ETSI EN 300 328 V1.6.1: 2004

TEST REPORT

For

108M Wireless Router

Model: MR0-WR641G / MR0-WR642G

Trade Name: TP-LINK

Prepared for

TP-LINK TECHNOLOGIES CO., LTD.

BUILDING 7, SECTION 2, HONGHUALING INDUSTRIAL PARK, XILI, NANSHAN DISTRICT, SHENZHEN, P. R. C.

Prepared by

COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.
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LAB CODE:200577-0

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1. TEST RESULT CERTIFICATION

Applicant:	TP-LINK TECHNOLOGIES CO., LTD. BUILDING 7, SECTION 2, HONGHUALING INDUSTRIAL PARK, XILI, NANSHAN DISTRICT, SHENZHEN, P. R. C.
Equipment Under Test:	108M Wireless Router
Trade Name:	TP-LINK
Model:	MR0-WR641G / MR0-WR642G
Date of Test:	November 15-December 06, 2006

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
ETSI EN 300 328 V1.6.1: 2004	No non-compliance noted

The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements set forth in ETSI EN 300 328. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by: ***Tested By:*** **Henry Ding**

Clinton Kao/ Manager
COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.

***Reviewed By*:**
Eric Wong / Assistant manager
COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.

2. EUT DESCRIPTION

Product	108M Wireless Router
Trade Name	TP-LINK
Model Number	MR0-WR641G / MR0-WR642G
Model Discrepancy	MR0-WR641G are fixed antenna, MR0-WR642G are detachable antenna. Others are the same each other.
Power Supply	Powered by the adaptor
Frequency Range	IEEE 802.11b: 2400 ~ 2483.5 MHz IEEE 802.11g: 2400 ~ 2483.5 MHz
Transmit Power (mean EIRP)	802.11b mode: 18.76dBm 802.11g mode: 19.50 dBm
Modulation Technique	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) + OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
Number of Channels	IEEE 802.11b/g: 13 Channels
Channels Spacing	IEEE 802.11b/g: 5MHz
Antenna Specification	RF Antenna Assembly Gain: 5 dBi (Max)
Temperature Range	0°C ~ +55°C

Remark: *for more details, please refer to the User's manual of the EUT.*

3. TEST METHODOLOGY

3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

ETSI EN 300 328 – Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2.4GHz ISM band and using spread spectrum modulation techniques: Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive.

3.2 DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE802.11b:
Channel Low and Channel High with 11 Mbps data rate were chosen for full testing.

IEEE802.11g:
Channel Low and Channel High with 6Mbps data rate were chosen for full testing.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: *Each piece of equipment is scheduled for calibration once a year.*

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/08/2007
EMI Test Receiver	R&S	ESCI	1166.5950 03	01/13/2007
Pre-Amplifier	MITEQ	N/A	AFS42-00102650-42-10P-42	02/14/2007
Bilog Antenna	SCHWAZBECK	CBL6143	5082	06/09/2007
Turn Table	EMCO	2081-1.21	N/A	N.C.R
Antenna Tower	CT	N/A	N/A	N.C.R
Controller	CT	N/A	N/A	N.C.R
RF Comm. Test set	HP	8920B	US36142090	N.C.R
Site NSA	C&C	N/A	N/A	06/09/2007
Horn Antenna	TRC	N/A	N/A	03/04/2007

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 5, Jinao industrial park, No.35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

5.3 LABORATORY ACCREDITATIONS AND LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200577-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No	Equipment	Model	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1.	Notebook	PP05L	CN-04Y212-48643-38L-0491	E2K24CLNS	DELL	N/A	Unshielded 1.8m
2.	AC/AC Adaptor	G090080A34	N/A	DoC	TEN PAO	N/A	Unshielded 1.8m
3.	AC/AC Adaptor	U090080A	N/A	DoC	TEN PAO	N/A	Unshielded 1.8m
4.	AC/AC Adaptor	A41090080-C5	N/A	DoC	LEADER	N/A	Unshielded 1.8m

