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IEC81000-4-4 EFT & IEC81000-4-5 SURGE TEST SETUP



—END OF REPORT—

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ETSI EN 301 489-01 V 1.8.1: 2008-04 ETSI EN 301 489-07 V 1.3.1: 2005-11 TEST REPORT

For

Fixed Wireless Phone (Fixed Wireless Payphone)

Model Name: HA6966TI(LCD)

Brand Name: --

Report No.: ZSAGC282080801E1

Date of Issue: Sep.10, 2008

Prepared For

Guangdong Telepower Communication Technology Co., Ltd.

1st Floor, C Zone, Chuangyezhongxin Building,

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Prepared By

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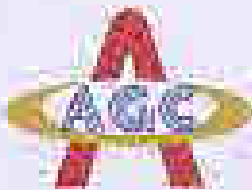


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1. TEST REPORT CERTIFICATION

Product:	Fixed Wireless Phone (Fixed Wireless Payphone)
Model No.:	HA6956TH(LCD)
Series/Model Difference Description:	---
Applicant:	Guangdong Telepower Communication Technology Co., Ltd.
Applicant Address:	1st Floor, C Zone, Chuangyexzhongxin Building, Software & Science Park, Nanhai, Guangdong, China
Manufacturer:	Guangdong Telepower Communication Technology Co., Ltd.
Manufacturer Address:	1st Floor, C Zone, Chuangyexzhongxin Building, Software & Science Park, Nanhai, Guangdong, China
Test Standards:	ETSI EN 301 489-01 V1.9.1 (2008-04) ETSI EN 301 489-07 V1.3.1 (2005-11)
Test Result:	PASS

We, AGC, hereby certify that the submitted samples of the above item, as detailed in chapter 2.1 of this report, has been tested in our facility. The test record, data evaluation and test configuration represented herein are true and accurate accounts of measurements of the sample's EMC characteristics under the conditions herein specified.

Prepared By:

Tony Tian

Checked By:

Randy He

Authorized By:

King Zhang

Sep 10, 2008

Sep 10, 2008

Sep 10, 2008

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2. GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

EUT1- Mobile Phone	
Description:	Fixed Wireless Phone (Fixed Wireless Payphone)
Model No.:	HA5866TI(LCD)
Mode Difference description:	—
IMEI No.	—
Serial No.:	—
Hardware Version	V1.01_F200_0509
Software Version	TBW25V2.0
EUT2- Battery	
Description:	Ni-MH Battery
Model No.	H51AAJ1200
Serial No.:	—
Manufacturer:	Foshan City Sanshui District Fengda Battery Co., Ltd.
Capacitance	1200mAh
Rated Voltage	3.6V
Charge Limit:	3.6V
EUT3 - Power Supply	
Description:	Charger
Model No.	GM-120100
Serial No.	—
Manufacturer:	Foshan City Shunde District Guangjuda Power Co., Ltd.
Rated Input:	AC 100-240V 50/60HZ
Rated Output:	DC 12V / 1A
Length DC cable:	120cm

NOTE:

1. The EUT is a model of GSM Portable Mobile Station (MS). It consists of hand telephone set, battery and charger as listed above.
2. Please refer to Appendix I for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.





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2.2 OBJECTIVE

Perform Electromagnetic Interference (EMI) and Electro Magnetic Susceptibility (EMS) tests for CE Marking.

2.3 TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 301 489-7 V1.3.1 (2005-11), together with ETSI EN 301 489-1 V1.3.1 (2006-04)

ETSI EN 301 489-01	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services. Part 1: Common technical requirements
ETSI EN 301 489-07	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services. Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS)

Test items and the results are as below:

No	Basic Standard	Test Type	Result
EMISSION (EN 301 489-1 §7.1)			
1	EN 55022	Radiated emission	PASS
2	EN 55022	Conducted emission, DC ports	N/A
3	EN 55022	Conducted emission, AC ports	PASS
4	EN 55022	Conducted emission, Telecom ports	N/A
5	EN 61000-3-2	Harmonic current emissions	PASS
6	EN 61000-3-3	Voltage fluctuations & flicker	PASS
IMMUNITY (EN 301 489-1 §7.2)			
7	EN 61000-4-2	Electrostatic discharge immunity	PASS
8	EN 61000-4-3	Radiated RF electromagnetic field immunity (80MHz to 2000MHz)	PASS
9	EN 61000-4-4	Electrical fast transient/burst immunity	PASS
10	ISO 7637-1, -2	Transients and surges, DC ports	N/A
11	EN 61000-4-5	Surge immunity, AC ports, Telecom ports	PASS
12	EN 61000-4-6	Immunity to conducted disturbances induced by RF fields	PASS
13	EN 61000-4-11	Voltage dips and short interruptions immunity	PASS

NOTE:

1. N/A- Not Applicable
2. The latest versions of basic standards are applied

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2.4 IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Test Site: Accurate Technology Co., Ltd
Address: E F1, Bldg A, Changyuan New Material Park, Keyuan Rd., Science & Industry Park, Nanshan District, 518057, Shenzhen, P.R.China.

2.5 LIST OF EQUIPMENTS USED

Description	Manufacturer	Model No.	Serial No.
Universal Radio Communication Tester	ROHDE&SCHWARZ	CMU200	A0304212
Mobile Phone Tester	Wibrik	4403	A0304245
Telecommunication Antenna	European Antennas	PSA 75301RU170	A0304213
Test Receiver	Schwarzbeck	FCBL1525	A0304230
Test Receiver	ROHDE&SCHWARZ	ESP13	A0304215
LCN	Schwarzbeck	ESH3-20	A0304233
Ultra Broadband Ant	ROHDE&SCHWARZ	VULBB163	A0304224
EMS Antenna, B-Log	Amplifier Research	AR AT1050	A0304245
EMS Antenna, Horn	Amplifier Research	AT4002A	A0304250
Power Frequency Test System	HAEFELY	PHF 355	A0103103
ESD Test System	HAEFELY	PESG16000	A0103108
EFT Test System	HAEFELY	PEFT JUNIOR	A0103110
Surge Test System	HAEFELY	PSurge5000	A0103107
Signal Generator	IFR	2031	A0304201
Power Amplifier	Amplifier Research	AR 150W1005	A0304247
Power Amplifier	Amplifier Research	AR 75A230M	A0304255
Power Amplifier	Amplifier Research	2651-g1AM1	A0304248
Field Monitor	Amplifier Research	AR FM500M	305129
Shield Room	Nambo Tech	SR-3	A0501141
Shield Room	Nambo Tech	SR-1	A0304210
Anechoic Chamber	Abrams	H-240	A0304210

NOTE:

Equipments listed above have been calibrated and are in the period of validation.





2.6 ENVIRONMENTAL CONDITIONS

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

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 85-105 kPa

2.7 MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

- Uncertainty of Conducted Emission: $U_c = \pm 1.8\text{dB}$
- Uncertainty of Radiated Emission: $U_r = \pm 3.2\text{dB}$





3. EMISSION TEST

3.1 EUT SETUP AND OPERATING CONDITIONS

Mode 1: Call Mode

Before the measurement, the lithium battery was completely discharged.

