EMC
TEST REPORT

Report No. : **EME-050813**
Model No. : **CS-A50-2, CS-A50, CS-A50E**
Issued Date : **Oct. 5, 2005**

Applicant : **Geemarc Telecom International Ltd.**
1902 Mass Mutual Tower 38 Gloucester Road, Wan Chai
Hong Kong

Test By : **Intertek Testing Services Taiwan Ltd.**
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
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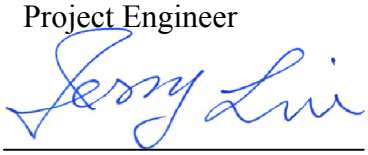
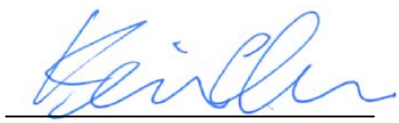
Project Engineer



Jerry Liu

Reviewed By



Kevin Chen

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Summary of Tests

CT1 cordless phone - Model: CS-A50-2, CS-A50, CS-A50E
FCC ID: RUMCSA50

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	: Geemarc Telecom International Ltd.
Product	: CT1 cordless phone
Model No.	: CS-A50-2
FCC ID.	: RUMCSA50
Frequency Range (Base)	: 902.800MHz ~ 904.750MHz
Frequency Range (Handset)	: 925.300MHz ~ 927.250MHz
Channel Number	: 40 channels
Frequency of Each Channel (Base)	: 902.800MHz + 50k MHz k=0~39
Frequency of Each Channel (Handset)	: 925.300MHz + 50k MHz k=0~39
Type of Modulation	: FM
Power Supply (Base)	: 120Vac, 60Hz with adapter (U120050D)
Power Supply (Handset)	: 1.2Vdc Battery × 3
Power Cord	: N/A
Sample Received	: RJ-11 unshielded cable 10meter × 1
Sample Received	: Aug. 15, 2005
Test Date(s)	: Aug. 15, 2005 ~ Oct. 5, 2005

A DoC report has been generated for the client.

1.2 Additional information about the EUT

The EUT is a CT1 cordless phone; it consists of handset unit, base unit and charger.

The models listed below are identical to model CS-A50-2 (EUT); the details please refer to the following table:

Trade Name	Model Number	Difference (to collocate)
Clearsound	CS-A50	1 Handset + 1 Base
Clearsound	CS-A50E	1 Handset + 1 Charger
Clearsound	CS-A50-2	2 Handset + 1 Base + 1Charger

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 : 1.5dBi max
Antenna Type : Integtral antenna
Connector Type : N/A

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Exchange Board	Teltone	250-00193-07	94948	FCC DoC Approved

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

In the conducted emission test, the EUT was operated in charging mode.
During the other tests, the EUT was operated in continuously transmitting status.

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	10/18/2005
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	02/20/2006
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	12/30/2005
Pre-Amplifier	MITEQ	26GHz~40GHz	828825	EC374	1/27/2006
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	01/13/2006