Remark:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

7. ETSI EN 300 328 REQUIREMENTS

7.1 EQUIVALENT ISOTROPIC RADIATED POWER

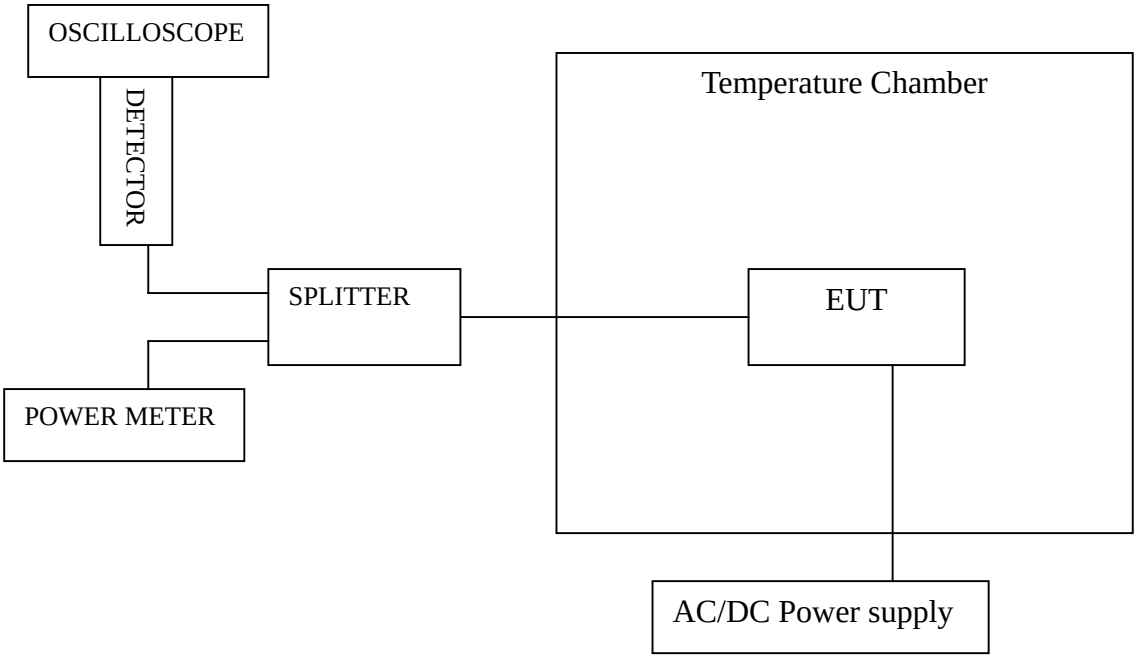
LIMIT

EN 300 328 Clause 4.3.1

The equivalent isotropic radiated power shall be equal to or less than -10 dBW (100 mW) e.i.r.p. This limit shall apply for any combination of power level and intended antenna assembly.

Test Configuration

Temperature and Voltage Measurement (under normal and extreme test conditions)



TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V1.6.1) clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.6.1) clause 5.7.2.2 for the measurement method.

TEST RESULTS

Operation Mode: IEEE 802.11b **Test Date:** December 01, 2006

Temperature: 25°C **Tested by:** Henry

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Duty Cycle measurement x: Ton / (Ton + Toff) =	0.99
10 * log (1/x) =	0.04 dB
Antenna Assembly Gain =	5 dBi
Cable Loss =	1.70 dB

Test Conditions		Transmitter Power (dBm)				
		Temp (25)°C	Temp (0)°C		Temp (55)°C	
Channel	Voltage / Power	230v	207v	253v	207v	253v
2412	Reading	11.98	12.02	12.01	11.83	11.81
	EIRP	18.72	**18.76**	18.75	18.57	18.55
2442	Reading	11.39	11.36	11.33	11.29	11.26
	EIRP	18.13	18.10	18.07	18.03	18.00
2472	Reading	11.93	12.02	12.01	11.42	11.40
	EIRP	18.67	**18.76**	18.75	18.16	18.14
Limit		Average Limit= 20 dBm				
Measurement Uncertainty		+ 0.28dB / - 0.30dB				

Operation Mode: IEEE 802.11g **Test Date:** December 01, 2006

Temperature: 25°C **Tested by:** Henry

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Duty Cycle measurement x: Ton / (Ton + Toff) =	0.94
10 * log (1/x) =	0.27 dB
Antenna Assembly Gain =	5 dBi
Cable Loss =	1.70 dB

Test Conditions		Transmitter Power (dBm)				
		Temp (25)°C	Temp (0)°C		Temp (55)°C	
Channel	Voltage / Power	230v	207v	253v	207v	253v
2412	Reading	12.13	12.15	12.12	11.85	11.84
	EIRP	19.10	19.12	19.09	18.82	18.81
2442	Reading	12.53	12.47	12.45	12.39	12.36
	EIRP	**19.50**	19.44	19.42	19.36	19.33
2472	Reading	11.97	12.07	12.03	11.65	11.63
	EIRP	18.94	19.04	19.00	18.62	18.60
2442 (Turbo)	Reading	12.33	12.41	12.40	12.28	12.26
	EIRP	19.30	19.38	19.37	19.25	19.23
Limit		Average Limit= 20 dBm				
Measurement Uncertainty		+ 0.28dB / - 0.30dB				

Remark: *EIRP = A+G-AL+CL+10log(1/x) (dBm)*
A = Reading
G = Antenna Gain
AL = Assembly Loss
CL = Cable Loss
x = Tx on / (Tx on + Tx off) (0 < X ≤ 1)

Remarks:

Steps for determining the ERP/EIRP

1. *Substitution method: pseudo-EUT is consisted by an appropriated antenna (chosen among the frequency range: Conic antenna for 25MHz to 300MHz ; Dipole antenna for 300MHz to 1000MHz and 1GHz to 18GHz) and signal generator (with a pre-defined in strength signal fed).*
2. *The pseudo-EUT is then placed at the center of the turntable about 1.5m in height where the location EUT to be tested.*
3. *Receiver is placed 3m away from the pseudo-EUT while measuring the strength below 1GHz. For the strength above 1GHz, the distance between the pseudo-EUT and the receiver varies with the size of the EUT.*
4. *Receiving antenna will be risen from 1m to 4m measuring the emission level of the pseudo-EUT per each azithum with horizontal or vertical antenna polarization.*
5. *The difference between the signal generator and the receiver, by taking all the factor (antenna factor, cable lose and free space loss etc.) into account and yield the value for the product of the evaluation.*
6. *By substitute the product and yield the ERP or EIRP at the EUT's antenna.*

