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No. L0095

Test Report No.:
FCC2004-0007

TEST REPORT

EUT	**:**	**Receiver I of Wireless 2-way Intelligent Control System**
MODEL/TYPE	**:**	**GKB7U-3/60**
FCC ID	**:**	**SDGGKB7U-360**
CLIENT	**:**	**GUANGZHOU GKB ELECTRIC CO., LTD.**
Classification of Test	**:**	**COMMISSION TEST**

Guangzhou Testing & Inspection Institute for Household Electrical Appliances

广州日用电器检测所 GTIHEA

国家日用电器质量监督检验中心

Add.: 204 Xingang West Road Guangzhou 510302 P.R. China
Telephone: 86-20-84451692 Fax: 86-20-84183160
E-mail: EMC@ GTIHEA.COM

Client	**Name:** GUANGZHOU GKB ELECTRIC CO., LTD. **Address:** No. 98, Hedong Rd., Fangcun District, Guangzhou, Guangdong Province, P. R. China
Manufacturer	**Name:** GUANGZHOU GKB ELECTRIC CO., LTD. **Address:** No. 98, Hedong Rd., Fangcun District, Guangzhou, Guangdong Province, P. R. China
Equipment under Test	**Name** : Receiver I of Wireless 2-way Intelligent Control System **Model/ type** : GKB7U-3/60 **FCC ID** : SDGGKB7U-360 **Trade mark** : GKB **Serial no.** : — **Sampling** : —

Date of Receipt.	**2004.02.15**	Date of Testing	**2004.02.15-2004.03.18**

Test Specification	**Test Result**
FCC PART 15,Subpart C, 2004	**PASS**

Evaluation of Test Result

This device complies with the requirements of Federal Communications Commission (FCC) Rules and Regulations Part 15.

Issue Date: : Nov.04.2004

Tested by:	Reviewed by:	Approved by:
Chen Xiuliu	Wang Xiaoyan	
Name Signature	Name Signature	Name Signature

Other Aspects:

NONE

Abbreviations: OK, Pass = passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested

This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of **GTIHEA**.

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1. General Product Information

1.1 Product Function

Refer to the operation instruction.

1.2 Ratings and System Details (Details see 5.3 Nameplate.)

Power supply	AC110V, 60Hz
Max Load	7A
Frequency	433.9MHz
Modulation type	Pulse modulation
Power wire	NONE
Interconnecting wires	NONE
Antenna type	Internal permanently attached antenna
Classification	Intentional radiator

1.3 Independent Operation Modes

The basic operation modes are:

1. Bi-directional transmission (two-way transmission)

Note: Through the function of bi-directional transmission, the EUT can send out the information about the working state of the controlled loads (for example, electrical appliances). The EUT can receive the RF signal from the controlling unit (for example, the LCD control panel) to change the working state of the controlled electrical appliances.

2. Stand by

1.4 Submitted Documents

Operating Instructions and Installation Manual
Rating Label
Wiring Diagram
Construction Drawing
Photographs of EUT
Material Bill (Parts List)

2. Test Sites

2.1 Test Facilities

The tests and measurements refer to this report were performed by EMC testing Lab. of Guangzhou Testing & Inspection Institute for Household Electric Appliances.

Add. : 204 Xingang West Road Guangzhou 510302 P.R. China
Telephone : 86-20-84451692
Fax : 86-20-84183160

The EMC testing laboratory has been recognized by China National Commission for Laboratory Assessment, and authorized by Nemko of Norway since 1997(Aut. No. ELA139), and authorized by TüV Rheinland of Germany since 1998(Aut. No. 9868976-1216), and registered by FCC since 2001(Registered No. 102430).

2.2 Description of Non-standard Method and Deviations

The testing and measurement method used in this report are all the standard method applied, no any non-standard method and deviations from the used standard were used.

2.3 List of Test and Measurement Instruments

Refer to **Appendix A**.

3. Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

3.2 Physical Configuration for Testing

Refer to relative descriptions in this test report.

3.3 Test Operation Mode and Test Software

Refer to **Test Setup.**

3.4 Special Accessories and Auxiliary Equipment

None.

3.5 Countermeasures to Achieve EMC Compliance

None.

4. Emission test results (intentional radiator)

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 and ANSI C63.4:2003 for FCC Certification.

Test Standards and Results Summary					
Test Condition	Test Requirement	Test Method	Test Result		
			Pass	Failed	N/A
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	☒	☐	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	☒	☐	☐
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.231(a)	ANSI C63.4:2003	☒	☐	☐

Note: N/A - Not Applicable

According to FCC 47CFR 15.231(a), the following conditions shall be met to comply with the provisions for this periodic operation: A transmitter activated automatically shall cease transmission within 5 seconds after activation.
The EUT is to transmit RF signal about the working state of the controlled loads after receiving this signal from controlling unit (for example, the LCD control panel), the EUT ceases transmission almost immediately after transmitting. The receiving time and transmitting time are not more than 5 seconds.

4.1 AC mains power input/output ports

RESULT : Pass

Test procedure : FCC 15.207
Frequency range : 0.15MHz ~30MHz
Test Site : Shielding Room (Registration Number: 102430)

Test Setup:

The GRP (Ground Reference Plate) is 2m×3m.
The EUT was placed on a wooden table, 40cm high, standing on the GRP.
The EUT was kept more than 0.8m from any other earthed conducting surface.

Test Results:

Test Conditions

Ambient Temperature : 25 ℃/ 25 ℃ (Before Test/After Test);
Relative Humidity : 60 %/ 60 % (Before Test/After Test);
Power Supply : 110VAC/60Hz ;
Operating Mode of the EUT : Bi-direction transmission

RF Terminal Disturbance Voltage							
Port: AC Power							
Freq. (MHz)	QP Reading (dBμV)	Phase	QP Limits (dBμV)	Freq. (MHz)	AV Reading (dBμV)	Phase	AV Limits (dBμV)
/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/
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/	/	/	/	/	/	/	/
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Note: Where PK reading is less than relevant limit decrease 25dB, the QP reading and AV reading will not be recorded.

