Test Report:	80288-1R1TRFWL
Applicant:	WOLF STEEL LTD 9 NAPOLEON RD, BARRIE, ONTARIO L4M 4Y8
Apparatus:	303.8MHz Remote Controller System – Transmitter, Models: W660-0066 and W660-0067
FCC ID:	VA8LB020
In Accordance With:	FCC Part 15 Subpart C, 15.231 Periodic operation in the band 40.66-40.70MHz and above 70 MHz.
Tested By:	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
Authorized By:	 Jason Nixon, Wireless Specialist
Date:	February 25, 2008
Total Number of Pages:	20

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	303.8MHz Remote Controller System – Transmitter, Models: W660-0066 and W660-0067
Specification:	FCC Part 15 Subpart C, 15.231
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Release 1 Radiated emission was re-assessed with the final enclosure.

Author: Heng Lin, EMC/Wireless Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

TABLE OF CONTENTS

Report Summary **2**

Section 1 : Equipment Under Test **4**

1.1 Product Identification 4
1.2 Samples Submitted for Assessment 4
1.3 Theory of Operation 4
1.4 Technical Specifications of the EUT 5
1.5 Block Diagram of the EUT 5

Section 2 : Test Conditions **6**

2.1 Specifications 6
2.2 Deviations From Laboratory Test Procedures 6
2.3 Test Environment 6
2.4 Test Equipment 6

Section 3 : Observations **7**

3.1 Modifications Performed During Assessment 7
3.2 Record Of Technical Judgements 7
3.3 EUT Parameters Affecting Compliance 7
3.4 Test Deleted 7
3.5 Additional Observations 7

Section 4 : Results Summary **8**

4.1 FCC Part 15 Subpart B : Test Results 9

Appendix A : Test Results **10**

Clause 15.209(a) Radiated Emissions within Restricted Bands 10
Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation 13
Clause 15.231(b) Radiated Emissions 16
Clause 15.231(c) 20dB Bandwidth 18

Appendix B : Setup Photographs **19**

Appendix C : Block Diagram of Test Setups **20**

Section 1 : Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows:

303.8MHz Remote Controller System – Transmitter, Models: W660-0066 and W660-0067

1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Part No.
1	303.8MHz Remote controller System – Transmitter (normal mode)	RY72Q40–2
2	303.8MHz Remote controller System – Transmitter (test mode)	RY72Q40–2
7	303.8MHz Remote controller System – Transmitter (test mode)	RY72Q40–2