During the measurement, the lithium battery and the charger were installed, and the MS were in charging state. A communication link was established between the MS and a System Simulator (SS). The MS operated at GSM 800MHz mid ARFCN (62) and maximum output power (level 5).

The EUT configuration of the emission test was MS + Battery+ Charge.

Mode 2: Idle Mode

The MS was registered to the base station simulator but no call was set up.

The EUT configuration of the emission test was MS + Battery+ Charge.





3.2 MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT

3.2.1 LIMITS OF MAINS TERMINAL DISTURBANCE VOLTAGE

Frequency range (MHz)	Limits (dBuV), Class B ITE	
	Quasi-peak	Average
0.15 ~ 0.50	55 to 55	55 to 45
0.50 ~ 5	55	45
0.50 ~ 30	60	50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

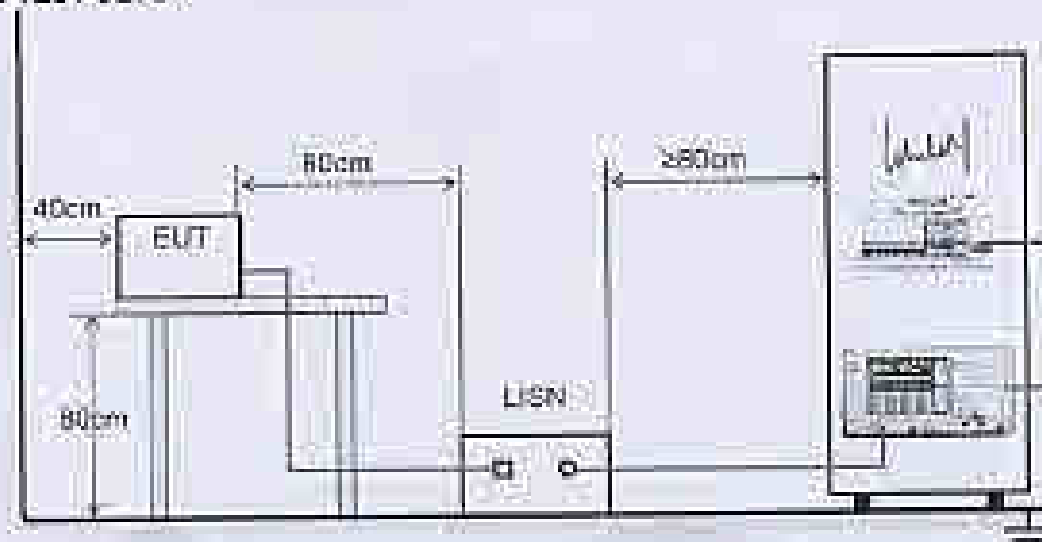
3.2.2 TEST PROCEDURE

1. The EUT was placed 0.4 meters from the conducting wall of shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50Ω/50μH of coupling impedance for the measuring instrument.
2. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
3. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits are not reported.





3.2.3 TEST SETUP



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

3.2.4 TEST RESULT

The test modes were carried out for all operation mode.

The worst test mode of the EUT was Mode 1, and its test data was showed as the follow:

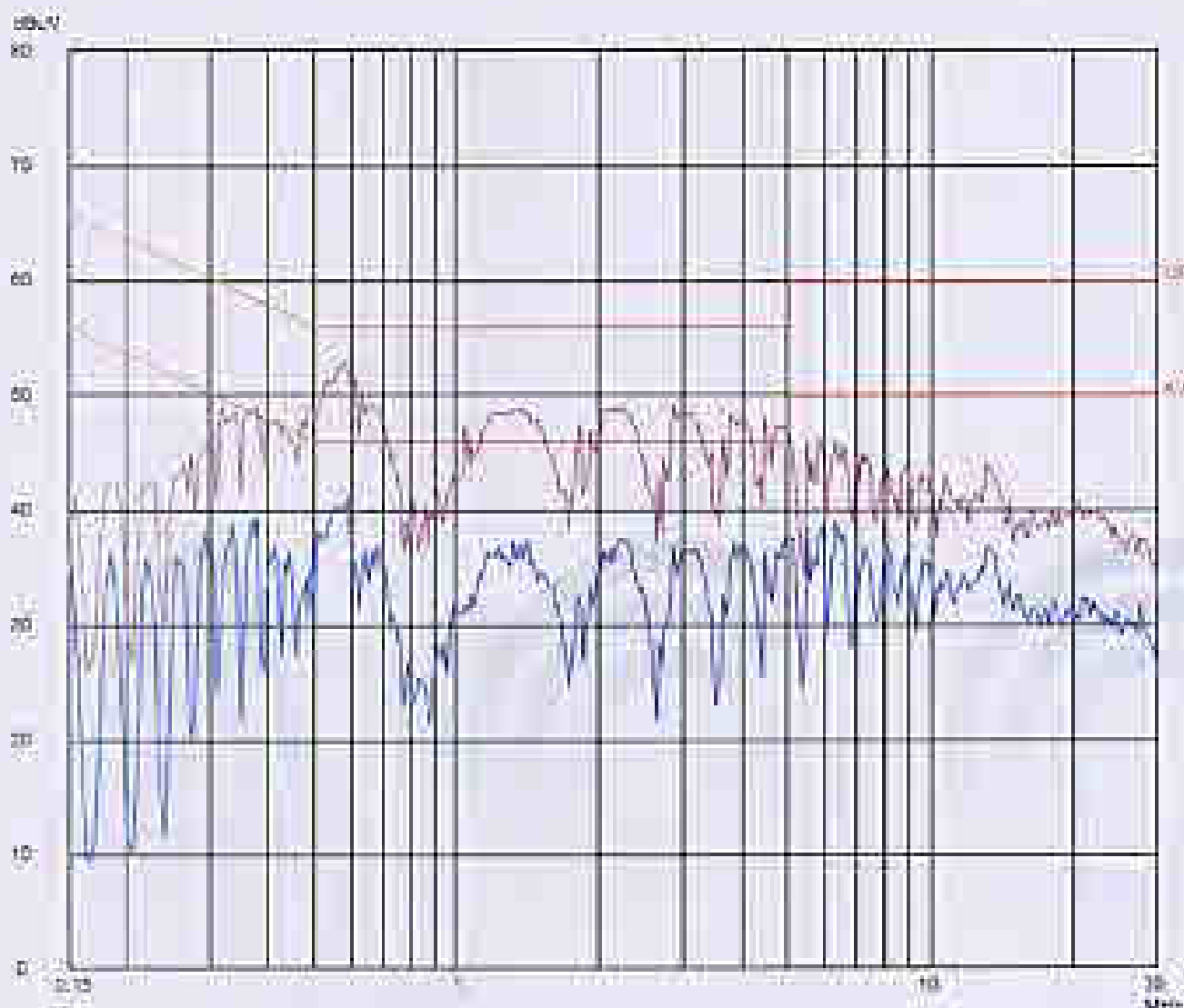




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LINE CONDUCTED EMISSION TEST LINE 1



