

Global EMC Labs

EMC/EMI Test Report

As per

**IEC/EN 61326-1:2005 &
IEC/EN 61326-2-5:2006**

Emission & Immunity for
Electrical Equipment for Measurement, Control and
Laboratory Use – EMC Requirements

Part 1: Industrial Locations

on

Product: SITRANS LR560 Foundation Fieldbus

Model: 7ML5440-xxx00-xCxx



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Testing produced for



See appendix A for full client & EUT details.





Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

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Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
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Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Report Scope

This report addresses the EMC verification testing and test results of the Siemens Canada – Siemens Milltronics Process Instruments, SITRANS LR560 Foundation Fieldbus, herein referred to as EUT (Equipment under test). The EUT was tested for emissions and immunity compliance against customer specific requirements based on the following standards:

- IEC / EN 61326-1:2005
- IEC / EN 61326-2-5:2006
- FCC Part 15 Subpart B:2010

Test procedures, results, justifications, and engineering considerations, if any, follow later in this report.


Client	Siemens Canada – Siemens Milltronics Process Instruments	
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Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Guidance - Selection of Test Levels

Immunity testing – was performed as per the table listed below from customer provided documentation, which meets or exceeds the requirements of

Table 2 of IEC 61326-1/EN 61326-1, Industrial Immunity Requirements

Port	Phenomenon	Basic Standard	Test Value	Performance Criteria Observed / Required
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact/ (tested @ 2, 4, 6kV) 8 kV air (tested @ 2, 4, 8kV)	A
	EM Field	IEC 61000-4-3	10 V/m 80 MHz – 1 GHz, 3 V/m 1.4 GHz – 2 GHz 1 V/m 2.0 GHz – 2.7 GHz (All Frequencies Tested @ 10 V/m)	A
	Power Freq Magnetic Field	IEC 61000-4-8	30 A/m (Tested @ 100 A/m)	A
Terminal Block & Display Contacts Traces^f	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact/ (tested @ 2, 4, 6kV) 8 kV air (tested @ 2, 4, 8kV)	C
I/O signal/ control (Including lines)	Burst	IEC 61000-4-4	1 kV ^d (5/50 ns, 5 kHz)	A

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connected to functional earth port)	Surge	IEC 61000-4-5	1 kV ^{b,c}	A
	Conducted RF	IEC 61000-4-6	3V ^d (150 kHz – 80 MHz) (Test @ 10 Vrms 10 kHz – 80 MHz)	A

Note:

- a. Line to line
- b. Line to earth (ground)
- c. Only in case of long distance lines
- d. Only in case of lines > 3m
- e. 25/30 cycles means 25 cycles for 50 Hz test and 30 cycles for 60 Hz.
- f. Internal ESD tests requested by the client.

Emissions requirements

Emissions	Conducted emissions	CISPR 11 & FCC 15 Subpart B	150 kHz – 30 MHz	Class B
	Radiated emissions	CISPR 11 & FCC 15 Subpart B	30 MHz – 1 GHz	Class B


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Summary

The results contained in this report relate only to the item(s) tested. This report does not imply product endorsement by any government, or Global EMC.

Equipment under test	SITRANS LR560 Foundation Fieldbus
EUT Passed all tests performed.	See Table Below
Tests conducted by	Min Xie

For testing dates see ‘Testing Environmental Conditions’.


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Test Results Summary

For test details refer to “Selection of Test Levels” section above.

Standard/Method	Description	Class/Limit	Result
IEC 61326-1 / IEC 61000-4-2	Electrostatic Discharge	Refer to table above	Pass
IEC 61326-1 / IEC 61000-4-3	Radiated Susceptibility	Refer to table above	Pass
IEC 61326-1 / IEC 61000-4-4	Electrical Fast Transients	Refer to table above	Pass
IEC 61326-1 / IEC 61000-4-5	Surge	Refer to table above	Pass
IEC 61326-1 / IEC 61000-4-6	Conducted Susceptibility	Refer to table above	Pass
IEC 61326-1 / IEC 61000-4-8	Power Frequency Magnetic Field Susceptibility	Refer to table above	Pass
CISPR 11 – 2003 + A1 2004	Conducted emissions	Refer to table above	Class B
CISPR 11 – 2003 + A1 2004	Radiated emissions	Refer to table above	Class B
Overall Result			Pass¹

¹If the product as tested complies with the specification or requirement, the EUT is deemed to comply and is issued a ‘PASS’ grade. If not ‘FAIL’ grade will be issued.

