EMC

TEST REPORT

Report No. : **EME-061025**
Model No. : **36582, 36287, 36297, 36282, 36807, 36802, 36170, 36121, 36122, 36587, 36582, 36287, 36297, 36282, 36807, 36802, 36170, 36121, 36122 UA202xxy, U200xxy, UA201xyz, UA215xxy, UA204xxy, U200xxy, UA201xyz**
Issued Date : **Sep. 14, 2006**

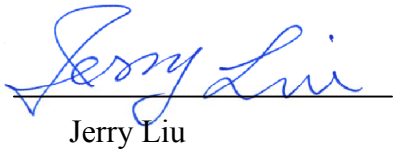
Applicant : **SENTON Enterprises Limited**
Flat 10, 17F., Fotan Ind. Centre, 26-28 Au Pui Wan St., Fo Tan, Shatin, N.T. Hong Kong

Test By : **Intertek Testing Services Taiwan Ltd.**
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan

Project Engineer

Kevin Chen

Reviewed By



Jerry Liu

Table of Contents

Summary of Tests

2.4 GHz Cordless Phone-Model: 36587
FCC ID: PEG36587

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.	: 36587
FCC ID.	: PEG36587
Frequency Range (Handset)	: 2470.2MHz ~ 2478.9MHz
Frequency Range (Base)	: 2400.3MHz ~ 2409.0MHz
Channel Number	: 30 channels
Frequency of Each Channel (Handset)	: 2470.2MHz + 0.3k MHz k=0~29
Frequency of Each Channel (Base)	: 2400.3MHz + 0.3k MHz k=0~29
Type of Modulation	: FM
Power Supply	: 120Vac, 60Hz with adapter (Model: U090020D)
Power Cord	: N/A
Data Cable	: RJ-11 unshielded cable 1.8 meter × 1
Sample Received	: Aug. 21, 2006
Test Date(s)	: Aug. 21, 2006 ~ Aug. 26, 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 36587 (EUT).
Different brand serves as marking strategy.

Trade Name	Model Number
SENTON	36582
SENTON	36287
SENTON	36297
SENTON	36282
SENTON	36807
SENTON	36802
SENTON	36170
SENTON	36121
SENTON	36122
Bell Phone	36587
Bell Phone	36582
Bell Phone	36287
Bell Phone	36297
Bell Phone	36282
Bell Phone	36807
Bell Phone	36802
Bell Phone	36170
Bell Phone	36121
Bell Phone	36122
American	UA202xxy
American	U200xxy
American	UA201xyz
American	UA215xxy
American	UA204xxy
American	U200xxy
American	UA201xyz

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain	: 0dBi max
Antenna Type	: Copper Wire
Connector Type	: Soldering antenna

1.4 Peripherals equipment

Dummy Load 600Ω

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

The EUT was supplied with 120Vac, 60Hz for Base unit and 3.6Vdc Nicd Battery for Handset unit.

During Conducted emission test, it was tested in charging mode.

During radiated emission test, the EUT was operated in continuously transmitting.

The EUT had two Base Units.
Base1: Charger with RF module
Base2: Charger only.
The conducted emission test was tested at each charging mode.

Mode 1: Handset + Base 1
Mode 2: Handset + Base 2

The worst case was found at mode 1.

The final test was executed under test mode with highest emission and recorded in this report individually.

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	04/17/2007
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	EC317	08/07/2007
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/24/2007
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	EC365	11/01/2006
Horn Antenna	EMCO	1GHz~18GHz	3115	EC338	08/16/2007
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	EC351	07/08/2007
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	EC368	05/20/2007
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	04/13/2007
Pre-Amplifier	MITEQ	26GHz~40GHz	828825	EC374	01/28/2007
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	01/14/2007

