

Test Report



(Declaration of Conformity)

for

Electromagnetic Interference

of

E.U.T.: ROBOT 2000 Remote Controller

Trade Name: STL

Model Number: SI583R

Prepared for

STL Electronics Limited

16D, CDW Building, 388 Castle Peak Road,

Tsuen Wan, Hong Kong

TEL: +852 2499 8911

FAX: +852 2413 6035

Prepared by

Interocean EMC Technology Corp.

No.5-2, Lin 1, Tin-Fu Tsun, Lin-Kou Hsiang,

Taipei County, Taiwan, R.O.C.

TEL. : +886 2 2600 6861

FAX. : +886 2 2600 6859

NVLAP LAB. Code: 200458-0

Caution :

1. This report must not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.
2. No Single part of this report may be reproduced without written permission from Interocean EMC Technology Corp.
3. This test data is traceable to National or International Standards.

Table of Contents

1	General Information	4
1.1	Description of Equipment Under Test	4
1.2	Tested Supporting System Detail	5
	Do not Support system.	5
1.3	Test Facility	6
2	Power Line Conducted Emission Measurement	7
2.1	Instrument	7
2.2	Block Diagram of Test Configuration	7
2.3	Conducted Limit	8
2.4	Instrument configuration	8
2.5	Measured Mode	8
2.6	Configuration of Measurement	8
2.7	Configuration of EUT	8
2.8	Test Result	8
3	Radiated Emission Measurement	12
3.1	Instrument	12
3.2	Block Diagram of Test Configuration	12
3.3	Radiated Limit	13
3.4	Instrument configuration	13
3.5	Measured Mode	13
3.6	Configuration of Measurement	13
3.7	Configuration of EUT	13
3.8	Test Result	14
4	Frequency Measurements	17
4.1	Instrument	17
4.2	Measurement Operating Frequency	17
4.3	Measurement Frequency Stability vs. Temperature	17
5	Occupied Bandwidth Measurements	18
5.1	Instrument	18
5.2	Instrument configuration	18
5.3	Result	18
6	Photographs of Measurement	19
6.1	Power Line Conducted Emission Measurement	19
6.2	Radiated Emission Measurement	20
7	Photographs of EUT	22

Certification of Compliance

Applicant : STL Electronics Limited
Manufacturer : STL Electronics Limited
EUT Description : ROBOT 2000 Remote Controller
Model No. : SI583R
Serial No. : N/A
Tested Power Supply : 15Vdc
Date of Final Test : Dec. 22, 2000
Measurement Procedures and Standards Used :

- ☒ CFR 47, Part 15
☒ ANSI C63.4: 1992

The device described above was tested by Interocean EMC Technology Corporation to determine the maximum emission levels emanated from the device and severity levels of the device endure and its performance criterion. The measurement results are contained in this test report and Interocean EMC Technology Corp assumes full responsibility for the accuracy and completeness of these measurements. This report shows the EUT is technically compliant with the Part 15 subpart C and ANSI C63.4 official requirements. This report applies to the above sample only and shall not be reproduced in part without written approval of Interocean EMC Technology Corporation.

Report Issued: 2000.12.30

Test Engineer: Jacky Yeh 1230 2000
Jacky Yeh

Checked: Tomy Hu
Tomy Hu

Approved: Kent J.K. Hsu
Kent J.K. Hsu

1 General Information

1.1 Description of Equipment Under Test

Equipment Under Test : ROBOT 2000 Remote Controller
Model Number : SI583R
Serial Number : N/A
Type of Sample Tested : ☒ Proto-type, ☐ Pre-production, ☐ Mass Production
Applicant : STL Electronics Limited
 16D, CDW Building, 388 Castle Peak Road, Tsuen Wan, Hong Kong
Manufacturer : STL Electronics Limited
 Block 15, Huang Gong Industrial Area, Huang Gong, Fu Tian, Shenzhen,
 P.R.C.
Power Supply : AC/DC Adapter
 M/N: MEC-B5678
 Input: 120Vac, 100mA, 60Hz
 Output: 15Vdc, 700mA
 Cable: Non-Shielded, Un-detachable, 1.8m
Data Cable : N/A
Date of Receipt of Sample : Nov. 07, 2000
Date of Test : Nov. 10 ~ Dec. 22, 2000
Description of E.U.T. : The EUT is ROBOT remote controller for ROBOT 2000. The power system is used rechargeable battery.
 This wireless system is multi-functional. It provides only with control signal.
 There are three channel for communication:
 1) 900 MHz for data transmission.