The first samples were received on: March 23, 2007

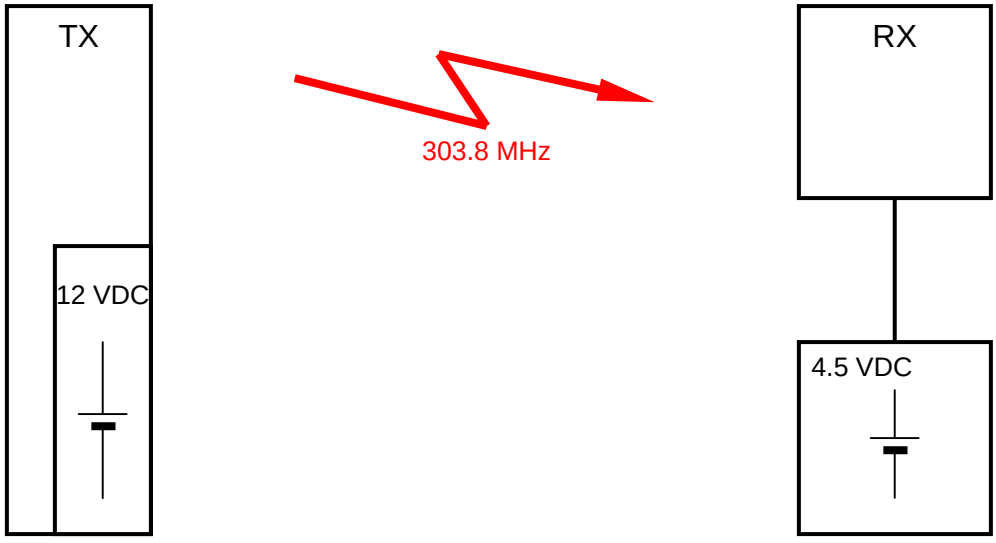
1.3 Theory of Operation

The EUT is a part of a battery operated remote control system developed to provide remote control for gas heating appliances. The system uses one of 255 factory pre-programmed security codes. It is comprised of two main components: Transmitter and Remote Receiver.
The transmitter uses 303.8 MHz ASK-modulated signal to send ON and OFF commands to the appliance. The transmission of commands is activated by pressing buttons S1 and S2 on the face of the transmitter and it stops automatically after ~ 0.7 or 1.1 seconds (depending on the command). The remote receiver houses the microprocessor that responds to commands from the transmitter that control appliance operation.

1.4 Technical Specifications of the EUT

Manufacturer:	WOLF STEEL LTD
Operating Frequency:	303.8 MHz
Emission Designator:	L1D
Modulation:	ASK
Antenna Data:	Integral on PCB
Antenna Connector:	None
Power Source:	Transmitter: 12 VDC Battery

1.5 Block Diagram of the EUT



Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.231
Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.

2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 ^{o}C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
Spectrum Analyzer	Rhode & Schwarz	FSU	FA001877	May 10/07
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU	FA002043	Oct. 24/07
RF Amplifier	JCA	1-2 GHz	FA001498	Aug. 2, 07
RF Amplifier	JCA	2-4 GHz	FA001496	Aug. 2, 07
Bi-Conical Antenna #1	EMCO	3109	FA000805	May 03/07
Log Periodic Antenna #1	EMCO	3148	FA000477	Sept. 12/07
Horn Antenna #2	EMCO	3115	FA000825	Jan. 30/08
Test Receiver	Rohde & Schwarz	ESVS-30	FA001445	July 14/07
Electro-Magnetic Interference Test Chamber	TDK	SAC-3	FA002047	May 19/08
Bilog	Sunol	JB3	FA002108	Jan. 21/09
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 26	FA002043	Dec. 07/08
Controller	Sunol	SC104V	FA002060	NCR
Mast	Sunol	TLT2	FA002061	NCR

* COU (Calibrate on Use)

Section 3 : Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 15 Subpart C : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N	No : not applicable / not relevant.
Y	Yes : Mandatory i.e. the apparatus shall conform to these tests.
N/T	Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

4.1 FCC Part 15 Subpart B : Test Results

Part 15	Test Description	Required	Result
15.31(e)	Variation of Power source	N	N/A
15.207(a)	Powerline Conducted Emissions	N	N/A
15.209(a)	Radiated Emissions within Restricted Bands	–	–
15.231(a)(1)	Manually operated transmitter	YES	PASS
15.231(a)(2)	Automatically activated transmitter	N	N/A
15.231(a)(3)	Periodic transmissions at regular predetermined intervals	N	N/A
15.231(a)(4)	Radiators used in cases of emergency	N	N/A
15.231(a)(5)	Set-up information for security systems	N	N/A
15.231(b)	Radiated Emissions	YES	PASS
15.231(c)	20dB Bandwidth	YES	PASS
15.231(d)	Devices operating within the frequency band 40.66-40.70 MHz	N	N/A
15.231(e)	Radiated emissions for Periodic radiators	N	N/A

Notes:

The system will be marketed in two different configurations: F-40 and F-50.
As stated in User Guide (Installation and Operation Instructions):

F-40 Includes: Transmitter, Model: W660-0066
Receiver, Model: W660-0076

F-50 Includes: Transmitter, Model: W660-0067
Receiver, Model: W660-0076

Only the Transmitter, Model: W660-0067 associated with configuration F-50 was tested. As stated by the applicant the differences between proposed configurations F-40 and F-50 for remotes (these differences are also explained in the user guide) are the following:

FUNCTION	F-40	F-50
ON/OFF (w/ status display)	X	X
Room Temperature Display	X	X
Low Battery Indicator	X	X
Set Room Temperature (Thermostatically Controlled)	–	X

Appendix A : Test Results

Clause 15.209(a) Radiated Emissions within Restricted Bands

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvoltsmeter)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Conditions:

Sample Number:	1 – 4n and 7	**Temperature:**	23°C
Date:	March 29, 2007 February 22, 2008	**Humidity:**	35%
Modification State:	0	**Tester:**	Roman Kuleba Heng Lin
		Laboratory:	Ottawa

Test Results:

Pass (See attached table).

