

EMC

TEST REPORT

Report No. : EME-060404
Model No. : 36007, MB6007
Issued Date : Jun. 27, 2006

Applicant : SENTON Enterprises Limited
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Project Engineer



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Reviewed By



Jerry Liu

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Summary of Tests**2.4GHz cordless phone -Model: 36007
FCC ID: PEG36007**

Test	Reference	Results
Power Line Conducted Emission test	15.207	Pass
Radiated Emission test	15.249(c), 15.209	Pass

1. General information**1.1 Identification of the EUT**

Applicant : SENTON Enterprises Limited
Product : 2.4GHz cordless phone
Model No. : 36007
FCC ID. : PEG36007
Frequency Range (Base) : 2403.05MHz ~ 2405.00MHz
Frequency Range (Handset) : 2474.00MHz ~ 2475.95MHz
Channel Number : 40 channels
Frequency of Each Channel : 2402.55MHz + 0.05k MHz k=0~39
Frequency of Each Channel : 2474MHz + 0.05k MHz k=0~39
Type of Modulation : FM
Power Supply : 120Vac, 60Hz with adapter (U090020D)
Power Cord : N/A
Sample Received : Apr. 6, 2006
Test Date(s) : Apr. 7, 2006 ~ Jun. 21, 2006

A DoC report has been generated for the client.

1.2 Additional information about the EUT

The EUT is a 2.4GHz cordless phone; it consists of handset unit and base unit.

The models listed below are identical to model 36007 (EUT).
Different brand serves as marking strategy.

Trade Name	Model Number
Unical	36007
Bell Phone	36007
Moutain Bell	MB6007

For more detail features, please refer to User's manual as file name "Users Manual.pdf"

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain : 0dBi max

Antenna Type : Soldering antenna

Connector Type : Lead Wire

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

During radiated emission test, the EUT was operated in continuously transmitting. The EUT was operated in charging and ringing mode in conducted emission test.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Intertek ID No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	EC303	04/16/2007
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	EC317	08/07/2006
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/24/2006
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	EC365	11/01/2006
Horn Antenna	EMCO	1GHz~18GHz	3115	EC338	08/15/2006
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	EC351	07/07/2006
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	EC368	05/18/2007
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	04/11/2007
Pre-Amplifier	MITEQ	26GHz~40GHz	828825	EC374	01/26/2007
Controller	HDGmbH	N/A	HD 100	EP317-1	N/A
Antenna Tower	HDGmbH	N/A	MA 240	EP317-2	N/A
Turn Table	HDGmbH	N/A	DS 420S	EP317-3	N/A
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	EC344	01/12/2007

Note: The above equipments are within the valid calibration period.

