

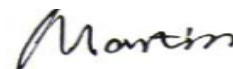
FCC TEST REPORT

47 CFR FCC Part 15 Subpart B

Report Reference No.....: MWR150900606

FCC ID.....: RQQHLT-L40SCL

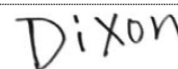
Compiled by
(position+printed name+signature)..: File administrators Martin Ao



Supervised by
(position+printed name+signature)..: Test Engineer Yuchao Wang



Approved by
(position+printed name+signature)..: Manager Dixon Hao



Date of issue.....: Sep 22, 2015

Representative Laboratory Name ..: Maxwell International Co., Ltd.

Address: Room 509, Hongfa center building, Baoan District, Shenzhen, Guangdong, China

Testing Laboratory Name CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Address: Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. 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.

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Test item description Mobile Phone

Trade Mark: HYUNDAI

Manufacturer.....: Skycom Telecommunications Co., Limited

Model/Type reference.....: L445

Listed Models: N/A

Rating: DC 3.70V

Hardware version: 5096SF_MM1_V01

Software version: HYUNDAI_L445_V5.0.2_20150907

Result.....: **PASS**

TEST REPORT

| | |
|---------------------------------------|---------------|
| Test Report No. : MWR150900606 | Sep 22, 2015 |
| | Date of issue |

Equipment under Test : Mobile Phone

Model /Type : L445

Listed Models : N/A

Applicant : **HYUNDAI CORPORATION**

Address : 140-2, Kye-dong, Chongro-ku, Seoul, South Korea

Manufacturer **Skycom Telecommunications Co., Limited**

Address : Rm604, East Block, Shengtang Bldg., No.1, Tairan 9 Rd.,
Chengongmiao, Futian 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.

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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 | : | Aug 20, 2015 |
| | | |
| Testing commenced on | : | Aug 21, 2015 |
| | | |
| Testing concluded on | : | Sep 22, 2015 |

2.2. Product Description

The **HYUNDAI CORPORATION**'s Model: L445 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 | L445 |
| Modulation Type | GMSK for GSM/GPRS/EDGE, 8-PSK for EDGE only Downlink,QPSK for UMTS |
| Antenna Type | Internal |
| UMTS Operation Frequency Band | Device supported UMTS FDD Band II and FDD Band V |
| WLAN FCC Operation frequency | IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz IEEE 802.11n HT40:2422-2452MHz |
| BT FCC Operation frequency | 2402MHz-2480MHz |
| HSDPA Release Version | Release 10 |
| HSUPA Release Version | Release 6 |
| DC-HSUPA Release Version | Not Supported |
| WCDMA Release Version | R99 |
| LTE Release Version | R8 |
| UMTS Operation Frequency Band | Device supported FDD band 2, FDD band 4, FDD band 5, FDD band V 7, FDD band V 17 |
| WLAN FCC Modulation Type | IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK) |
| BT Modulation Type | GFSK (BT 4.0)/GFSK,8DPSK, π /4DQPSK(BT 3.0+EDR) |
| Hardware version | 5096SF_MM1_V01 |
| Software version | HYUNDAI_L445_V5.0.2_20150907 |
| Android version | Android 4.4.2 |
| GPS function | Supported |
| WLAN | Supported 802.11b/802.11g/802.11n |
| Bluetooth | Supported BT 4.0/BT 3.0+EDR |
| GSM/EDGE/GPRS | Supported GSM/GPRS/EDGE |
| GSM/EDGE/GPRS Power Class | GSM900:Power Class 4/DCS1800:Power Class 1 |
| GSM/EDGE/GPRS Operation Frequency | GSM900 :880MHz-915MHz/DCS1800:1710MHz-1785MHz |
| GSM/EDGE/GPRS Operation Frequency Band | GSM900/DCS1800/GPRS900/ GPRS 1800/EDGE900/EDGE1800 |
| GSM Release Version | R99 |
| GPRS/EDGE Multislot Class | GPRS/EDGE: Multi-slot Class 12 |
| Extreme temp. Tolerance | -30°C to +50°C |
| Extreme vol. Limits | 3.40VDC to 4.20VDC (nominal: 3.70VDC) |
| GPRS operation mode | Class B |

2.3. Equipment under Test

Power supply system utilised

| | | | | | |
|----------------------|---|----------------------------------|----------------------------------|-----------------------|-------------|
| Power supply voltage | : | <input type="radio"/> | 120V / 60 Hz | <input type="radio"/> | 115V / 60Hz |
| | | <input type="radio"/> | 12 V DC | <input type="radio"/> | 24 V DC |
| | | <input checked="" type="radio"/> | Other (specified in blank below) | | |