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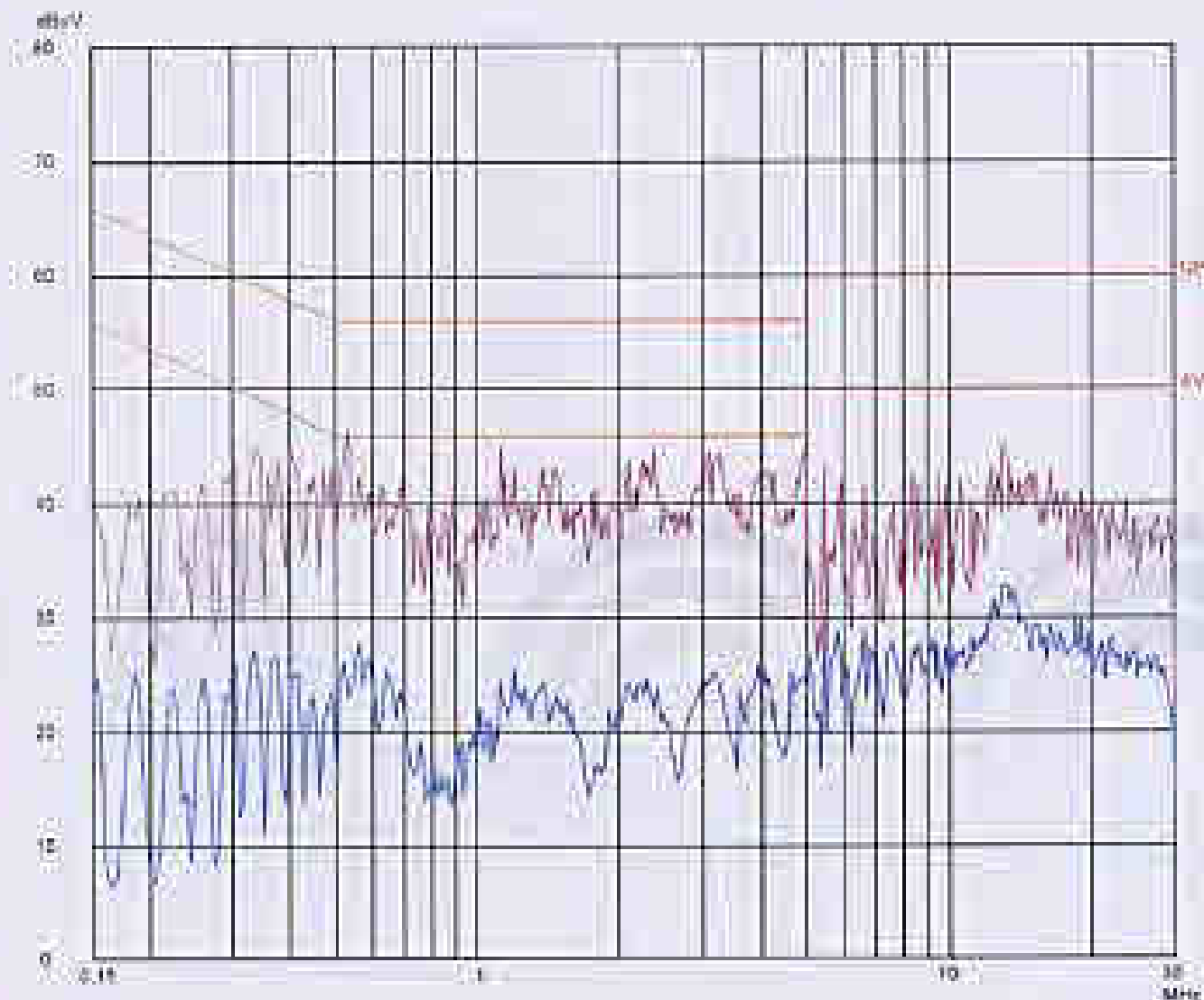
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LINE CONDUCTED EMISSION TEST LINE 2



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3.1 RADIATED DISTURBANCE MEASUREMENT

3.3.1 LIMITS OF RADIATED DISTURBANCE

Frequency range (MHz)	Quasi-peak limits(dB μ V/m), for Class B ITE, at 3m measurement distance
30 - 230	40
230 - 1000	47

Notes:

- (1) The lower limit shall apply at the transition frequency.
- (2) Additional provisions may be required for cases where interference occurs.

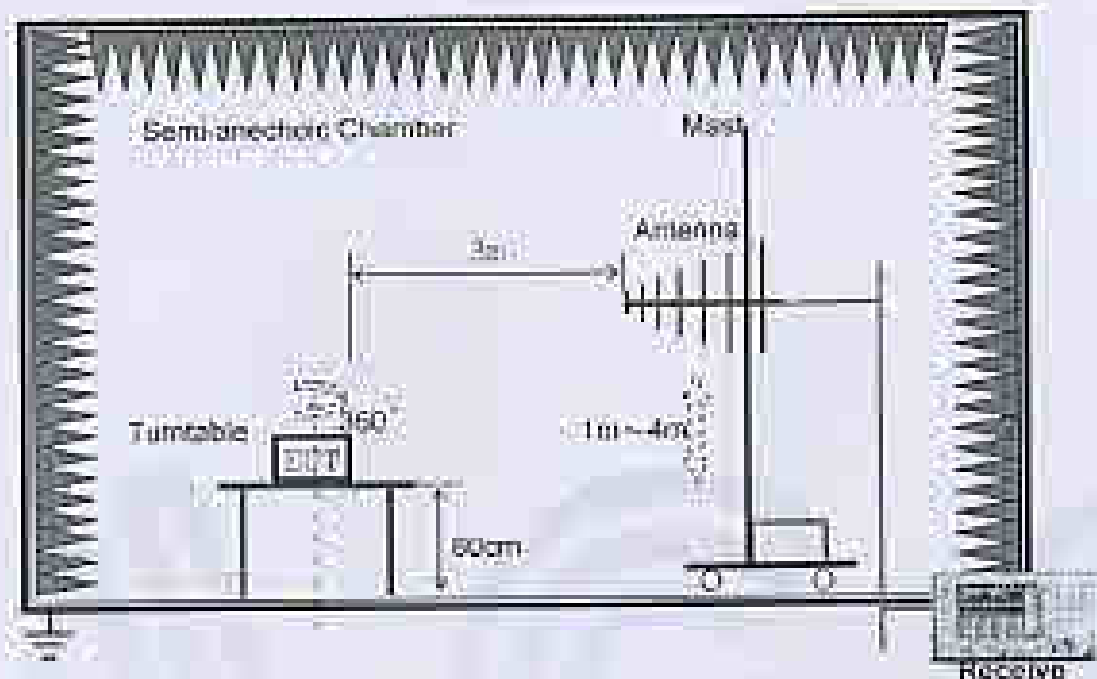
3.3.2 TEST PROCEDURE

- (1) The EUT was placed on the top of an insulating table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- (2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- (3) The antenna is a broadband antenna, and its height is varied from 1 to 4 meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- (4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to the heights from 1 to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- (5) The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10dB margin would be retested one by one using the quasi-peak method.





