

# EMC

## TEST REPORT

**Report No. : EME-060309**

**Model No. : 36028, MB6028**

**Issued Date : Mar. 23, 2006**

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

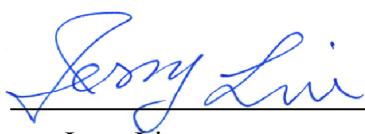
**Test By : Intertek Testing Services Taiwan Ltd.**  
**No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,**  
**Shiang-Shan District, Hsinchu City, Taiwan**

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Project Engineer

  
Riau Dery

Reviewed By

  
Jerry Liu

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**Summary of Tests****Cordless Phone -Model: 36028**  
**FCC ID: PEG36028**

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

## 1. General information

### 1.1 Identification of the EUT

Applicant	: SENTON Enterprises Limited
Product	: Cordless Phone
Model No.	: 36028
FCC ID.	: PEG36028
Frequency Range (Base)	: 2402.55MHz ~ 2404.50MHz
Frequency Range (Handset)	: 2474.00MHz ~ 2475.95MHz
Channel Number	: 40 channels
Frequency of Each Channel (Base)	: 2402.55MHz + 0.05k MHz k=0~39
Frequency of Each Channel (Handset)	: 2474MHz + 0.05k MHz k=0~39
Type of Modulation	: FM
Power Supply (Base)	: 120Vac, 60Hz with adapter (U090050D)
Power Supply (Handset)	: 3.6Vdc Battery
Power Cord	: N/A
Sample Received	: RJ-11 unshielded cable 10meter × 1
Sample Received	: Mar. 9, 2006
Test Date(s)	: Mar. 9, 2006 ~ Mar. 23, 2006

A DoC report has been generated for the client.

### 1.2 Additional information about the EUT

The EUT is a Cordless Phone; it consists of two handsets, one base and one charge unit.

The models listed below are identical to model 36028 (EUT).  
Difference brand serves as marking strategy.

Trade Name	Model Number
Unical	36028
Bell Phone	36028
Moutain Bell	MB6028

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

### **1.4 Peripherals equipment**

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Exchange Board	Teltone	250-00193-07	94948	FCC DoC Approved
Telephone	TENTEL	K-903S	0514000941	FCC DoC Approved
Earphone	N/A	N/A	N/A	N/A

## **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	04/17/2006
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	08/16/2007
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	EC351	07/08/2007
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	EC368	02/19/2007
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	12/29/2007
Pre-Amplifier	MITEQ	26GHz~40GHz	828825	EC374	01/15/2008
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.

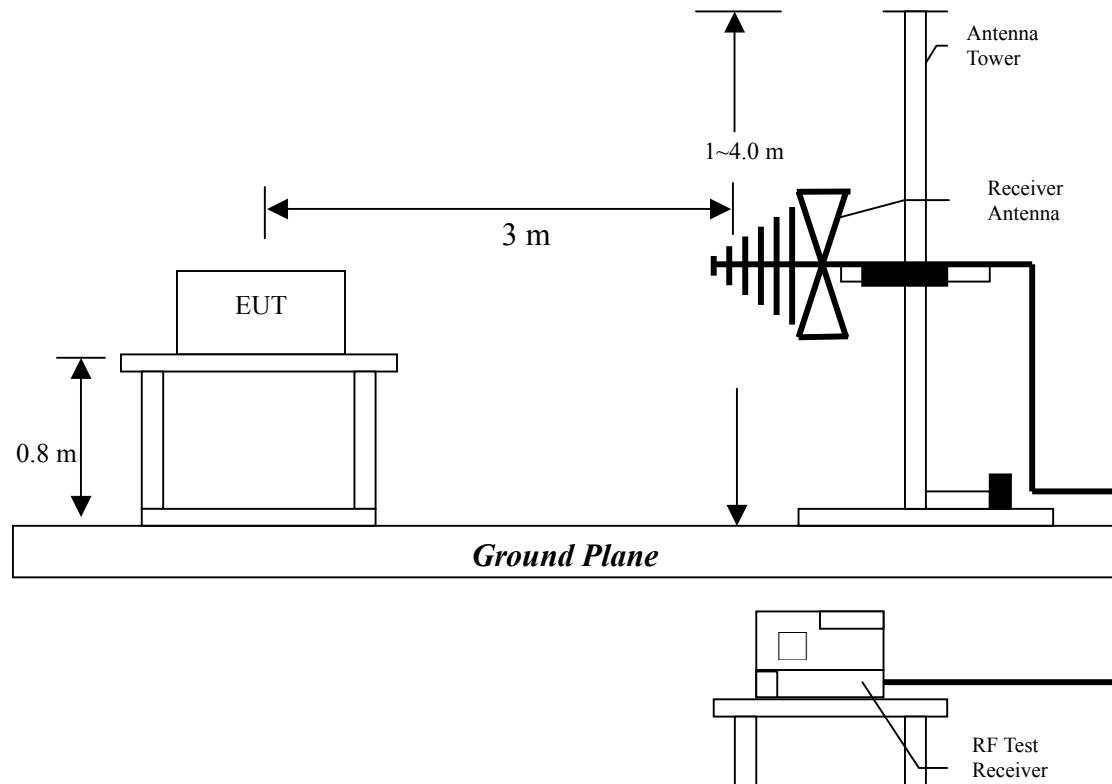
### 3. Radiated emission test FCC 15.249 (C)