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

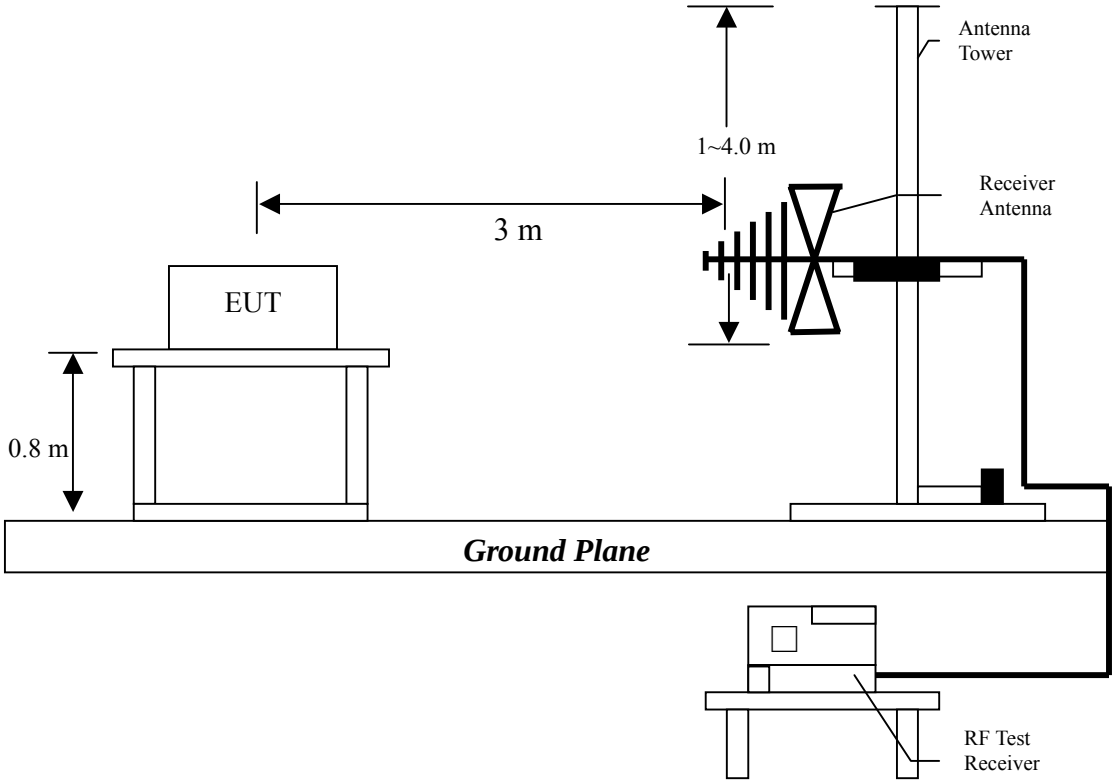
3. Radiated emission test FCC 15.249 (C)

3.1 Operating environment

Temperature:	24	℃
Relative Humidity:	56	%
Atmospheric Pressure:	1023	hPa

3.2 Test setup & procedure

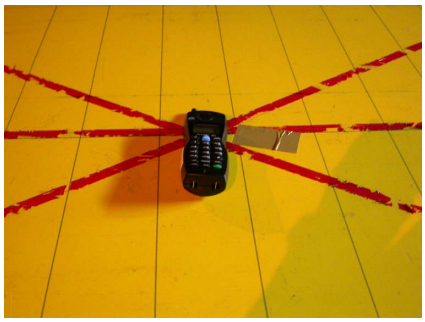
The Diagram below shows the test setup, which is utilized to make these measurements.



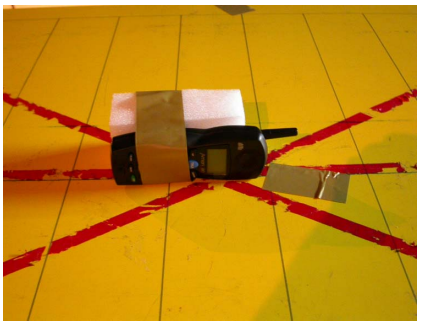
The signal is maximized through rotation and placement in the three orthogonal axes. Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record 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 for Horizontal and at setup 3 for Vertical 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 : 36587
Test Unit : Base
Worst Case : Tx at low channel

Test Result:

No Spurious emissions were found above the spectrum analyzer noise floor in the frequency range 30MHz to 1GHz.

EUT : 36587
Test Unit : Handset
Worst Case : Tx at high channel

Test Result:

No Spurious emissions were found above the spectrum analyzer noise floor in the frequency range 30MHz to 1GHz.

