

Date : 2020-05-16 Page 1 of 21 No. : HMD20050001

**Applicant**: Zhongshan Hefeng Electronics Co., Ltd.

6/F, Building D, Ou Le Ya Industrial Park, No.19, Jinan Road, Minzhong Town, Zhongshan City, Guangdong Province, China

**Supplier / Manufacturer :** Zhongshan Hefeng Electronics Co., Ltd.

6/F, Building D, Ou Le Ya Industrial Park, No.19, Jinan Road, Minzhong Town, Zhongshan City, Guangdong Province, China

**Description of Sample(s) :** Submitted sample(s) said to be

Product: Fan Light Remote Control

Brand Name: HF Model No.: RT36A

FCC ID: 2AWB7-RT36A

**Date Samples Received** : 2020-04-29

**Date Tested** : 2020-05-15 to 2020-05-16

**Investigation Requested**: Perform ElectroMagnetic Interference measurement in accordance

with FCC 47CFR [Codes of Federal Regulations] Part 15 and ANSI

C63.10:2013 for FCC Certification.

**Conclusions** : The submitted product <u>COMPLIED</u> with the requirements of Federal

Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described

above and on Section 2.2 in this Test Report.

Remarks : ---

LEUNG Kwun Hang, Joey
Authorized Signatory



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: HMD20050001 **CONTENT:** Cover Page 1 of 21 Content Page 2 of 21 <u>1.0</u> **General Details** 1.1 Page 3 of 21 **Test Laboratory** 1.2 Equipment Under Test [EUT] Page 3 of 21 Description of EUT operation 1.3 Date of Order Page 3 of 21 Page 3 of 21 1.4 Submitted Sample(s) Page 3 of 21 1.5 **Test Duration** 1.6 Country of Origin Page 3 of 21 **Technical Details** 2.0 2.1 Investigations Requested Page 5 of 21 2.2 Page 5 of 21 Test Standards and Results Summary 3.0 **Test Results** 3.1 Emission Page 6-11 of 21 3.2 20dB Bandwidth of Fundamental Emission Page 12-13 of 21



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#### 1.0 General Details

#### 1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.

**EMC Laboratory** 

10 Dai Wang Street, Taipo Industrial Estate, New Territories, Hong Kong

Telephone: 852 2666 1888 Fax: 852 2664 4353

### 1.2 Equipment Under Test [EUT]

**Description of Sample(s)** 

Product: Fan Light Remote Control

Manufacturer: Zhongshan Hefeng Electronics Co., Ltd.

6/F, Building D, Ou Le Ya Industrial Park, No.19, Jinan Road, Minzhong Town, Zhongshan City, Guangdong Province, China

Brand Name: HF
Model Number: RT36A

Rating: 3Vd.c. (Two CR2032 batteries in parallel)

### 1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Fan Light Remote Control. The EUT is operating at 315MHz. Test was conducted under Tx mode.

### 1.3 Date of Order

2020-04-29

### 1.4 Submitted Sample(s):

1 Sample

#### 1.5 Test Duration

2020-05-15 to 2020-05-16

#### 1.6 Country of Origin

China



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### **<u>2.0</u>** Technical Details

### 2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 and ANSI C63.10: 2013 for FCC Certification. This is a manually operated transmitter, Press the button to start sending signals.

### 2.2 Test Standards and Results Summary Tables

EMISSION Results Summary								
Test Condition	Test Requirement	Test Method	Class /	Test Result				
			Severity	Pass	Failed	N/A		
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.231(a)	ANSI C63.10: 2013	N/A	$\boxtimes$				
20dB Bandwidth of Fundamental Emission	FCC 47CFR 15.231(c)	ANSI C63.10: 2013	N/A	$\boxtimes$				
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10: 2013	N/A	$\boxtimes$				
Manual Operated Transmitter Transmission Time	FCC 47CFR 15.231(a)	ANSI C63.10: 2013	N/A	$\boxtimes$				
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	$\boxtimes$				