3.3.3 TEST SETUP



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

3.3.4 TEST RESULT

The test modes were carried out for all mode.

The worst test mode of the EUT was Mode 1, and its test data was showed as the follow:

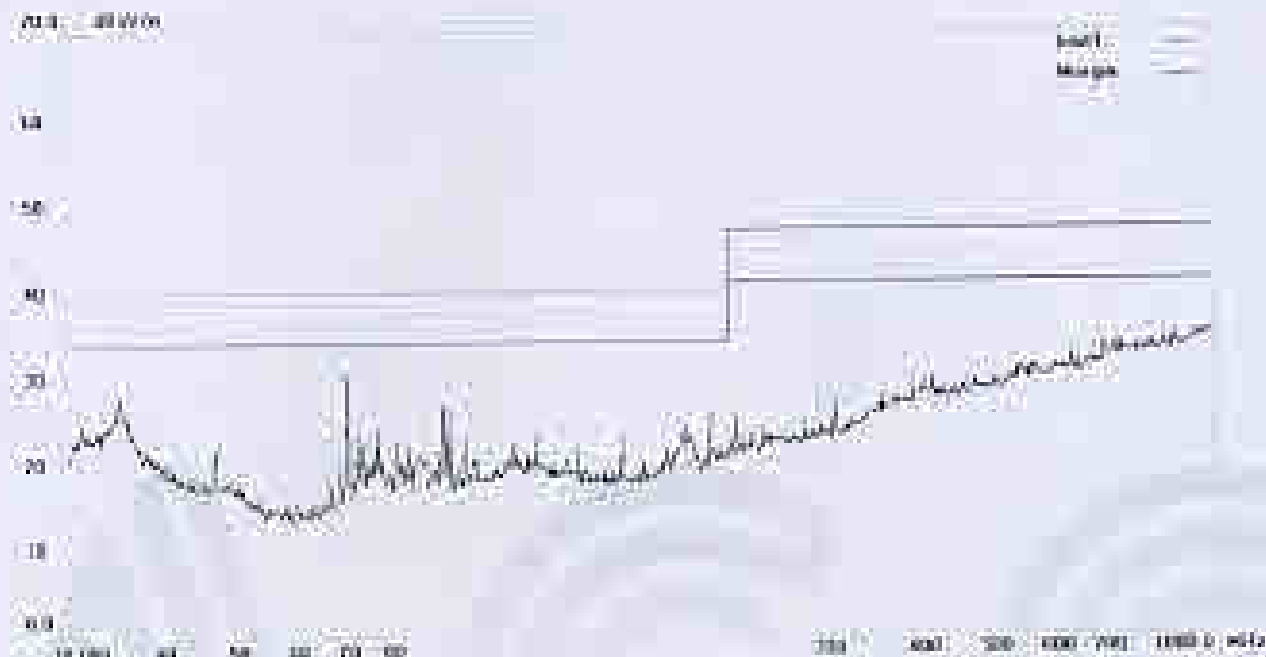




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RADIATED EMISSION - HORIZONTAL



Item	From	Frequency	Field	Power	Limit	Margin	Pass/Fail	Reason
14	1000	1000	1000	1000	1000	1000	1000	1000

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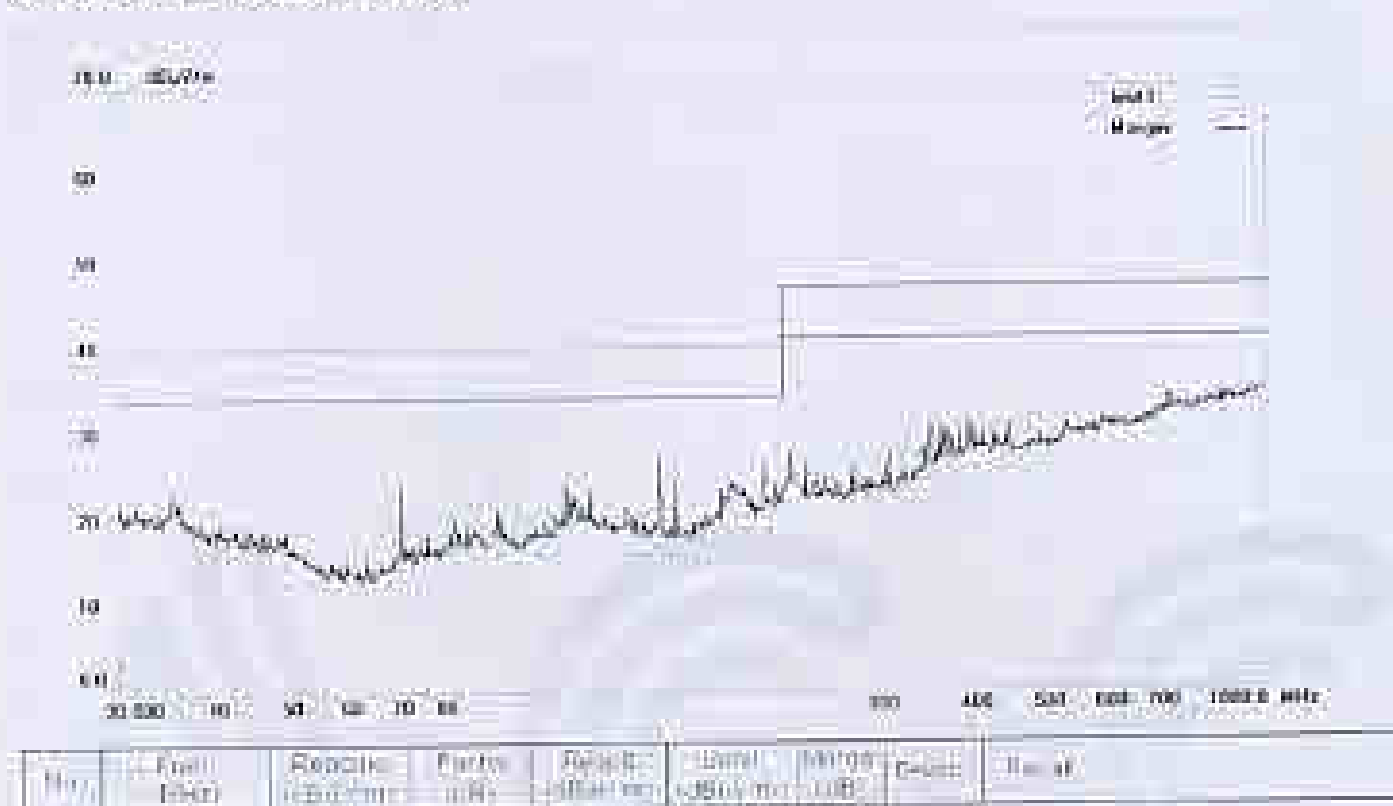
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RADIATED EMISSION – VERTICAL



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3.4 HARMONIC CURRENT MEASUREMENT

3.4.1 LIMITS OF HARMONIC CURRENT

Limits for Class A Equipment	
Harmonics Order n	Max. permissible harmonic current (A)
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15≤n≤35	0.15×15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8≤n≤40	0.23×8/n

NOTE:

- 1 According to section 5 of EN61000-3-2, the EUT is Class A equipment.
- 2 The above limits are for all applications having an active input power>75W. No limits apply for equipment with an active input power up to and including 75W.