There are 3 channel from Remote Controller:

	Remote Controller
Channel 1	925.50
Channel 2	926.25
Channel 3	927.00

1.2 Tested Supporting System Detail

Do not Support system.

1.3 Test Facility

Site Description : ☒ OATS 1 ☐ OATS 2

Name of Firm : Interocean EMC Technology Corp.

Site Location : No.5-2, Lin 1, Tin-Fu Tsun, Lin-Kou Hsiang,
Taipei County, Taiwan, R.O.C.

Site Filing : ~~EE~~ Federal Communication Commissions – USA
Registration No.: 96399
~~EE~~ Voluntary Control Council for Interference by Information Technology
Equipment (VCCI) – Japan
Registration No. (Conducted Room): C-1094
Registration No. (OATS 1): R-1040
Registration No. (OATS 2): R-1041

Site Accreditation : ~~EE~~ Bureau of Standards and Metrology and Inspection (BSMI) – Taiwan, R.O.C.
Accreditation No.:
SL2-IN-E-0026 for CNS13438 / CISPR22
SL2-A1-E-0026 for CNS13783-1 / CISPR14
~~EE~~ National Voluntary Laboratory Accreditation Program (NVLAP) - USA
Lab Code: 200458-0
~~EE~~ NEMKO
ELA 181

1.3.1 Test Methodology

Both conducted and Radiated Emission Measurement was performed according to the procedures in ANSI C63.4-1992 and Part 15 subpart C. Radiated Emission Measurement was performed at 3 meters distance from antenna to EUT.

1.3.2 Measurement Uncertainty

The uncertainty is calculated in accordance with NAMAS document NIS 81.

Conducted Uncertainty $U_c = \pm 2.96\text{dB}$.

Radiated Uncertainty $U_c = \pm 3.67\text{dB}$.

2 Power Line Conducted Emission Measurement

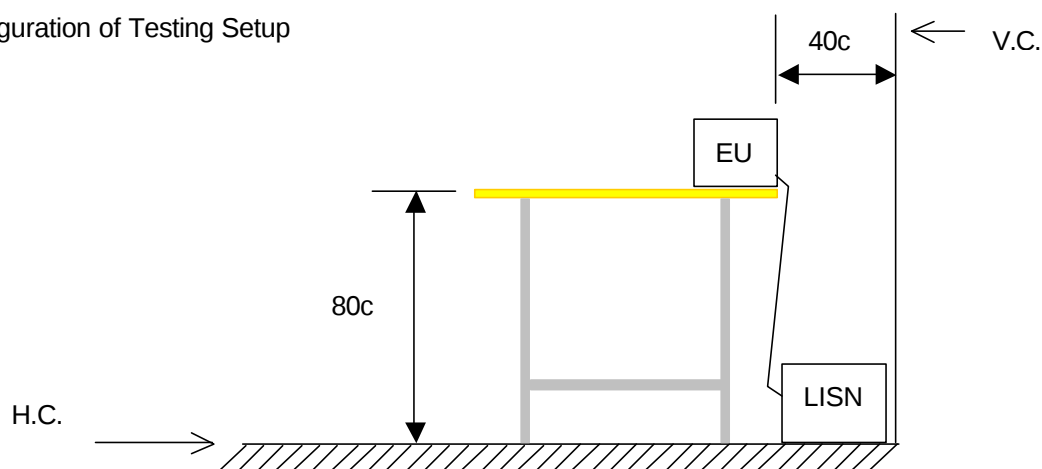
2.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Last Calibration
EMI Test Receiver	Rohde & Schwarz	ESCS 30	830245/027	2000/07/26
L.I.S.N.	Schwarzbeck	NNLK8121	8121417	2000/09/08
L.I.S.N.	Rohde & Schwarz	ESH3-Z5	829996/016	2000/06/16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	830836/026	2000/07/29
RF Cable	IETC	CBL04	N/A	2000/10/11