Where QP reading is less than relevant AV limit, the AV reading will not be measured.

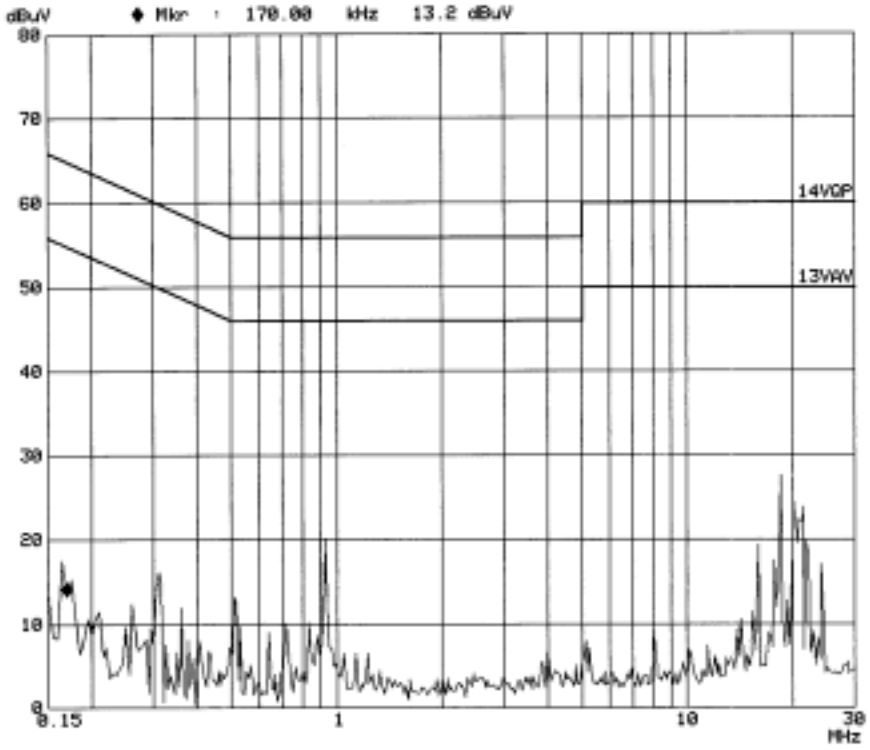
Calculated measurement uncertainty: 0.15~30MHz 2.5dB

Scan Graph and Scan setting

```
Scan Settings (1 Range)
|--------- Frequencies -----------||----------- Receiver Settings ------------|
  Start        Stop          Step      IF BW  Detector  M-Time Atten Preamp OpRge
 150k          30M           5k          10k      PK       5ms AUTO LN OFF   60dB

Transducer No. Start       Stop       Name
              3   150k       30M      ESH3Z5

Final Measurement: x QP
                   Meas Time:     1 s
                   Subranges:     8
                   Acc Margin:  20dB
```



Test Results:

Test Conditions

Ambient Temperature : 25 ℃/ 25 ℃ (Before Test/After Test);
Relative Humidity : 60 %/ 60 % (Before Test/After Test);
Power Supply : 110VAC/60Hz ;
Operating Mode of the EUT : Stand by

RF Terminal Disturbance Voltage							
Port: AC Power							
Freq. (MHz)	QP Reading (dBμV)	Phase	QP Limits (dBμV)	Freq. (MHz)	AV Reading (dBμV)	Phase	AV Limits (dBμV)
/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/
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/	/	/	/	/	/	/	/
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/	/	/	/	/	/	/	/

Note: Where PK reading is less than relevant limit decrease 25dB, the QP reading and AV reading will not be recorded.

Where QP reading is less than relevant AV limit, the AV reading will not be measured.

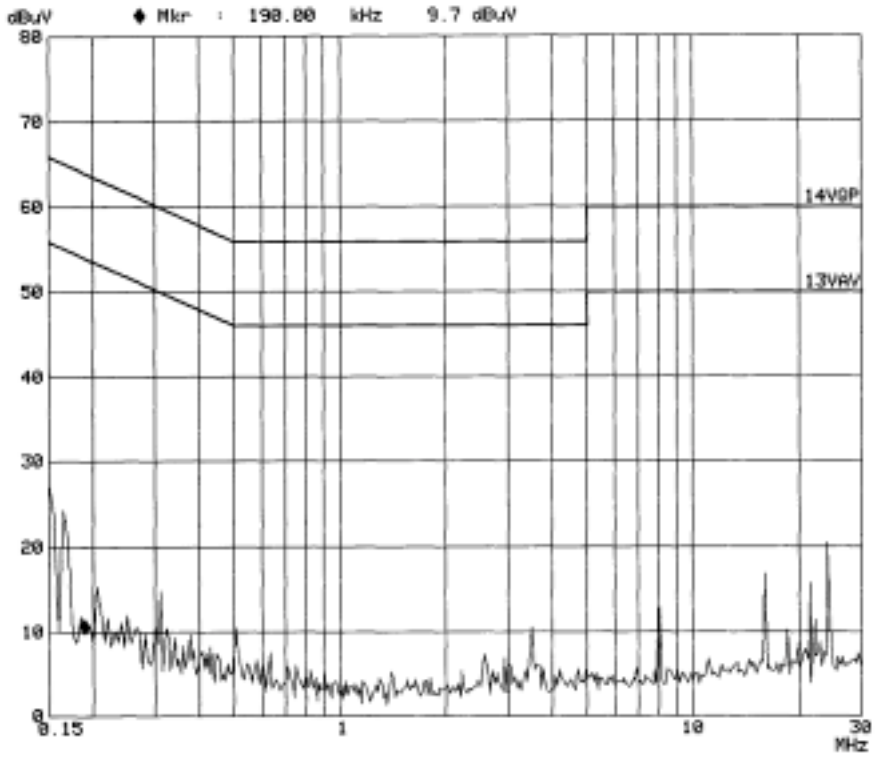
Calculated measurement uncertainty: 0.15~30MHz 2.5dB