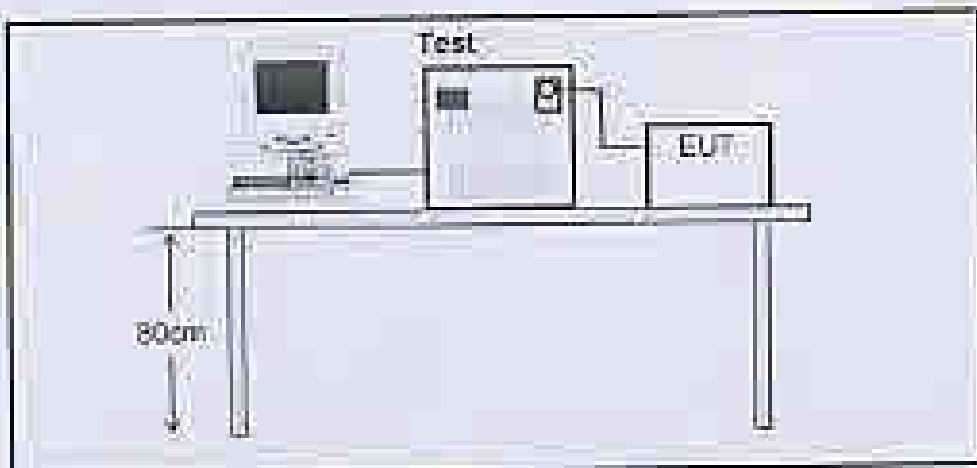
3.4.2 TEST PROCEDURE

- 1 The EUT was placed on the top of a wooden table 0.6 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- 2 The corresponding test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.





3.4.1 TEST SETUP



For the actual test configuration, please refer to Appendix II : Photographs of the Test Configuration.





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3.4.4 TEST RESULT

Test Specification

Test Frequency	50Hz	Test Voltage	230Vac
Waveform	Sine	Test Time	2.5min
Classification	Class A		

Test Result

Harmonics Order	Harmonics Current (A)	Limit (A)	Harmonics Order	Harmonics Current (A)	Limit (A)
1	0.040	—	2	0.001	—
3	0.011	—	4	0.001	—
5	0.011	—	6	0.000	—
7	0.010	—	8	0.000	—
9	0.010	—	10	0.000	—
11	0.009	—	12	0.000	—
13	0.009	—	14	0.000	—
15	0.008	—	16	0.000	—
17	0.007	—	18	0.000	—
19	0.006	—	20	0.000	—
21	0.005	—	22	0.000	—
23	0.004	—	24	0.000	—
25	0.003	—	26	0.000	—
27	0.002	—	28	0.000	—
29	0.001	—	30	0.000	—
31	0.001	—	32	0.000	—
33	0.000	—	34	0.000	—
35	0.000	—	36	0.000	—
37	0.000	—	38	0.000	—
39	0.000	—	40	0.000	—

NOTE:

- (1) The active input power of the EUT is 3.00 W.
- (2) The power factor of the EUT is 0.989.
- (3) No limits apply for equipment with an active input power up to and including 75W.

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3.5 VOLTAGE FLUCTUATIONS AND FLICK MEASUREMENT

3.5.1 LIMITS OF VOLTAGE FLUCTUATIONS AND FLICK

Test Item	Limit	Note
P_{st}	1.0	P_{st} means Short-term flicker indicator
P_{lt}	0.85	P_{lt} means long-term flicker indicator
T_{st}	0.2	T_{st} means maximum time that d_v exceeds 3%
$d_{max}(\%)$	4%	d_{max} means maximum relative voltage change
$d_v(\%)$	3%	d_v means relative steady-state voltage change

3.5.2 TEST PROCEDURE

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions.
- During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

3.5.3 TEST SETUP

Same as 3.4.3

3.5.4 TEST RESULT

Test Specification

Test Frequency	50Hz	Test Voltage	230Vac
Waveform	Sine	Test Time	10 minutes(P_{st}), 2 hours (P_{lt})

Test Result

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.007	1.0	Pass
P_{lt}	0.005	0.85	Pass
T_{st}	0.00	0.2	Pass
$d_{max}(\%)$	0.00%	4%	Pass
$d_v(\%)$	0.00%	3%	Pass





4. IMMUNITY TEST

4.1 EUT SETUP AND OPERATING CONDITIONS

The EUT configuration of the word emission tests is **MS + Battery + Charger**.

The battery was in full voltage and the charger was connected to the EUT to keep the voltage constant during the tests.

Each immunity test was performed with the EUT operated respectively at the **Traffic Mode** and the **Idle Mode** of both GSM 900 MHz and DCS 1800 MHz according to the requirements of the standard.

- Traffic Mode:** A communication link was established between the MS and a System Simulator (SS). The MS operated at the ARFCN (82 for GSM 900 MHz and 700 for DCS 1800 MHz) and maximum output power (level 5 for GSM 900 MHz and level 0 for DCS 1800 MHz).
- Idle Mode:** The EUT was synchronized to the BCCH, listening to the CCCH and able to respond to paging message. Periodic location updating was disabled.

4.2 PERFORMANCE CRITERIA

4.2.1 GENERAL PERFORMANCE CRITERIA TO MS

Criterion A	The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
Criterion B	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
Criterion C	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

4.2.2 PERFORMANCE CRITERIA FOR CT AND CR TO MS

Refer to EN 301 489-7 sub-clause 6.2.1 and 6.2.3 for the performance criteria for Continuous phenomena applied to Transmitter (CT) and Receiver (CR).

Traffic Mode: A communication link shall be established at the start of the test, and maintained during the test. During the test, the RXQUAL of the downlink shall not exceed 3, measured during each individual exposure in the test sequence. Both the uplink speech output level and the downlink speech output level shall be at least 35 dB less than the previously recorded reference levels, when measured through an audio band Pass filter of width 200 Hz, centered on 1 kHz (audio breakthrough check). At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained.

Idle Mode: The transmitter shall not unintentionally operate during the test.





4.2.3 PERFORMANCE CRITERIA FOR TT AND TR TO M5

Refer to EN 301 489-7 sub clause 6.2.2 and 6.2.4 for the performance criteria for Transient phenomena applied to Transmitter (CT) and Receiver (CR).

Traffic Mode: A communications link shall be established at the start of the test. At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link. At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained.

Idle Mode: The transmitter shall not unintentionally operate during the test.