Note: N/A - Not Applicable



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3.0 Test Results

3.1 Emission

#### 3.1.1 Radiated Emissions

Test Requirement: FCC 47CFR 15.231(a)
Test Method: ANSI C63.10:2013
Test Date: 2020-05-16
Mode of Operation: Tx mode

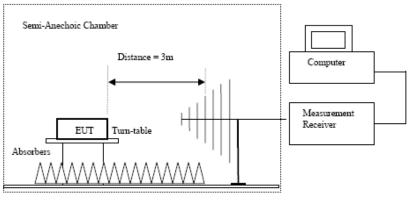
Ambient Temperature: 25°C Relative Humidity: 52% Atmospheric Pressure: 101 kPa

#### **Test Method:**

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber\*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber\*. 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 of the following pages.

\* Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

### **Test Setup:**



Ground Plane

- Absorbers placed on top of the ground plane are for measurements above 1000MHz only
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz hom antennas are used, 9kHz to 30MHz loop antennas are used.



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### Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.231a]:

Frequency Range of	Field Strength of	Field Strength of
Fundamental	Fundamental Emission	Spurious Emission
	[Average]	[Average]
[MHz]	$[\mu V/m]$	$[\mu V/m]$
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750 *	125 to 375 *
174-260	3,750	375
260-470	3,750 to 12,500 *	375 to 1,250 *
Above 470	12,500	1,250

<sup>&</sup>lt;sup>1</sup>Linear interpolations.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

### Results of Tx mode(1GHz - 18GHz): PASS

Field Strength of Fundamental Emissions							
	Peak Value						
Frequency	Measured	Correction	Field	Field	Limit	E-Field	
	Level @3m	Factor	Strength	Strength	@3m	Polarity	
MHz	$dB\mu V$	dB/m	dBμV/m	μV/m	μV/m		
315.00	50.5	15.4	65.9	1972.4	60,430.5	Vertical	
315.00	51.6	15.3	66.9	2213.1	60,430.5	Horizontal	

Field Strength of Spurious Emissions Peak Value							
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field	
	Level @3m	Factor	Strength	Strength		Polarity	
MHz	$dB\mu V$	dB/m	dBμV/m	μV/m	μV/m		
630.00	34.1	22.8	56.9	703.1	6,043.05	Vertical	
630.00	27.3	22.5	49.8	308.3	6,043.05	Horizontal	
945.00	27.8	26.8	54.6	537.0	6,043.05	Vertical	
945.00	23.4	26.8	50.2	323.6	6,043.05	Horizontal	
1575.00	25.0	32.9	57.9	781.6	6,043.05	Vertical	
1575.00	22.2	32.7	54.9	552.7	6,043.05	Horizontal	
2205.00	17.2	38.2	55.4	586.8	6,043.05	Vertical	
2205.00	17.6	38.1	55.7	609.5	6,043.05	Horizontal	



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Results of Tx mode(1GHz - 18GHz): PASS

Field Strength of Fundamental Emissions Average Value							
Frequency Peak Value Duty Crycle Field Field Limit E-Field							
	Level @3m	Factor	Strength	Strength	@3m	Polarity	
MHz	$dB\mu V$	dB/m	dBμV/m	μV/m	μV/m	-	
315.00	65.9	-12.4	53.5	472.1	6,043.05	Vertical	
315.00	66.9	-12.4	54.6	533.9	6.043.05	Horizontal	

	Field Strength of Spurious Emissions							
	Average Value							
Frequency	Peak Value	Duty Cycle	Field	Field	Limit @3m	E-Field		
	Level @3m	Factor	Strength	Strength		Polarity		
MHz	$dB\mu V$	dB/m	dBμV/m	μV/m	μV/m			
630.00	56.9	-12.4	44.6	169.0	604.305	Vertical		
630.00	49.8	-12.4	37.4	74.1	604.305	Horizontal		
945.00	54.6	-12.4	42.2	128.8	604.305	Vertical		
945.00	50.2	-12.4	37.8	77.6	604.305	Horizontal		
1575.00	57.9	-12.4	45.5	187.9	604.305	Vertical		
1575.00	54.9	-12.4	42.5	132.9	604.305	Horizontal		
2205.00	55.4	-12.4	43.0	141.1	604.305	Vertical		
2205.00	55.7	-12.4	43.3	146.7	604.305	Horizontal		

#### Remarks:

FCC Limit for Fundamental Average Measurement = 41.67(315.0)-7083=6043.05μV/m

+: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 were not adjusted for averaging and the limits of FCC Rules Part 15 Section 15.209 were applied.