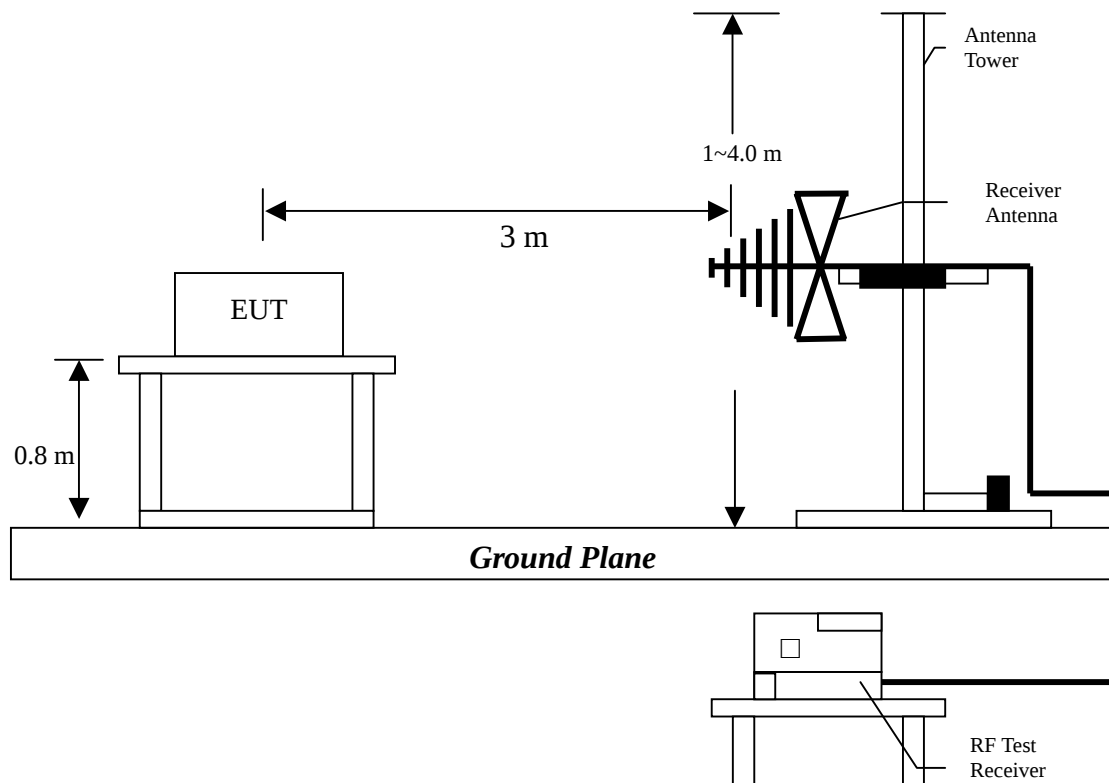
3. Radiated emission test FCC 15.249 (C)

3.1 Operating environment

Temperature: 25
Relative Humidity: 55 %
Atmospheric Pressure: 1023 hPa

3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report. The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

This test was verified at three orthogonal axes, and the test configuration was listed below:

**Setup 1****Setup 2****Setup 3**

After verifying three axes, the worst case was occurred at setup 1 configuration. The final test was executed under this configuration and recorded in this report.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

3.3 Emission limit

3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
2400-2483.5	50	94	500	54

3.3.2 General radiated emission limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	15.209 Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
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

Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is ± 4.98 dB.

3.4 Radiated spurious emission test data

3.4.1 Measurement results: frequencies equal to or less than 1 GHz

EUT : 36007
Test Unit : Base
Test Condition : Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2403.05	PK	H	30.31	28.28	58.59	114	-55.41	100.00	318.00
2403.05	AV	H	30.31	17.26	47.57	94	-46.43	100.00	318.00

Remark:

- 1.Corrected Level = Reading Level + Correction Factor
- 2.Correction Factor = Antenna Factor + Cable Loss

EUT : 36007
Test Unit : Base
Test Condition : Tx at channel 40

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2405.00	PK	H	30.31	28.13	58.44	114	-55.56	100.00	195.00
2405.00	AV	H	30.31	17.02	47.33	94	-46.67	100.00	195.00

Remark:

- 1.Corrected Level = Reading Level + Correction Factor
- 2.Correction Factor = Antenna Factor + Cable Loss

EUT : 36007
Test Unit : Handset
Test Condition : Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2474.00	PK	H	30.31	53.13	83.44	114	-30.56	100.00	198.00
2474.00	AV	H	30.31	52.64	82.95	94	-11.05	100.00	198.00

Remark:

1. Corrected Level = Reading Level + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

EUT : 36007
Test Unit : Handset
Test Condition : Tx at channel 40

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2475.95	PK	H	30.31	51.78	82.09	114	-31.91	100.00	335.00
2475.95	AV	H	30.31	51.24	81.55	94	-12.45	100.00	335.00

Remark:

1. Corrected Level = Reading Level + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

3.5 Measurement results: frequency above 1GHz

The test was performed on EUT under continuously transmitting mode. Handset and Base were verified. The worst case occurred at Handset.

EUT : 36007
Test Unit : Handset
Test Condition : Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
4948.00	PK	V	36.07	37.77	52.4	54.1	74	-19.9	100.00	195.00
4948.00	AV	V	36.07	37.77	50.58	52.28	54	-1.72	100.00	195.00
4948.00	PK	H	36.07	37.77	42.21	43.91	54	-10.09	100.00	274.00

Remark:

1. Corrected Level = Reading Level + Correction Factor - Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-” means the emission is below the noise floor.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV

3GHz-14GHz: 27dBuV

14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV

3GHz-14GHz: 16dBuV

14GHz-26.5GHz: 28dBuV

EUT : 36007
 Test Unit : Handset
 Test Condition : Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
4951.90	PK	V	36.07	37.77	52.58	54.28	74	-19.72	100.00	184.00
4951.90	AV	V	36.07	37.77	51.11	52.81	54	-1.19	100.00	184.00
4951.90	PK	H	36.07	37.77	42.94	44.64	54	-9.36	100.00	331.00

Remark:

1. Corrected Level = Reading Level + Correction Factor - Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV
 3GHz-14GHz: 27dBuV
 14GHz-26.5GHz: 39dBuV

For AV:

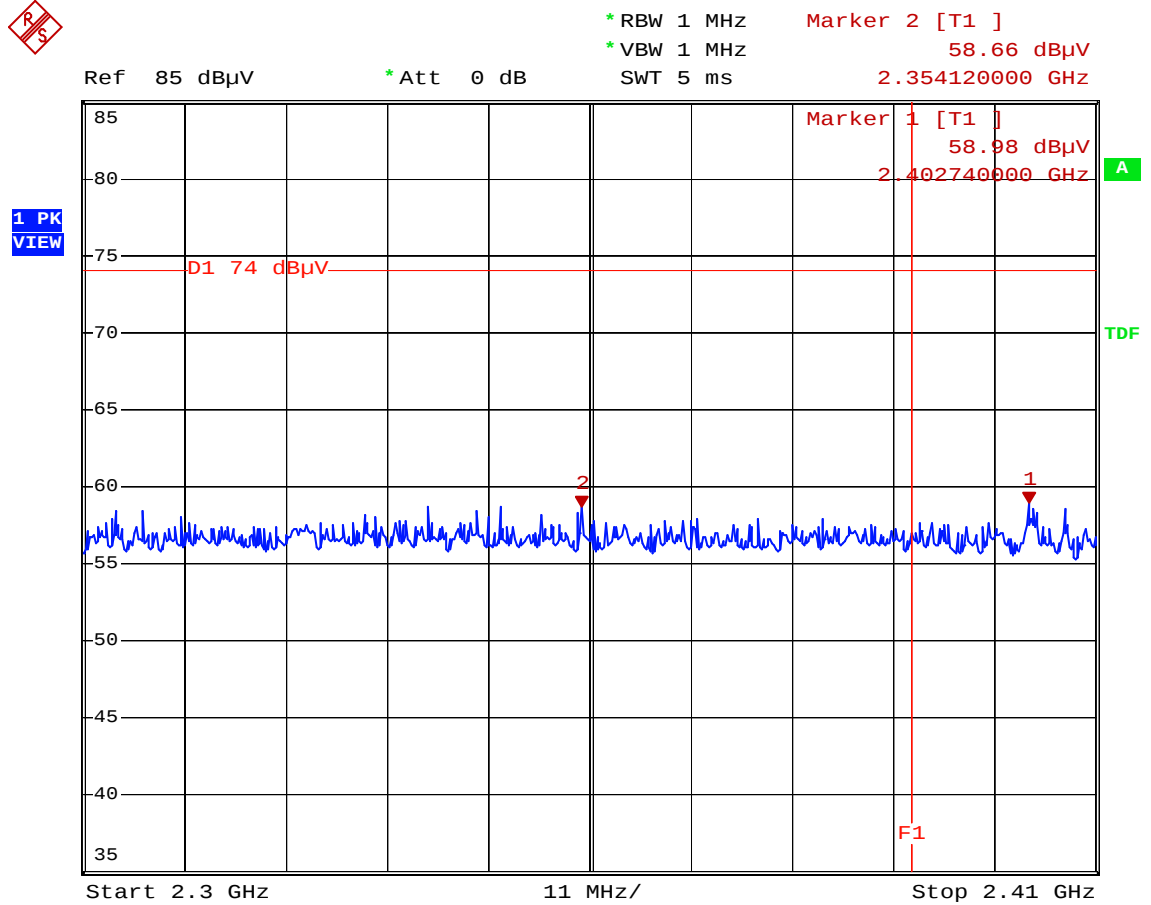
1GHz-3GHz: 10dBuV
 3GHz-14GHz: 16dBuV
 14GHz-26.5GHz: 28dBuV

3.6 Radiated emission on the band edge FCC 15.249(C)

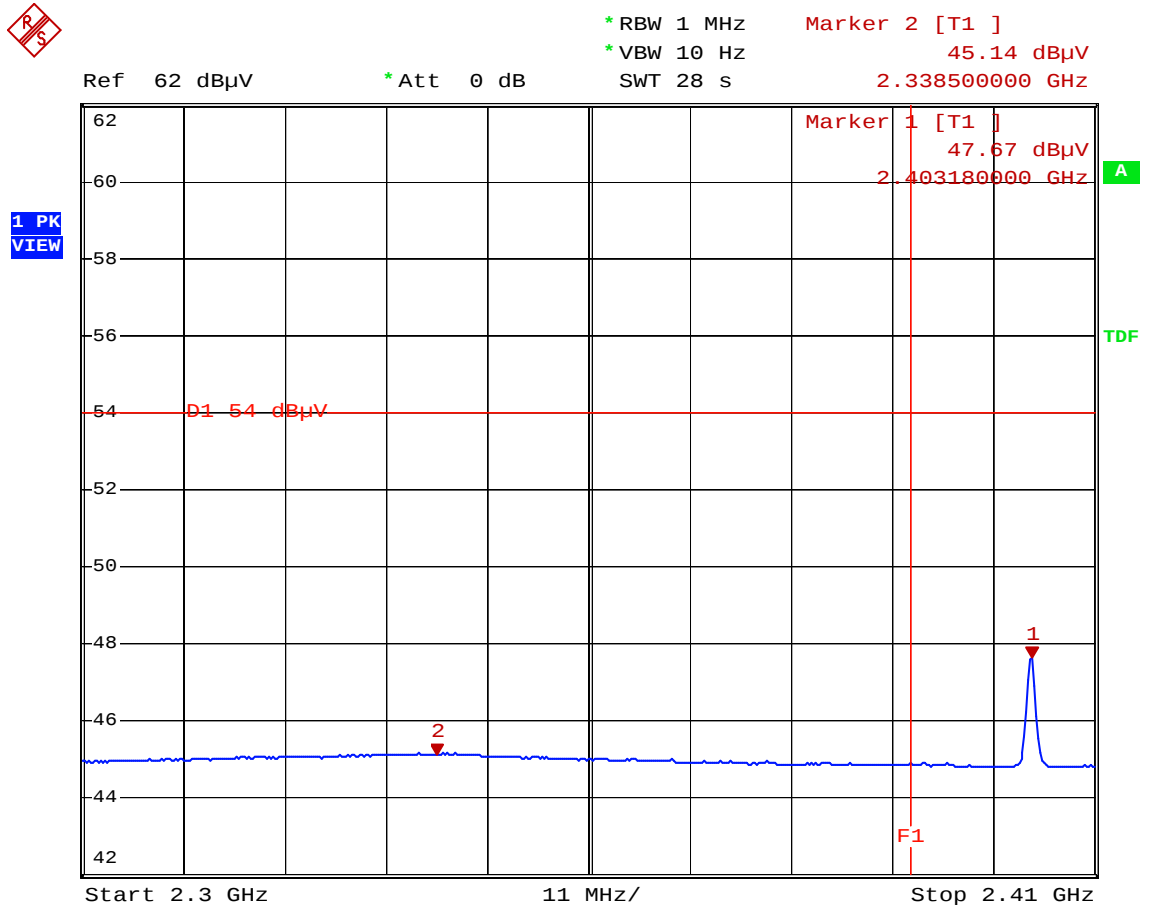
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental (Base: 2403.05MHz ~ 2405.00MHz, Handset: 2474.00MHz ~ 2475.95MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Please see the plot below.