4.3 ELECTROSTATIC DISCHARGE IMMUNITY TEST

4.3.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330Ω / 150 pF
Discharge Voltage:	Air Discharge – 8 kV Contact Discharge – 4 kV
Polarity:	Positive / Negative
Number of Discharge:	Minimum 20 times at each test point
Discharge Mode:	Single discharge
Discharge Period:	1 second minimum

4.3.2 TEST PROCEDURE

The test procedure was in accordance with IEC 61000-4-2:

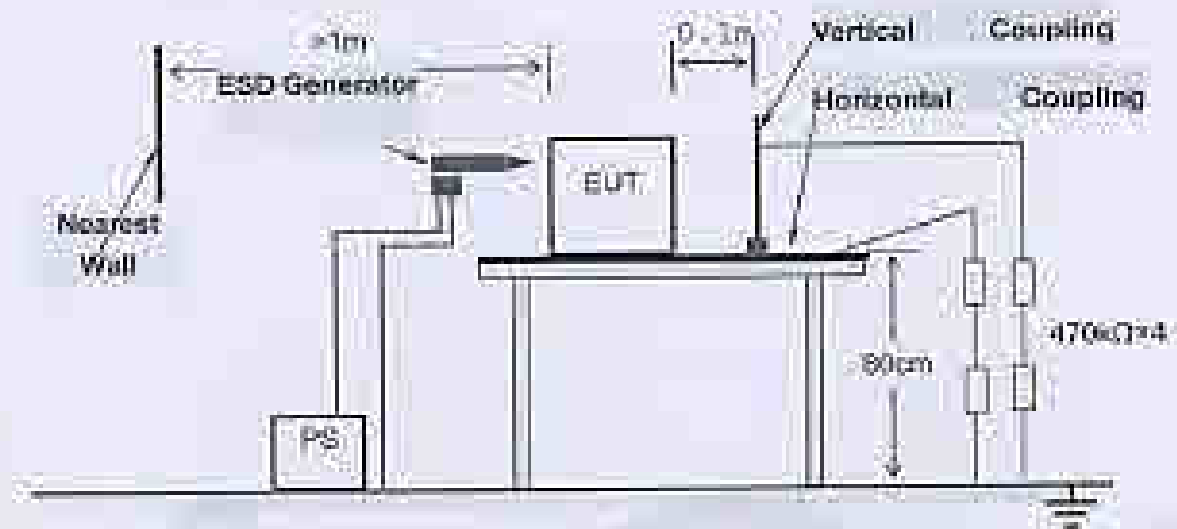
- Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were completed.
- At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.
- At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to EUT.

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4.3.3 TEST SETUP



For the actual test configuration, please refer to Appendix II Photographs of the Test Configuration.





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4.3.4 TEST RESULT

Test Points	Discharge Level (kV)	Discharge Mode	Observation	Conclusion
HCP	$\pm 2 \pm 4$	Contact	Note(1)	Pass
VCP	$\pm 2 \pm 4$	Contact	Note(1)	Pass
Metallic parts	$\pm 2 \pm 4$	Contact	Note(1)	Pass
MIC	$\pm 2, \pm 4 \sim \pm 8$	Air	Note(1)	Pass
LCD screen	$\pm 2, \pm 4 \sim \pm 8$	Air	Note(1)	Pass
Keyboard	$\pm 2, \pm 4 \sim \pm 8$	Air	Note(1)	Pass
Speaker	$\pm 2, \pm 4 \sim \pm 8$	Air	Note(1)	Pass
Side port for the headset	$\pm 2, \pm 4 \sim \pm 8$	Air	Note(1)	Pass
Other aperture of the M5	$\pm 2, \pm 4 \sim \pm 8$	Air	Note(1)	Pass
Cover of the AC/DC adapter	$\pm 2, \pm 4 \sim \pm 8$	Air	Note(1)	Pass

NOTE:

(1). The EUT performance complied with the performance criteria for TT and TR is M5.





4.4 RADIATED, RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST

4.4.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-3
Frequency Range	80 MHz – 1000MHz, 1400MHz-2700MHz
Field Strength	3V/m
Modulation	1 kHz sine wave, 80% AM modulation
Frequency Step	1% of fundamental
Polarity of Antenna	Horizontal and Vertical
Test Distance	3m
Antenna Height	1.5m
Dwell Time	3 seconds

4.4.2 TEST PROCEDURE

The test procedure was in accordance with IEC 61000-4-3.

- The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The test signal was 80% amplitude modulated with a 1 kHz sine wave.
- The frequency range was swept from 80 MHz to 1000MHz and 1400MHz to 2700MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers. The rate of sweep did not exceed 1.5×10^{-2} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The field strength level was 3V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

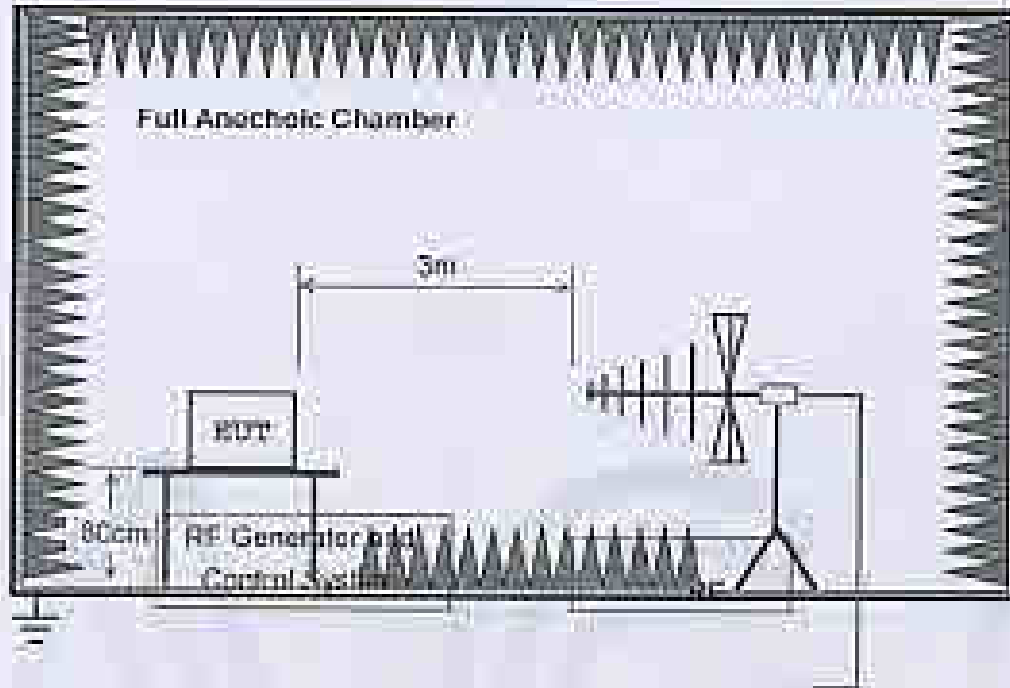




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4.4.3 TEST SETUP



For the actual test configuration, please refer to Appendix II : Photographs of the Test Configuration.