The noise floor are listed as below:

3.5 Measurement results: frequency above 1GHz

EUT : 36587
Test Unit : Handset
Test Condition : Tx at low channel

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)
2470.20	PK	V	0	30.31	34.39	64.70	114	-49.30
2470.20	AV	V	0	30.31	28.41	58.72	94	-35.28
2470.20	PK	H	0	30.31	35.76	66.07	114	-47.93
2470.20	AV	H	0	30.31	32.48	62.79	94	-31.21

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)
4800.00	PK	V	36.07	37.77	47.4	49.10	54	-4.90
4920.00	PK	V	36.07	37.77	47.32	49.02	54	-4.98
4920.00	PK	H	36.07	37.77	44.16	45.86	54	-8.14

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

EUT : 36587
Test Unit : Handset
Test Condition : Tx at high channel

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)
2478.90	PK	V	0	30.31	32.89	63.20	114	-50.80
2478.90	AV	V	0	30.31	26.56	56.87	94	-37.13
2478.90	PK	H	0	30.31	34.78	65.09	114	-48.91
2478.90	AV	H	0	30.31	30.43	60.74	94	-33.26

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)
4800.00	PK	V	36.07	37.77	47.76	49.46	54	-4.54
4920.00	PK	V	36.07	37.77	48.45	50.15	54	-3.85
4800.00	PK	H	36.07	37.77	43.34	45.04	54	-8.96
4950.00	PK	H	36.07	37.77	42.95	44.65	54	-9.35

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

EUT : 36587
Test Unit : Base
Test Condition : Tx at low channel

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)
2400.30	PK	V	0	30.31	48.92	79.23	114	-34.77
2400.30	AV	V	0	30.31	48.53	78.84	94	-15.16
2400.30	PK	H	0	30.31	49.8	80.11	114	-33.89
2400.30	AV	H	0	30.31	49.32	79.63	94	-14.37

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)
4800.00	PK	V	36.07	37.77	45.69	47.39	54	-6.61
4920.00	PK	V	36.07	37.77	47.58	49.28	54	-4.72
4800.00	PK	H	36.07	37.77	42.25	43.95	54	-10.05
4920.00	PK	H	36.07	37.77	42.38	44.08	54	-9.92

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

EUT : 36587
Test Unit : Base
Test Condition : Tx at high channel

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)
2409.00	PK	V	0	30.31	54.53	84.84	114	-29.16
2409.00	AV	V	0	30.31	53.95	84.26	94	-9.74
2409.00	PK	H	0	30.31	54.69	85.00	114	-29.00
2409.00	AV	H	0	30.31	54.16	84.47	94	-9.53

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)
4800.00	PK	V	36.07	37.77	43.78	45.48	54	-8.52
4950.00	PK	V	36.07	37.77	47.54	49.24	54	-4.76
4800.00	PK	H	36.07	37.77	42.07	43.77	54	-10.23
4950.00	PK	H	36.07	37.77	41.66	43.36	54	-10.64