Additional Observations:

The Spectrum was searched from 30MHz to the 10th Harmonic.

These results apply to emissions found in the Restricted Bands defined in FCC Part 15 Subpart C, 15.205.

The EUT was measured on three orthogonal axes with fresh new batteries.

All measurements were performed using a Peak Detector with 100kHz RBW/VBW below 1GHz and a 1MHz RBW/VBW above 1GHz at a distance of 3 meters.

Radiated Emissions within Restricted Bands, continued

Transmitter: Average

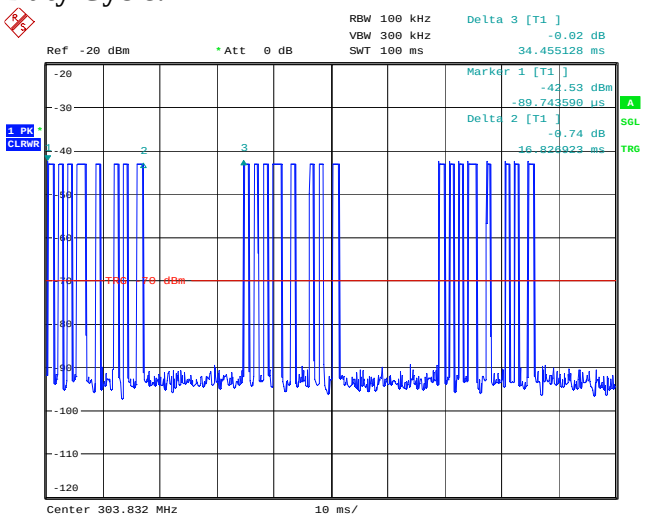
Frequency MHz	Emission dBµV/m	Bandwidth kHz	Antenna height cm	Polarity	Turntable position deg	Corr. dB	Duty Cycle Corr. dB	Margin dB	Limit dBµV/m
1215.2	49.58	1000	360	H	24	-21.35	-5.9	4.42	54
1519.2	47.78	1000	346	H	24	-19.96	-5.9	6.22	54

Transmitter: Peak

Frequency MHz	Emission dBµV/m	Bandwidth kHz	Antenna height cm	Polarity	Turntable position deg	Corr. dB	Margin dB	Limit dBµV/m
1215.2	55.48	1000	360	H	24	-21.35	18.52	74
1519.2	53.68	1000	346	H	24	-19.96	20.32	74

Radiated Emissions within Restricted Bands, continued

Duty Cycle:



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Duty Cycle Correction = $20 \cdot \log_{10}(T_{ON\ Total}/100\ ms)$

Duty Cycle Correction = $20 \cdot \log_{10}[(3 \times 16.826923\ ms)/100\ ms] = -5.94\ dB$

Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation

The provisions of this section are restricted to periodic operation within the band 40.66-40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

(4) Intentional radiators, which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

(5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

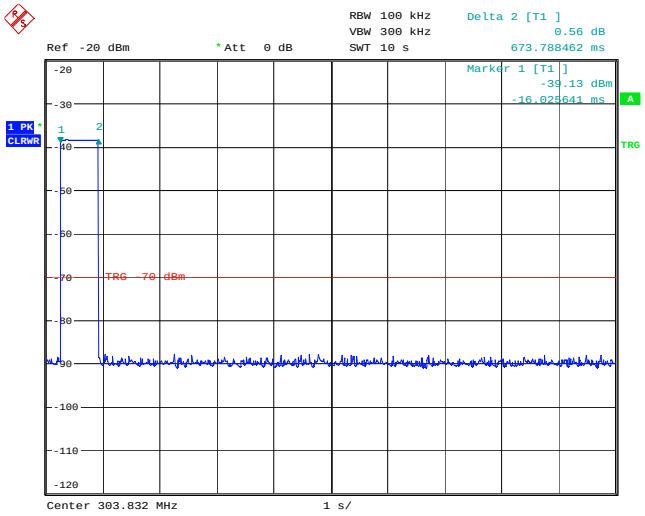
Test Conditions:

Sample Number:	1 – 4	**Temperature:**	20°C
Date:	March 29, 2007	**Humidity:**	45%
Modification State:	0	**Tester:**	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Pass (See plots).

Conditions for intentional radiators to comply with periodic operation, continued

Command S1 Activated:



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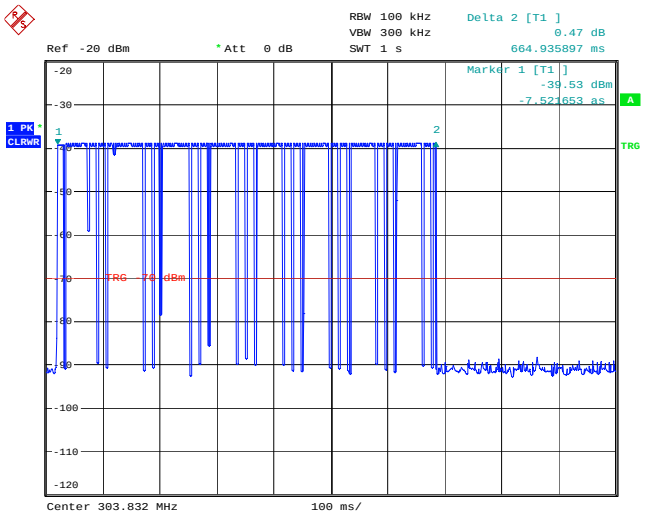

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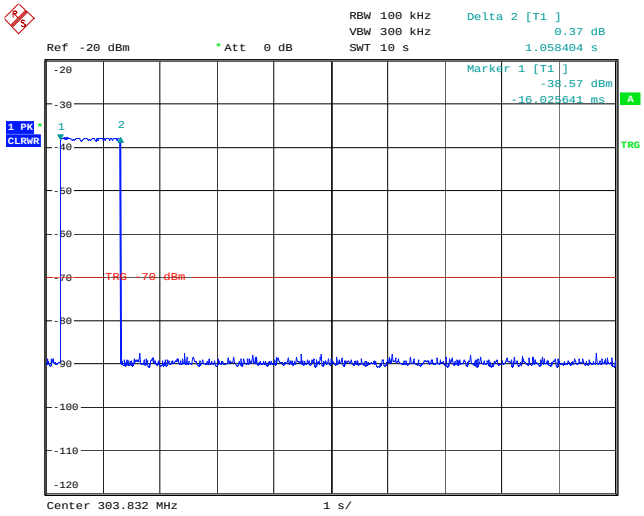
Transmission is activated by pressing button S1 on the face of the transmitter and it stops automatically after 674 milliseconds (< 5 seconds).

Conditions for intentional radiators to comply with periodic operation, continued

Command S2 Activated:



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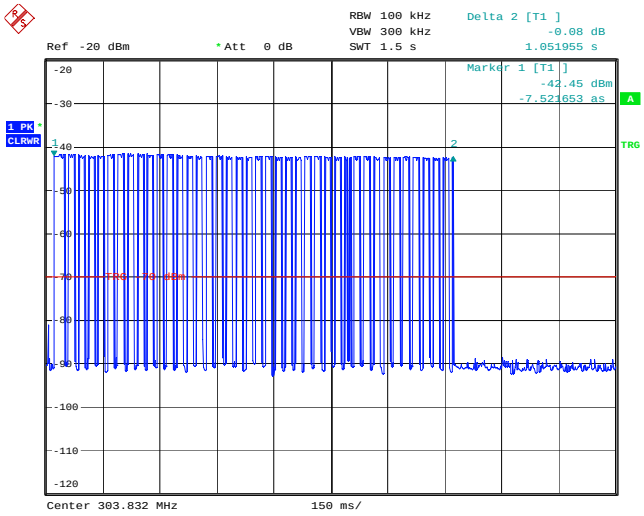

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Transmission is activated by pressing button S2 on the face of the transmitter and it stops automatically after 1.06 seconds (< 5 seconds).