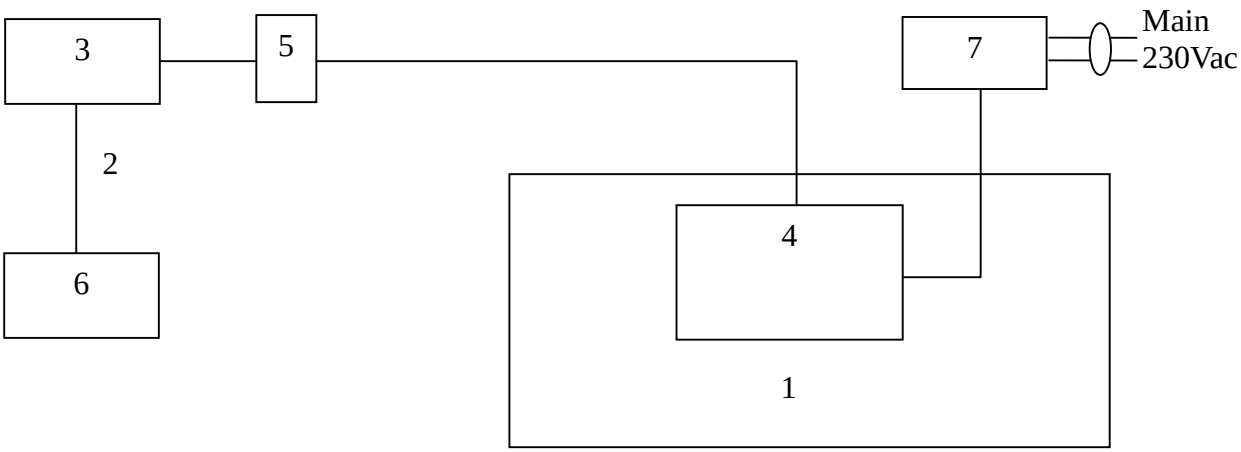
7.2 MAXIMUM SPECTRAL POWER DENSITY

LIMIT

ETSI EN 300 328 clause 4.3.2.2

For wide band modulations other then FHSS (e.g. DSSS, OFDM, etc.), the maximum spectrum power density is limited to 10 mW per MHz e.i.r.p.

Test Configuration



Legend

1. Wooden table
2. Test cable
3. Spectrum analyzer
4. EUT
5. DC block
6. Power meter
7. Power supply

TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V1.6.1) clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.6.1) clause 5.7.3 for the measurement method.

TEST RESULTS

No non-compliance noted

Please refer to ETSI EN 300 328 clause 5.7.3

For wide band modulations other then FHSS (e.g. DSSS, OFDM, etc.), the maximum spectral power density shall be measured and recorded.

TEST RESULTS

Operation Mode:	IEEE 802.11b	**Test Date:**	December 01, 2006
Temperature:	25°C	**Tested by:**	Henry
Humidity:	55 % RH	**Polarity:**	Ver. / Hor.

Test Conditions		Reading (dBm/MHz) (A)	Antenna Gain (dBi) (B)	10*log (1/x) (dB) (C)	Cable Loss (dB) (D)	Measured Power Density (dBm/MHz) (A+B+C+D)
Measured Power Density	Low	3.12	5.00	0.04	1.70	9.86
	Mid	2.88				9.62
	High	2.86				9.60
Limit		10 dBm/MHz				
Measurement Uncertainty		+1.5dB / -1.4dB				

Operation Mode:	IEEE 802.11g	**Test Date:**	December 01, 2006
Temperature:	25°C	**Tested by:**	Henry
Humidity:	55 % RH	**Polarity:**	Ver. / Hor.

Test Conditions		Reading (dBm/MHz) (A)	Antenna Gain (dBi) (B)	10*log (1/x) (dB) (C)	Cable Loss (dB) (D)	Measured Power Density (dBm/MHz) (A+B+C+D)
Measured Power Density	Low	2.49	5.00	0.27	1.70	9.46
	Mid	2.56				9.53
	High	2.55				9.52
	Mid(Turbo)	-3.61				3.36
Limit		10 dBm/MHz				
Measurement Uncertainty		+1.5dB / -1.4dB				

Remarks:
Steps for determining the Peak Power Density

1. *Remove the EUT's antenna and the directly connected to the spectrum analyzer with appropriate cable with connector and attenuator/DC block.*
2. *Observation is made under the continue operation by the PEAK detector mode, by taking all the factor into account and yield the Peak Power Density.*

7.3 FREQUENCY RANGE

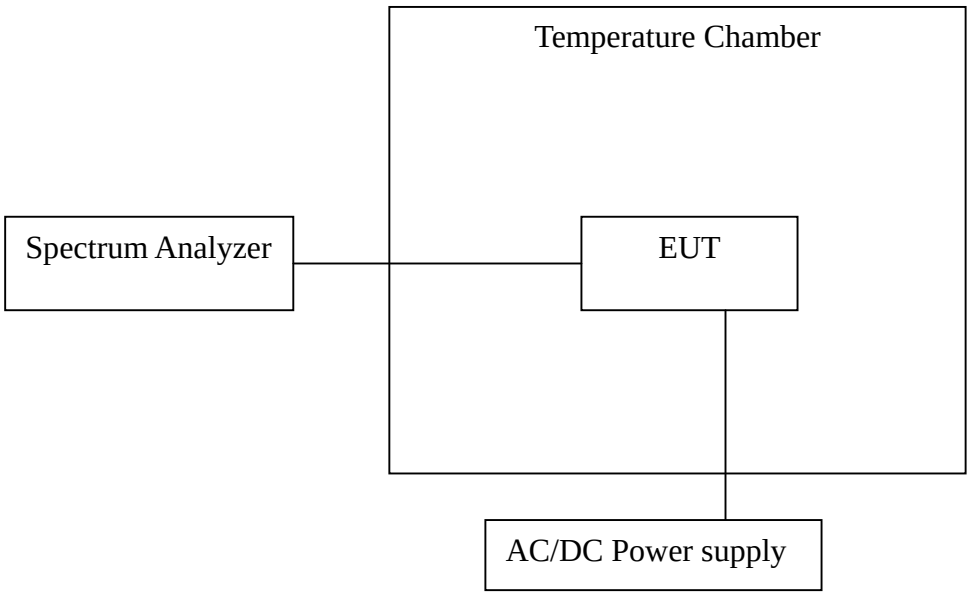
LIMIT

ETSI EN 300 328 clause 4.3.3.2

For all equipment the frequency shall lie within the band 2.4GHz to 2.4835GHz (f_L>2.4GHz and f_H<2.4835GHz)

Test Configuration

Temperature and Voltage Measurement (under normal and extreme test conditions)



TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V1.6.1) clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.6.1) clause 5.7.4 for the measurement method.

TEST RESULTS

Operation Mode: IEEE 802.11b **Test Date:** December 01, 2006

Temperature: 25°C **Tested by:** Henry

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Test Conditions			Frequency Range	
			Low Frequency (MHz)	High Frequency (MHz)
25 °C	Vnor	230.00	2402.50	2481.42
0 °C	Vmin	207.00	2402.46	2481.50
	Vmax	253.00	2402.45	2481.48
55 °C	Vmin	207.00	2402.67	2481.25
	Vmax	253.00	2402.65	2481.23
Measured frequencies (Lowest and Highest)			2402.45	2481.50
Limit			F_L > 2400MHz	F_H < 2483.5MHz
Measurement Uncertainty			+/- 20.53 kHz	

Operation Mode: IEEE 802.11g **Test Date:** December 01, 2006

Temperature: 25°C **Tested by:** Henry

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Test Conditions			Frequency Range	
			Low Frequency (MHz)	High Frequency (MHz)
25 °C	Vnor	230.00	2402.42	2481.42
0 °C	Vmin	207.00	2402.33	2481.33
	Vmax	253.00	2402.31	2481.32
55 °C	Vmin	207.00	2402.58	2481.25
	Vmax	253.00	2402.56	2481.23
Measured frequencies (Lowest and Highest)			2402.31	2481.42
Limit			F_L > 2400MHz	F_H < 2483.5MHz
Measurement Uncertainty			+/- 20.53 kHz	

Operation Mode:	IEEE 802.11g (Turbo)	**Test Date:**	December 01, 2006
Temperature:	25°C	**Tested by:**	Henry
Humidity:	55 % RH	**Polarity:**	Ver. / Hor.

Test Conditions			Frequency Range	
			Low Frequency (MHz)	High Frequency (MHz)
25 °C	Vnor	230.00	2424.52	2459.48
0 °C	Vmin	207.00	2424.46	2459.56
	Vmax	253.00	2424.44	2459.54
55 °C	Vmin	207.00	2424.54	2459.42
	Vmax	253.00	2424.53	2459.41
Measured frequencies (Lowest and Highest)			2424.44	2459.56
Limit			F_L > 2400MHz	F_H < 2483.5MHz
Measurement Uncertainty			+/- 20.53 kHz	

7.4 TRANSMITTER SPURIOUS EMISSIONS

LIMIT

The spurious emissions of the transmitter shall not exceed the values in tables in the indicated bands:

Transmitter limits for NARROWBAND spurious emissions		
Frequency Range	**Limit when operating**	**Limit when in stand-by**
30 MHz to 1 GHz	-36 dBm	-57 dBm
Above 1 GHz to 12.75 GHz	-30 dBm	-47 dBm
1.8 GHz to 1.9GHz 5.15 GHz to 5.3GHz	-47 dBm	-47 dBm

The above limit values apply to narrowband emissions, e.g. as caused by local oscillator leakage. The measurement bandwidth for such emission may be as small as necessary to achieve a reliable measurement result.

Wideband emissions shall not exceed the values given as below:

Transmitter limits for WIDEBAND spurious emissions		
Frequency Range	**Limit when operating**	**Limit when in stand-by**
30 MHz to 1 GHz	-86 dBm	-107 dBm
Above 1 GHz to 12.75 GHz	-80 dBm	-97 dBm
1.8 GHz to 1.9GHz 5.15 GHz to 5.3GHz	-97 dBm	-97 dBm

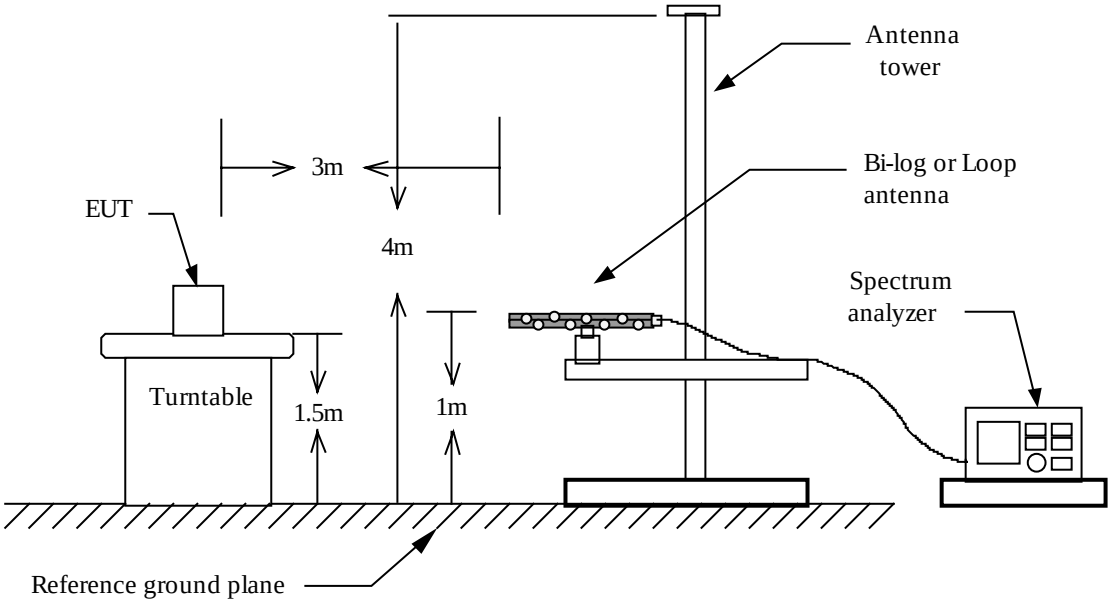
MEASUREMENT EQUIPMENT USED

966 RF CHAMBER 2				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/08/2007
EMI Test Receiver	R&S	ESCI	1166.5950 03	01/13/2007
Pre-Amplifier	MITEQ	N/A	AFS42-00102650-42-10P-42	02/14/2007
Bilog Antenna	SCHWAZBECK	CBL6143	5082	06/09/2007
Turn Table	EMCO	2081-1.21	N/A	N.C.R
Antenna Tower	CT	N/A	N/A	N.C.R
Controller	CT	N/A	N/A	N.C.R
RF Comm. Test set	HP	8920B	US36142090	N.C.R
Site NSA	C&C	N/A	N/A	06/09/2007
Horn Antenna	TRC	N/A	N/A	03/04/2007

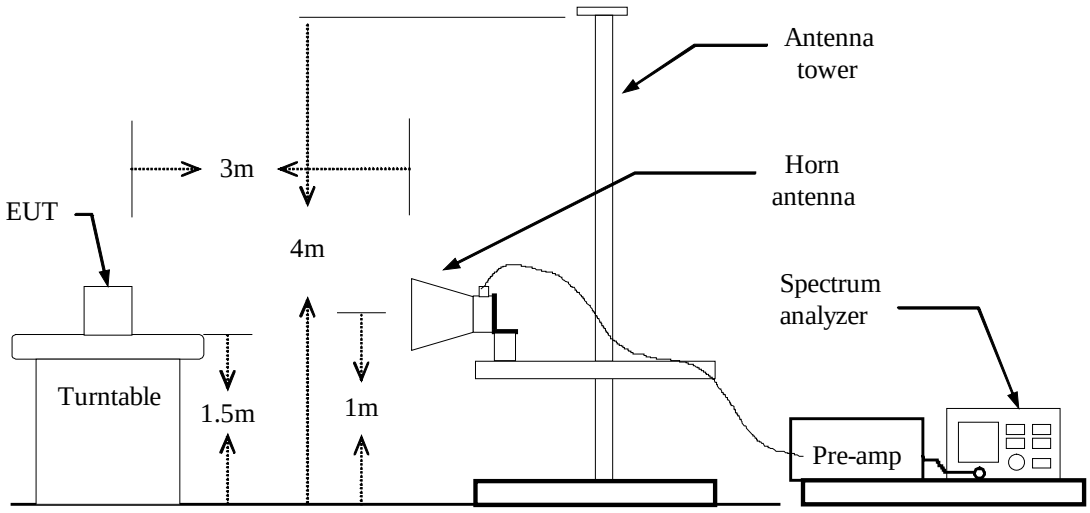
Remark: *Each piece of equipment is scheduled for calibration once a year.*

Test Configuration

Below 1GHz



Above 1GHz



TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V1.6.1) clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.6.1) clause 5.7.5 for the measurement methods.

Measurement Uncertainty

The measurement uncertainty of the test is ±2.65dB.