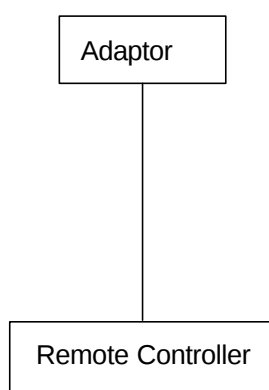
Note: All instrument upon which need to calibrated are with calibration period of 1 year.

2.2 Block Diagram of Test Configuration

Configuration of Testing Setup



Configuration of EUT Setup



2.3 Conducted Limit

☒ FCC Part 15

Frequency (MHz)	☒ Class B	
	uV	dBuV
0.45 ~ 1.705	250	48
1.705 ~ 30	250	48

2.4 Instrument configuration

2.4.1 The EMI test receiver frequency range set from 450 KHz to 30 MHz.

2.4.2 The EMI test receiver bandwidth set at 9kHz.

2.4.3 The EMI test receiver detector set as Quasi-Peak (Q.P.).

2.5 Measured Mode

2.5.1 The test mode for preliminary test as following:

Mode 1: Remote Controller

2.5.2 Selected the worst case mode when after preliminary test for final test, the mode as following:

Mode 1: Remote Controller

2.6 Configuration of Measurement

2.6.1 The EUT was place on a non-conductive table whose total height equaled 80cm and vertical conducting plane located 40cm to the rear of the EUT.

2.6.2 The EUT was connected to the main power through Line Impedance Stabilization Networks (LISN). This setup provided a 50ohm/50?H coupling impedance for the measuring equipment. The auxiliary equipment was also connected to the main power through a LISN that provided a 50ohm/50?H coupling impedance with 50ohm termination. (Refer to the block diagram of the test setup and photographs.)

2.6.3 The conducted disturbance was measured between the phase lead and the reference ground, and between the neutral lead and reference ground. The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.

2.6.4 The identification of the frequency of highest disturbance with respect to the limit was found by investigating disturbances at a number of significant frequencies. The probable frequency of maximum disturbance had been found and that the associated cable and EUT configuration and mode of operation had been identified.

2.7 Configuration of EUT

2.7.1 Setup the EUT and simulators as shown section 2.2.

2.7.2 Turn on the power of all equipment.

2.7.3 Measured the Line phase and record value.

2.7.4 Changed into Neutral phase and record value.

2.8 Test Result

PASS

The final tests data as shown on following page.

Date of Tested	: Dec. 11, 2000	Power Line	: Line
Temperature	: 19	Humidity	: 71%
Tested Mode	: Remote Controller		

[illegible]

1. All readings are Quasi-Peak values.
2. Factor = Insertion Loss + Cable Loss
3. “*” Means emission level un-detectable.
4. “--” Means do not need detect.

Date of Tested	: Dec. 11, 2000	Power Line	: Neutral
Temperature	: 19	Humidity	: 71%
Tested Mode	: Remote Controller		

[illegible]

1. All readings are Quasi-Peak values.
2. Factor = Insertion Loss + Cable Loss
3. “*” Means emission level un-detectable.
4. “--“ Means do not need detect.