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

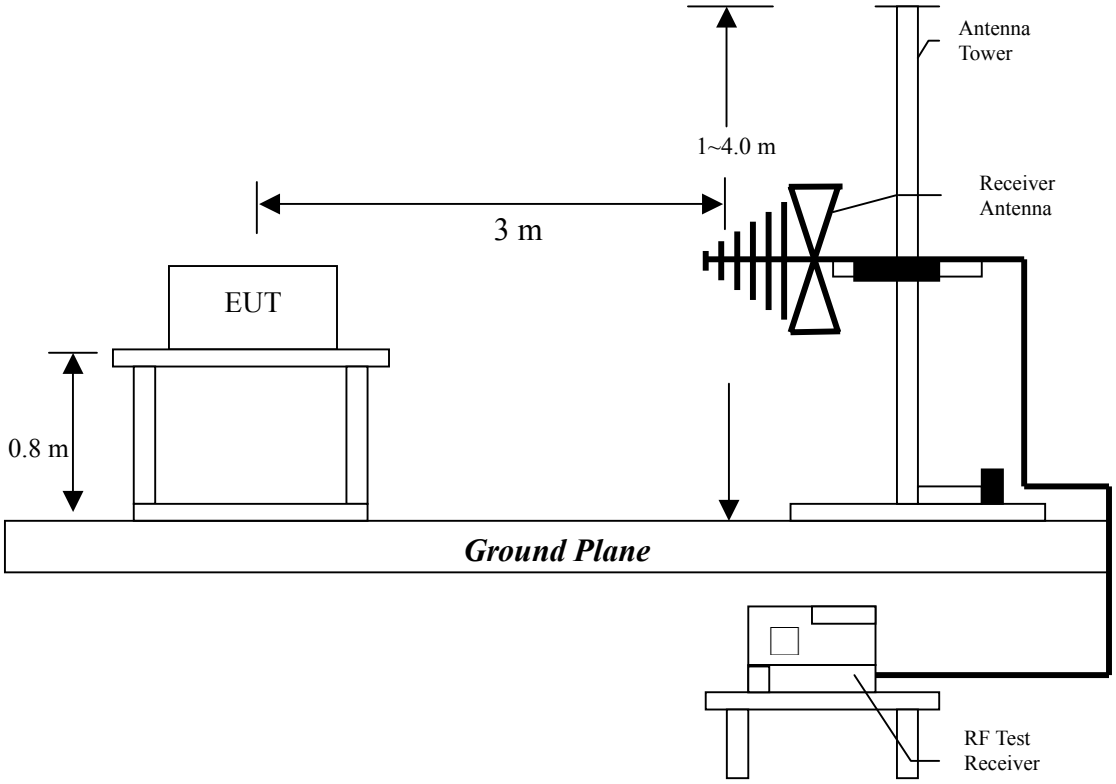
3. Radiated emission test FCC 15.249 (C)

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.



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 radiated spurious test of handset 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)
902.0~928.0	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

The radiated spurious emissions at

Frequency(MHz)	Margin
936.000	-4.10
466.500	-3.50
936.000	-2.70
600.360	-3.50
891.400	-2.70

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

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

EUT : CS-A50-2
Test Unit : Base
Worst Case : 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)
125.060	QP	V	11.62	18.59	30.20	43.50	-13.30	100.00	178.00
249.220	QP	V	12.36	19.34	31.70	46.00	-14.30	100.00	314.00
443.200	QP	V	18.12	18.78	36.90	46.00	-9.10	100.00	122.00
451.000	QP	V	18.16	18.14	36.30	46.00	-9.70	100.00	128.00
466.500	QP	V	18.16	22.84	41.00	46.00	-5.00	100.00	274.00
936.000	QP	V	25.33	16.57	41.90	46.00	-4.10	229.00	9.00
55.220	QP	H	12.90	17.61	30.50	40.00	-9.50	400.00	284.00
63.950	QP	H	12.23	16.07	28.30	40.00	-11.70	400.00	245.00
433.200	QP	H	17.64	18.26	35.90	46.00	-10.10	199.00	65.00
451.000	QP	H	17.68	19.62	37.30	46.00	-8.70	199.00	36.00
466.500	QP	H	17.68	24.82	42.50	46.00	-3.50	220.00	181.00
936.000	QP	H	25.13	18.18	43.30	46.00	-2.70	100.00	125.00

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

EUT : CS-A50-2
Test Unit : Handset
Worst Case : Tx at channel 1 with setup 1 configuration

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)
39.700	QP	V	13.21	17.29	30.50	40.00	-9.50	100.00	287.00
53.300	QP	V	14.11	14.20	28.30	40.00	-11.70	100.00	101.00
445.200	QP	V	18.12	17.78	35.90	46.00	-10.10	100.00	79.00
462.600	QP	V	18.16	19.14	37.30	46.00	-8.70	100.00	288.00
600.360	QP	V	20.88	21.63	42.50	46.00	-3.50	100.00	330.00
891.400	QP	V	24.62	18.69	43.30	46.00	-2.70	262.00	273.00
39.700	QP	H	12.62	16.80	30.50	40.00	-9.50	400.00	90.00
51.300	QP	H	12.90	13.41	26.30	40.00	-13.70	400.00	29.00
445.200	QP	H	17.64	16.96	34.60	46.00	-11.40	201.00	94.00
462.600	QP	H	17.68	13.52	31.20	46.00	-14.80	221.00	147.00
600.400	QP	H	20.75	9.65	30.40	46.00	-15.60	144.00	109.00
891.400	QP	H	24.35	13.16	37.50	46.00	-8.50	100.00	331.00