#### 3.1 Operating environment

Temperature: 23 °C  
Relative Humidity: 56 %  
Atmospheric Pressure: 1023 hPa

#### 3.2 Test setup & procedure

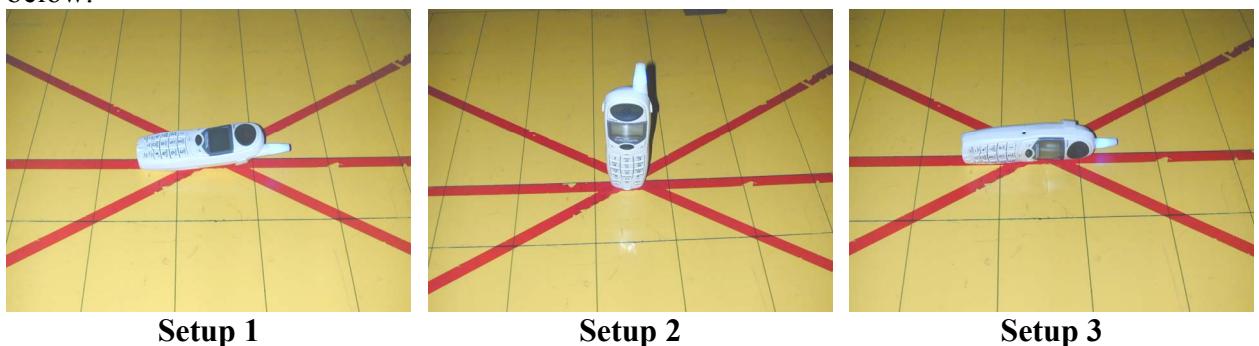
The Diagram below shows the test setup, which is utilized to make these measurements.



The signal is maximized through rotation and placement in the three orthogonal axes. Radiated emissions were investigated over 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:



After verifying three axes, the worst case was occurred at setup 3configuration. 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 $\mu$ 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  $\pm 4.98$  dB.

**3.4 Radiated spurious emission test data****3.4.1 Measurement results: frequencies equal to or less than 1 GHz**

The test was performed on EUT under continuously transmitting mode. Channel 1, 40 were verified. The worst case occurred at Tx channel 1.

EUT : 36028  
Test Unit : Base  
Worst Case : Tx at channel 1

Frequency (MHz)	Spectrum Analyzer	Antenna	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
43.580	QP	V	12.38	26.25	38.63	40.00	-1.38	100	334
47.460	QP	V	12.84	24.62	37.46	40.00	-2.54	100	305
107.600	QP	V	7.64	23.36	31.00	43.50	-12.50	100	229
148.340	QP	V	14.27	17.10	31.37	43.50	-12.13	100	158
165.800	QP	V	15.70	22.22	37.92	43.50	-5.58	100	225
43.580	QP	H	14.20	14.15	28.35	40.00	-11.65	400	247
107.600	QP	H	9.03	27.30	36.33	43.50	-7.18	400	44
165.800	QP	H	13.84	21.47	35.31	43.50	-8.20	400	108
313.240	QP	H	14.32	19.35	33.67	46.00	-12.34	286	63
800.180	QP	H	23.62	12.05	35.67	46.00	-10.33	133	352

Remark:

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

EUT : 36028  
Test Unit : Handset  
Test Condition : Tx at channel 1, 40

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

### 3.5 Measurement results: frequency above 1GHz

EUT : 36028

Test Unit : Base

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)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2402.55	PK	H	30.31	30.31	71.32	65.87	114	-48.13	100	147
2402.55	AV	H	30.31	30.31	68.46	63.01	94	-30.99	100	147
3180.00	PK	V	35.54	34.62	54.34	53.42	74	-20.58	100	19
3180.00	AV	V	35.54	34.62	52.91	51.99	54	-2.01	100	19
3180.00	PK	H	35.54	34.62	47.12	46.2	74	-27.8	102	154
3180.00	AV	H	35.54	34.62	41.94	41.02	54	-12.98	102	154