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Justifications or Deviations


The following justifications for tests not performed or deviations from the above listed specifications apply:

None

A later revision of the standard may have been substituted in place of the previous dated referenced revision. The year of the specification used are listed under applicable standards. Using the later revision accomplishes the goal of ensuring compliance to the intent of the previous specification, while allowing the laboratory to incorporate the extensions and clarifications made available by a later revision.


The EUT uses radar pulses at 78-79 GHz to measure liquids, solids, and slurries levels which are cover under a separate report by the manufacturer. The scope of this report does not cover any intentional radiator frequency or components, and was tested for unintentional emissions as if the highest clock was less than 108 MHz, at the request of the client.

The immunity performance summaries were compiled and supplied by the client.

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Applicable Standards, Specifications and Methods

- ANSI C63.4:2003 - Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
- CISPR 11:2003 + A1:2004 - Industrial, scientific and Medical (ISM) radio frequency equipment Electromagnetic disturbance characteristics. Limits and methods of measurement
- IEC 61326-2-5:2006 - Electrical equipment for measurement, control and laboratory use – EMC requirements: Part 2 Particular requirements – Test configurations, operational conditions and performance criteria for field devices with interfaces according to IEC 61784-1, CP 3/2
- IEC 61326-1:2005 - Electrical equipment for measurement, control and laboratory use – EMC requirements: Part 1
- IEC 61000-4-2:2001 - Testing and measurement techniques – Electrostatic discharge immunity test
- IEC 61000-4-3:2002 - Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
- IEC 61000-4-4:2004 - Testing and measurement techniques – Electrical fast transient/burst immunity test
- IEC 61000-4-5:2004 - Testing and measurement techniques - Surge immunity test
- IEC 61000-4-6:2003 - Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields
- IEC 61000-4-8:2001 - Testing and measurement techniques – Power frequency magnetic field immunity test
- ISO 17025:2005 - General Requirements for the competence of testing and calibration laboratories

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Document Revision Status

Revision 1 November 22, 2010
Initial Release

Revision 2 November 26, 2010


- Corrected SITRAN to SITRANS
- Remove N/A sections from Immunity, Emission, Conducted and Radiated immunity tables
- Change PWR cable to I/O cables
- Reference FCC 15 Subpart B in Report Scope and Emission requirement table.

Revision 2 replaces Revision 1 in its entirety.

Revision 3 December 01, 2010

- Added “- EMC Requirements – Part 1: Industrial Locations” and model number to title page;
- Added model number to header.
- Corrected model number in Appendix A.

Revision 3 replaces Revision 2 in its entirety.

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Definitions and Acronyms

The following definitions and acronyms are applicable in this report.
See also ANSI C63.14.

AE – Auxiliary Equipment.

Class A device – A device that is marketed for use in a commercial, industrial or business environment. A ‘Class A’ device should not be marketed for use by the general public . A ‘Class A’ device should contain the following warning in it’s user manual: “**Warning:** This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.”

Class B device – A device that is marketed for use in a residential environment and may also be used in a commercial, business or industrial environments. A ‘Class B’ device may also be defined as a device to which a broadcast radio or television receivers would be expected within a distance of 10 m of the device concerned.

EMC – Electro-Magnetic Compatibility

EMI – Electro-Magnetic Immunity


EUT – Equipment Under Test

LISN – Line impedance stabilization network

RF – Radio Frequency

NCR – No Calibration Required

Test Plan – See ‘Appendix B – Client Provided Details’. This is required prior to testing.

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Testing Facility

Testing for EMC on the EUT was carried out at Global EMC labs in Toronto, Ontario, Canada. The testing lab consists of a 3m semi-anechoic chamber calibrated to be able to allow measurements on an EUT with a maximum width or length of up to 2m and height up to 3m. The chamber is equipped with a turn table that is capable of testing devices up to 3300lb in weight. This facility is capable of testing products that are rated for 120 Vac and 240Vac single phase, or 208 Vac 3 phase input. DC capability is also available. The chamber is equipped with an antenna mast that controls polarization and height from the control room adjoining the shielded chamber. Radiated emissions measurements are performed using a Bilog, and Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN.

For ESD testing, the HCP is 1.6m x 0.8m and the VCP is 0.5m x 0.5m. The reference ground plane, when applicable, was 1.6m x 1.6m.