Test Mode: Base

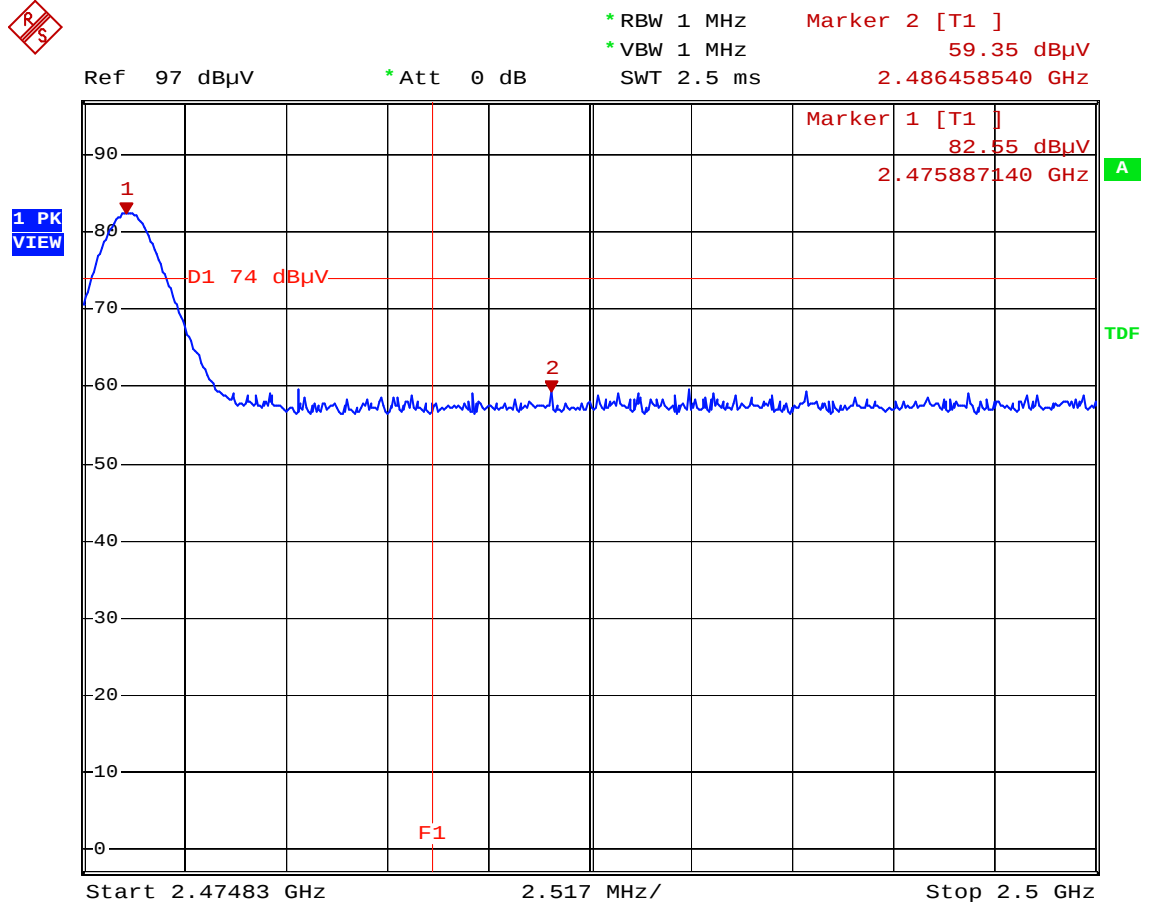


Comment: Band-edge at ch1
Comment: Base PK F1=2390MHz
Date: 21.JUN.2006 12:27:46