TEST RESULTS

Below 1GHz

Test Mode: IEEE 802.11b (CH Low) **Tested by:** Henry

Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** December 01, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
71.400	-38.40	V	-54.80	0.60	-1.27	-56.67	-36.00	-20.67
106.500	-48.84	V	-60.81	0.73	1.09	-60.45	-36.00	-24.45
250.050	-54.01	V	-70.24	1.14	5.70	-65.68	-36.00	-29.68
319.833	-59.15	V	-72.95	1.31	6.10	-68.16	-36.00	-32.16
374.666	-64.56	V	-77.07	1.41	6.05	-72.43	-36.00	-36.43
412.000	-65.27	V	-77.42	1.48	6.48	-72.42	-36.00	-36.42
106.950	-50.59	H	-68.30	0.73	1.11	-67.92	-36.00	-31.92
250.050	-44.14	H	-60.87	1.14	5.70	-56.31	-36.00	-20.31
276.150	-48.20	H	-64.85	1.20	5.62	-60.43	-36.00	-24.43
323.333	-52.15	H	-67.80	1.32	6.12	-63.00	-36.00	-27.00
374.666	-61.18	H	-75.14	1.41	6.05	-70.50	-36.00	-34.50
499.500	-65.67	H	-77.68	1.64	6.40	-72.92	-36.00	-36.92

Test Mode: IEEE 802.11b (CH High) **Tested by:** Henry

Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** December 01, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
55.200	-39.85	V	-53.25	0.54	-3.71	-57.50	-36.00	-21.50
102.000	-50.46	V	-61.82	0.71	0.96	-61.57	-36.00	-25.57
143.400	-50.78	V	-64.23	0.87	0.73	-64.37	-36.00	-28.37
326.833	-60.61	V	-74.36	1.33	6.13	-69.56	-36.00	-33.56
407.333	-66.16	V	-78.50	1.47	6.53	-73.44	-36.00	-37.44
625.500	-70.69	V	-78.19	1.84	6.53	-73.50	-36.00	-37.50
43.950	-56.92	H	-61.71	0.48	-6.36	-68.55	-36.00	-32.55
143.400	-50.75	H	-69.32	0.87	0.73	-69.46	-36.00	-33.46
250.050	-44.14	H	-60.87	1.14	5.70	-56.31	-36.00	-20.31
312.833	-53.64	H	-69.56	1.29	6.14	-64.71	-36.00	-28.71
374.666	-61.18	H	-75.14	1.41	6.05	-70.50	-36.00	-34.50
750.333	-70.47	H	-77.27	2.01	6.70	-72.58	-36.00	-36.58

Note:

1. The emission behaviour belongs to narrowband spurious emission.

2. Remark"---" means that the emission level is too low to be measured

3. Calculation of result is:

Emission Level (dBm) = Reading level (dBm) + Correction Factor (dB)

Test Mode: IEEE 802.11g (CH Low) **Tested by:** Henry
Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** December 01, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
73.200	-38.91	V	-55.25	0.61	-1.11	-56.97	-36.00	-20.97
124.950	-47.70	V	-62.67	0.80	0.85	-62.62	-36.00	-26.62
250.050	-54.01	V	-70.24	1.14	5.70	-65.68	-36.00	-29.68
374.666	-64.56	V	-77.07	1.41	6.05	-72.43	-36.00	-36.43
499.500	-63.46	V	-73.50	1.64	6.40	-68.74	-36.00	-32.74
750.333	-72.76	V	-77.97	2.01	6.70	-73.28	-36.00	-37.28
143.400	-50.75	H	-69.32	0.87	0.73	-69.46	-36.00	-33.46
224.850	-58.73	H	-77.29	1.08	5.75	-72.62	-36.00	-36.62
250.020	-44.14	H	-60.87	1.14	5.70	-56.31	-36.00	-20.31
323.333	-52.15	H	-67.80	1.32	6.12	-63.00	-36.00	-27.00
374.666	-61.18	H	-75.14	1.41	6.05	-70.50	-36.00	-34.50
499.500	-65.67	H	-77.68	1.64	6.40	-72.92	-36.00	-36.92

Test Mode: IEEE 802.11g (CH High) **Tested by:** Henry
Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** December 01, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
54.300	-40.95	V	-54.08	0.54	-3.88	-58.50	-36.00	-22.50
73.200	-38.91	V	-55.25	0.61	-1.11	-56.97	-36.00	-20.97
100.200	-51.26	V	-62.36	0.70	0.91	-62.15	-36.00	-26.15
319.833	-59.15	V	-72.95	1.31	6.10	-68.16	-36.00	-32.16
419.000	-66.87	V	-78.75	1.49	6.41	-73.83	-36.00	-37.83
499.500	-63.46	V	-73.50	1.64	6.40	-68.74	-36.00	-32.74
41.250	-55.62	H	-59.89	0.49	-7.28	-67.66	-36.00	-31.66
106.950	-50.59	H	-68.30	0.73	1.11	-67.92	-36.00	-31.92
276.150	-48.20	H	-64.85	1.20	5.62	-60.43	-36.00	-24.43
326.833	-54.91	H	-70.59	1.33	6.13	-65.79	-36.00	-29.79
342.000	-62.35	H	-78.05	1.37	6.17	-73.25	-36.00	-37.25
825.000	-70.63	H	-76.16	2.20	6.90	-71.46	-36.00	-35.46