#### Remark:

1. Corrected Level = Reading Level + Correction Factor—Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

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 : 36028  
Test Unit : Base  
Test Condition : Tx at channel 40

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2404.500	PK	H	30.31	30.31	71.06	65.61	114	-48.39	100	235
2404.500	AV	H	30.31	30.31	68.04	62.59	94	-31.41	100	235
3180.000	PK	V	35.54	34.62	53.78	52.86	74	-21.14	100	117
3180.000	AV	V	35.54	34.62	52.47	51.55	54	-2.45	100	117
3180.000	PK	H	35.54	34.62	46.04	45.12	74	-28.88	110	163
3180.000	AV	H	35.54	34.62	40.98	40.06	54	-13.94	110	163

**Remark:**

1. Corrected Level = Reading Level + Correction Factor—Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

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 : 36028  
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)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2474.000	PK	H	35.76	30.31	86.64	81.19	114	-32.81	100	209
2474.000	AV	H	35.76	30.31	86.01	80.56	94	-13.44	100	209

**Remark:**

1. Corrected Level = Reading Level + Correction Factor—Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

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 : 36028  
Test Unit : Handset  
Test Condition : Tx at channel 40

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2475.950	PK	H	35.76	30.31	86.78	81.33	114	-32.67	100	187
2475.950	AV	H	35.76	30.31	86.17	80.72	94	-13.28	100	187

**Remark:**

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

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

For AV:

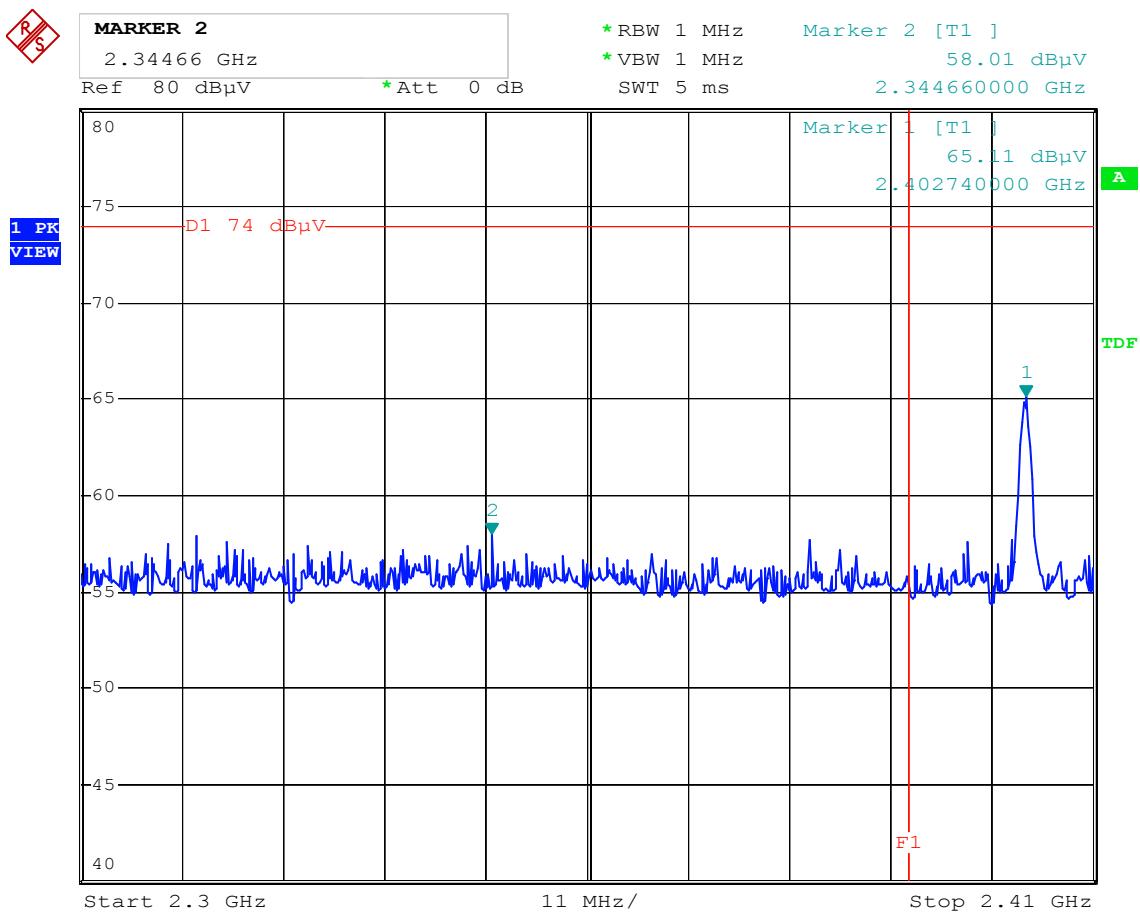
1GHz-3GHz: 10dBuV  
3GHz-14GHz: 16dBuV  
14GHz-26.5GHz: 28dBuV