DC 3.70V

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

2.4.1 General Description

L445 is subscriber equipment in the WCDMA/GSM /LTE system. The HSPA/UMTS frequency band is Band II, Band IV and Band V, LTE frequency band is band 2,band 4,band 5,band 7,band 17; The GSM/GPRS/EDGE frequency band 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 ,LTE and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS 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-L40SCL** 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: TPA-5950100UU
INPUT: 100-240V 50/60Hz 0.2A
OUTPUT: DC 5.0V,1000mAh

*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:

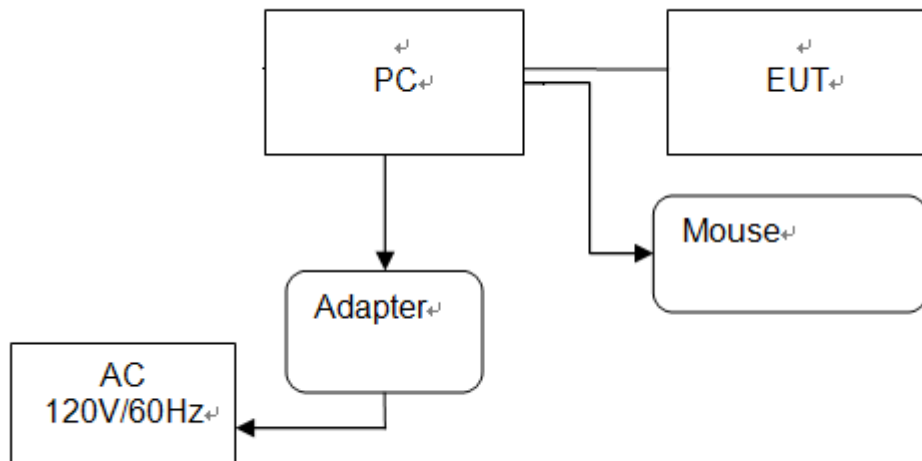
● - supplied by the manufacturer

○ - 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 | Notebook | ThinkPad | E430C | A131101550 | / | / | DOC |
| 2 | Mouse | DELL | MO56UO A | G0E02SY7 | 1.00m | unshielded | DOC |
| 3 | USB Cable (EUT to PC) | Genshuo | USB 2.0 | N/A | 0.60m | unshielded | N/A |
| 4 | Power line | / | / | N/A | 1.00m | unshielded | N/A |

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China
The sites are constructed in conformance with the requirements of 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 information:

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.
Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China
Test Firm FCC Registration number: 806614

3.3. Environmental conditions

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

| | |
|-----------------------|---------------------|
| Temperature: | <u>15-35 ° C</u> |
| Humidity: | <u>30-60 %</u> |
| Atmospheric pressure: | <u>950-1050mbar</u> |

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 CCIC Southern Electronic Product Testing (Shenzhen) 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 CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. National Digital Electronic Product Testing Center is reported:

| Test | Range | Measurement Uncertainty | Notes |
|-----------------------|-------------|-------------------------|-------|
| Radiated Emission | 30~1000MHz | 4.18dB | (1) |
| Radiated Emission | 1~18GHz | 5.26dB | (1) |
| Conducted Disturbance | 0.009~30MHz | 3.02dB | (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