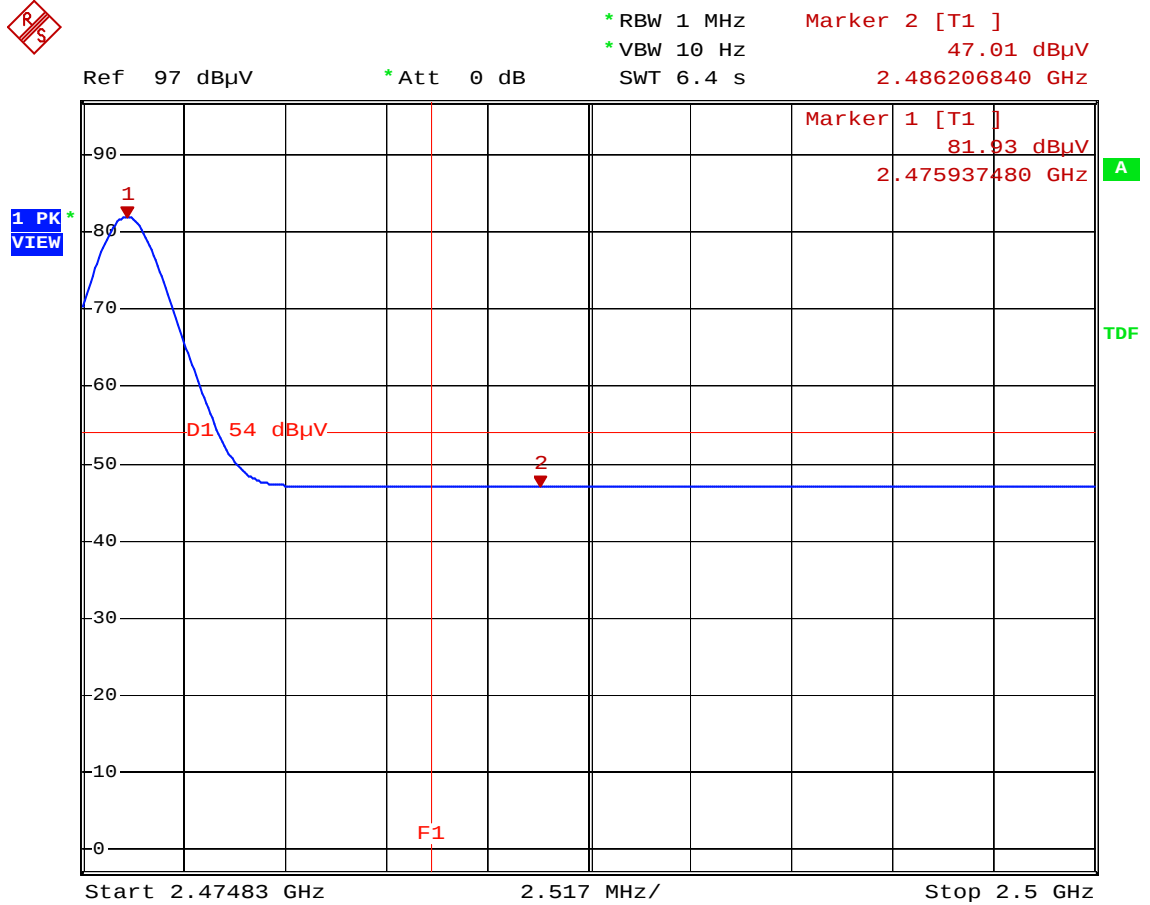


Comment: Band-edge at ch1
 Comment: Base AV F1=2390MHz
 Date: 21.JUN.2006 12:31:07