**4. Radiated emission on the band edge FCC 15.249(C)**

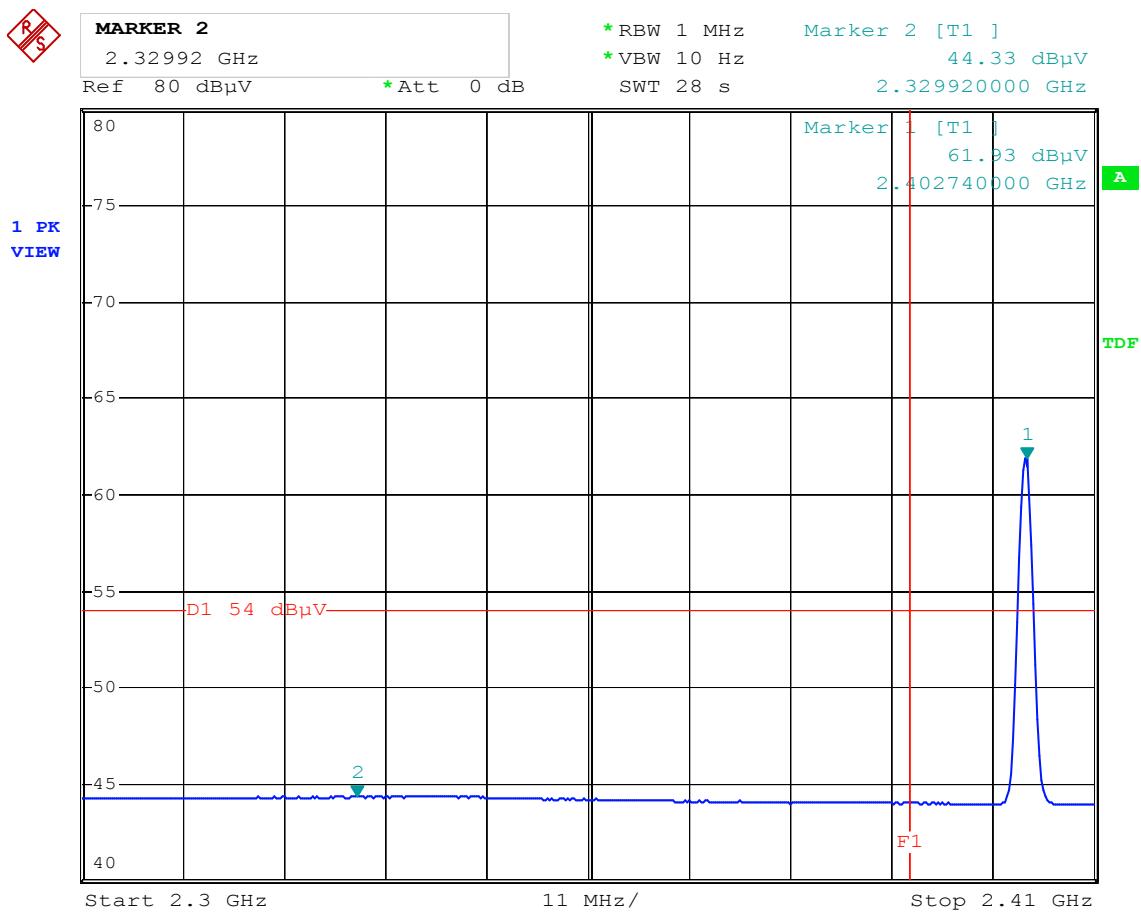
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental (Base: 2402.55MHz ~ 2404.50MHz, Handset: 2474.00MHz ~ 2475.95MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Please see the plot below.