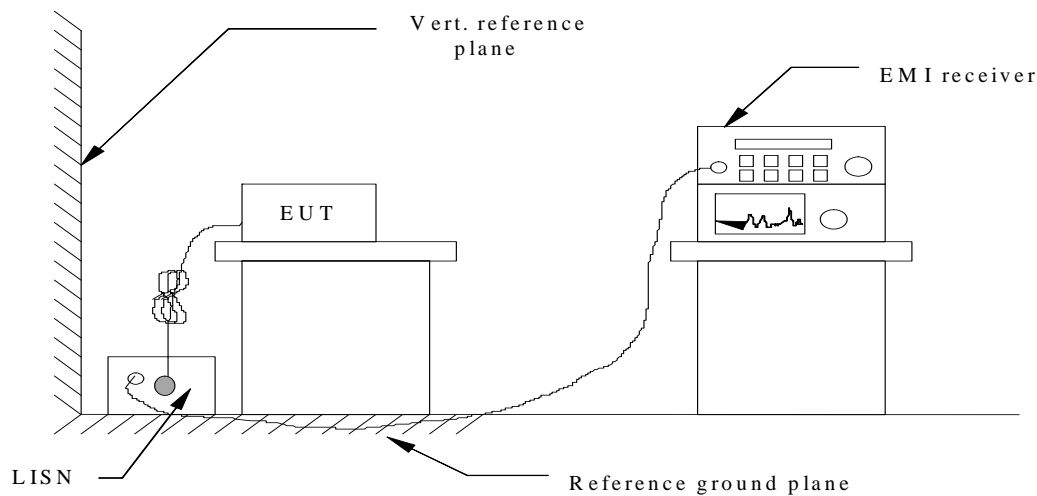
| Description | Manufacturer | Model | Serial No. | Test Date | Due Date |
|--------------------------------|--------------|----------------------|---------------|-------------|------------|
| EMI Test Receiver | R&S | ESIB26 | A0304218 | 2015.06.02 | 2016.06.01 |
| Full-Anechoic Chamber | Albatross | 12.8m*6.8m*6.4m | A0412372 | 2015.01.05 | 2016.01.04 |
| Loop Antenna | Schwarzbeck | HFH2-Z2 | 100047 | 2015.06.02 | 2016.06.01 |
| Bilog Antenna | Schwarzbeck | VULB 9163 | 9163-274 | 2015.06.02 | 2016.06.01 |
| Bilog Antenna | Schwarzbeck | VULB 9163 | 9163-276 | 2015.06.02 | 2016.06.01 |
| Double ridge horn antenna | R&S | HF960 | 100150 | 2015.06.02 | 2016.06.01 |
| Double ridge horn antenna | R&S | HF960 | 100155 | 2015.06.02 | 2016.06.01 |
| Ultra-wideband antenna | R&S | HL562 | 100089 | 2015.06.02 | 2016.06.01 |
| Ultra-wideband antenna | R&S | HL562 | 100090 | 2015.06.02 | 2016.06.01 |
| Test Antenna – Horn (18-25GHz) | ETS | UG-596A/U | A0902607 | 2015.06.02 | 2016.06.01 |
| Test Antenna – Horn (18-25GHz) | ETS | UG-596A/U | A0902611 | 2015.06.02 | 2016.06.01 |
| Amplifier 20M~3GHz | R&S | PAP-0203H | 22018 | 2015.06.02 | 2016.06.01 |
| Amplifier 1G~18GHz | R&S | MITEQ AFS42-00101800 | 25-S-42 | 2015.06.02 | 2016.06.01 |
| Amplifier 18G~40GHz | R&S | JS42-18002600-28-5A | 12111.0980.00 | 2015.06.02 | 2016.06.01 |
| System Simulator | R&S | CMW500 | A130101034 | 2015.06.010 | 2016.06.09 |
| Signal Analyzer | Agilent | N9030A | MY49430428 | 2015.06.010 | 2016.06.09 |
| Power Sensor | R&S | NRP-Z4 | 823.3618.03 | 2015.06.02 | 2016.06.01 |
| Power Meter | R&S | NRVS | 1020.1809.02 | 2015.06.02 | 2016.06.01 |
| LISN | R&S | ESRV26 | A0304221 | 2015.06.02 | 2016.06.01 |
| EMI Test Receiver | R&S | ESCS | A0304260 | 2015.06.02 | 2016.06.01 |

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 C63.4-2014.
2. Support equipment, if needed, was placed as per ANSI C63.4-2014.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4-2014.
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 :