Clause 15.231(b) Radiated Emissions

In addition to the provisions of 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
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

Test Conditions:

Sample Number:	1 – 4 and 7	**Temperature:**	22°C
Date:	March 29, 2007 February 22, 2008	**Humidity:**	35%
Modification State:	0	**Tester:**	Roman Kuleba Heng Lin
		Laboratory:	Ottawa

Test Results:

See Attached Table for Results

Additional Observations:

The Spectrum was searched from 30MHz to the 10th Harmonic.

The EUT was measured on three orthogonal axis with fresh new batteries.

All measurements were performed using a Peak Detector with 100kHz RBW/VBW below 1GHz and a 1MHz RBW/VBW above 1GHz at a distance of 3 meters.

Radiated Emissions, continued

Transmitter: Average

Frequency MHz	Emission dBµV/m	Bandwidth kHz	Antenna height cm	Polarity	Turntable position deg	Corr. dB	Duty Cycle Corr. dB	Margin dB	Limit dBµV/m
303.8	74.50	120	400	H	20	15.62	-5.9	0.40	74.9
607.6	50.53	120	400	H	0	21.45	-5.9	4.37	54.9
911.4	50.11	120	400	H	21	25.47	-5.9	4.79	54.9
1882.4	38.94	1000	400	H	350	-18.08	-5.9	15.96	54.9

Duty Cycle Correction = $20 \cdot \log_{10}(T_{ON\ Total}/100\ ms)$

Duty Cycle Correction = $20 \cdot \log_{10}[(3 \times 16.826923\ ms)/100\ ms] = -5.94\ dB$

Transmitter: Peak

Frequency MHz	Emission dBµV/m	Bandwidth kHz	Antenna height cm	Polarity	Turntable position deg	Corr. dB	Margin dB	Limit dBµV/m
303.8	80.40	120	400	H	20	15.62	14.50	94.9
607.6	56.43	120	400	H	0	21.45	18.47	74.9
911.4	56.01	120	400	H	21	25.47	18.90	74.9
1882.4	44.84	1000	400	H	350	-18.08	30.06	74.9

Clause 15.231(c) 20dB Bandwidth

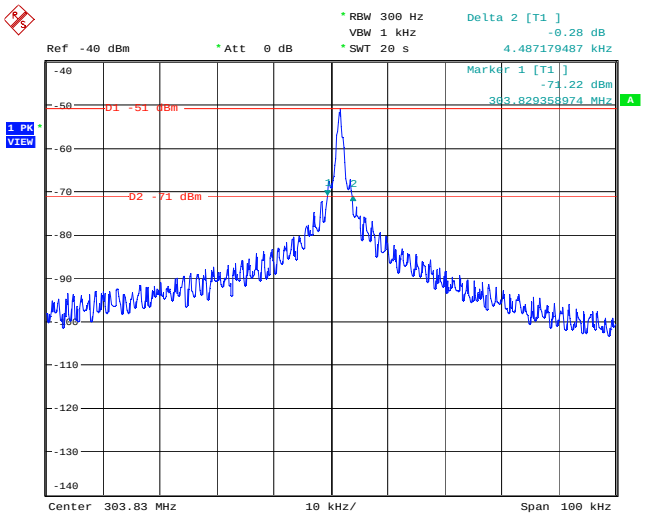
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Conditions:

Sample Number:	1 – 4	**Temperature:**	20°C
Date:	March 29, 2007	**Humidity:**	45%
Modification State:	0	**Tester:**	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Pass (see plot below).

20 dB Bandwidth:



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Appendix B : Setup Photographs

Radiated Emissions Setup (Transmitter):

Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions