

EMC

ONSITE TEST REPORT

Test Report No : ED/2007/80088

Applicant : Ya De Li Technology Co., Ltd.
亞得力科技股份有限公司

Address of Applicant : 1F, No. 5, Alley 39, Lane 64, Sec. 1, Beisin Road, Sindian City,
Taipei County 231, Taiwan (R.O.C.)
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Equipment Under Test (EUT):

Name : Frequency Conversion Saving System of Compressor in the outside type
壓縮機變頻節能系統設備

Model No. : VR2220A、VR2220、VR3820A、VR3820、VR4420A、VR4420、
VR2215A、VR2215、VR3815A、VR3815、VR4415A、VR4415、
VR2210A、VR2210、VR3810A、VR3810、VR4410A、VR4410、
VR2275A、VR2275、VR3875A、VR3875、VR4475A、VR4475、
OP2220、OP3820、OP4420、OP2215、OP3815、OP4415、
OP2210、OP3810、OP4410、OP2275、OP3875、OP4475

Test(s) Required : SGS Onsite Test Standard: 2002
EN 61000-6-2: 2001, EN 61000-6-4: 2001

Date of Tests : August 31, 2007

Date of Issue : September 20, 2007

Test Result :

PASS

Remarks :

This report detail the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS EMC Services or testing done by SGS EMC Services in connection with distribution or use of the product described in this report must be approved by SGS EMC Services in writing.

Authorized Signatory:

SGS TAIWAN LTD.

Jason Lin

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1. General Information

1.1 Client Information

Applicant : Ya De Li Technology Co., Ltd.
亞得力科技股份有限公司

Address of Applicant: 1F, No. 5, Alley 39, Lane 64, Sec. 1, Beisin Road,
Sindian City, Taipei County 231, Taiwan (R.O.C.)
台北縣新店市北新路1段64巷39弄5號1樓

1.2 General Description of EUT

Name : Frequency Conversion Saving System of Compressor in the outside type
壓縮機變頻節能系統設備

Model No. : VR2220A、VR2220、VR3820A、VR3820、VR4420A、VR4420、
VR2215A、VR2215、VR3815A、VR3815、VR4415A、VR4415、
VR2210A、VR2210、VR3810A、VR3810、VR4410A、VR4410、
VR2275A、VR2275、VR3875A、VR3875、VR4475A、VR4475、
OP2220、OP3820、OP4420、OP2215、OP3815、OP4415、
OP2210、OP3810、OP4410、OP2275、OP3875、OP4475

1.3 Details of EUT (Worst Model)

Model No.:VR2220
Voltage: AC 380 V, 50/60 Hz
Current: 20 A max.
Power Cords: Unshielded

1.4 Description of Support Units

N/A

1.5 Standards Applicable for Testing

The SGS Onsite Test Standard refers to the following standards.

Standard	Test Applicable
CISPR 11 Industrial, Scientific and Medical Equipment	Yes
EN55022 Information Technology Equipment	No
EN61000-4-2 Electrostatic Discharge	Yes
EN61000-4-4 Electrical Fast Burst Transient	Yes
EN61000-4-6 Conducted Disturbances	Yes
EN61000-4-8 Magnetic Power Frequency	No
Mobile Phone Test	Yes

1.6 Deviation from the Standard

1.6.1 Emissions Testing

Conducted emissions measurements were performed using the Line Impedance Stabilization Network (LISN) defined in the basic standard CISPR 11.

1.6.2 Immunity Testing

The free field radiated immunity test called up by the test specification is normally performed within a high integrity screened room to prevent interference with broadcast services.

For this reason, the radiated immunity test should not be performed on-site where the protection of local broadcast services cannot be guaranteed.

As an acceptable on-site alternative to the radiated immunity test called up by EN61000-6-2 : 2001 and detailed in the Basic Standard EN61000-4-3 Bulk Current Injection tests were performed over the frequency range 1MHz to 400MHz.

To simulate as closely as possible the free field radiated immunity test which is called up by the test specification, the BCI test was to be applied to all cables which may be exposed to radio frequency fields.

Cables which were contained within fully enclosed cable trunking were to be omitted. Internal cable runs within control panels, wiring cabinets or behind metal panels were not tested.

Due to the large physical size and current drawn by the EUT's supply leads, the FBT interference pulses were applied to the supply cables via a flexible clamp instead of a 33nF blocking capacitor as per the basic standard. To compensate for the reduced coupling efficiency of the coupling clamp, the test levels quoted for direct injection were raised by a factor of two.

Radio Disturbance

CISPR 11: 1999

2.1 Test Results

CISPR 11 Class A Group 1 Equipment	Result
Conducted Emission	PASS
Radiated Emission	PASS

2.2 Frequency Range and Limits

2.2.1 Conducted Emission

Frequency Range:	0.15 to 30 MHz
Quasi-Peak Limit:	79 dB μ V 0.15 to 0.50 MHz
	73 dB μ V 0.50 to 30.0 MHz
Average Limit:	66 dB μ V 0.15 to 0.50 MHz
	60 dB μ V 0.50 to 30.0 MHz

2.2.2 Radiated Emissions

Frequency Range:	30 to 1000 MHz
Limit (3m Antenna to EUT distance):	50 dB μ V/m 30 to 230 MHz
	57 dB μ V/m 230 to 1000 MHz

2.3 Methods and Procedures

Standard	Date	Description
CISPR 11	1999	Limits and methods of measurement of radio interference characteristics of industrial, scientific and medical equipment.

2.4 Test Instruments

Conducted Emission Measurements

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
Hewlett Packard Spectrum Analyser	HP8594EM	3624A0203	Dec. 31, 2006
Rhode and Schwarz Voltage Probe	ESH2-Z3	299.7810.52	Dec. 01, 2006
Attenuator	25-A-MFN-06	9731	N/A
Hewlett Packard Transient Limiter	HP11947A	3107A02062	Apr. 02, 2007

Radiated Emission Measurements

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
Hewlett Packard Spectrum Analyser	HP8594EM	3624A0203	Dec. 31, 2006
Hewlett Packard Preamplifier	HP8447F	3113A06892	Apr. 02, 2007
Hewlett Packard Attenuator	HP8495A	N/A	Apr. 02, 2007
CHASE BILOG Antenna	CBL11966P	N/A	Jul. 20, 2006

2.5 Test Site

No.131-24, Sec.2 Keelung Road, Taipei, Taiwan, R.O.C.

2.6 Operating Mode of the EUT

The EUT was pre-tested in the following modes :

1. Main motor set at stand-by mode, and machine is operating.
2. Main motor set at low speed, and machine is operating.
3. Main motor set at high speed, and machine is operating.

The worst case in mode 3 was tested in compliance tests.

2.7 Climatic Environment

Temperature: 25 °C

Relative Humidity: 52 %

Atmospheric Pressure: 1003 mBar

2.8 Measurement Data

2.8.1 Conducted Emission

The EUT was pre-tested in the following modes, as detailed above. The emissions profile for each mode was very similar. Measurements were carried out on L1, L2 and L3 with respect to earth in high speed mode.

Tables 1 shows the worst case phase emissions for L1, L2 and L3.

In order to meet the Conducted Emission tests, we suggest manufacturer to add a 3-phase filter on the main input of EUT.

The following is the specifications of the Filter :

Manufacturer : SCHAFFNER Corp.

Model Number :FN3258-150-99

Specification : 3800 VAC /150A / 50-60 Hz.

Frequency (MHz)	Conductor	Quasi-Peak Reading (dB μ V)	Average Reading (dB μ V)	Quasi-Peak Limit (dB μ V)	Average Limit (dB μ V)
0.15	L1	58.10	53.40	79.00	66.00
0.29	L1	54.30	49.10	79.00	66.00
0.81	L1	49.50	44.30	73.00	60.00
2.28	L1	48.30	43.50	73.00	60.00
5.87	L1	47.70	42.40	73.00	60.00
7.94	L1	47.30	42.10	73.00	60.00
0.15	L2	62.10	57.30	79.00	66.00
0.31	L2	49.50	44.40	79.00	66.00
0.84	L2	48.70	43.50	73.00	60.00
1.29	L2	48.20	43.10	73.00	60.00
2.33	L2	45.30	40.20	73.00	60.00
6.13	L2	43.90	38.50	73.00	60.00
0.23	L3	52.40	47.30	79.00	66.00
0.28	L3	51.90	46.70	79.00	66.00
0.75	L3	49.30	44.10	73.00	60.00
1.52	L3	48.70	43.20	73.00	60.00
6.23	L3	46.30	41.40	73.00	60.00

Table 1 shows the worst case phase emissions for L1, L2, and L3

With the EUT operating in high speed mode, the highest average emission was 57.30 dB μ V at 0.15 MHz. This is 8.70 dB μ V below the class A group 1 average limits.

2.8.2 Radiated Emission

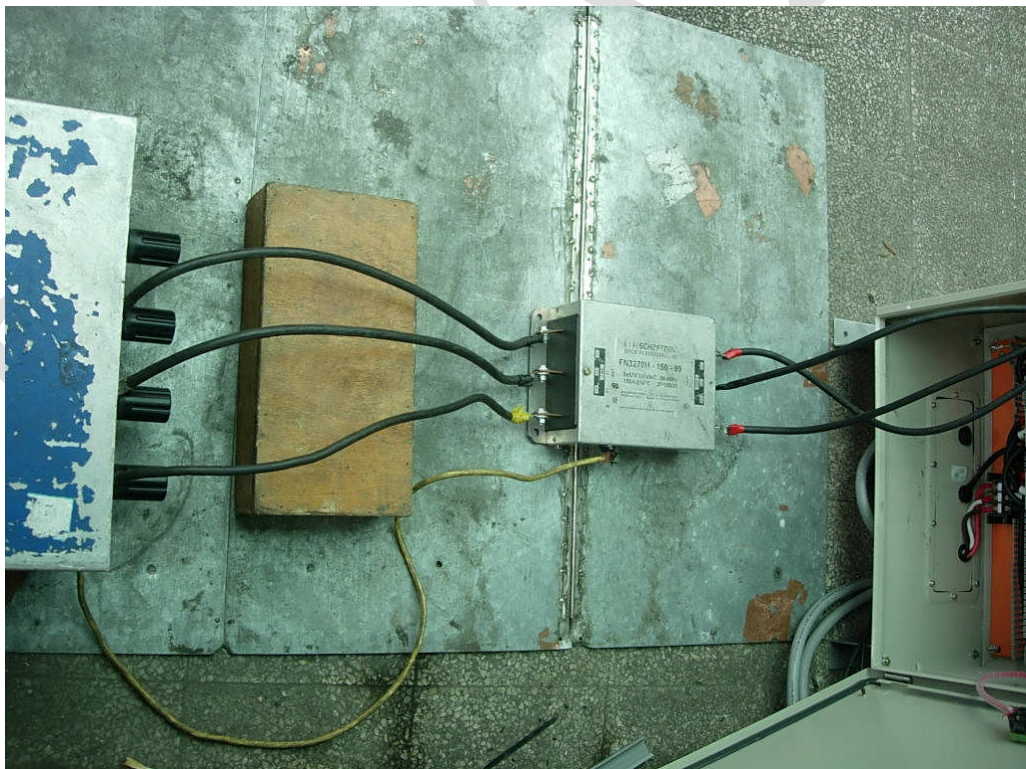
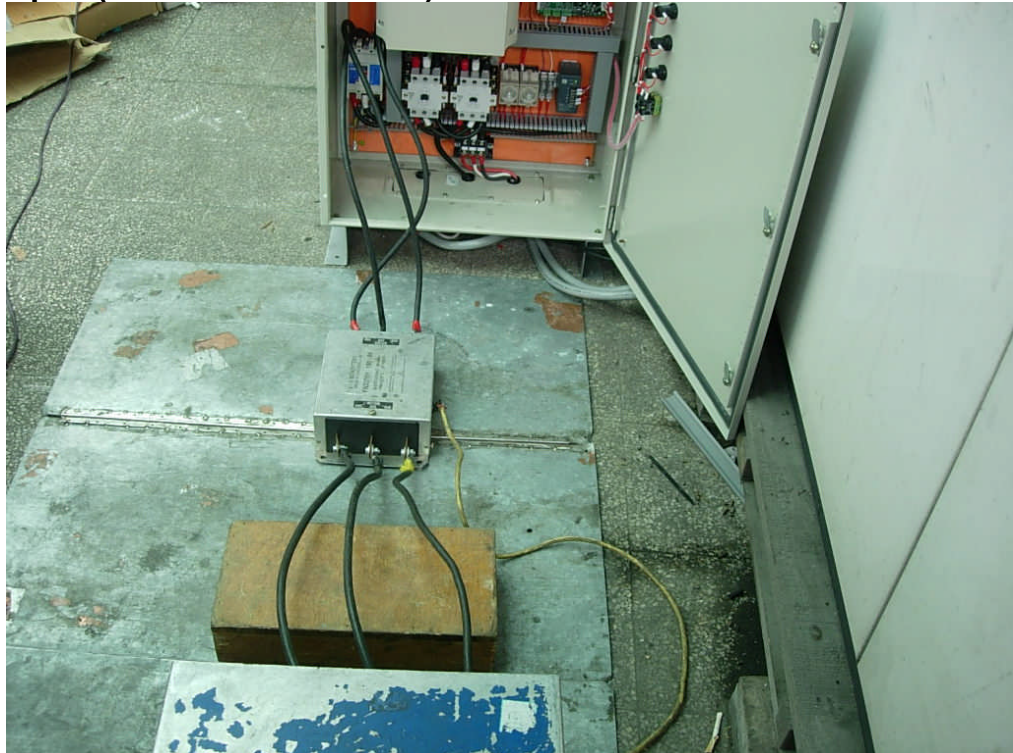
The EUT was pre-tested in the modes as detailed in the previous page. The emissions profile for each mode was very similar. Tests were carried out with the EUT operating in mode 3. Measurements were performed at 4 positions around the EUT with the antenna height set at 1.5 metres high. The antenna to EUT distance was 3 metres.

With the EUT operating in mode 3, there were no peak/quasi-peak emissions within 10dB μ V/m of the class A group 1, 3m limit.

With the EUT operating in mode 4, position 4 / Antenna Horizontal was the worst case emission position / antenna orientation. The highest quasi-peak emission was 36.50 dB μ V/m at 197.50 MHz. This is 13.50 dB μ V/m below the class A, group 1 limit.

Frequency (MHz)	Antenna Position	Antenna Orientation	Quasi-Peak Reading (dB μ V/m)	Quasi-Peak Limit (dB μ V/m)
34.10	1.00	Horizontal	33.20	50.00
35.60	1.00	Horizontal	35.20	50.00
235.20	1.00	Horizontal	34.10	57.00
422.20	1.00	Horizontal	34.60	57.00
40.50	1.00	Vertical	33.30	50.00
84.60	1.00	Vertical	36.20	50.00
253.70	1.00	Vertical	35.40	57.00
316.50	1.00	Vertical	33.70	57.00
39.50	2.00	Horizontal	34.30	50.00
67.30	2.00	Horizontal	35.50	50.00
238.50	2.00	Horizontal	36.20	57.00
356.20	2.00	Horizontal	36.80	57.00
39.40	2.00	Vertical	35.50	50.00
79.30	2.00	Vertical	32.30	50.00
246.10	2.00	Vertical	33.80	57.00
311.70	2.00	Vertical	38.30	57.00
66.10	3.00	Horizontal	31.50	50.00
79.20	3.00	Horizontal	34.50	50.00
241.70	3.00	Horizontal	34.10	57.00
394.20	3.00	Horizontal	36.60	57.00
36.30	3.00	Vertical	35.90	50.00
65.40	3.00	Vertical	32.10	50.00
205.70	3.00	Vertical	33.40	50.00
401.30	3.00	Vertical	35.10	57.00
39.70	4.00	Horizontal	36.20	50.00
197.50	4.00	Horizontal	36.50	50.00
274.80	4.00	Horizontal	34.20	57.00
299.10	4.00	Horizontal	33.50	57.00
46.20	4.00	Vertical	34.70	50.00
65.50	4.00	Vertical	32.30	50.00
268.70	4.00	Vertical	34.10	57.00
386.10	4.00	Vertical	33.50	57.00

2.9 Photographs (Conducted Emission)



Photographs (Radiated Emission)



IMMUNITY

EN61000-4-2 : 1995+A1:1998+A2:2001

EN61000-4-4 : 1995+A1:2001

EN61000-4-6 : 1996+A1:2001

Mobile Phone Test: 2002

3.1 Test Results

EN61000-4-2: 1995+A1:1998+A2:2001	PASS
EN61000-4-4: 1995+A1:2001	PASS
EN61000-4-6: 1996+A1:2001	PASS
Mobile Phone Test: 2002	PASS

3.2 Performance Criteria Description

Criterion A - The apparatus shall continue to operate as intended. 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.

3.3 Test of EN61000-4-2

3.3.1 Methods and Procedures

Standard	Date	Description
EN61000-4-2	1995+A1:1998+A2:2001	Electrostatic Discharge (ESD)

3.3.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
NOISEKEN	PSED 1600	H603053	Nov. 29, 2006

3.3.3 Test Site

No.131-24, Sec.2 Keelung Road, Taipei, Taiwan, R.O.C.

3.3.4 Operating Mode of the EUT

The EUT was pre-tested in the following modes :

1. Main motor set at stand-by mode, and machine is operating.
2. Main motor set at low speed, and machine is operating.
3. Main motor set at high speed, and machine is operating.

The worst case in mode 3 was tested in compliance tests.

3.3.5 Monitoring of the EUT

1. To monitor the LEDs on Control Box are in normal operation.
2. To monitor all functions of the machine are running properly.
3. To monitor the machine if it has any degradation in control system.
4. To monitor the control panel display of control box.
5. To monitor main motor are running properly.
6. To monitor if the machine has any malfunction.

3.3.6 Climatic Environment

Temperature: 25 °C (15 TO 35 °C)

Relative Humidity: 52 % (30 TO 60 %)

Atmospheric Pressure: 1004 mBar (860 TO 1060 mBar)