## Test Mode: Base

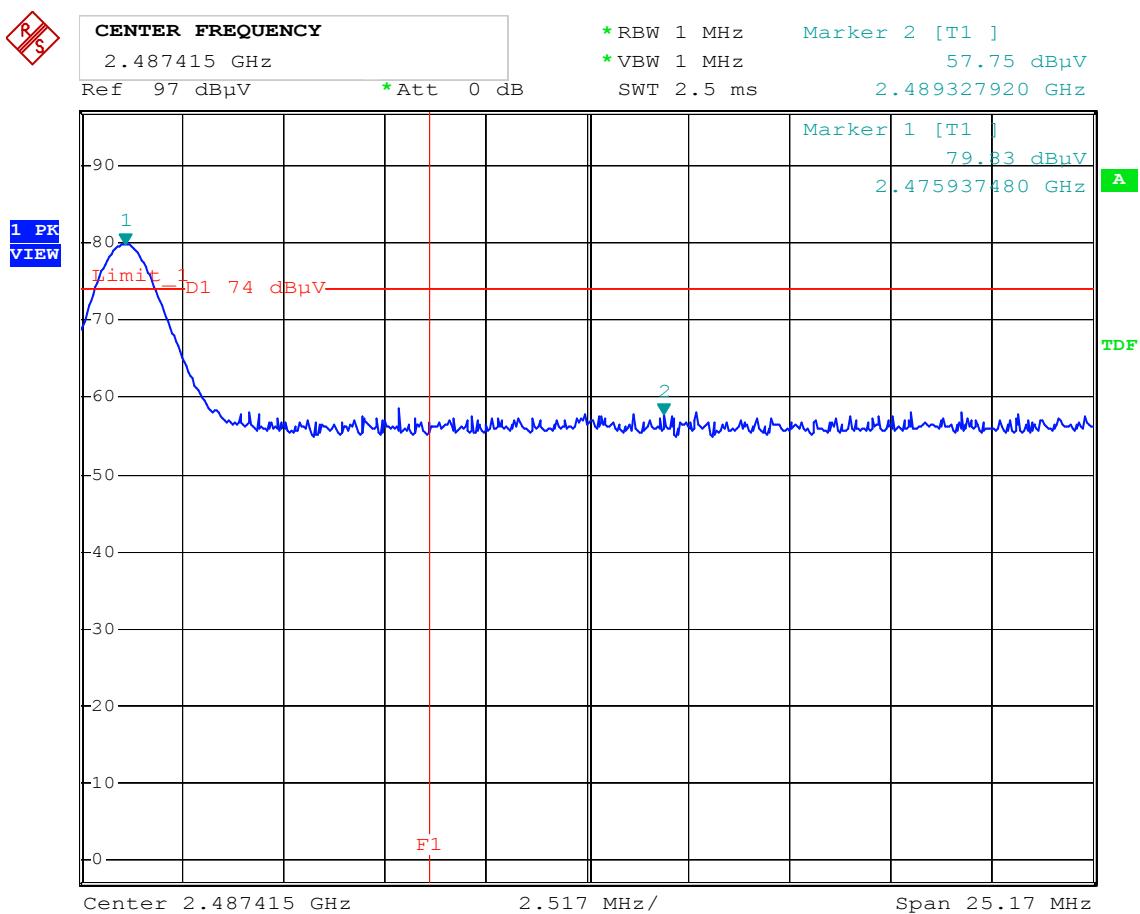


Comment: Band-edge at low ch  
 Comment: 36028 Base PK F1=2390MHz  
 Date: 20.MAR.2006 15:16:57