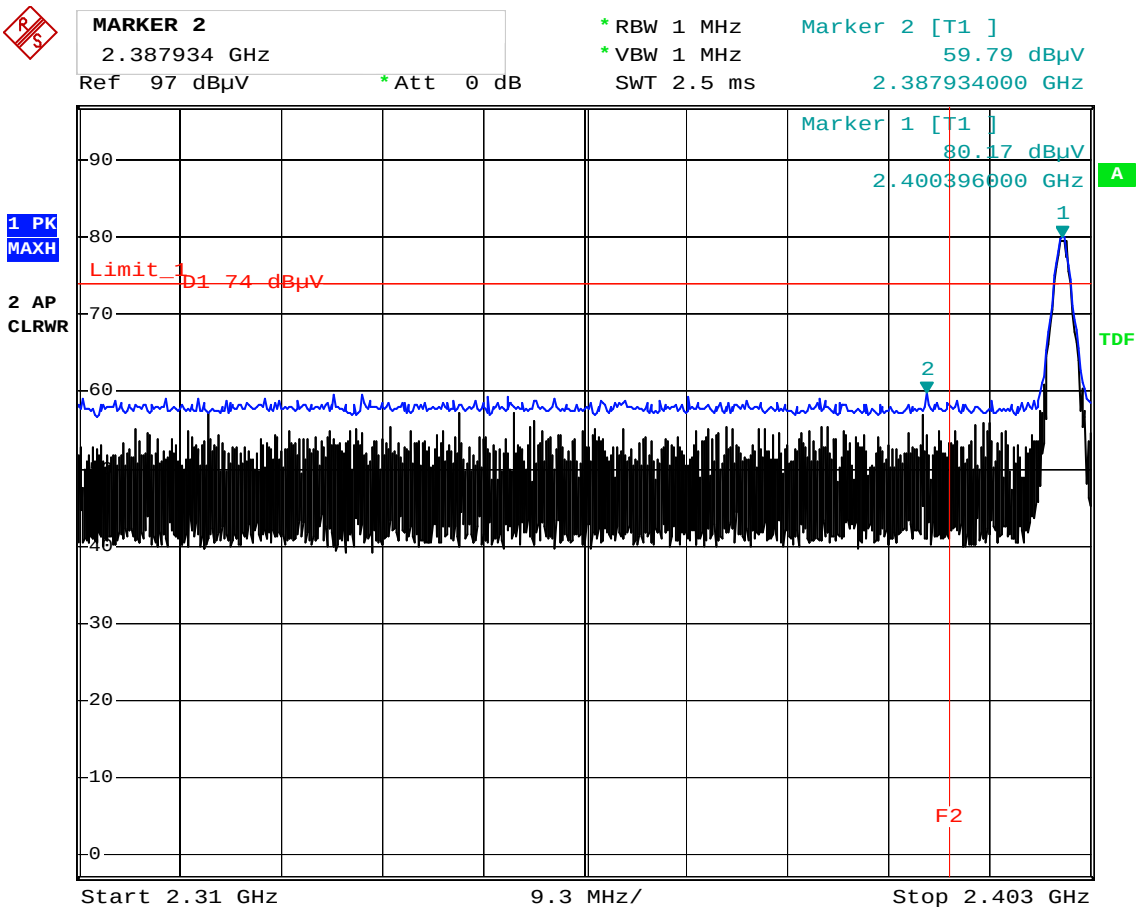
Remark:
1. Corrected Level = Reading Level + Correction Factor－Preamp
2. Correction Factor = Antenna Factor + Cable Loss

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: 2470.2MHz ~ 2478.9MHz, Handset: 2400.3MHz ~ 2409.0MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

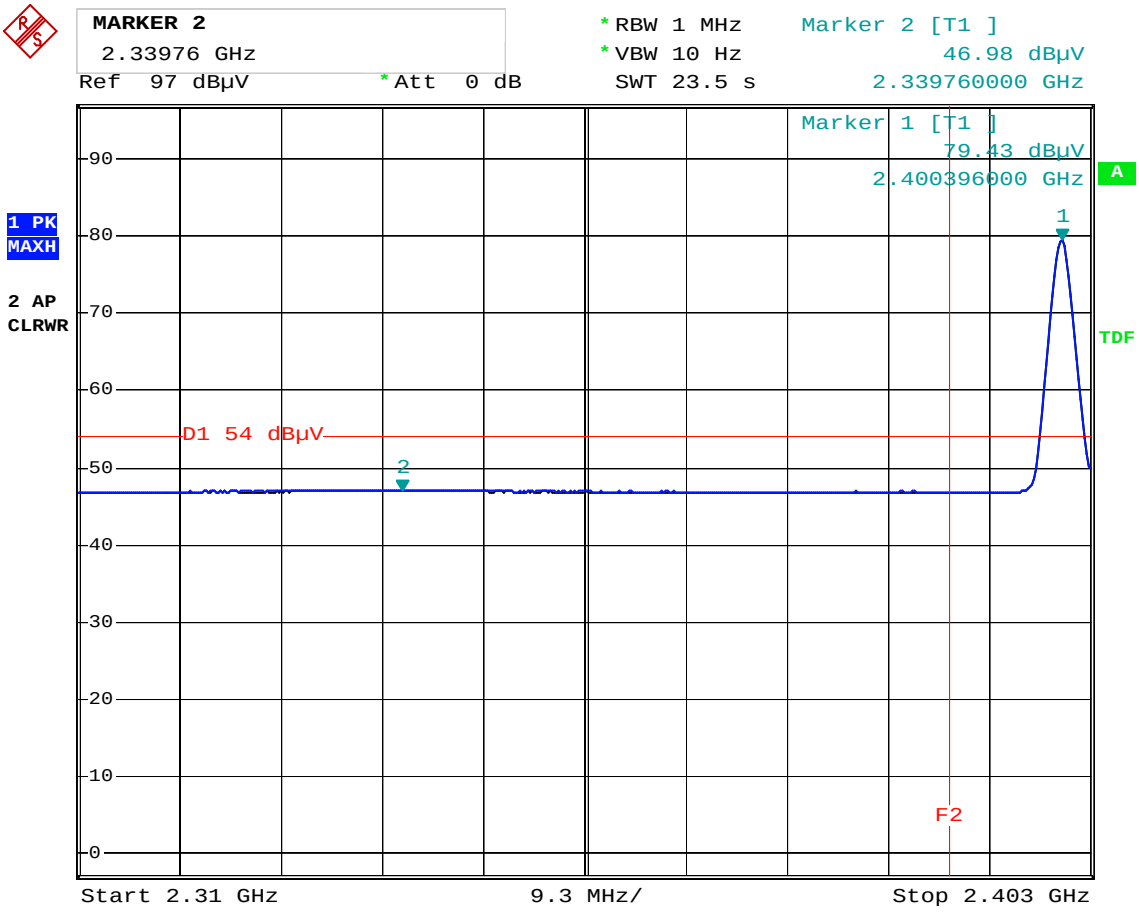
Please see the plot below.