Test Mode: Handset



Comment: Band-edge at ch40
Comment: Handset PK F1=2483.5MHz
Date: 21.JUN.2006 11:08:17



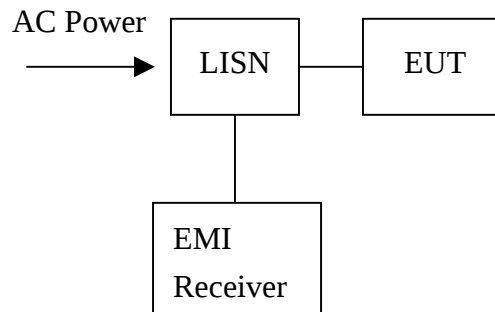
Comment: Band-edge at ch40
Comment: Handset AV F1=2483.5MHz
Date: 21.JUN.2006 11:09:20

5. Conducted emission test FCC 15.207

5.1 Operating environment

Temperature: 25
Relative Humidity: 55 %
Atmospheric Pressure: 1023 hPa

5.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

5.3 Emission limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

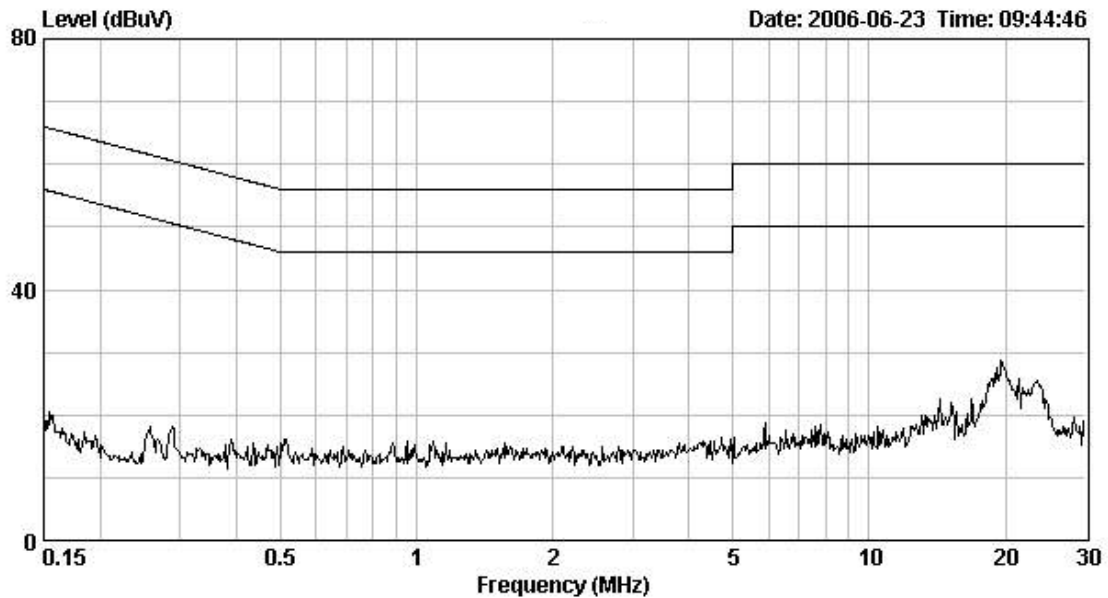
5.4 Uncertainty of Conducted Emission

Expanded uncertainty (k=2) of conducted emission measurement is ± 2.6 dB.

5.5 Power Line Conducted Emission test data

Phase : Line
EUT : 36007
Test Condition : Normal operating mode

The conducted emission was very low against the limit in the frequency range (0.15MHz to 30MHz).



Phase : Neutral
EUT : 36007
Test Condition : Normal operating mode

The conducted emission was very low against the limit in the frequency range (0.15MHz to 30MHz).