4.4.4 TEST RESULT

EUT Operating Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Conclusion
GSM 900 MHz Traffic	Vertical	80-1000, 1400-2700	3	Note(1)	Pass
	Horizontal	80-1000, 1400-2700	3	Note(1)	Pass
GSM 900 MHz Idle	Vertical	80-1000, 1400-2700	3	Note(1)	Pass
	Horizontal	80-1000, 1400-2700	3	Note(1)	Pass
DCS 1800 MHz Traffic	Vertical	80-1000, 1400-2700	3	Note(1)	Pass
	Horizontal	80-1000, 1400-2700	3	Note(1)	Pass
DCS 1800 MHz Idle	Vertical	80-1000, 1400-2700	3	Note(1)	Pass
	Horizontal	80-1000, 1400-2700	3	Note(1)	Pass

NOTE:

The EUT performance complied with the performance criteria for CT and CR is MS.

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4.5 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

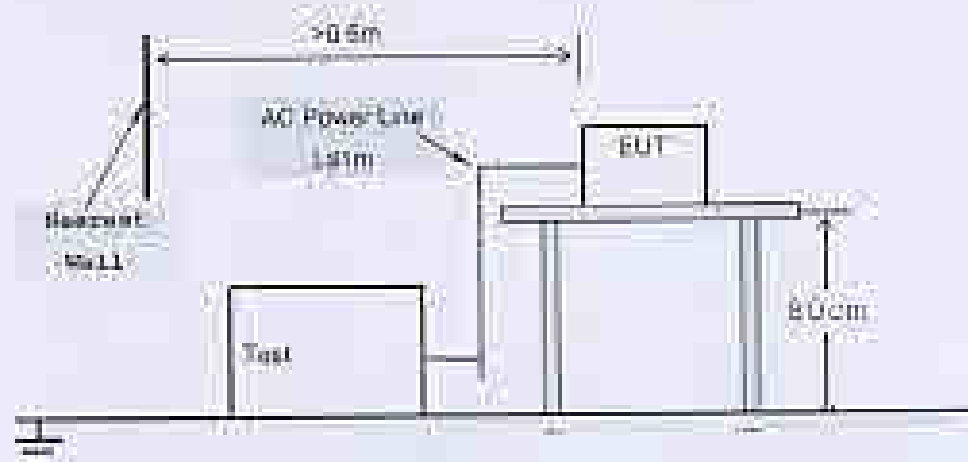
4.5.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-4
Test Voltage	a.c. power port – 1 kV
Polarity	Positive/Negative
Impulse Frequency	5kHz
Impulse wave shape	5/50ns
Burst Duration	15ms
Burst Period	300ms
Test Duration	Not less than 1 min.

4.5.2 TEST PROCEDURE

- The EUT was tested with 1000 volt discharges to the AC power input leads.
- Both positive and negative polarity discharges were applied.
- The length of the "hot wire" from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 meter.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

4.5.3 TEST SETUP



For the actual test configuration, please refer to Appendix II - Photographs of the Test Configuration.

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4.5.4 TEST RESULT

Test Port	Polarity	Test Level (KV)	Observation	Conclusion
a.c. port: L	L-	1	Note (1)	Pass
a.c. port: N	N-	1	Note (1)	Pass
a.c. port: L-N	L-N	1	Note (1)	Pass

NOTE

- (1) The EUT performance complied with the performance criteria for TT and TR to MS.





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4.6.4 TEST RESULT

Coupling Line	Polarity	Voltage (KV)	Observation	Conclusion
a.c. power, L-N	+/-	0.5	Note (1)	Pass

NOTE:

- (1) The EUT performance complied with the performance criteria for TT and TR to MS





4.6 SURGE IMMUNITY TEST

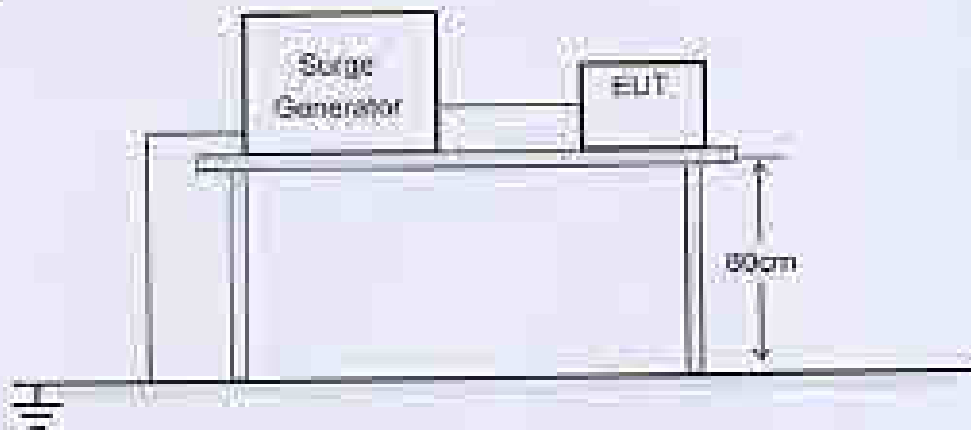
4.6.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-5
Waveform:	Voltage 1.2/50 μ s; Current 8/20 μ s
Test Voltage:	a.c. power port, line to ground 1 kV, line to line 0.5kV
Polarity:	Positive/Negative
Phase Angle:	0°, 90°, 180°, 270°
Repetition Rate:	60/sec
Times:	5 time/each condition

4.6.2 TEST PROCEDURE

- The EUT and the auxiliary equipment were placed on a table of 0.8m heights above a metal ground reference plane. The size of ground plane is greater than 1m×1m and project beyond the EUT by at least 0.1m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT was less than 2 meters (provided by the manufacturer).
- The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).
- The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.

4.6.3 TEST SETUP



For the actual test configuration, please refer to Appendix II – Photographs of the Test Setup.





4.7 IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS

4.7.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz – 80 MHz
Field Strength:	3Vrms
Modulation:	1 kHz Sine Wave, 80% AM
Frequency Step:	1% of fundamental
Coupled Cable:	a/c power line
Coupling Device:	CDN-M2

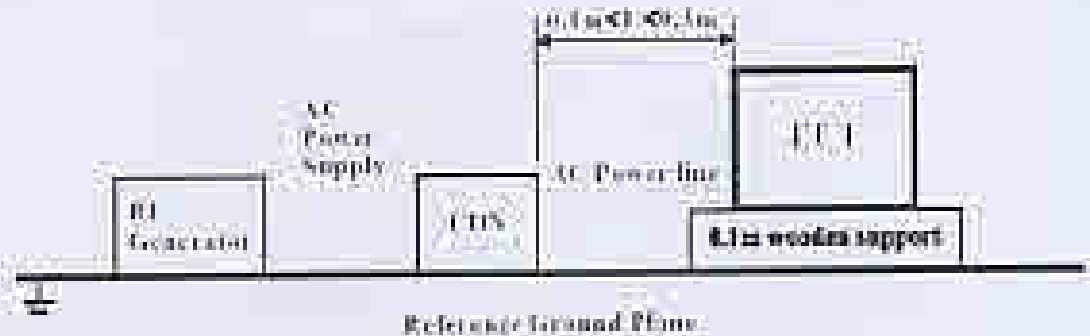
4.7.2 TEST PROCEDURE

- The EUT shall be tested within its intended operating and climate conditions.
- The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
- The test signal was 80% amplitude modulated with a 1 kHz sine wave.
- The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The sweep rate shall not exceed 1.5×10^{-2} decades/s. The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value where the frequency is swept incrementally.
- The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.
- Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.