\*: Adjusted by Duty Cycle = -12.38dB

Duty Cycle Correction = -12.38dB

Correction Factor= Cable loss Factor+ Ant Factor-Amp Factor

Average Value Final Field Strengted = Peak Value Final Field Strengted +Duty Cycle

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty (9kHz-30MHz): 2.0dB

(30MHz -1GHz): 4.9dB (1GHz -6GHz): 4.02dB (6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.



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#### Limits for Radiated Emissions FCC 47 CFR 15.209 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	$[\mu V/m]$
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

#### Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: (9kHz-30MHz): 2.0dB

(30MHz -1GHz): 4.9dB (1GHz -6GHz): 4.02dB (6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

#### Result of Tx mode (9kHz - 30MHz): PASS

Emissions detected are more than 20 dB below the limit line(s).

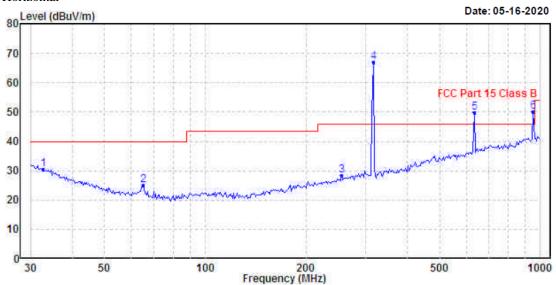
#### Results of Tx mode (30MHz - 1GHz): PASS

	Radiated Emissions								
	Quasi-Peak								
Emission	E-Field	Level	Limit	Level	Limit				
Frequency	Polarity	@3m	@3m	@3m	@3m				
MHz		dBμV/m	dBμV/m	μV/m	μV/m				
32.9	Horizontal	30.4	40.0	33.0	100				
65.3	Horizontal	24.9	40.0	17.6	100				
254.7	Horizontal	28.3	46.0	26.0	200				
36.8	Vertical	31.3	40.0	36.6	100				
44.1	Vertical	30.6	40.0	33.8	100				
66.3	Vertical	27.1	40.0	22.5	100				

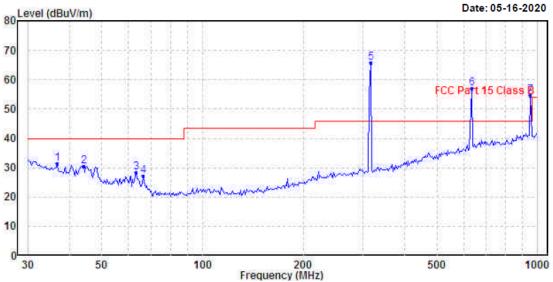


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#### Horizontal



### Vertical





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3.1.2 Antenna Requirement

Ambient Temperature: 25°C Relative Humidity: 51% Atmospheric Pressure: 101 kPa

**Test Requirements: § 15.203** 

### **Test Specification:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### **Test Results:**

This is PCB antenna. There is no external antenna, the antenna gain = 0dBi. User is unable to remove or changed the Antenna.