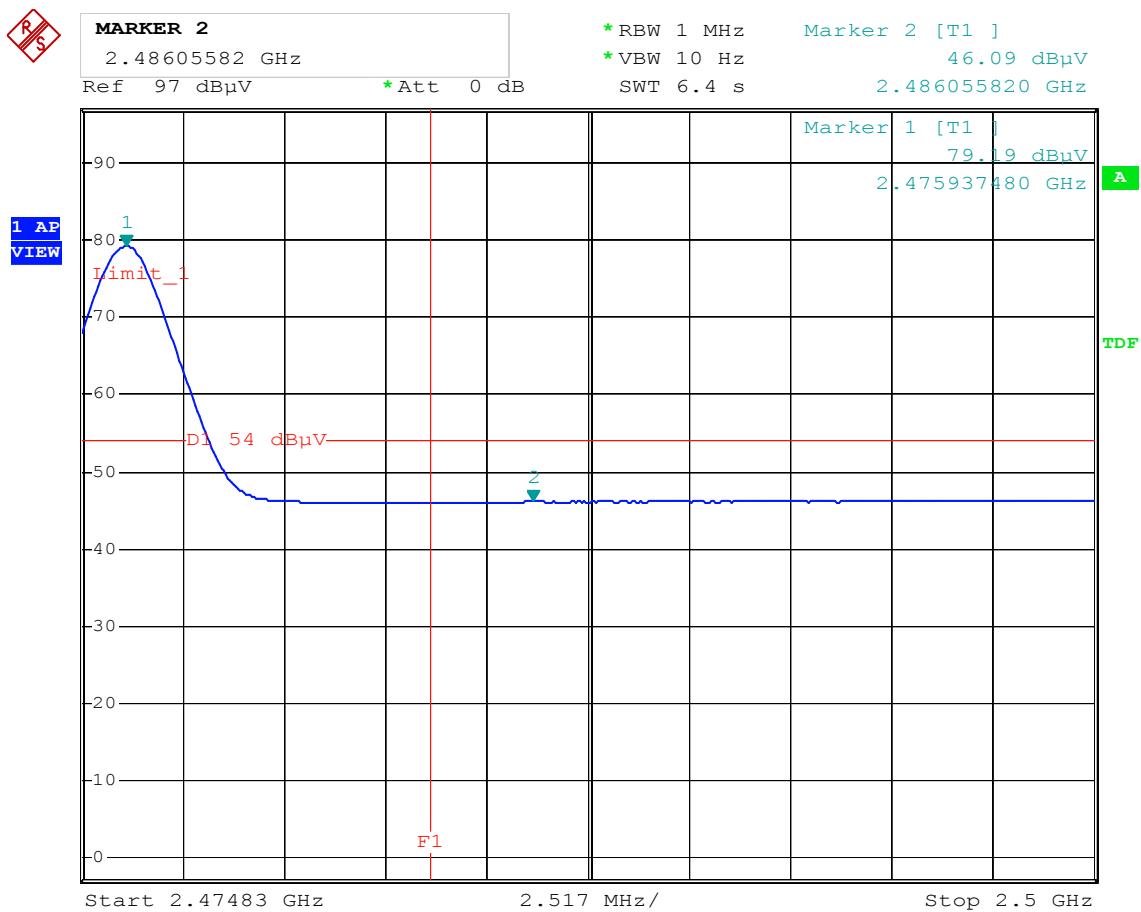


Comment: Band-edge at low ch  
 Comment: 36028 Base AV F1=2390MHz  
 Date: 20.MAR.2006 15:08:56

## Test Mode: Handset



Comment: Band-edge at high ch  
 Comment: Headset PK F1=2483.5MHz  
 Date: 20.MAR.2006 16:16:27



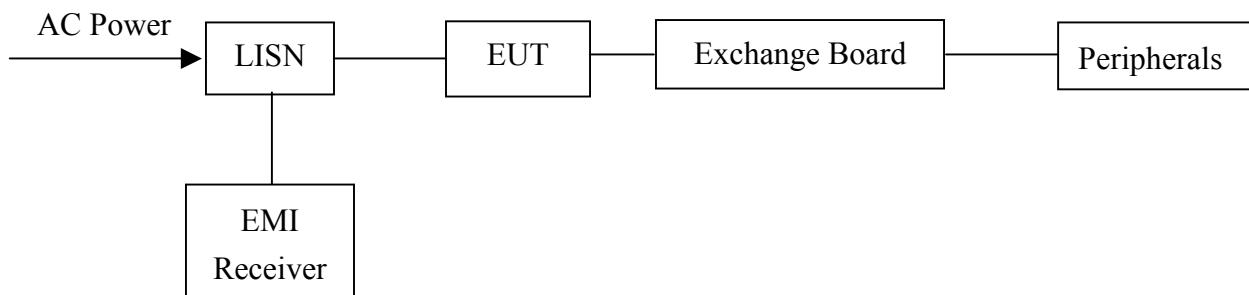
Comment: Band-edge at high ch  
 Comment: Headset AV F1=2483.5MHz  
 Date: 20.MAR.2006 16:18:37

## 5. Conducted emission test FCC 15.207

### 5.1 Operating environment

Temperature: 23 °C  
Relative Humidity: 53 %  
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

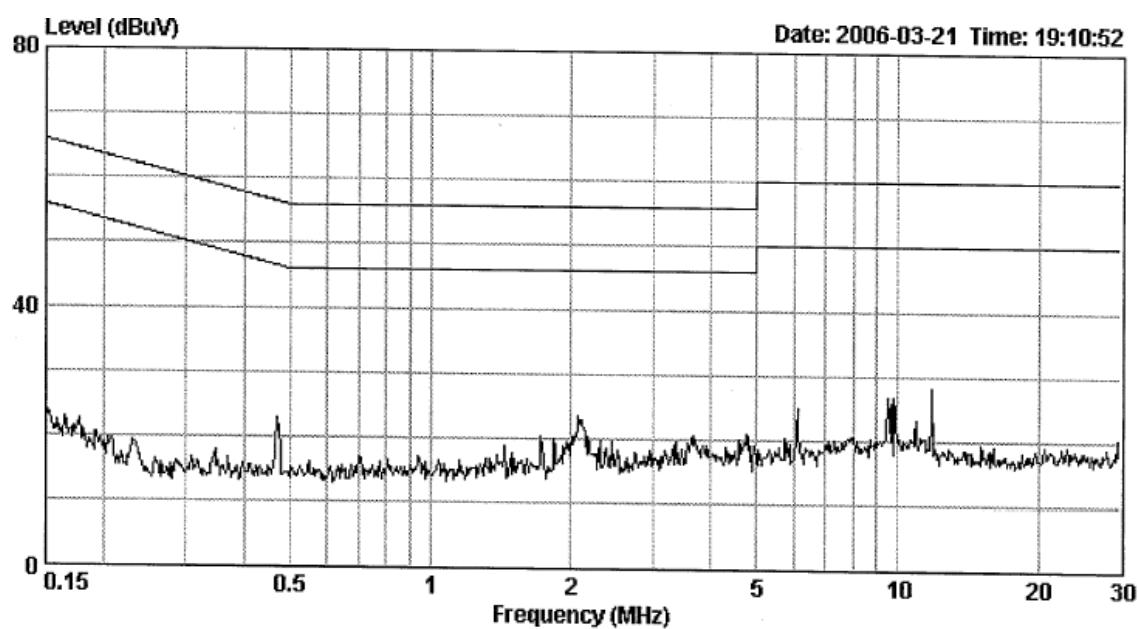
\*Decreases with the logarithm of the frequency.

**5.4 Uncertainty of Conducted Emission**

Expanded uncertainty (k=2) of conducted emission measurement is  $\pm 2.6$  dB.

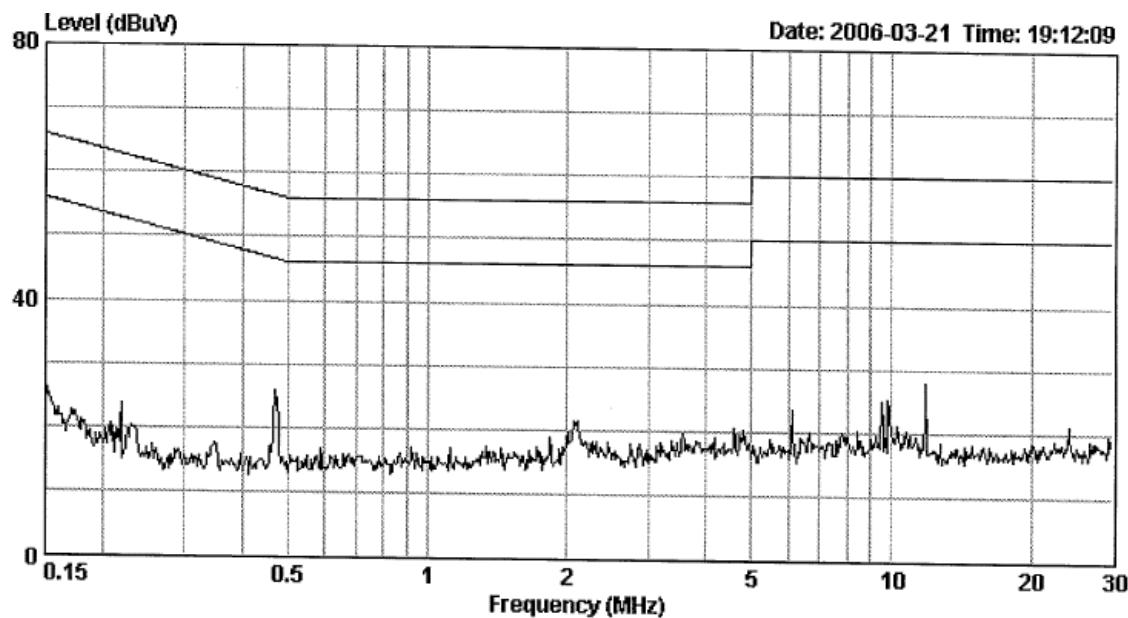
**5.5 Power Line Conducted Emission test data**