Scan Graph and Scan Settings

```
Scan Settings (1 Range)
|--------- Frequencies -----------||----------- Receiver Settings ------------|
  Start        Stop          Step      IF BW  Detector  M-Time Atten Preamp OpRge
 150k          30M           5k          10k      PK        5ms AUTO LN OFF   60dB

Transducer No. Start       Stop       Name
             3   150k        30M      ESH3Z5

Final Measurement: x QP
                   Meas Time:     1 s
                   Subranges:     8
                   Acc Margin:  20dB
```



4.2 Radiated emission (Above30 MHz)

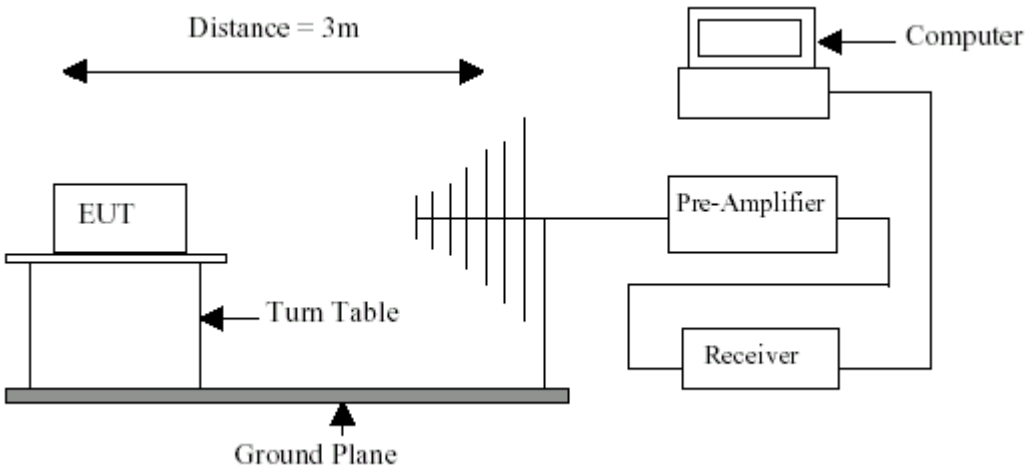
RESULT : **Pass**

Test Setup
Test procedure : ANSI C63.4:2003
Frequency range : 30 MHz~5GHz
Limits : FCC PART 15, Subpart C, Section 15.209
FCC PART 15, Subpart C, Section 15.231(a)
Test Site : 3m Anechoic Chamber (Registration Number: 102430)

Test Method:

The EUT was placed on a wooden turntable, which could rotate from 0° to 360°, 0.8m high above the ground, at a distance of 3m in anechoic chamber, from the bi-direction transmission broadband antenna, which was mounted on the antenna tower. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results below.

Test Setup:



Transducer (partial)

3m, 26MHz~2GHz

Freq. (MHz)	3141 (3m) Value (dB)	Cable Value (dB)	Total Value (dB)
26	12.0	0.30	12.30
30	8.7	0.35	9.05
60	6.7	0.70	7.40
100	9.8	1.14	10.94
150	9.4	1.38	10.78
200	10.1	1.62	11.72
250	12.1	1.96	14.06
300	14.5	1.96	16.46
350	15.7	2.36	18.06
400	16.1	2.68	18.78
450	16.9	2.79	19.69
500	17.7	2.87	20.57
550	18.8	3.21	22.01
600	19.9	3.55	23.45
650	20.5	3.58	24.08
700	21.8	3.54	25.34
750	21.5	3.89	25.39
800	22.1	4.11	26.21
850	22.4	4.06	26.46
900	22.9	4.20	27.10
950	23.0	4.50	27.50
1000	24.1	4.56	28.66
1300	26.2	5.00	31.20
1700	27.2	6.00	33.20
2000	30.3	7.00	37.30

3m, 1GHz-18GHz

Freq. (MHz)	3115 (3m) Value (dB)	Cable) Value (dB)	Total Value (dB)
1000	4.36	1.00	5.36
1500	5.71	1.15	6.86
2000	9.33	1.30	10.63
3000	10.62	1.50	12.12
4000	12.32	1.80	14.12
5000	11.86	1.90	13.76
6000	13.06	2.10	15.16
7000	14.58	2.20	16.78
8000	14.23	2.55	18.88
9000	17.98	2.70	20.68
10000	17.58	3.10	21.85
11000	18.75	3.30	22.05
12000	18.71	3.40	22.11
13000	19.81	3.50	23.31
14000	20.91	3.60	24.51
15000	19.71	3.70	23.41
16000	19.51	3.80	23.31
17000	23.81	3.90	27.71
18000	28.21	4.00	32.21

Note: Correction Factor included Antenna Factor and Cable Attenuation.

(1). Radiated Emissions limits, additional provisions [FCC 47 CFR 15.231(a)]:

Frequency Range. (MHz)	Field Strength of Fundamental (μV/m)	Field Strength of Spurious Emissions (μV/m)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750**	125 to 375**
174-260	3750	375
260-470	3750 to 12500**	375 to 1250**
Above 470	12500	1250

Note: ** linear interpolations

Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strengths is as follows: for 433.9MHz, μV/m at 3 meters = 41.6667×(F) - 7083.3333 =10995.8 (μV/m). The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in Section 15.209, whichever limit permits a higher field strength.

The field strength of emissions appearing within restricted bands of operation shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions.

Test Results:

Test Conditions:

Ambient Temperature : 25 ℃/ 25 ℃ (Before Test/After Test);
Relative Humidity : 60 %/ 60 % (Before Test/After Test);
Power Supply : 110VAC/60Hz ;
Operating Mode of the EUT : Bi-direction transmission.