3.3.7 Results of Electrostatic Discharge Test (ESD)

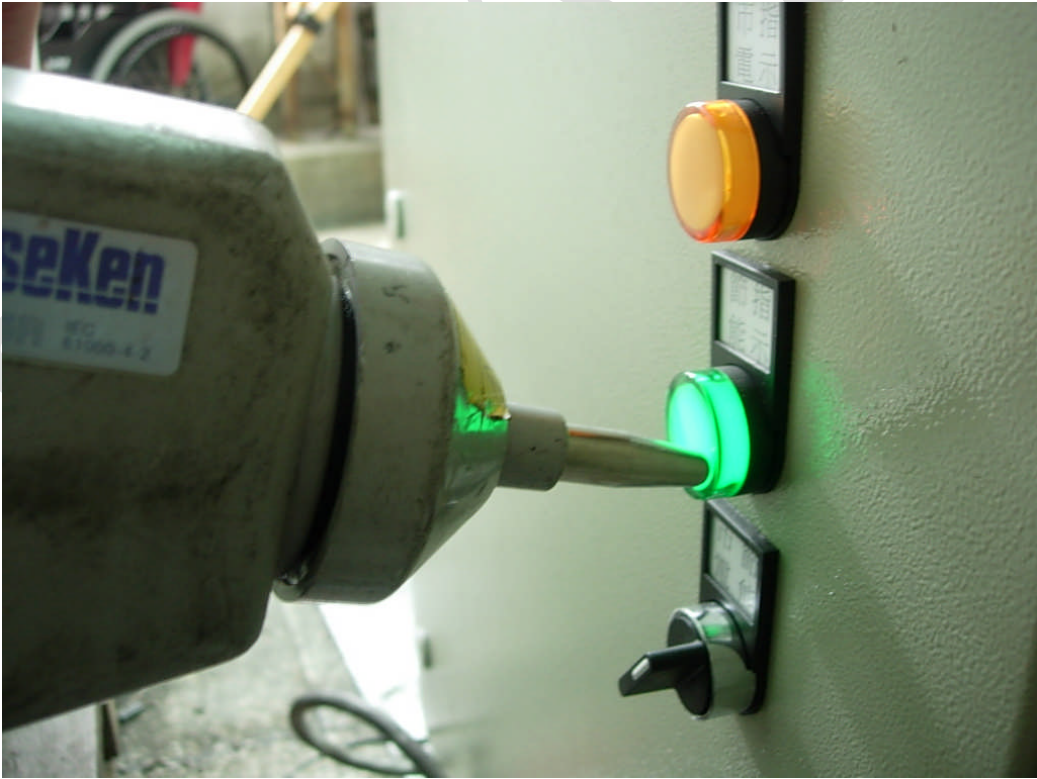
Basic Standard : EN61000-4-2: 1995
Discharge Impedance : 330 Ω / 150 pF
Discharge Voltage : Air Discharge - \pm 8 kV
 Contact Discharge - \pm 4 kV (Direct)
Polarity : Positive/Negative
Number of Discharge : Minimum 10 times at each test point
Discharge Mode : Single Discharge
Discharge Period : 1 second minimum

Results of Electrostatic Discharge Test (Continued)

Periphery of EUT/ Test Points	Discharge Level (\pm)	Discharge Type (Contact/Air)	Observations
All screws on main control box	4	Contact	Note 1
Metal Surface of the machine	4	Contact	Note 1
Junction of the machine	4	Contact	Note 1
Screw of melt temperature	4	Contact	Note 1
LEDs on main control box	8	Air	Note 1
Control buttons	8	Air	Note 1
Push Buttons on main control box	8	Air	Note 1
Control panel on main control box	8	Air	Note 1
LEDs on all control panels	8	Air	Note 1
Surface of the machine	8	Air	Note 1
Junction of the machine	8	Air	Note 1
Power switch	8	Air	Note 1

Note 1: No degradation in the performance of the EUT was observed.

3.3.8 Photographs



3.4 Test of EN61000-4-4**3.4.1 Methods and Procedures**

Standard	Date	Description
EN61000-4-4	1995+A1: 2001	Electrical fast transient/burst requirements

3.4.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
Haefely-Trench EFT/Burst Tester	PEFT Junior	583333-30	Nov. 13, 2006

3.4.3 Test Site

No.131-24, Sec.2 Keelung Road, Taipei, Taiwan, R.O.C.

3.4.4 Operating Mode of the EUT

The EUT was pre-tested in the following modes :

1. Main motor set at stand-by mode, and machine is operating.
2. Main motor set at low speed, and machine is operating.
3. Main motor set at high speed, and machine is operating.

The worst case in mode 3 was tested in compliance tests.

3.4.5 Monitoring of the EUT

1. To monitor the LEDs on Control Box are in normal operation.
2. To monitor all functions of the machine are running properly.
3. To monitor the machine if it has any degradation in control system.
4. To monitor the control panel display of control box.
5. To monitor main motor are running properly.
6. To monitor if the machine has any malfunction.