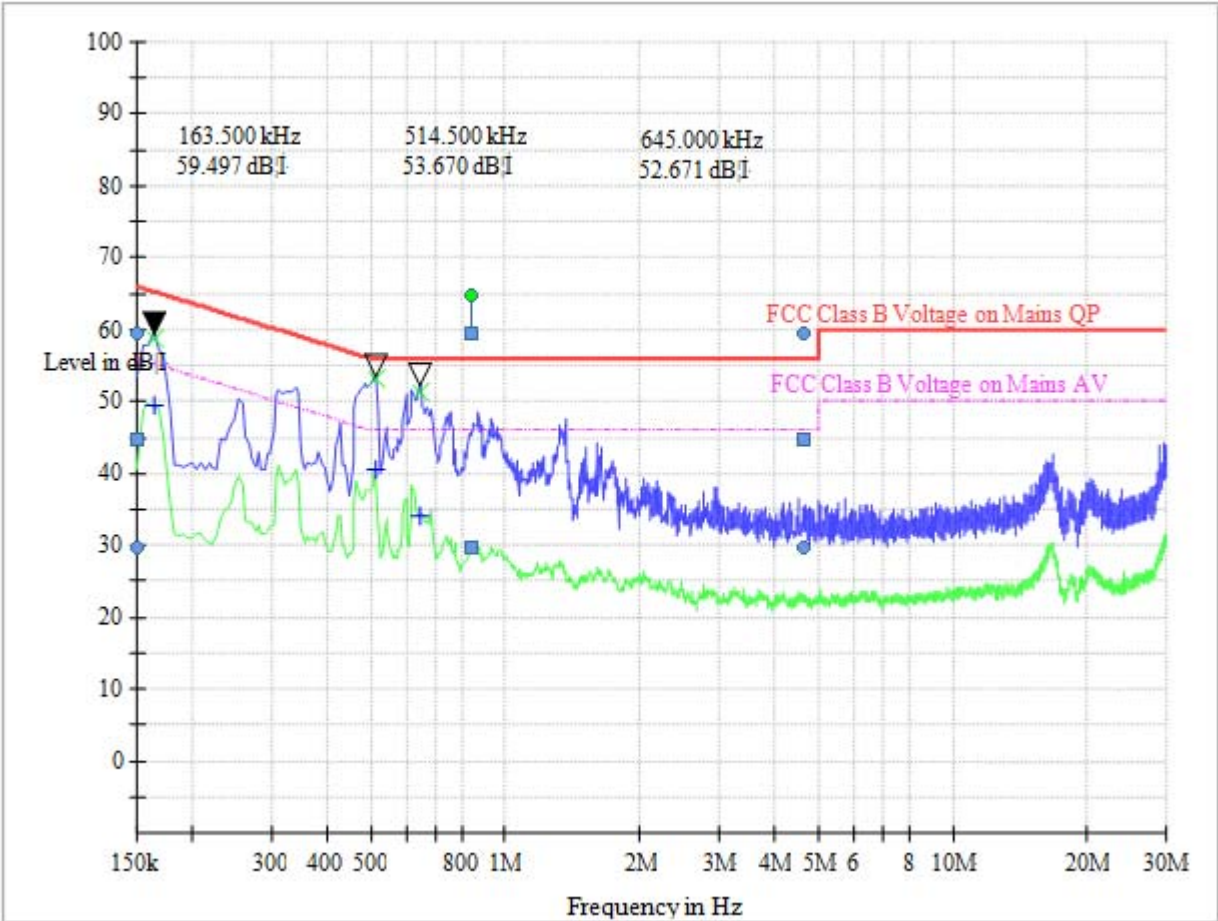
| Frequency (MHz) | Maximum RF Line Voltage (dBμV) | | | |
|-----------------|--------------------------------|------|---------|--------|
| | CLASS A | | CLASS B | |
| | Q.P. | Ave. | Q.P. | Ave. |
| 0.15 - 0.50 | 79 | 66 | 66-56* | 56-46* |
| 0.50 - 5.00 | 73 | 60 | 56 | 46 |
| 5.00 - 30.0 | 73 | 60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