For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



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#### 3.2 20dB Bandwidth of Fundamental Emission

Test Requirement: FCC 47 CFR 15.231(c)
Test Method: ANSI C63.10:2013

Test Date: 2020-05-15 Mode of Operation: Tx mode

Ambient Temperature: 25°C Relative Humidity: 52% Atmospheric Pressure: 101 kPa

#### **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 3.1.1 in this test report.



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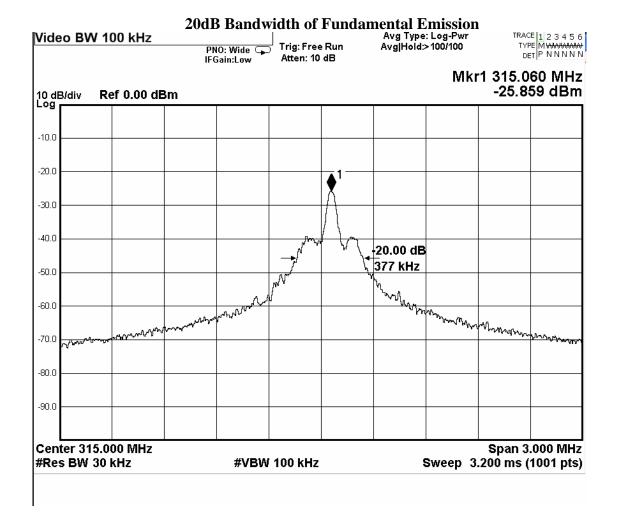
### Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range	20dB Bandwidth	FCC Limits *
[MHz]	[kHz]	[MHz]
315.0	377	0.7875

\*: FCC Limit for Bandwidth measurement = (0.25%) (Center Frequency)

=(0.0025)(315.0)

= 0.7875MHz





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Appendix A

### **List of Measurement Equipment**

#### **Radiated Emission**

	Radiated Ellission							
EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL		
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A		
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A		
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3		2020/04/20	2021/04/20		
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A		
EM336	PRECISION CONICAL DIPOLE	SEIBERSDORF LABORATORIES	PCD 3100	6236/M	2018/06/28	2020/06/28		
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2020/05/13	2021/05/13		
EM276	BROADBAND HORN ANTENNA	A-INFOMW	JXTXLB- 10180-SF	J203109090300 7	2019/03/20	2021/03/29		
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2020/04/28	2022/04/28		
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2020/04/28	2022/04/28		
EM022	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2019/11/30	2021/11/30		
EM045	POWER METER	ROHDE & SCHWARZ	NRVD	843246/028	2018/06/01	2020/06/01		

### Remarks:-

CM Corrective Maintenance

N/A Not Applicable
TBD To Be Determined



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### Appendix B

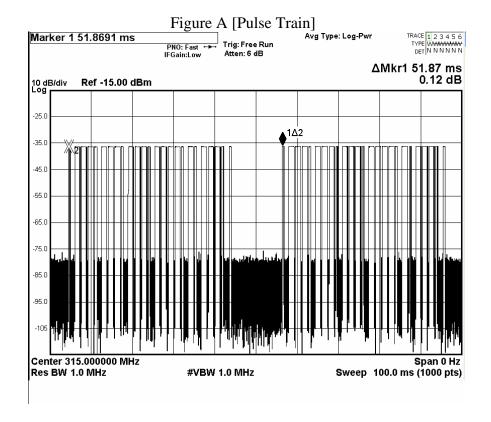
### **Duty Cycle Correction During 100msec**

Each packet period (51.87msec) never exceeds a series of 17(1.202msec) long and 8(0.4506msec) short pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered (1.202\*17+0.4506\*8) msec per 51.87msec = 46.34% duty cycle.

#### Remarks:

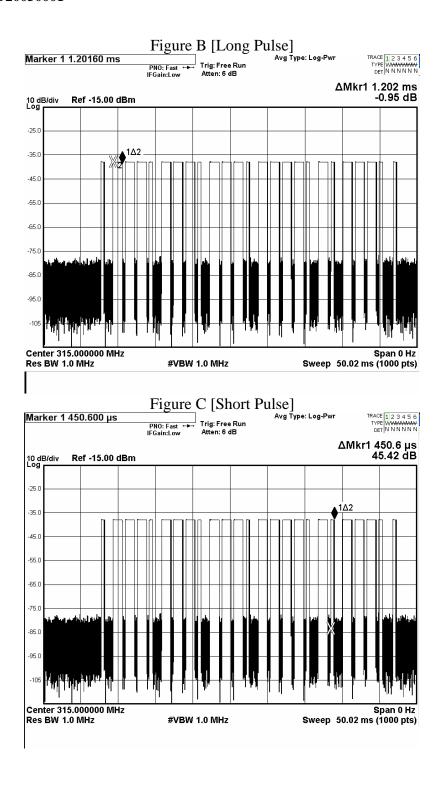
Duty cycle factor = 20Log [(1.202\*17+0.4506\*8)/51.87] = -12.38dB

The following figures [Figure A to Figure D] showed the characteristics of the pulse train for one of these functions.