Field Strength of Fundamental Emissions (Peak Value)				
Freq. (MHz)	Antenna Polarity (V/H)	Result dB(μV/m)	Limits dB(μV/m)	Limits (μV/m)
433.9	H	35.5	101	109958
433.9	V	46.9	101	109958

Field Strength of Spurious Emissions (Peak Value)				
Freq. (MHz)	Antenna Polarity (V/H)	Result dB(μV/m)	Limits dB(μV/m)	Limits (μV/m)
867.8	H/V	<32.0	81	10995.8

Field Strength of Fundamental Emissions (Average Value)				
Freq. (MHz)	Antenna Polarity (V/H)	Result dB(μV/m)	Limits dB(μV/m)	Limits (μV/m)
433.9	H	13.6	81	10995.8
433.9	V	25.0	81	10995.8

Field Strength of Spurious Emissions (Average Value)				
Freq. (MHz)	Antenna Polarity (V/H)	Result dB(μV/m)	Limits dB(μV/m)	Limits (μV/m)
867.8	H/V	<10.1	61	1099.6

Remarks:

- Adjusted by Duty Cycle = -21.9dB
- FCC limit for Average Measurement = 41.6667×(F) - 7083.3333 =10995.8 (μV/m)
- Measurements were made using a peak detector.
- Calculated measurement uncertainty: 30MHz to 1GHz 5.9dB

Test Results:

Test Conditions:

Ambient Temperature : 25 ℃/ 25 ℃ (Before Test/After Test);
Relative Humidity : 60 %/ 60 % (Before Test/After Test);
Power Supply : 110VAC/60Hz ;
Operating Mode of the EUT : Stand by .

Field Strength of Fundamental Emissions (Peak Value)				
Freq. (MHz)	Antenna Polarity (V/H)	Result dB(μV/m)	Limits dB(μV/m)	Limits (μV/m)
433.9	H/V	/	101	109958

Field Strength of Spurious Emissions (Peak Value)				
Freq. (MHz)	Antenna Polarity (V/H)	Result dB(μV/m)	Limits dB(μV/m)	Limits (μV/m)
/	H/V	/	/	/

Field Strength of Fundamental Emissions (Average Value)				
Freq. (MHz)	Antenna Polarity (V/H)	Result dB(μV/m)	Limits dB(μV/m)	Limits (μV/m)
433.9	H/ V	/	81	10995.8

Field Strength of Spurious Emissions (Average Value)				
Freq. (MHz)	Antenna Polarity (V/H)	Result dB(μV/m)	Limits dB(μV/m)	Limits (μV/m)
/	H/V	/	/	/

Remarks:

- Adjusted by Duty Cycle = -21.9dB
- FCC limit for Average Measurement = 41.6667×(F) - 7083.3333 =10995.8 (μV/m)
- Measurements were made using a peak detector.
- Calculated measurement uncertainty: 30MHz to 1GHz 5.9dB

(2). Radiated Emissions limits, general requirements [FCC 47 CFR 15.209]:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1GHz are based on measurements employing an average detector.

Test Results:

Test Conditions:

Ambient Temperature : 25 ℃/ 25 ℃ (Before Test/After Test);
Relative Humidity : 60 %/ 60 % (Before Test/After Test);
Power Supply : 110VAC/60Hz ;
Operating Mode of the EUT : Bi-direction transmission.

Radiated Emissions Quasi-peak				
Freq. (MHz)	Antenna Polarity (V/H)	Result dB(μV/m)	Limits dB(μV/m)	Limits (μV/m)
938.0	H/V	<30.0	46	200
1834.1	H/V	27.4	54	500

Test Conditions:

Ambient Temperature : 25 ℃/ 25 ℃ (Before Test/After Test);
Relative Humidity : 60 %/ 60 % (Before Test/After Test);
Power Supply : 110VAC/60Hz ;
Operating Mode of the EUT : Stand by .

Radiated Emissions Quasi-peak				
Freq. (MHz)	Antenna Polarity (V/H)	Result dB(μV/m)	Limits dB(μV/m)	Limits (μV/m)
938.0	H/V	<30.0	46	200
>960.0	H/V	<30.0	54	500

Calculated measurement uncertainty: 30MHz to 1GHz 5.9dB

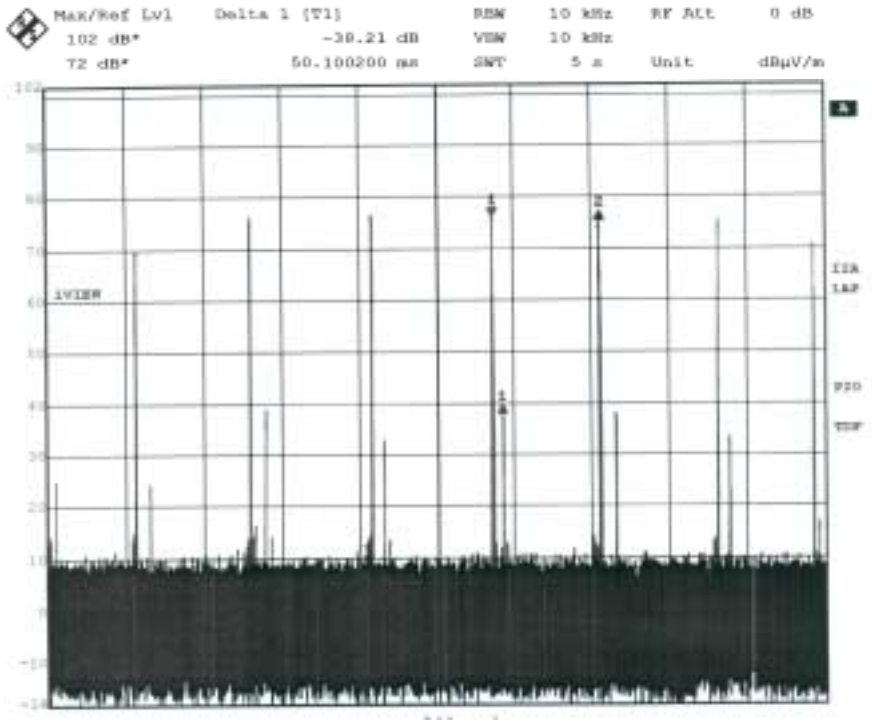
Attachment:
Duty Cycle Correction

Duty Cycle Correction (the Worst case): $20\log(T_{pulse} / T_{100ms})$
The average duty cycle correction factor = 20log((4.01+4.01) ms/100ms) = -21.9 dB

Note: According to ANSI C63.4, when the pulse train exceeds 100ms, calculate the duty cycle by averaging the sum of the pulsewidths over the 100ms width with the highest average value.