4.7.3 TEST SETUP



For the actual test configuration, please refer to Appendix II : Photographs of the Test Configuration.

4.7.4 TEST RESULT

EUT Operating Mode	Test Point	Frequency (MHz)	Field Strength (Vrms)	Observation	Conclusion
GSM 900 MHz. Traffic	a.c. port	0.15 – 80	3	Note(1)	Pass
GSM 900 MHz. Idle	a.c. port	0.15 – 80	3	Note(1)	Pass
DCS 1800 MHz. Traffic	a.c. port	0.15 – 80	3	Note(1)	Pass
DCS 1800 MHz. Idle	a.c. port	0.15 – 80	3	Note(1)	Pass

NOTE:

(1). The EUT performance complied with the performance criteria for CT and CR to MS





4.8 VOLTAGE DIPS AND SHORT INTERRUPTIONS IMMUNITY TEST

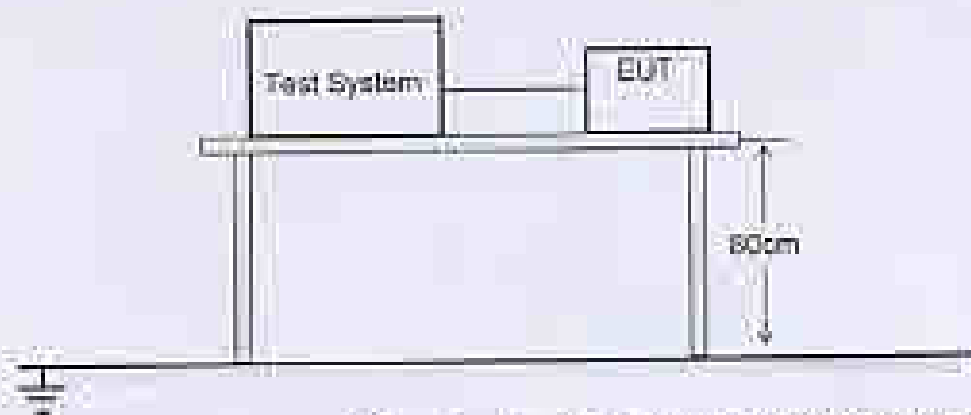
4.8.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-11
Voltage Dips:	100% reduction, 0.5 Cycle
	100% reduction, 1.0 Cycle
	30% reduction, 25 Cycles
Voltage Interruptions:	100% reduction, 250 Cycles
Voltage Phase Angle:	0°

4.8.2 TEST PROCEDURE

- The power cord was used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.
- The EUT was tested for (1) 100% voltage dip of supplied voltage with duration of 0.5 cycles, (2) 100% voltage dip of supplied voltage and duration 1.0 cycle, (3) 30% voltage dip of supplied voltage and duration 25 cycles, (4) 100% voltage interruption of supplied voltage with duration of 250 Cycles was followed.
- Voltage reductions occur at 0 degree crossover point of the voltage waveform. The performance of the EUT was checked after the voltage dip or interruption.

4.8.3 TEST SETUP



For the actual test configuration, please refer to Appendix II - Photographs of the Test Configuration.





4.8.4 TEST RESULT

Test Mode	Voltage Reduction	Duration (cycle)	Times	Interval (Sec)	Observation	Conclusion
Voltage dips	100%	0.5	3	10	Note (1)	Pass
	100%	1	3	10	Note (1)	Pass
	30%	25	3	10	Note (1)	Pass
Voltage interruptions	100%	250	3	10	Note (1)	Pass

NOTE:

(1) The EUT performance complied with the performance criteria for TT and TR to MS





APPENDIX I

PHOTOGRAPHS OF THE EUT

FRONT VIEW OF SAMPLE



BACK VIEW OF SAMPLE





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LEFT VIEW OF SAMPLE



RIGHT VIEW OF SAMPLE



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TOP VIEW OF SAMPLE



BOTTOM VIEW OF SAMPLE



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PHOTO OF POWER SUPPLY TOP VIEW



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INTERNAL PHOTO OF SAMPLE - 1



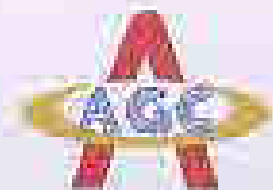
INTERNAL PHOTO OF SAMPLE - 2



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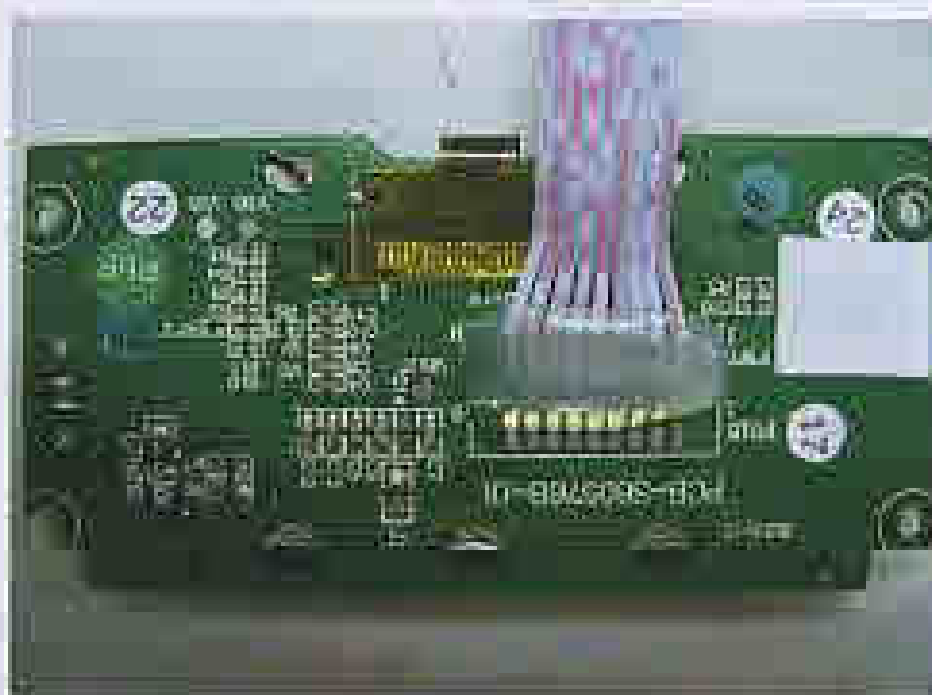
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INTERNAL PHOTO OF SAMPLE - 3



INTERNAL PHOTO OF SAMPLE - 4



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INTERNAL PHOTO OF SAMPLE - 5



INTERNAL PHOTO OF SAMPLE - 8



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APPENDIX II

PHOTOGRAPHS OF THE TEST SETUP

CONDUCTED EMISSION TEST



RADIATED EMISSION TEST





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HARMONIC CURRENT AND VOLTAGE FLICKER / DIPS TEST SETUP



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IEC 61000-4-2 ESD IMMUNITY TEST



IEC 61000-4-3 RADIATED IMMUNITY TEST



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