Test Mode: IEEE 802.11g (Turbo) **Tested by:** Henry
Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** December 01, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
53.400	-40.52	V	-53.39	0.53	-4.05	-57.97	-36.00	-21.97
72.300	-41.14	V	-57.51	0.60	-1.19	-59.30	-36.00	-23.30
106.500	-49.52	V	-61.49	0.73	1.09	-61.13	-36.00	-25.13
374.666	-64.71	V	-77.22	1.41	6.05	-72.58	-36.00	-36.58
400.333	-66.51	V	-79.13	1.46	6.60	-73.99	-36.00	-37.99
499.500	-64.59	V	-74.63	1.64	6.40	-69.87	-36.00	-33.87
106.950	-50.47	H	-68.18	0.73	1.11	-67.80	-36.00	-31.80
250.050	-44.98	H	-61.71	1.14	5.70	-57.15	-36.00	-21.15
276.150	-45.03	H	-61.68	1.20	5.62	-57.26	-36.00	-21.26
319.833	-59.40	H	-75.03	1.31	6.10	-70.24	-36.00	-34.24
374.666	-62.89	H	-76.85	1.41	6.05	-72.21	-36.00	-36.21
400.333	-64.69	H	-78.67	1.46	6.60	-73.53	-36.00	-37.53

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

2. Calculation of result is:

Emission Level (dBm) = S.G. (dBm) - Cable loss (dB) + Ant. Gain (dBi)

Above 1GHz

Test Mode: IEEE 802.11b (CH Low) **Tested by:** Henry

Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** December 01, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
2023.333	-47.02	V	-50.37	3.35	9.98	-43.74	-30.00	-13.74
2286.666	-47.65	V	-49.92	3.58	9.74	-43.76	-30.00	-13.76
2760.000	-45.81	V	-46.51	3.95	9.13	-41.33	-30.00	-11.33
4825.000	-58.10	V	-52.23	5.17	10.46	-46.94	-30.00	-16.94
N/A								
2576.666	-51.56	H	-53.25	3.82	9.43	-47.64	-30.00	-17.64
2760.000	-53.46	H	-54.10	3.95	9.13	-48.92	-30.00	-18.92
2906.666	-55.67	H	-55.46	4.06	8.89	-50.63	-30.00	-20.63
4791.666	-60.36	H	-53.45	5.17	10.54	-48.08	-30.00	-18.08
N/A								

Test Mode: IEEE 802.11b (CH High) **Tested by:** Henry

Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** December 01, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
2393.333	-42.63	V	-44.46	3.67	9.65	-38.48	-30.00	-8.48
2576.666	-42.28	V	-43.47	3.82	9.43	-37.86	-30.00	-7.86
2760.000	-46.94	V	-47.64	3.95	9.13	-42.46	-30.00	-12.46
4941.666	-48.24	V	-41.55	5.18	10.15	-36.58	-30.00	-6.58
N/A								
2393.333	-52.67	H	-54.95	3.63	9.65	-48.93	-30.00	-18.93
2576.666	-52.75	H	-54.44	3.82	9.43	-48.83	-30.00	-18.83
2760.000	-54.38	H	-55.02	3.95	9.13	-49.84	-30.00	-19.84
4941.666	-55.45	H	-47.66	5.18	10.15	-42.69	-30.00	-12.69
N/A								

Note:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Measurements above show only up to 6 Chris Hsiehimum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
3. *Calculation of result is:*

Emission Level (dBm) = Reading level (dBm) + Correction Factor (dB)

Test Mode: IEEE 802.11g (CH Low) **Tested by:** Henry

Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** December 01, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
2286.666	-49.51	V	-51.78	3.58	9.74	-45.62	-30.00	-15.62
2576.666	-40.70	V	-41.89	3.82	9.43	-36.28	-30.00	-6.28
2760.000	-45.08	V	-45.78	3.95	9.13	-40.60	-30.00	-10.60
4825.000	-59.84	V	-53.97	5.17	10.46	-48.68	-30.00	-18.68
N/A								
2023.333	-56.16	H	-58.97	3.35	9.98	-52.34	-30.00	-22.34
2576.666	-50.39	H	-52.08	3.82	9.43	-46.47	-30.00	-16.47
2760.000	-51.28	H	-51.92	3.95	9.13	-46.74	-30.00	-16.74
4858.333	-61.16	H	-53.86	5.17	10.37	-48.66	-30.00	-18.66
N/A								

Test Mode: IEEE 802.11g (CH High) **Tested by:** Henry

Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** December 01, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
2390.000	-41.77	V	-43.61	3.67	9.65	-37.63	-30.00	-7.63
2576.666	-40.55	V	-41.74	3.82	9.43	-36.13	-30.00	-6.13
2760.000	-45.17	V	-45.87	3.95	9.13	-40.69	-30.00	-10.69
4941.666	-58.74	V	-52.05	5.18	10.15	-47.08	-30.00	-17.08
N/A								
2393.333	-51.46	H	-53.74	3.67	9.65	-47.76	-30.00	-17.76
2576.666	-50.00	H	-51.69	3.82	9.43	-46.08	-30.00	-16.08
2760.000	-51.13	H	-51.77	3.95	9.13	-46.59	-30.00	-16.59
4941.666	-55.45	H	-47.66	5.18	10.15	-42.69	-30.00	-12.69
N/A								