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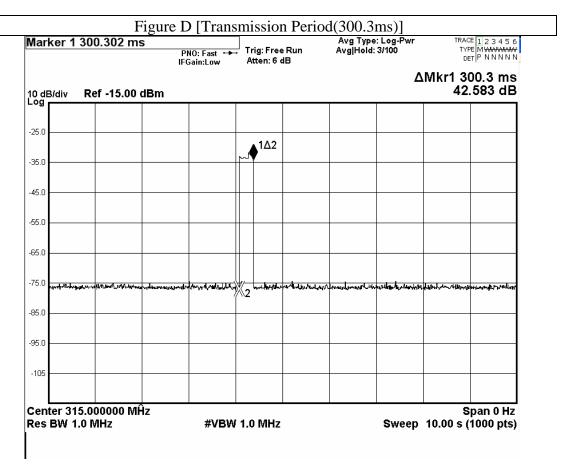


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Appendix C

#### Manual Operated Transmitter Transmission Time [FCC 47CFR 15.231(a)]

According to FCC 47CFR15.231 (a). A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. The EUT ceases transmission almost immediately upon being released and appears to finish the current packet being transmitted. Therefore the longest period of time the transmitter should take to deactivate is a packet length.





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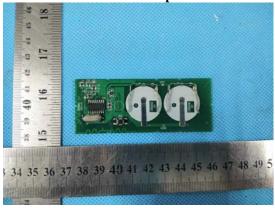
### Appendix D

### **Photographs of EUT**

Front View of the product



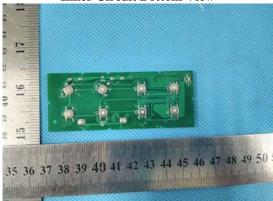
**Inner Circuit Top View** 



### Rear View of the product



**Inner Circuit Bottom View** 





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**Photographs of EUT** 





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Photographs of EUT

Measurement of Radiated Emission Test Set Up (30MHz - 1000MHz)





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Photographs of EUT

Measurement of Radiated Emission Test Set Up (above 1000MHz)



\*\*\*\*\* End of Test Report \*\*\*\*\*

### **Conditions of Issuance of Test Reports**

- 1. All samples and goods are accepted by The Hong Kong Standards & Testing Centre Limited (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The Company provides its services on the basis that such terms and conditions constitute express agreement between the Company and any person, firm or company requesting its services (the "Clients").
- 2. Any report issued by the Company as a result of this application for testing service (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to his customer, supplier or other persons directly concerned. Subject to clause 3, the Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
- 3. The Company shall be at liberty to disclose the testing-related documents and/or files anytime to any third-party accreditation and/or recognition bodies for audit or other related purposes. No liabilities whatsoever shall attach to the Company's act of disclosure.
- 4. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
- 5. The results in Report apply only to the sample as received and do not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.
- 6. When a statement of conformity to a specification or standard is provided, the ILAC-G8 Guidance document (and/or IEC Guide 115 in the electrotechnical sector) will be adopted as a decision rule for the determination of conformity unless it is inherent in the requested specification or standard, or otherwise specified in the Report.
- 7. In the event of the improper use the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
- 8. Sample submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
- 9. The Company will not be liable for or accept responsibility for any loss or damage howsoever arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
- 10. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
- 11. Subject to the variable length of retention time for test data and report stored hereinto as to otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of this test report for a period of three years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after the retention period. Under no circumstances shall we be liable for damages of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.
- 12. Issuance records of the Report are available on the internet at www.stc.group. Further enquiry of validity or verification of the Reports should be addressed to the Company.