Test mode: Base Unit



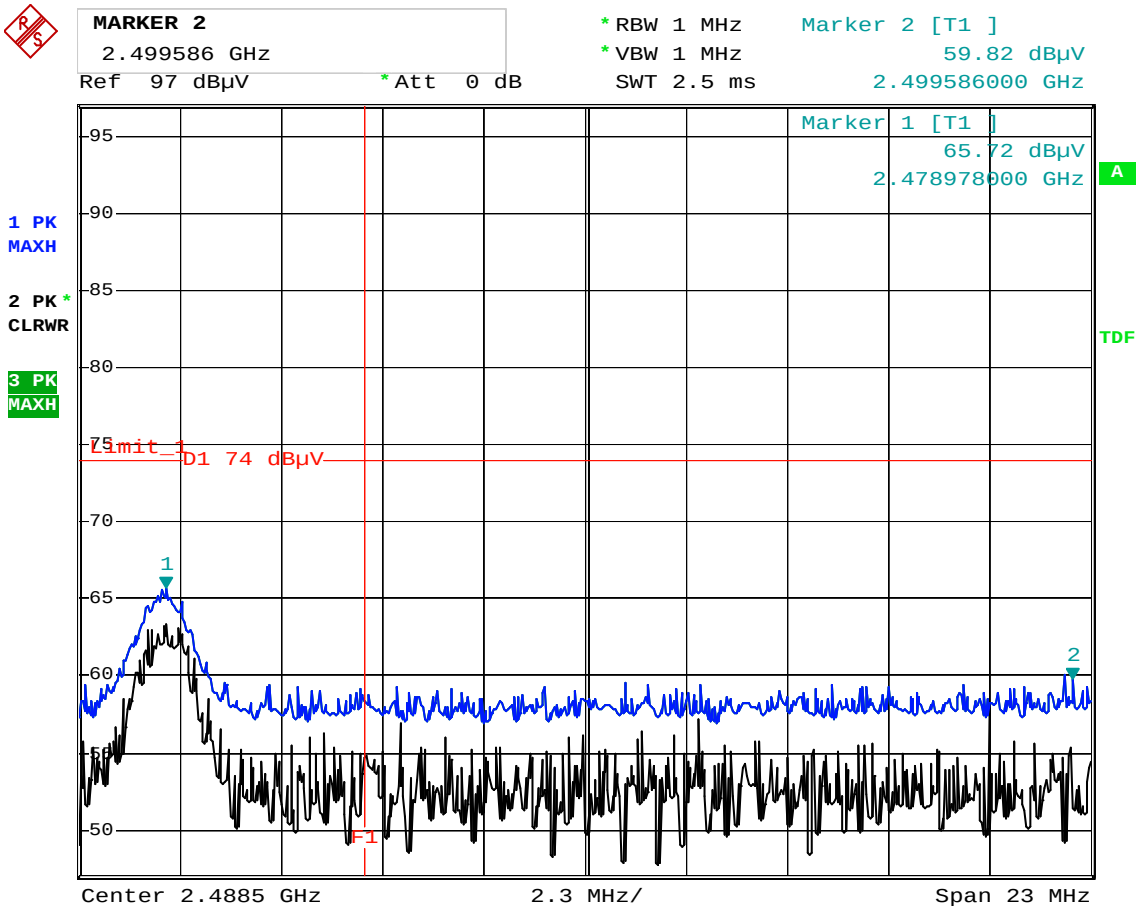
Comment: BS tx low hor
Comment: Band-edge measurement
Date: 22.AUG.2006 19:17:37