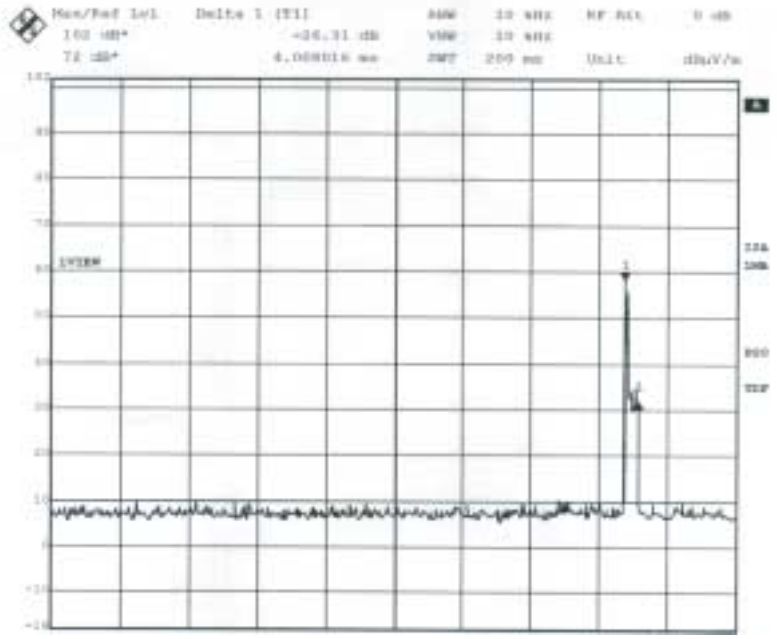
For the EUT, One pulse train (711.42ms, Graph: A) includes one low pulse (4.01ms, Graph: C) and one high pulse (4.01ms, Graph: B), the separation between these two pluses is about 50.10ms (Graph: A).

Graph: A, Pulse Train (the Worst case)

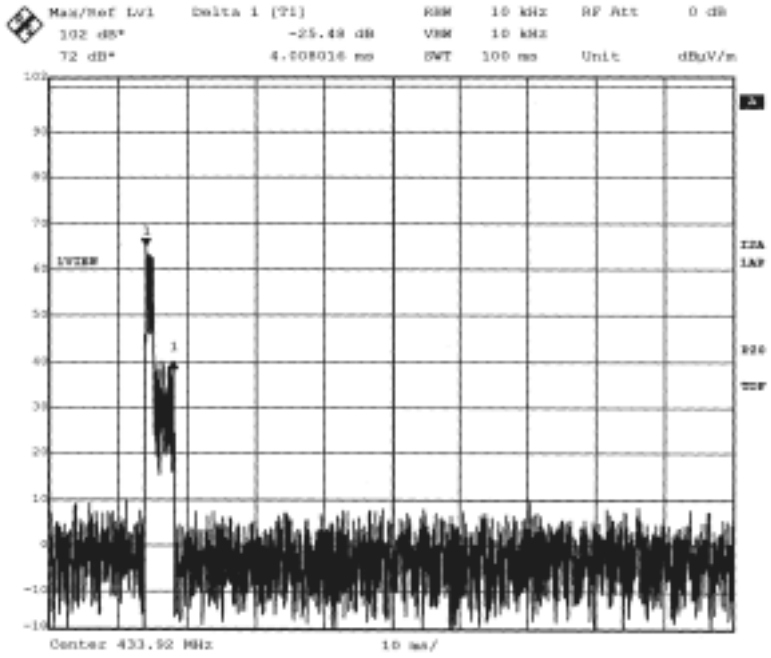


Note: Detla 2 = 711.42ms

Graph: B, the length of pulse is about 4.01ms.

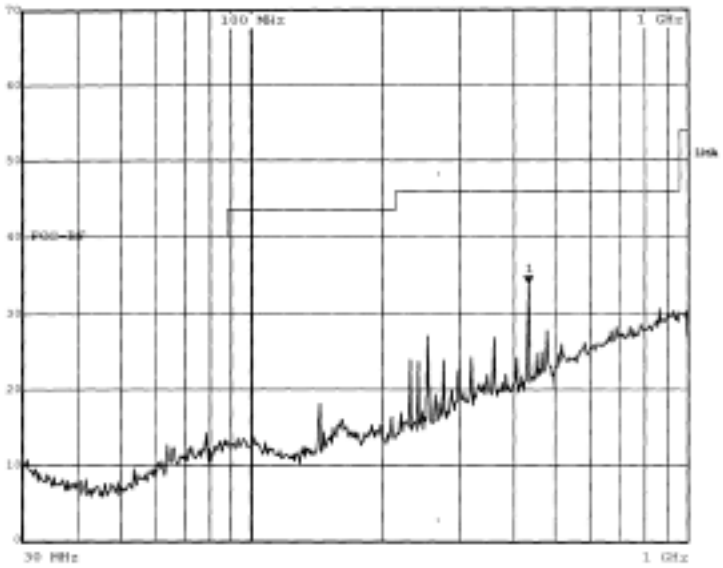


Graph: C, the length of pulse is about 4.01ms.