3.4.6 Climatic Environment

Temperature: 30 °C (15 TO 35 °C)
 Relative Humidity: 52 % (25 TO 75 %)
 Atmospheric Pressure: 1008 mBar (860 TO 1060 mBar)
 * Deviation from standard.

3.4.7 Results of Electrical Fast Transient

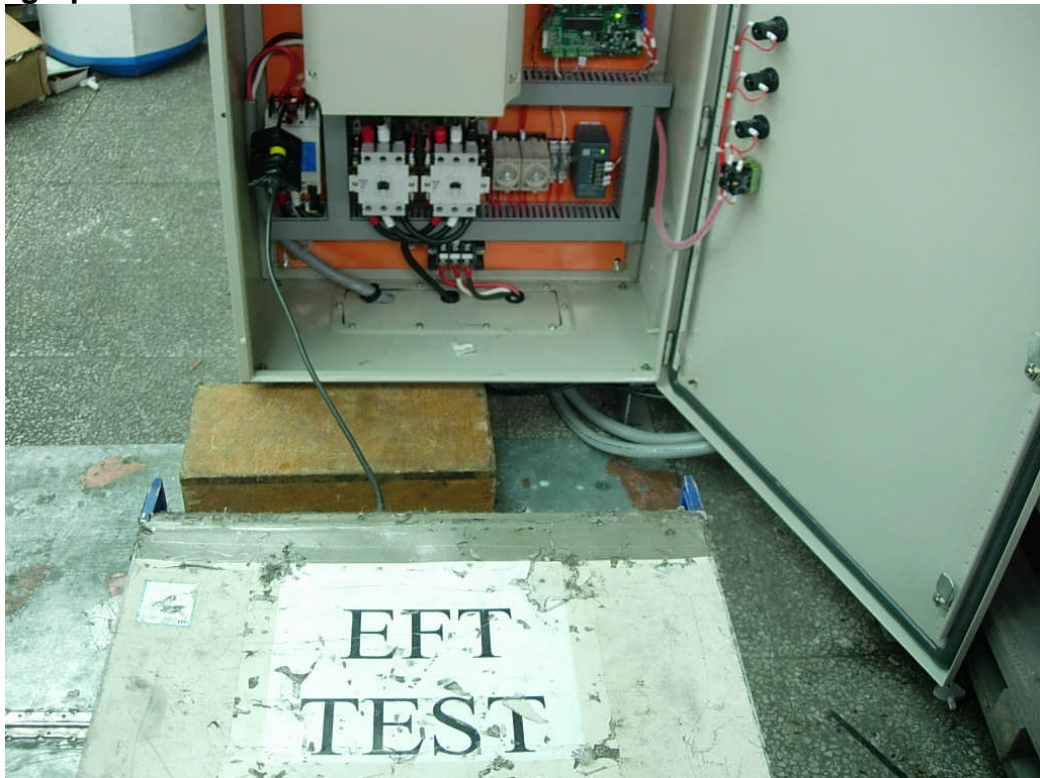
Basic Standard: EN61000-4-4: 1995
 Impulse Frequency: 5 kHz
 Tr/Tn: 5/50 ns
 Burst Duration: 15 ms
 Burst Period: 300 ms
 Test Duration: 1 minute
 Rest: 30 second

3.4.7 Results of Electrical Fast Transient (Continued)

Cable Description	Cable Type	Coupling (Direct/Clamp)	Test Level (± kV)	Observations
AC 380V Main power (L1)	Unshielded	Direct	2	Note 1
AC380V Main power (L2)	Unshielded	Direct	2	Note 1
AC380V Main power (L3)	Unshielded	Direct	2	Note 1
All external cables exceed 3 m	Unshielded	Clamp	2	Note 1

Note 1: No degradation in the performance of the EUT was observed.