Test mode: Base Unit



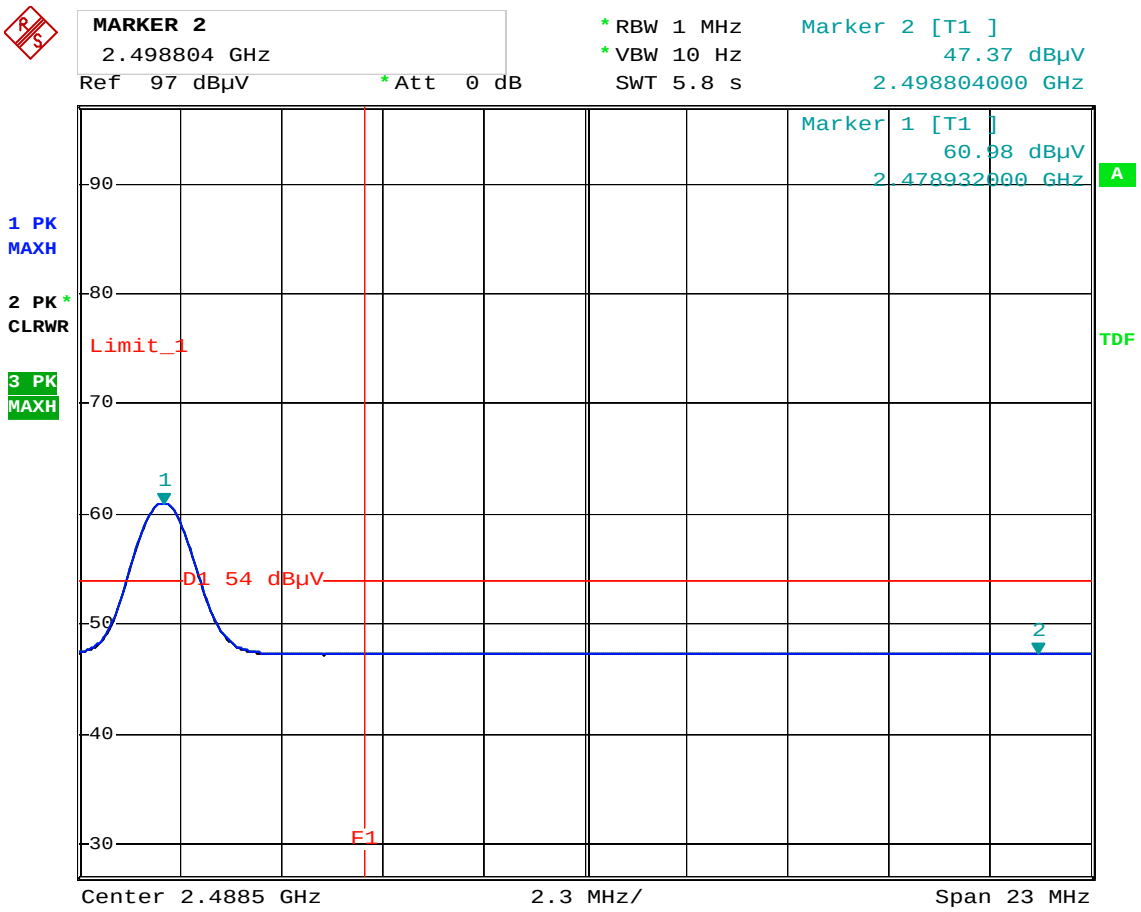
Comment: BS tx low hor
Comment: Band-edge measurement
Date: 22.AUG.2006 19:19:27