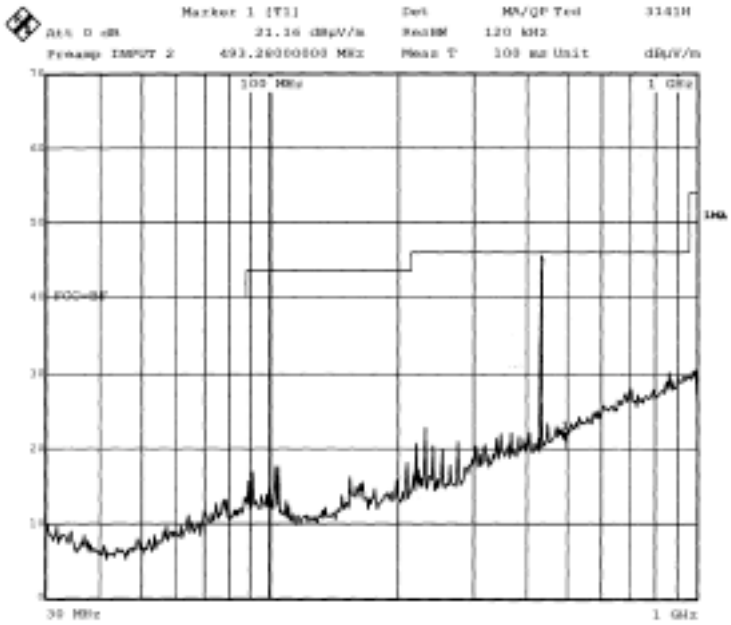


Scan Graph and Scan Settings

Bi-direction transmission (Horizontal)

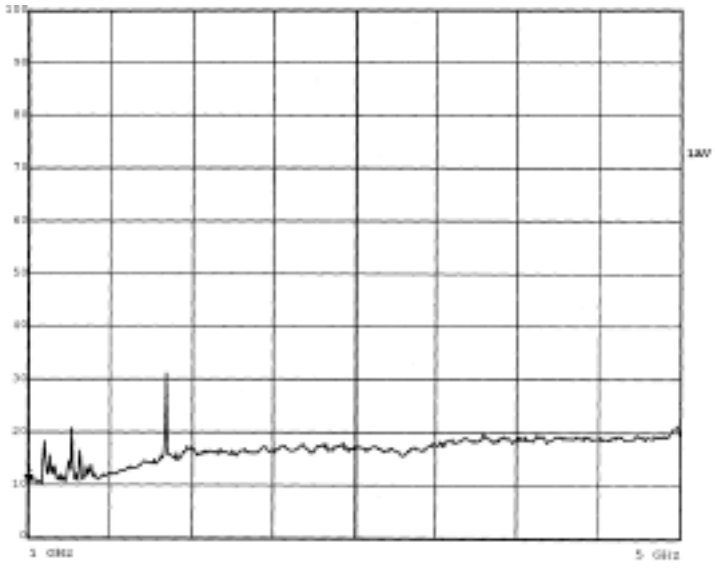


Bi-direction transmission (Vertical)



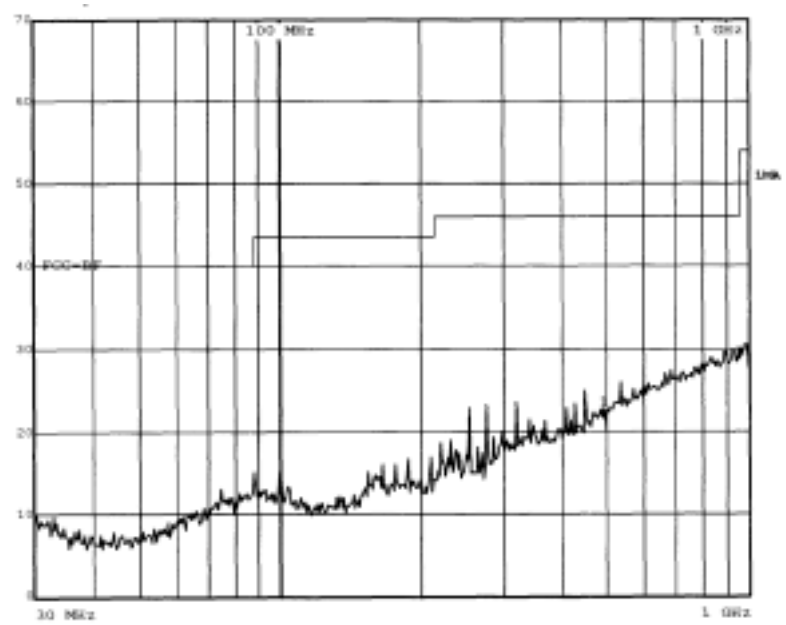
Scan Graph and Scan Settings

Bi-direction transmission (Horizontal/Vertical)

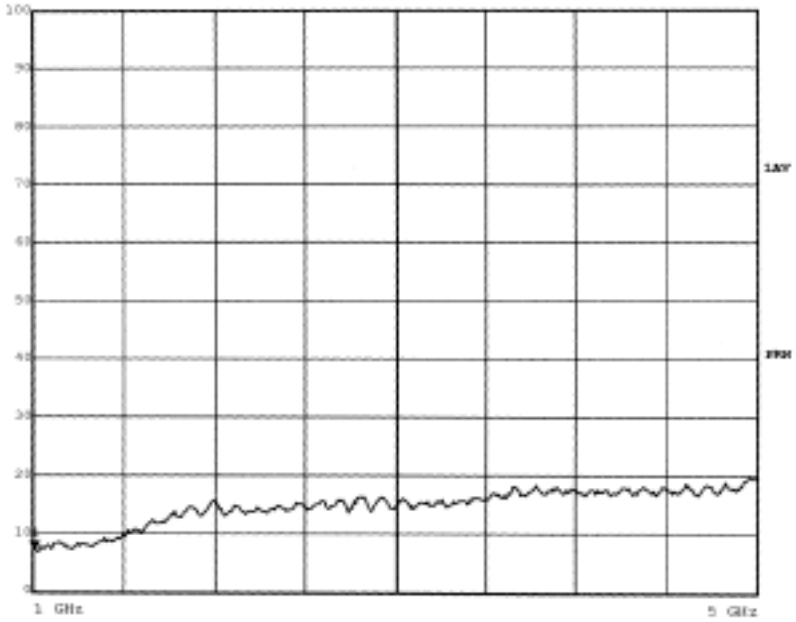


Scan Graph and Scan Settings

Stand by (Horizontal/Vertical)



Stand by (Horizontal/Vertical)



4.3 20dB Bandwidth of Fundamental Emission

RESULT : Pass

Test procedure : ANSI C63.4 : 2003
Limits : FCC PART 15, Subpart C, Section 15.231(a)
Test Site : 3m Anechoic Chamber (Registration Number: 102430)

Test Method:
The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:
As Test Setup of clause 4.2 in this test report.