Phase : Line  
EUT : 36028  
Test Condition : Handset with Base

**Test Result:**

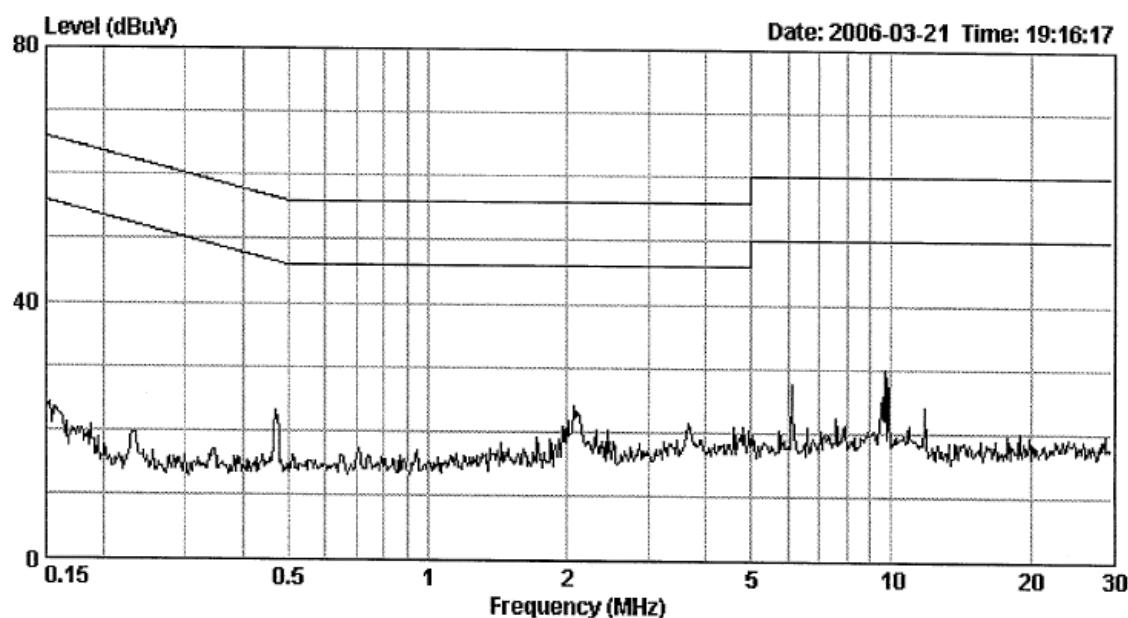
The power line conducted emission less than 20dB.

Phase : Neutral  
EUT : 36028  
Test Condition : Handset with Base

**Test Result:**

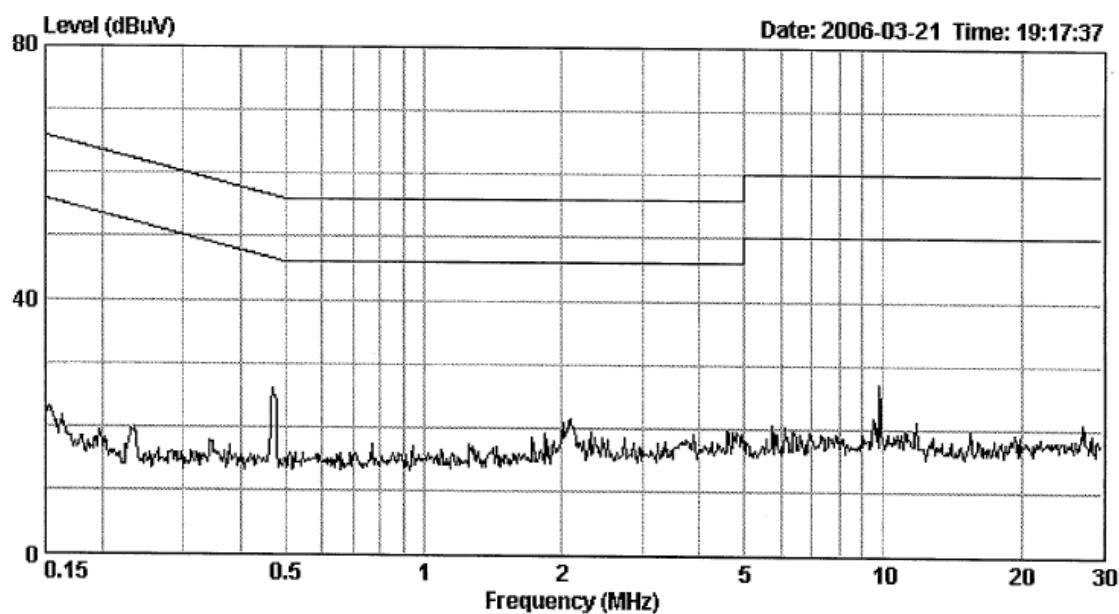
The power line conducted emission less than 20dB.

Phase : Line  
EUT : 36028  
Test Condition : Handset with Charge

**Test Result:**

The power line conducted emission less than 20dB.

Phase : Neutral  
EUT : 36028  
Test Condition : Handset with Charge

**Test Result:**

The power line conducted emission less than 20dB.