* Decreasing linearly with the logarithm of the frequency

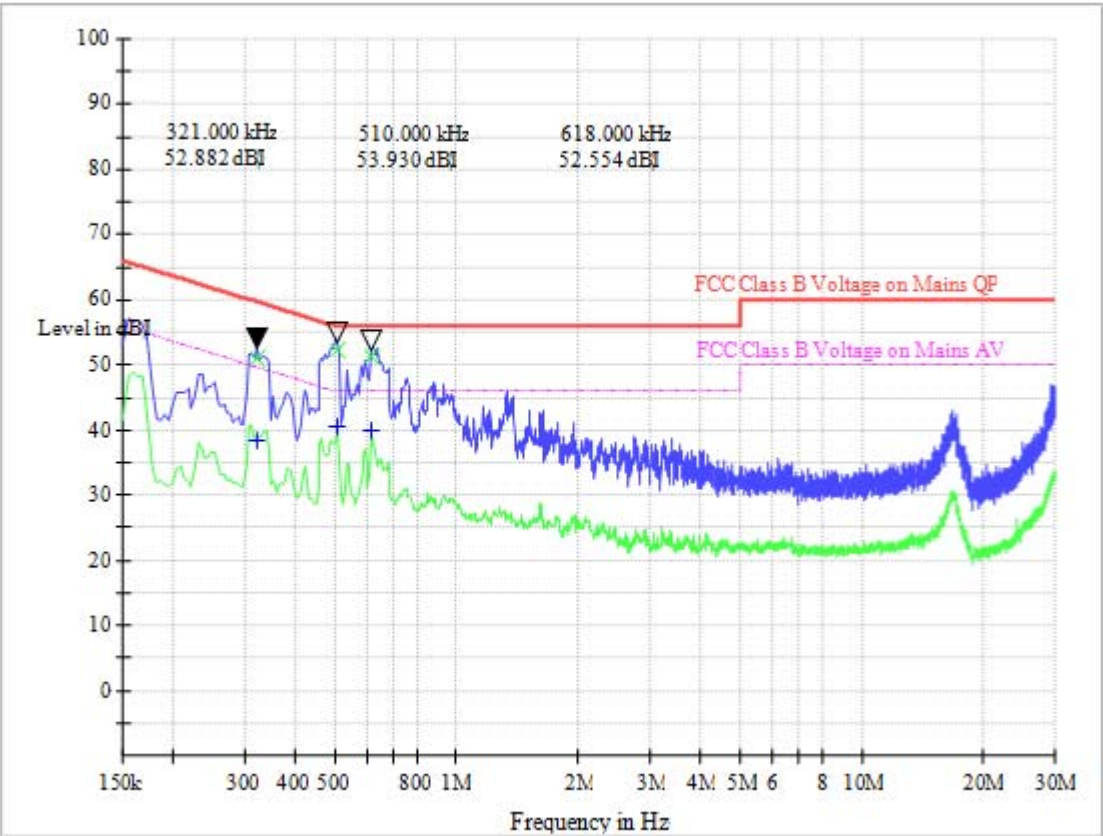
TEST RESULTS

Note: We tested the playing video Mode, Data transmission (connected PC) Mode, camera Mode and so on, and recorded the worst case at the playing video Mode.