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

3.5 Measurement results: frequency above 1GHz

EUT : CS-A50-2
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/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
*902.800	PK	V	-	24.76	53.18	77.94	94.00	-16.06	148.00	215.00
*902.800	PK	H	-	24.76	58.11	82.87	94.00	-11.13	147.00	327.00
3154.000	PK	V	35.54	34.62	42.98	42.06	54.00	-11.94	185.00	78.00

EUT : CS-A50-2
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/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
*904.750	PK	V	-	24.76	53.63	78.39	94.00	-15.61	102	308.00
*904.750	PK	H	-	24.76	58.32	83.08	94.00	-10.92	197	284.00
3154.000	PK	V	35.54	34.62	42.36	42.06	54.00	-11.94	106	101.00

Remark:
1. "*" means the Fundamental frequency.
2. Corrected Level = Reading Level + Correction Factor－Preamp
3. Correction Factor = Antenna Factor + Cable Loss
4. The frequency measured ranges from 1GHz to 10GHz.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

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV

EUT : CS-A50-2
Test Unit : Handset
Test Condition : Tx at channel 1 with setup 1 configuration

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)
*925.300	PK	V	-	24.76	45.82	70.58	94.00	-23.42	123.00	151.00
*925.300	PK	H	-	24.76	51.67	76.43	94.00	-17.57	125.00	136.00
3238.000	PK	H	35.54	34.62	43.16	42.24	54.00	-11.76	110.00	336.00

EUT : CS-A50-2
Test Unit : Handset
Test Condition : Tx at channel 1 with setup 1 configuration

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)
*927.250	PK	V	-	24.76	42.27	67.03	94.00	-26.97	197.00	360.00
*927.250	PK	H	-	24.76	49.13	73.89	94.00	-20.11	126.00	203.00
3238.000	PK	H	35.54	34.62	42.36	42.62	54.00	-11.38	110.00	50.00

Remark:
1. "*" means the Fundamental frequency.
2. Corrected Level = Reading Level + Correction Factor－Preamp
3. Correction Factor = Antenna Factor + Cable Loss
4. The frequency measured ranges from 1GHz to 10GHz.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