3.4.8 Photographs



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3.5 Test of EN61000-4-6**3.5.1 Methods and Procedures**

Standard	Date	Description
EN61000-4-6	1996+A1: 2001	Immunity to conducted disturbances, induced by radio-frequency fields.

3.5.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
Hewlett Packard Spectrum Analyser	HP8594EM	3624A0203	Dec. 31, 2006
FCC Current Injection Probe	F-140A	135	Apr. 02, 2007
FCC Monitoring Probe	F-52	23	Apr. 02, 2007
Kalmus Power Amplifier	747LC	7608A-1	Apr. 03, 2007
Rhode & Schwarz Signal Generator	SMY01	844146/016	Nov. 06, 2006
Calibration Jig	FCC-BCICF-2	120	-
50 Ω Terminator	50T-054	N/A	Apr. 02, 2007
30 dB Attenuator	25-A-MFN-30	9724	N/A

3.5.3 Test Site

No.131-24, Sec.2 Keelung Road, Taipei, Taiwan, R.O.C.

3.5.4 Operating Mode of the EUT

The EUT was pre-tested in the following modes:

1. Main motor set at stand-by mode, and machine is operating.
2. Main motor set at low speed, and machine is operating.
3. Main motor set at high speed, and machine is operating.

The worst case in mode 3 was tested in compliance tests.

3.5.5 Monitoring of the EUT

1. To monitor the LEDs on Control Box are in normal operation.
2. To monitor all functions of the machine are running properly.
3. To monitor the machine if it has any degradation in control system.
4. To monitor the control panel display of control box.
5. To monitor main motor are running properly.
6. To monitor if the machine has any malfunction.

3.5.6 Climatic Environment

Temperature: 25 °C
 Relative Humidity: 56 %
 Atmospheric Pressure: 1008 mBar

3.5.7 Results of Immunity to Conducted Disturbances (CS)

Basic Standard: EN61000-4-6: 1996
 Frequency range: 0.15 MHz - 400 MHz
 Test Voltage: 10 V rms
 Modulation: 80% Amplitude Modulation
 Frequency step: 1% of the fundamental
 Dwell time: 2 seconds

Results of Conducted Disturbances (Continued)

Cable Description	Cable Type	Test Voltage (V rms)	Observations
AC 380V main power	Unshielded	10	Note 1
External Control Lines	Unshielded	10	Note 1
External Signal Lines	Unshielded	10	Note 1

Note 1: No degradation in the performance of the EUT was observed.

3.5.8 Photographs



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3.6 Test of Mobile Phone Test**3.6.1 Methods and Procedures**

Standard	Date	Description
SGS Onsite Test Standard	2002	Mobile Phone test

3.6.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
Sony Ericsson	K608i	35194210036 298420	N/A

3.6.3 Test Site

No.131-24, Sec.2 Keelung Road, Taipei, Taiwan, R.O.C.

3.6.4 Operating Mode of the EUT

The EUT was pre-tested in the following modes :

1. Main motor set at stand-by mode, and machine is operating.
2. Main motor set at low speed, and machine is operating.
3. Main motor set at high speed, and machine is operating.

The worst case in mode 3 was tested in compliance tests.

3.6.5 Monitoring of the EUT

1. To monitor the LEDs on Control Box are in normal operation.
2. To monitor all functions of the machine are running properly.
3. To monitor the machine if it has any degradation in control system.
4. To monitor the control panel display of control box.
5. To monitor main motor are running properly.
6. To monitor if the machine has any malfunction.

3.6.6 Climatic Environment

Temperature: 30 °C

Relative Humidity: 51 %

Atmospheric Pressure: 1003 mBar

3.6.7 Results of Mobile Phone Test

Periphery of EUT	Distance from EUT (0.1m/Inside)	Mobile Phone Orientation	Observations
Control panel of Main Control box	0.1m	Horizontal Vertical	Note 1
LEDs of Main Control box	0.1m	Horizontal Vertical	Note 1

Note 1: No degradation in the performance of the EUT was observed.

3.6.8 Photographs