L



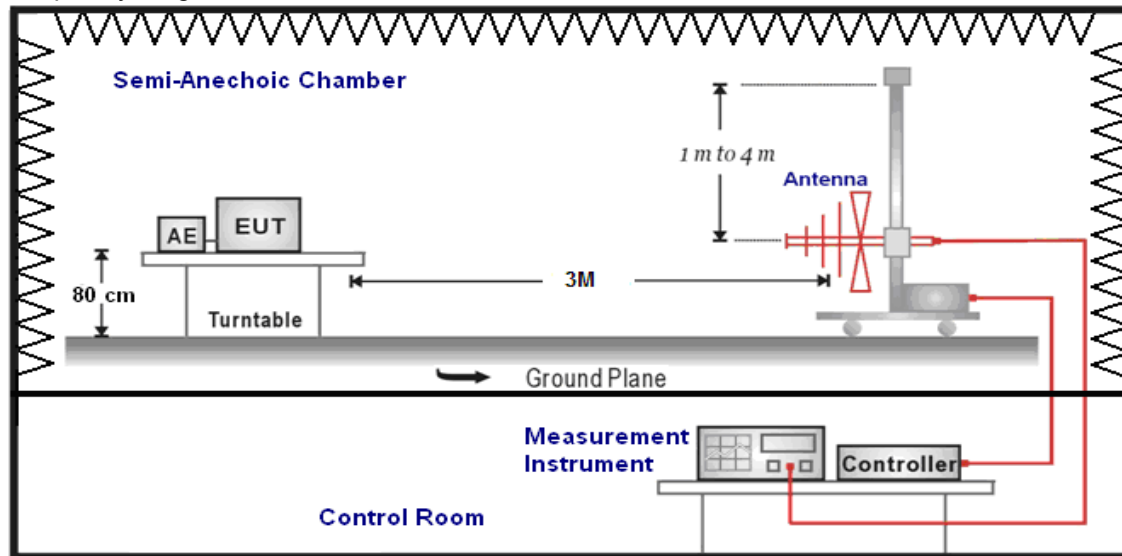
N



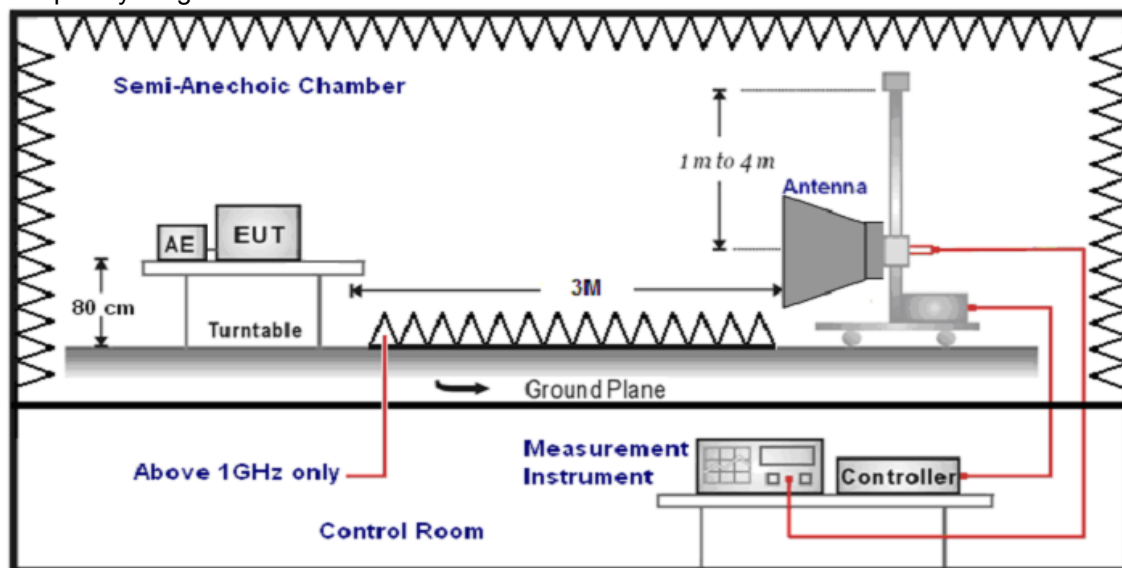
4.2. Radiated Emission Test

TEST CONFIGURATION

Frequency range: 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

- The EUT is placed on a turntable, which is 0.8m above ground plane.
- The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- Repeat above procedures until the measurements for all frequencies are complete.
- The maximum operation frequency was 512MHz, the radiated emission test frequency from 30 MHz to 6GHz.
- The distance between test antenna and EUT as following table states:

| Test Frequency range | Test Antenna Type | Test Distance |
|----------------------|----------------------------|---------------|
| 30MHz-1GHz | Ultra-Broadband Antenna | 3 |
| 1GHz-6GHz | Double Ridged Horn Antenna | 3 |
- Setting test receiver/spectrum as following table states:

| Test Frequency range | Test Receiver/Spectrum Setting | Detector |
|----------------------|--|-----------------------|
| 30MHz-1GHz | RBW=120KHz/VBW=1000KHz,Sweep time=Auto | QP |
| 1GHz-6GHz | Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto | Peak (Receiver) |
| | Average Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto | Average (Receiver) |

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 (dB μ V/m) | RA (dB μ V/m) | AF (dB) | CL (dB) | AG (dB) | Transd (dB) |
|-----------------|-------------------|-------------------|---------|---------|---------|-------------|
| 300.00 | 40 | 58.1 | 12.2 | 1.6 | 31.90 | -18.1 |

$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

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:

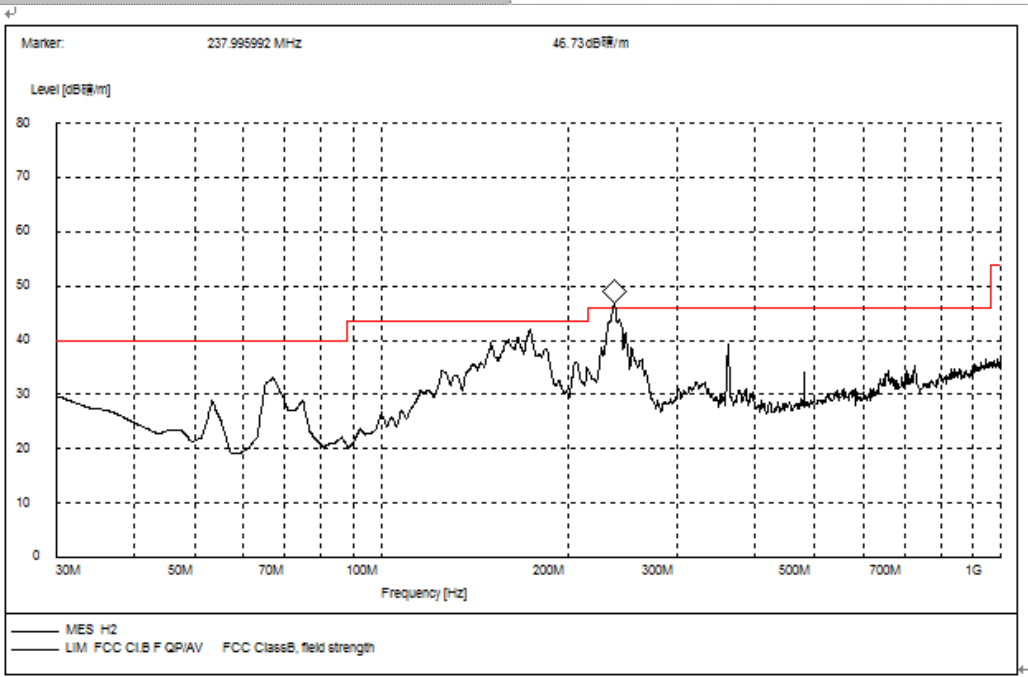
| Frequency (MHz) | Distance (Meters) | Radiated (dB μ V/m) | Radiated (μ V/m) |
|-----------------|-------------------|----------------------------------|-----------------------|
| 0.009-0.49 | 300 | $20\log(2400/F(\text{KHz}))+80$ | $2400/F(\text{KHz})$ |
| 0.49-1.705 | 30 | $20\log(24000/F(\text{KHz}))+40$ | $24000/F(\text{KHz})$ |
| 1.705-30 | 30 | $20\log(30)+40$ | 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