3 Radiated Emission Measurement

3.1 Instrument

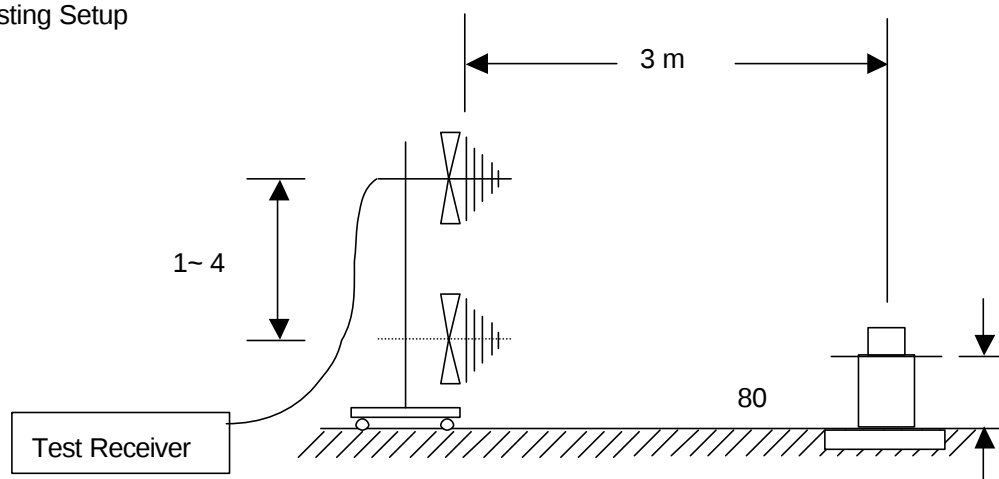
OATS 1

Instrument	Manufacturer	Model	Serial No.	Last Calibration
EMI Test Receiver	Rohde & Schwarz	ESI 07	830154/002	2000/07/28
Bi-Log Antenna	Schaffner	CBL6112B	2610	2000/06/28
Pre-Amplifier	Schaffner	CPA9231A	3351	2000/11/13
RF Cable	IETC	CBL01	N/A	2000/10/11
Horn Antenna	Com-Power	AH-118	10081	2000/05/15
Pre-Amplifier	Agilent Technologies	8449B	3008A01434	2000/06/19
RF Cable	Insulated Wire	NPS-2251-7880-NPR	CBL06	2000/10/19

Note: All instrument upon which need to calibrated are with calibration period of 1 year.

3.2 Block Diagram of Test Configuration

Configuration of Testing Setup



3.3 Radiated Limit

☒ FCC Part 15 (30~1000 MHz)

Frequency (MHz)	☐ Class A (10m)		☒ Class B (3m)	
	Field Strength (uV/m)	Quasi-Peak (dBuV/m)	Field Strength (uV/m)	Quasi-Peak (dBuV/m)
30 ~ 88	90	39.08	100	40.00
88 ~ 216	150	43.52	150	43.52
216 ~ 960	210	46.44	200	46.02
960 above	300	49.54	500	53.98

☒ FCC Part 15 (Section 15.249)

Frequency (MHz)	Fundamental		Harmonics	
	mv/m	dBuV/m	uV/m	dBuV/m
902~928	50	93.98	500	53.98
2400~2483.5	50	93.98	500	53.98

3.4 Instrument configuration

3.4.1 The EMI test receiver frequency range set from 30 MHz to 1000 MHz.

3.4.2 The EMI test receiver bandwidth set at 120 kHz.

3.4.3 The EMI test receiver detector set as Quasi-Peak (Q.P.).

3.4.4 The Spectrum frequency range set to fundamental and harmonics.

3.5 Measured Mode

3.5.1 The test mode for preliminary test as following:

Mode 1: Remote controller

3.5.2 Selected the worst case mode when after preliminary test for final test, the mode as following:

Mode 1: Remote controller

3.6 Configuration of Measurement

3.6.1 The EUT was place on a non-conductive table whose total height equaled 80cm. The turntable can rotate 360 degree to determine the position of the maximum emission level.

3.6.2 The EUT was set 10 meters away from the receiving antenna that was mounted on a non-conductive mast. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level.

3.6.3 The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.

3.6.4 The identification of the frequency of highest emission with respect to the limit was found by investigating emissions at a number of significant frequencies. The probable frequency of maximum emission had been found and that the associated cable and EUT configuration and mode of operation had been identified.