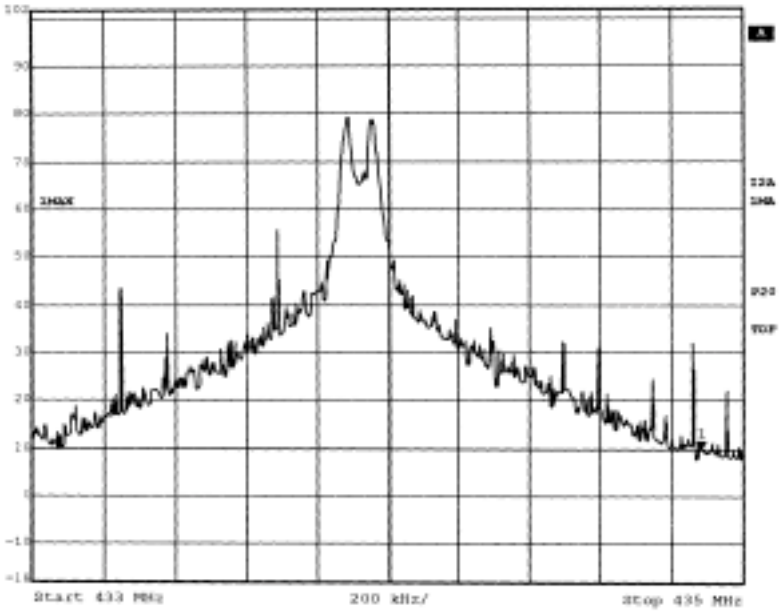
Results:

Test Conditions:

Ambient Temperature : 25 ℃/ 25 ℃ (Before Test/After Test);
Relative Humidity : 60 %/ 60 % (Before Test/After Test);
Power Supply : 110VAC/60Hz
Operating Mode of the EUT : Bi-directional transmission.

Frequency Range [MHz]	20dB Bandwidth [KHz]	FCC Limits [MHz]	Conclusion
433.9	179.8	0.25%×433.9MHz = 1084.75 kHz	No wider than The FCC limits