For 30MHz-1GHz

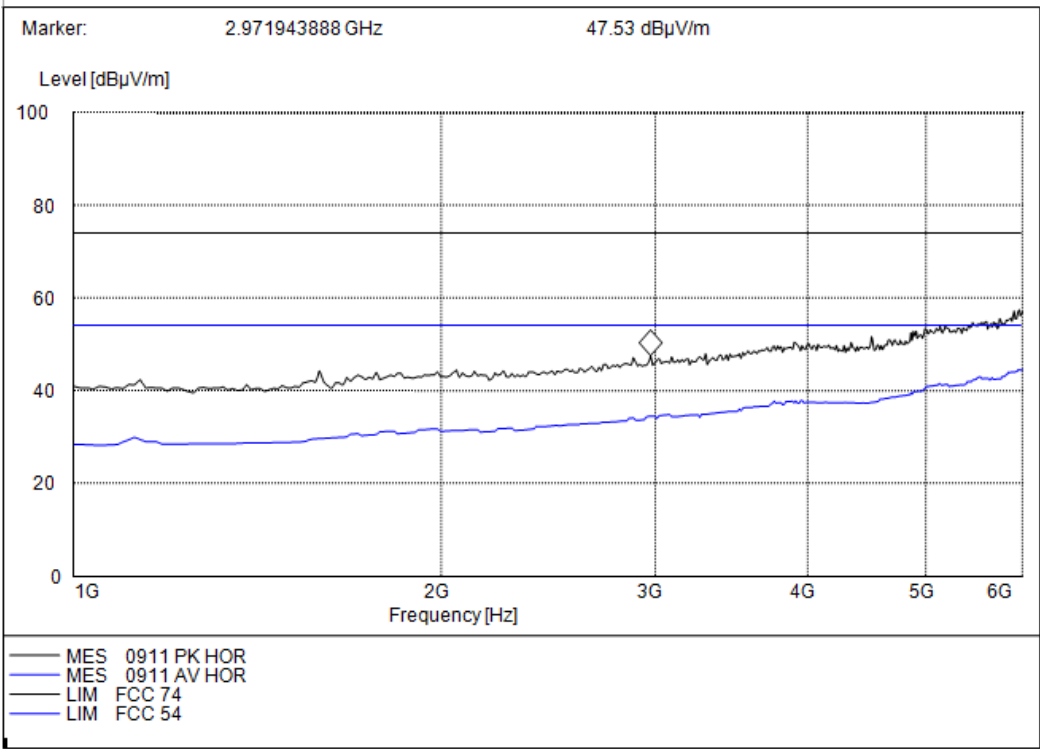
Polarization

Horizontal



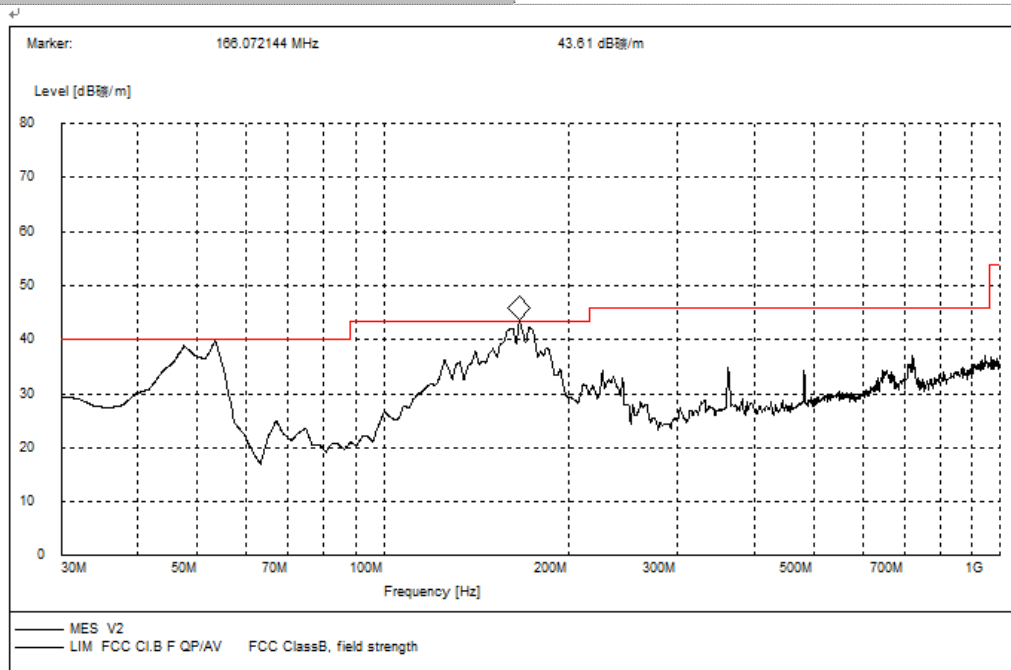
MEASUREMENT RESULT: "QuasiPeak"

