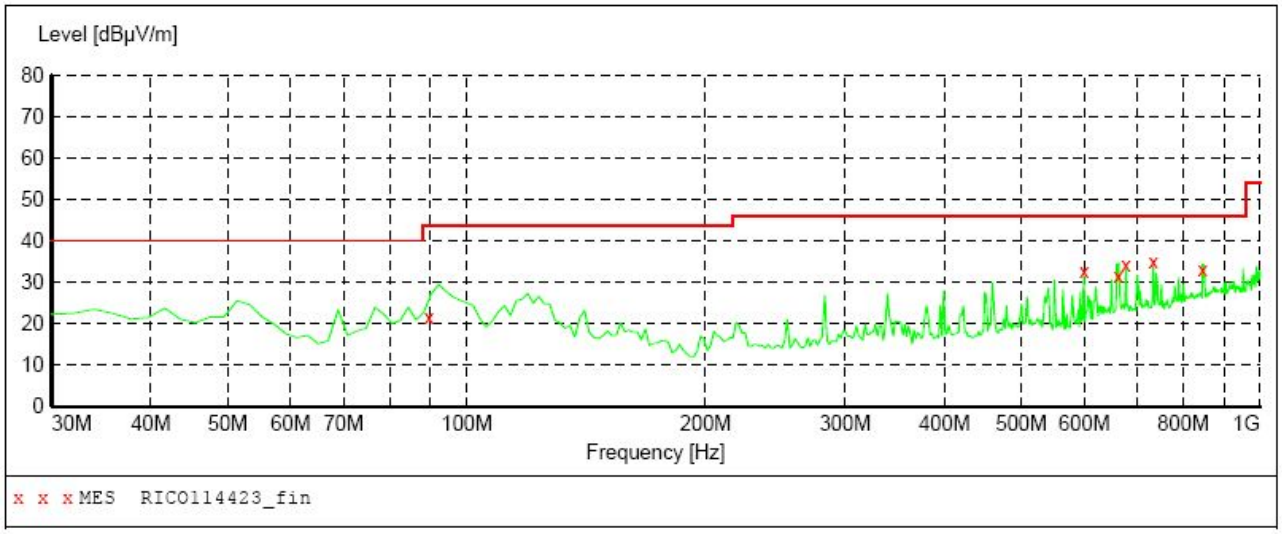
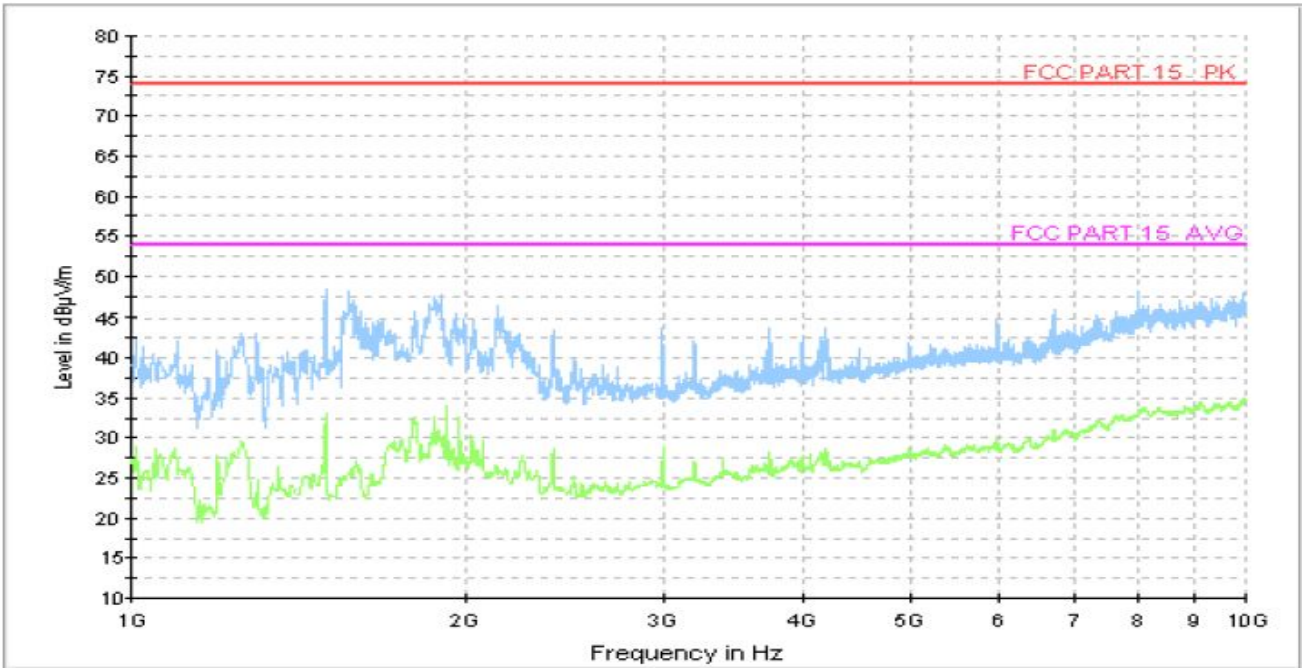


MEASUREMENT RESULT:

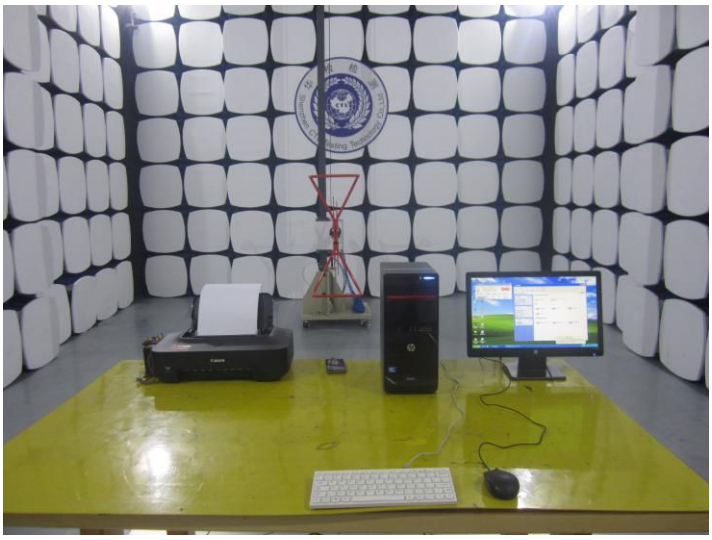
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
89.700000	21.70	-18.8	43.5	21.8	QP	100.0	101.00	VERTICAL
600.000000	32.70	-10.6	46.0	13.3	QP	100.0	0.00	VERTICAL
663.000000	31.70	-7.8	46.0	14.3	QP	100.0	260.00	VERTICAL
677.340000	34.40	-7.5	46.0	11.6	QP	100.0	314.00	VERTICAL
733.800000	35.00	-7.3	46.0	11.0	QP	100.0	107.00	VERTICAL
846.720000	32.90	-5.1	46.0	13.1	QP	100.0	204.00	VERTICAL

For 1GHz-10GHz



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Ant. Polar. H / V
	---					Peak & AV	H & V

5. Test Setup Photos of the EUT



.....End of Report.....