Test Mode: IEEE 802.11g (Turbo) **Tested by:** Henry

Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** December 01, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
2023.333	-45.48	V	-48.83	3.35	9.98	-42.20	-30.00	-12.20
2576.666	-39.74	V	-40.93	3.82	9.43	-35.32	-30.00	-5.32
2760.000	-43.48	V	-44.18	3.95	9.13	-39.00	-30.00	-9.00
4916.666	-60.78	V	-54.27	5.18	10.21	-49.24	-30.00	-19.24
N/A								
2023.333	-54.87	H	-57.68	3.35	9.98	-51.05	-30.00	-21.05
2576.666	-49.53	H	-51.22	3.82	9.43	-45.61	-30.00	-15.61
2760.000	-51.99	H	-52.63	3.95	9.13	-47.45	-30.00	-17.45
4858.333	-61.16	H	-53.86	5.17	10.37	-48.66	-30.00	-18.66
N/A								

Remark:

1. The emission behaviour belongs to narrowband spurious emission.

2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

3. Calculation of result is:

Emission Level (dBm) = S.G. (dBm) - Cable loss (dB) + Ant. Gain (dBi)

7.5 RECEIVER SPURIOUS EMISSIONS

LIMIT

The spurious emissions of the receiver shall not exceed the values in tables in the indicated bands:

Receiver limits for NARROWBAND spurious emissions	
Frequency Range	**Limit when in stand-by**
30 MHz to 1 GHz	-57 dBm
Above 1 GHz to 12.75 GHz	-47 dBm

The above limit values apply to narrowband emissions, e.g. as caused by local oscillator leakage. The measurement bandwidth for such emission may be as small as necessary to achieve a reliable measurement result.

Wideband emissions shall not exceed the values given as below:

Receiver limits for WIDEBAND spurious emissions	
Frequency Range	**Limit when in stand-by**
30 MHz to 1 GHz	-107 dBm
Above 1 GHz to 12.75 GHz	-97 dBm

Test Configuration

Conducted Spurious Emissions:
(Same as section 6.4 in this test report)

Radiated Spurious Emissions:
(Same as section 6.4 in this test report)

TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V1.6.1) clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.6.1) clause 5.7.6 for the measurement methods.

Measurement Uncertainty

The measurement uncertainty of the test is ± 2.65dB.

TEST RESULTS

Below 1GHz

Test Mode: RX **Tested by:** Henry

Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** November 29, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
53.400	-42.14	V	-55.01	0.53	-4.05	-59.59	-57.00	-2.59
76.800	-42.58	V	-58.79	0.62	-0.79	-60.20	-57.00	-3.20
98.400	-50.21	V	-62.04	0.70	0.80	-61.94	-57.00	-4.94
374.666	-61.46	V	-73.97	1.41	6.05	-69.33	-57.00	-12.33
499.500	-67.22	V	-77.26	1.64	6.40	-72.50	-57.00	-15.50
724.666	-71.78	V	-77.12	1.96	6.72	-72.36	-57.00	-15.36
106.500	-53.05	H	-70.77	0.73	1.09	-70.41	-57.00	-13.41
124.950	-48.28	H	-67.62	0.80	0.85	-67.57	-57.00	-10.57
276.150	-47.71	H	-64.36	1.20	5.62	-59.94	-57.00	-2.94
319.833	-61.55	H	-77.18	1.31	6.10	-72.39	-57.00	-15.39
374.666	-59.80	H	-73.76	1.41	6.05	-69.12	-57.00	-12.12
400.333	-64.78	H	-78.76	1.46	6.60	-73.62	-57.00	-16.62

Above 1GHz

Test Mode: RX **Tested by:** Henry

Ambient temperature: 25°C **Relative humidity:** 55 % RH **Date:** November 29, 2006

Frequency (MHz)	Reading level (dBm)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1130.000	-57.45	V	-63.86	2.45	11.28	-55.03	-47.00	-8.03
1273.333	-57.33	V	-63.64	2.62	11.35	-54.91	-47.00	-7.91
1553.333	-57.93	V	-63.80	2.95	11.31	-55.44	-47.00	-8.44
2023.333	-58.79	V	-62.14	3.35	9.98	-55.51	-47.00	-8.51
2336.666	-59.01	V	-61.08	3.62	9.70	-55.00	-47.00	-8.00
2600.000	-58.84	V	-59.96	3.83	9.39	-54.40	-47.00	-7.40
1276.666	-57.32	H	-62.10	2.63	11.35	-53.38	-47.00	-6.38
1396.666	-57.47	H	-62.41	2.77	11.42	-53.76	-47.00	-6.76
1830.000	-57.78	H	-61.39	3.18	10.50	-54.07	-47.00	-7.07
2096.666	-58.68	H	-61.38	3.41	9.91	-54.88	-47.00	-7.88
2296.666	-58.95	H	-61.37	3.59	9.73	-55.23	-47.00	-8.23
2460.000	-58.31	H	-60.50	3.73	9.59	-54.64	-47.00	-7.64

Note:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Remark"---" means that the emission level is too low to be measured*
3. *Calculation of result is:*
   Emission Level (dBm) = Reading level (dBm) + Correction Factor (dB)

Above 1GHz

No spurious emission were detected above the system noise floor from the transmitter.

APPENDIX I
PHOTOGRAPHS OF TEST SETUP