| Frequency MHz | Level dBμV/m | Limit dBμV/m |
|------------------|-----------------|-----------------|
| 174.560000 | 38.49 | 43.5 |
| 237.690000 | 43.46 | 46.0 |



Polarization

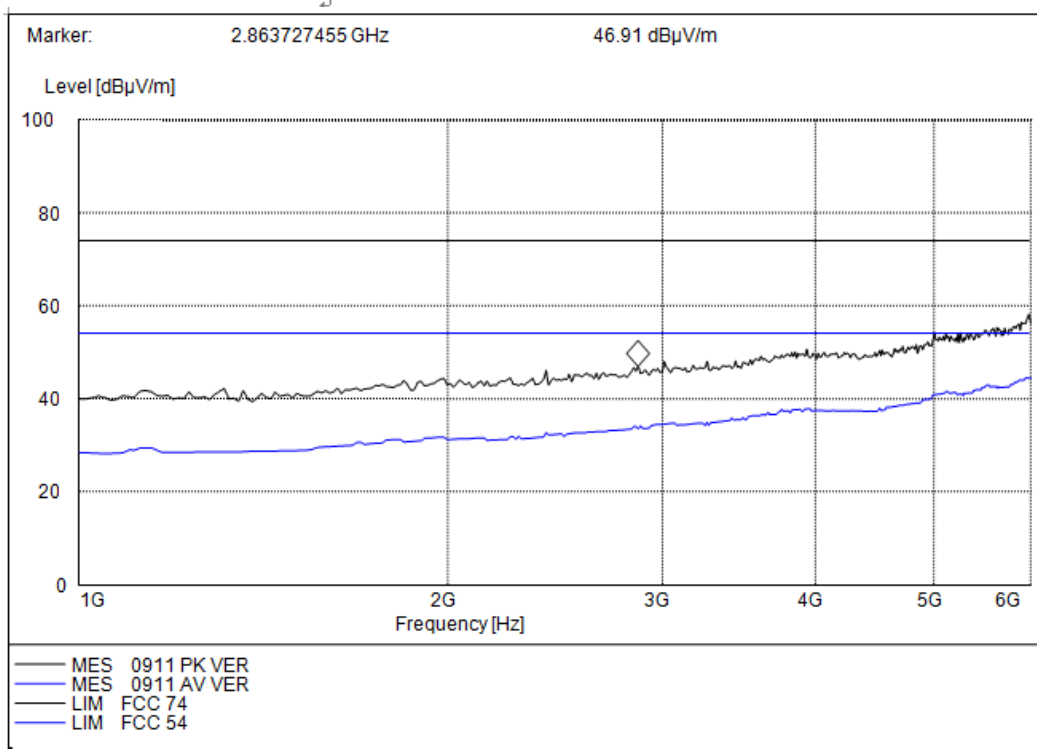
Vertical



MEASUREMENT RESULT: "QuasiPeak"

2015-9-1 10:29

| Frequency MHz | Level dBμV/m | Limit dBμV/m |
|------------------|-----------------|-----------------|
| 54.520000 | 36.14 | 40.0 |
| 167.620000 | 40.41 | 43.5 |



Remark:

1. Emission level (dBμV/m) = Reading Value (dBμV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
3. The other emission levels were very low against the limit.
4. Margin value = Limit value - Emission level.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. "----" states at least 20dB lower than limit, not record any values.

5. Test Setup Photos of the EUT

Please refer to separated files for Test Setup Photos of the EUT.

6. External Photos of the EUT

Please refer to separated files for External Photos of the EUT.

7. Internal Photos of the EUT

Please refer to separated files for Internal Photos of the EUT.

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