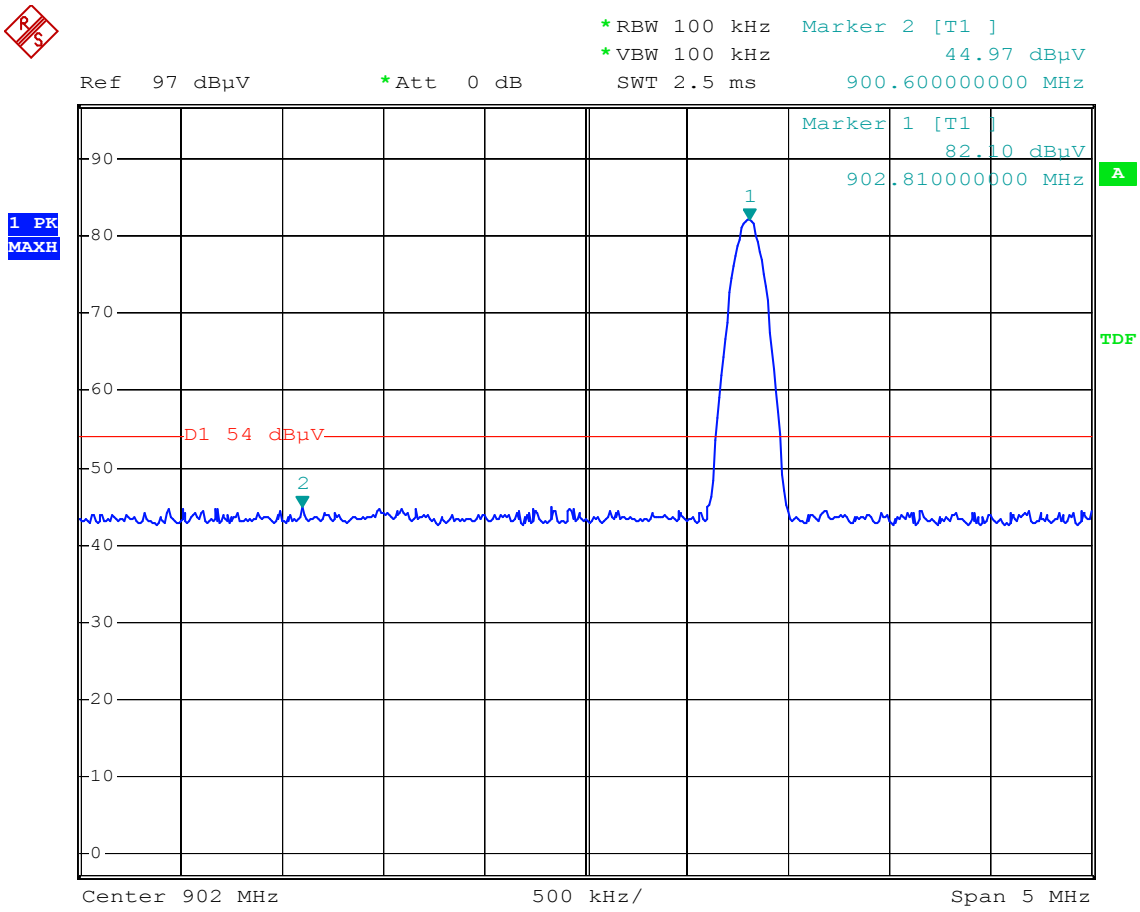
For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV

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: 902.800MHz ~ 904.750MHz, Handset: 925.300MHz ~ 927.250MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

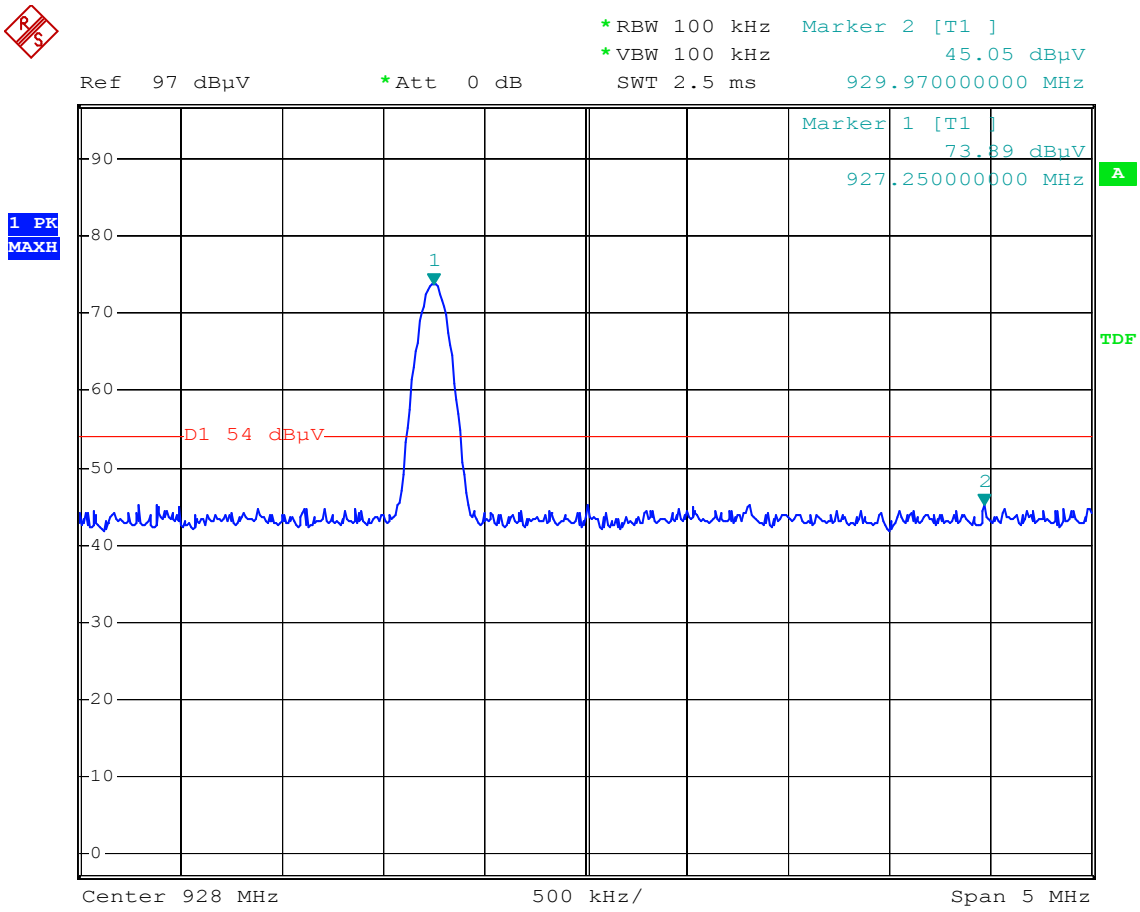
Please see the plot below.

Test Mode: Base



Comment: Band-edge test (Base tx at lowest channel)
Date: 5.OCT.2005 16:05:31

Test Mode: Handset



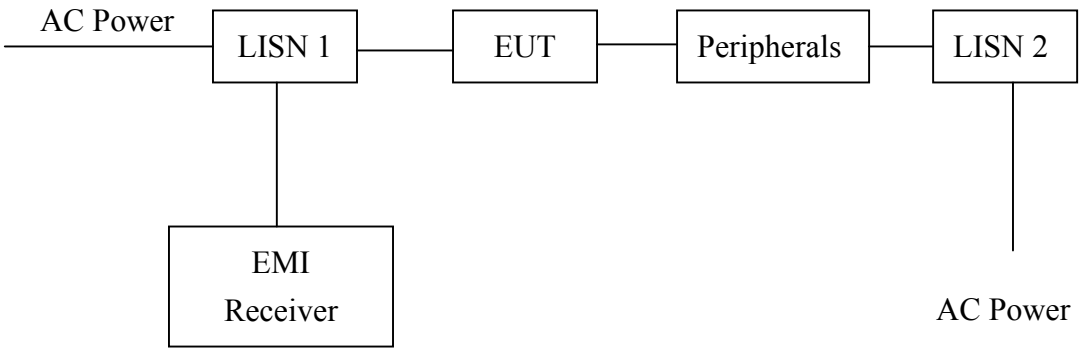
Comment: Band-edge test (Handset tx at highest channel)
Date: 5.OCT.2005 15:55:11

5. Conducted emission test FCC 15.207

5.1 Operating environment

Temperature:	25	℃
Relative Humidity:	60	%
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

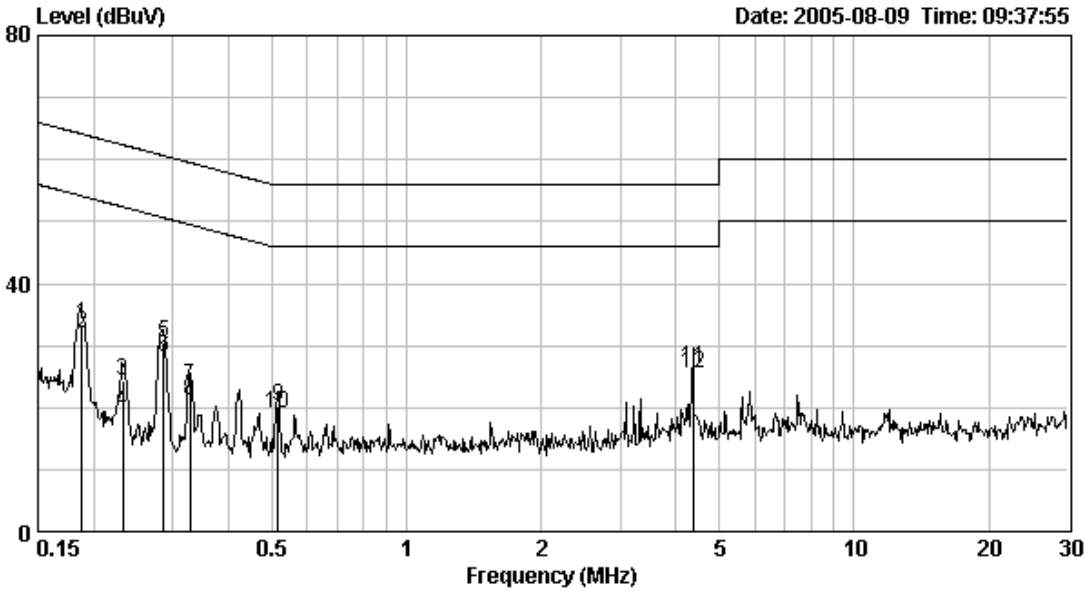
Expanded uncertainty (k=2) of conducted emission measurement is ±2.6 dB.

5.5 Power Line Conducted Emission test data

Phase : Line
EUT : CS-A50-2
Test Mode : Handset + Base
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.188	0.10	33.52	64.11	31.80	54.11	-30.59	-22.31
0.232	0.10	24.20	62.36	19.35	52.36	-38.16	-33.01
0.286	0.10	30.56	60.64	28.12	50.64	-30.08	-22.52
0.328	0.10	23.42	59.51	21.08	49.51	-36.09	-28.43
0.516	0.10	20.28	56.00	19.02	46.00	-35.72	-26.98
4.367	0.21	26.46	56.00	25.49	46.00	-29.54	-20.51

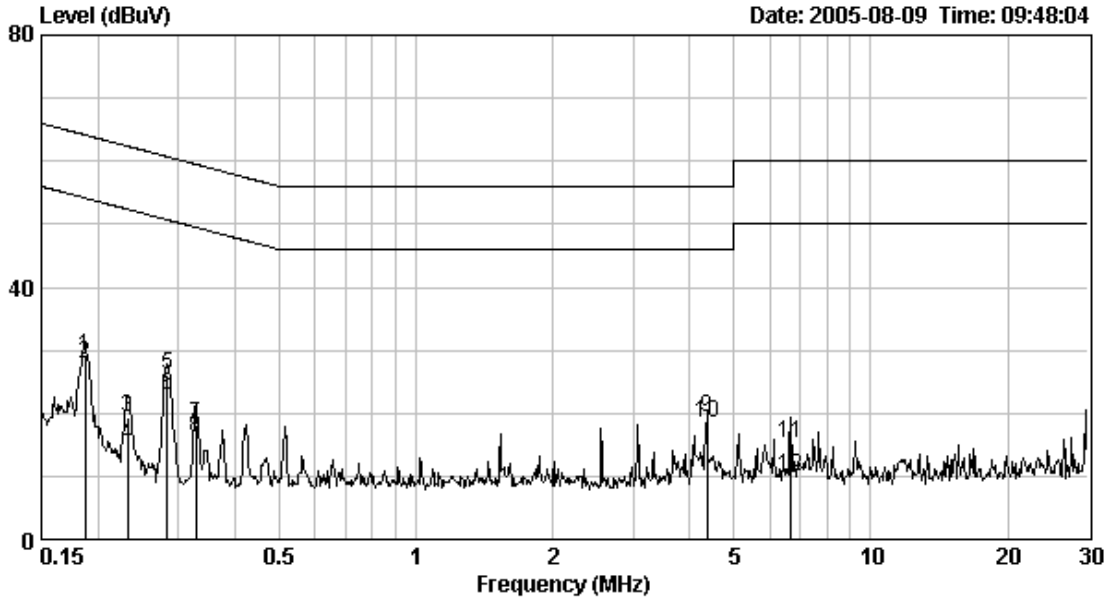
Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase	: Neutral
EUT	: CS-A50-2
Test Mode	: Handset + Base
Test Condition	: Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.187	0.10	28.91	64.15	27.74	54.15	-35.24	-26.41
0.232	0.10	19.41	62.36	15.00	52.36	-42.95	-37.36
0.284	0.10	26.17	60.71	22.95	50.71	-34.54	-27.76
0.328	0.10	18.11	59.51	16.21	49.51	-41.40	-33.30
4.367	0.20	19.37	56.00	18.42	46.00	-36.63	-27.58
6.657	0.20	15.10	60.00	10.06	50.00	-44.90	-39.94

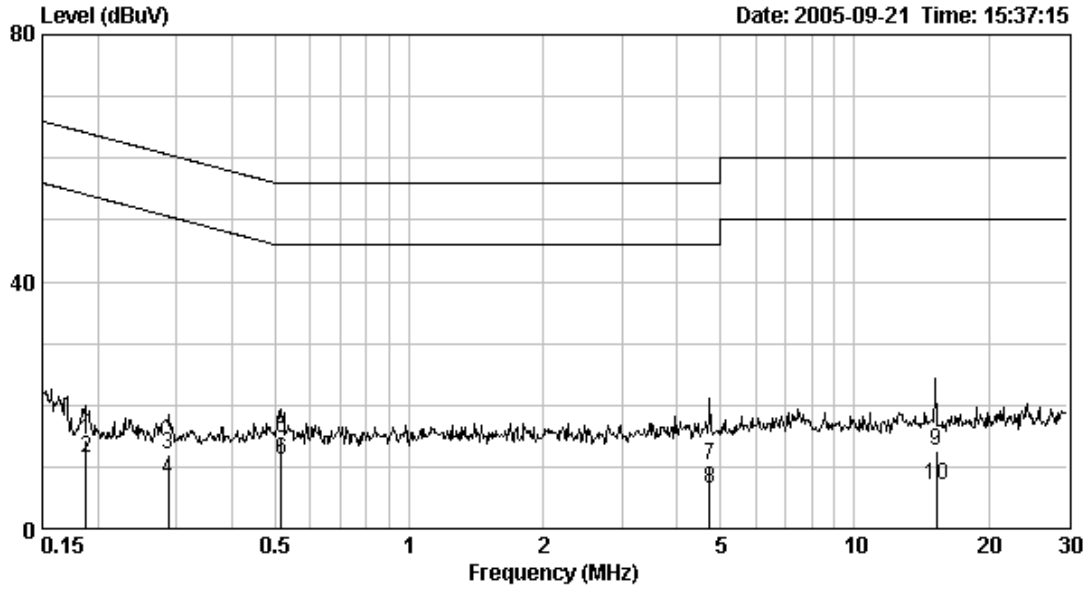
Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase	: Line
EUT	: CS-A50-2
Test Mode	: Handset + Charger
Test Condition	: Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.188	0.10	14.47	64.12	11.50	54.12	-49.65	-42.62
0.288	0.10	11.88	60.57	7.93	50.57	-48.69	-42.64
0.516	0.10	14.70	56.00	11.22	46.00	-41.30	-34.78
4.726	0.22	10.21	56.00	6.33	46.00	-45.79	-39.67
15.248	0.70	12.54	60.00	7.05	50.00	-47.46	-42.95

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



Phase	: Neutral
EUT	: CS-A50-2
Test Mode	: Handset + Charger
Test Condition	: Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Av
0.157	0.10	13.34	65.60	5.32	55.60	-52.26	-50.28
0.187	0.10	16.26	64.15	13.70	54.15	-47.89	-40.45
0.256	0.10	15.90	61.57	14.74	51.57	-45.67	-36.83
0.387	0.10	16.08	58.12	14.22	48.12	-42.04	-33.90
0.512	0.10	24.01	56.00	22.78	46.00	-31.99	-23.22

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