3.7 Configuration of EUT

- 3.7.1 Setup the EUT and simulators as shown section 3.2.
- 3.7.2 Turn on the power of all equipment.
- 3.7.3 Measured the horizontal polarization and record the value.
- 3.7.4 Changed into vertical polarization and record the value.

3.8 Test Result

PASS.

The final tests data as shown on following page.

Date of Tested	: Dec. 18, 2000	Polarization	: Horizontal
Temperature	: 22	Humidity	: 68%
Tested Mode	: Remote Controller		

[illegible]

Remark :

1. All readings are Quasi-Peak values.
2. “*” Means Average values.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier

Date of Tested	: Dec. 18, 2000	Polarization	: Vertical
Temperature	: 22	Humidity	: 68%
Tested Mode	: Remote Controller		

[illegible]

Remark :

1. All readings are Quasi-Peak values.
2. “*” Means Average values.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier

4 Frequency Measurements

4.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Last Calibration
EMI Test Receiver	Rohde & Schwarz	ESI 07	830154/002	2000/07/28
Bi-Log Antenna	Schaffner	CBL6112B	2610	2000/06/28
Pre-Amplifier	Schaffner	CPA9231A	3351	2000/11/13
RF Cable	IETC	CBL03	CBL03	2000/11/10
Horn Antenna	Com-Power	AH-118	10081	2000/05/15
Pre-Amplifier	Agilent Technologies	8449B	3008A01434	2000/06/19
RF Cable	Insulated Wire	NPS-2251-3940-NPS	CBL08	2000/10/19
RF Cable	Insulated Wire	NPS-2251-1180-NPR	CBL09	2000/10/19
Temperature Chamber	KATO	SSE47BLA	N/A	2000/08/23

Note: All instrument upon which need to calibrated are with calibration period of 1 year.

4.2 Measurement Operating Frequency

- 4.2.1 Test Condition: Temperature: 21 °C.
- 4.2.2 Supplied the EUT with fully charged battery.
- 4.2.3 Turn the EUT on and measure the EUT operating frequency at the start-up, and two, five, and ten minutes after startup.
- 4.2.4 Result as Remote Controller:

Timing	900 MHz Channel
Start-Up	926.25037
2 min.	926.25027
5 min.	926.25002
10 min.	926.24990

4.3 Measurement Frequency Stability vs. Temperature

- 4.3.1 Set the environmental temperature test chamber to temperature of 20 °C.
- 4.3.2 Supplied the EUT with fully charged battery.
- 4.3.3 Turn the environmental temperature test chamber on and wait the temperature of the chamber to stabilize.
- 4.3.4 While maintaining a constant temperature inside the environmental chamber, turn the EUT on and measure the EUT operating frequency at the start-up, and two, five, and ten minutes after startup.
- 4.3.5 Result as Remote Controller:

Timing	900 MHz Channel
Start-Up	926.24965
2 min.	926.24965
5 min.	926.24952
10 min.	926.24940

5 Occupied Bandwidth Measurements

5.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Last Calibration
EMI Test Receiver	Rohde & Schwarz	ESI 07	830154/002	2000/07/28
Bi-Log Antenna	Schaffner	CBL6112B	2610	2000/06/28
Pre-Amplifier	Schaffner	CPA9231A	3351	2000/11/13
RF Cable	IETC	CBL03	CBL03	2000/11/10
Horn Antenna	Com-Power	AH-118	10081	2000/05/15
Pre-Amplifier	Agilent Technologies	8449B	3008A01434	2000/06/19
RF Cable	Insulated Wire	NPS-2251-3940-NPS	CBL08	2000/10/19
RF Cable	Insulated Wire	NPS-2251-1180-NPR	CBL09	2000/10/19

Note: All instrument upon which need to calibrated are with calibration period of 1 year.

5.2 Instrument configuration

5.2.1 The EMI test receiver bandwidth set at 120 kHz.

5.3 Result

5.3.1 Remote Controller 900 MHz Channel

Frequency: 926.25 MHz