Test mode: Handset Unit



Comment: Band-edge
Comment: HS tx high F2=2483.5MHz
Date: 26.AUG.2006 13:50:46

Test mode: Handset Unit



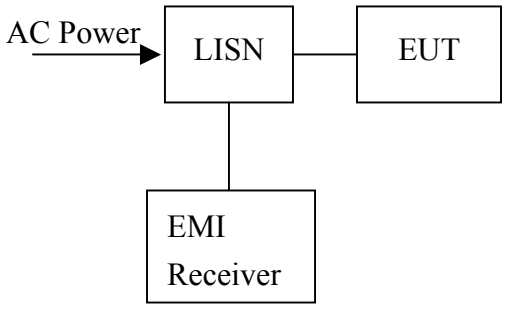
Comment: Band-edge
Comment: HS tx high F2=2483.5MHz
Date: 26.AUG.2006 13:52:26

4. Conducted emission test FCC 15.207

4.1 Operating environment

Temperature:	24	℃
Relative Humidity:	56	%
Atmospheric Pressure:	1023	hPa

4.2 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”.

4.3 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.

4.4 Uncertainty of Conducted Emission

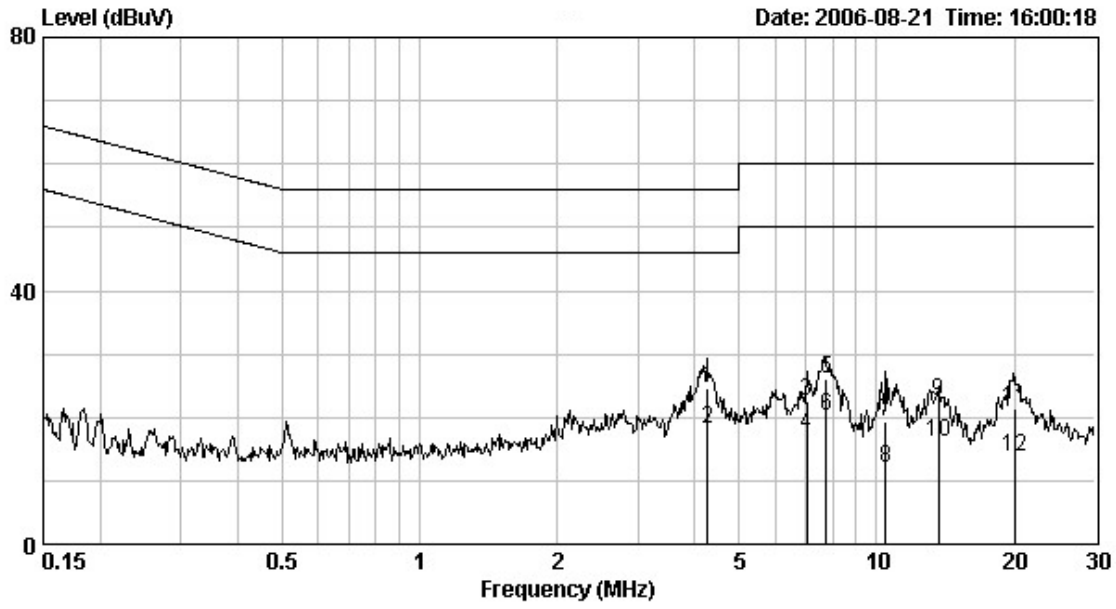
Expanded uncertainty (k=2) of conducted emission measurement is ±2.26 dB.

4.5 Power Line Conducted Emission test data

Phase : Line
EUT : 36587
Test Condition : Charger with phone jack

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
4.261	0.21	24.49	56.00	18.05	46.00	-31.51	-27.95
7.039	0.30	22.49	60.00	17.25	50.00	-37.51	-32.75
7.746	0.33	26.08	60.00	20.28	50.00	-33.93	-29.73
10.485	0.43	19.32	60.00	12.08	50.00	-40.68	-37.92
13.638	0.62	22.53	60.00	16.25	50.00	-37.47	-33.75
19.992	0.80	21.34	60.00	13.78	50.00	-38.66	-36.22

Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase : Neutral
EUT : 36587
Test Condition : Charger with phone jack

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
4.261	0.20	23.42	56.00	17.50	46.00	-32.58	-28.50
5.955	0.20	19.12	60.00	13.17	50.00	-40.88	-36.83
7.870	0.20	24.33	60.00	18.67	50.00	-35.67	-31.33
10.485	0.22	18.44	60.00	10.82	50.00	-41.56	-39.18
13.001	0.32	19.92	60.00	13.33	50.00	-40.08	-36.67
19.992	0.60	22.24	60.00	14.14	50.00	-37.76	-35.86

Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)