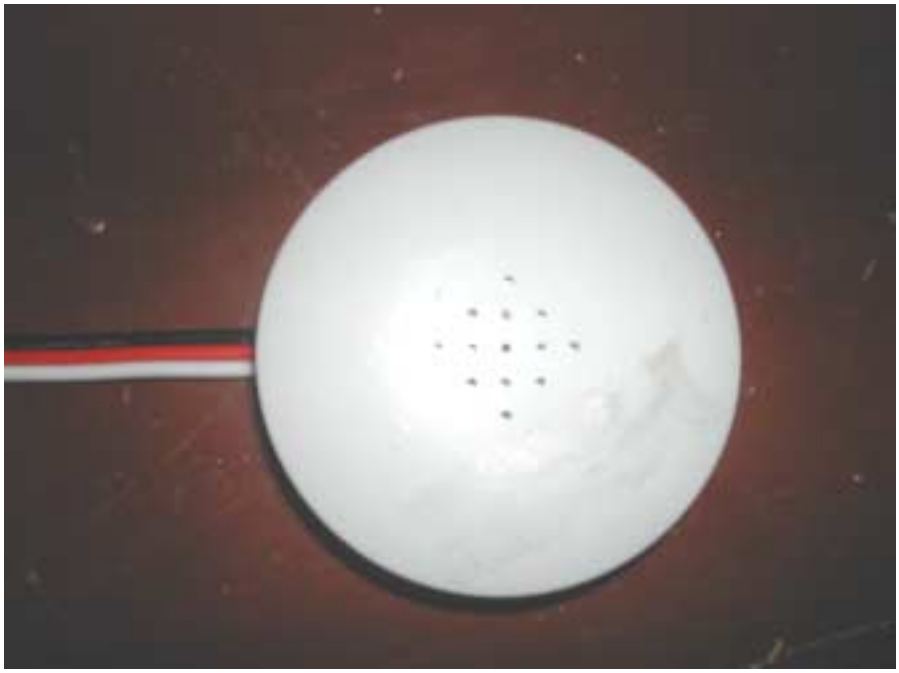
Scan Graph and Scan Settings



5. Photographs & Nameplates of the EUT

5.1 Outlook:

Front View of the EUT

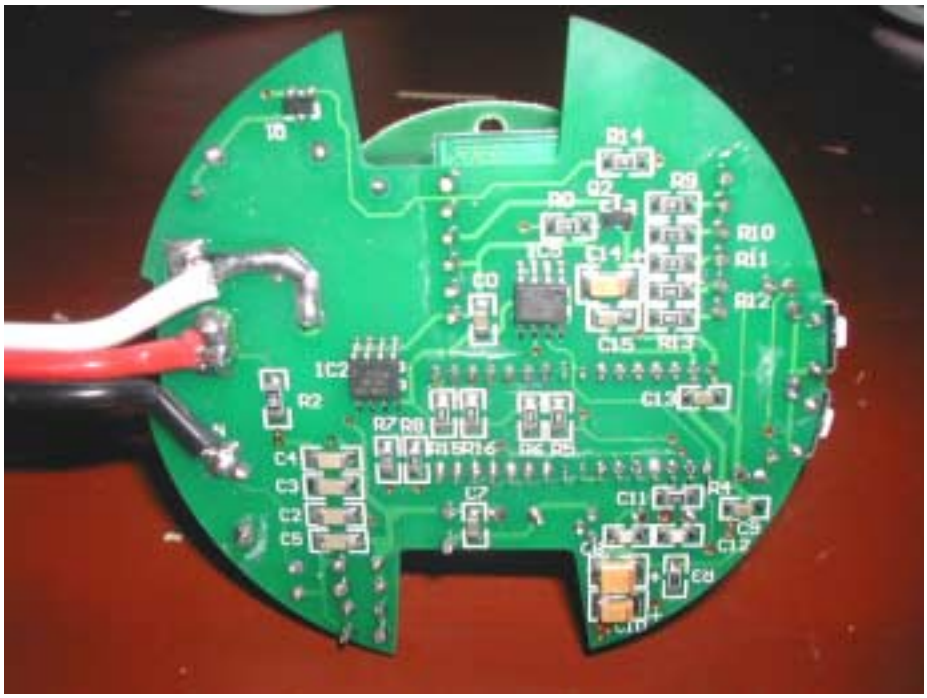


Rear View of the EUT

5.2 Structure of internal wires:

Inner Circuit Top View

Inner Circuit Bottom View



5.3 Nameplate:

Use direction

1. Model No.: GKB7U-3/60
2. Voltage: AC110V±10% 60Hz
   Max load: 7A
3. Red line -- live wire, black line -- neutral wire, white line -- load wire
4. Applicable load:
5. M1 key is for system code setting, M2 key is for receiver code setting.
   Please follow the use manual to set system code and the receiver code.

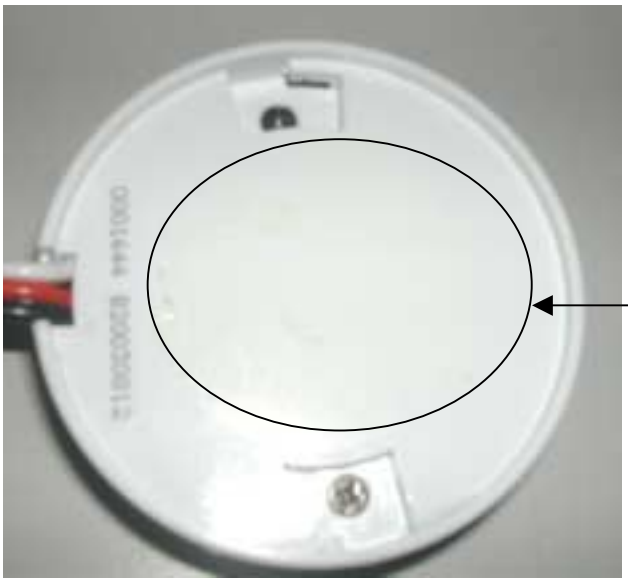
FCC ID: SDGGKB7U-360

GUANGZHOU GKB ELECTRIC CO., LTD.

Statement:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: The statement is in the Operating Instructions because of the size of nameplate

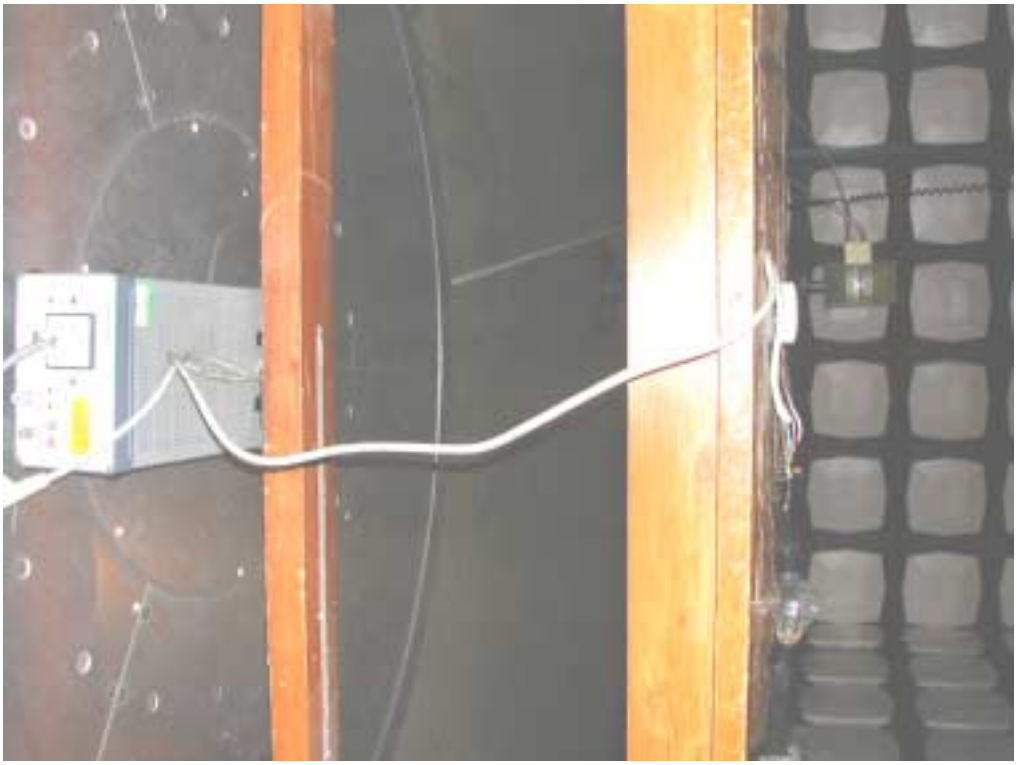


Position of the Nameplate

6. Photograph of the test setup

AC mains power input/output ports

Measurement of Radiated Emission Test



Measurement of Radiated Emission Test

Appendix A

Test Equipment	Mature Date of Calibration	Type/Model	Serial No.	Manufacturer
EMI Test Receiver	2005.10.12	ESI26	834000/009	R & S
EMI Test Receiver	2005.10.12	ESCS30	100158	R & S
LISN	2005.10.12	ESH3-Z5	844982/020	R & S
LISN	2005.10.12	ESH3-Z5	833874/002	R & S
Biconilog Antenna	2005.06.04	3141	1178	EMCO
Waveguide Horn	2005.06.04	3115	0002-6038	EMCO

End of Document