Calibrations and Accreditations


The 3m semi-anechoic chamber is registered with Federal Communications Commission (FCC) and Industry Canada (IC). This chamber was calibrated for Normalized Site Attenuation (NSA) using test procedures outlined in ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”. The chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. The NSA data is kept on file at Global EMC. For radiated susceptibility testing, a 16 point field calibration has been performed on the chamber. The field uniformity data is kept on file at Global EMC. Global EMC Inc is accredited to ISO 17025 by A2LA with Testing Certificate #2555.01. The laboratories current scope of accreditation listing can be found as listed on the A2LA website. All measuring equipment is calibrated on an annual or bi-annual basis as listed for each respective test.

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Testing Environmental Conditions

Following environmental conditions were recorded in the facility during time of testing –

Date	Test	Init.	Temperature (°C)	Humidity (%)	Pressure (kPa)
Nov-4 to 12, 2010	Conducted Emission	MX	20 - 25	35 - 42%	100 - 102.0
Nov-4 to 12, 2010	Radiated Emission	MX	20 - 25	35 - 42%	100 - 102.0
Nov-4 to 12, 2010	ESD	MX	20 - 25	35 %	100 - 102.0
Nov-4 to 12, 2010	Radiated Immunity	MX	20 - 25	35 - 42%	100 - 102.0
Nov-4 to 12, 2010	EFT	MX	20 - 25	35 - 42%	100 - 102.0
Nov-4 to 12, 2010	Surge	MX	20 - 25	35 - 42%	100 - 102.0
Nov-4 to 12, 2010	Conducted Immunity	MX	20 - 25	35 - 42%	100 - 102.0

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Detailed Test Result Section

Client	Siemens Canada – Siemens Milltronics Process Instruments	
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Power Line Conducted Emissions

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT's power line does not exceed the limits listed below as defined in the applicable test standard, as measured from a LISN. This helps protect lower frequency radio services such as AM radio, shortwave radio, amateur radio operators, maritime radio, CB radio, and so on, from unwanted interference.

Limits & Method


The limits are as defined in CISPR 11 and FCC Part 15, Section 15.107 and the methods are given in CISPR 11 and ANSI C63.4:2003.

Average Limits		QuasiPeak Limits	
150 kHz – 500 kHz	56 to 46 dBuV	150 kHz – 500 kHz	66 to 56 dBuV
500 kHz – 5 MHz	46 dBuV	500 kHz – 5 MHz	56 dBuV
5 MHz – 30 MHz	50 dBuV	500 kHz – 30 MHz	60 dBuV

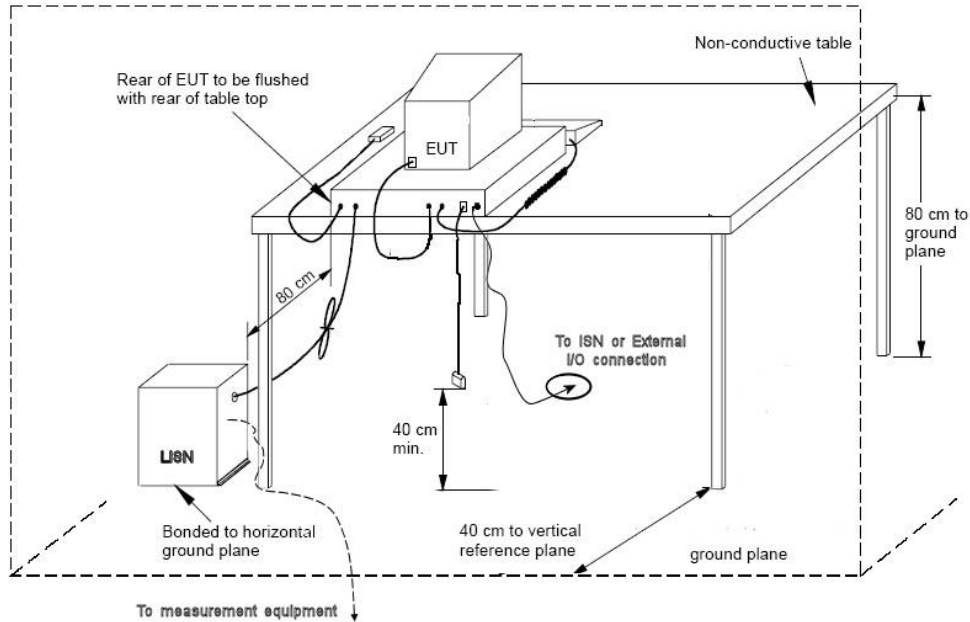
The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

Note: If the Peak or Quasi Peak detector measurements do not exceed the Average limits, then the EUT is deemed to have passed the requirements.

Both limits are applicable, and each is specified as being measured with a 9 kHz measurement bandwidth.

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Typical Setup Diagram




Measurement Uncertainty

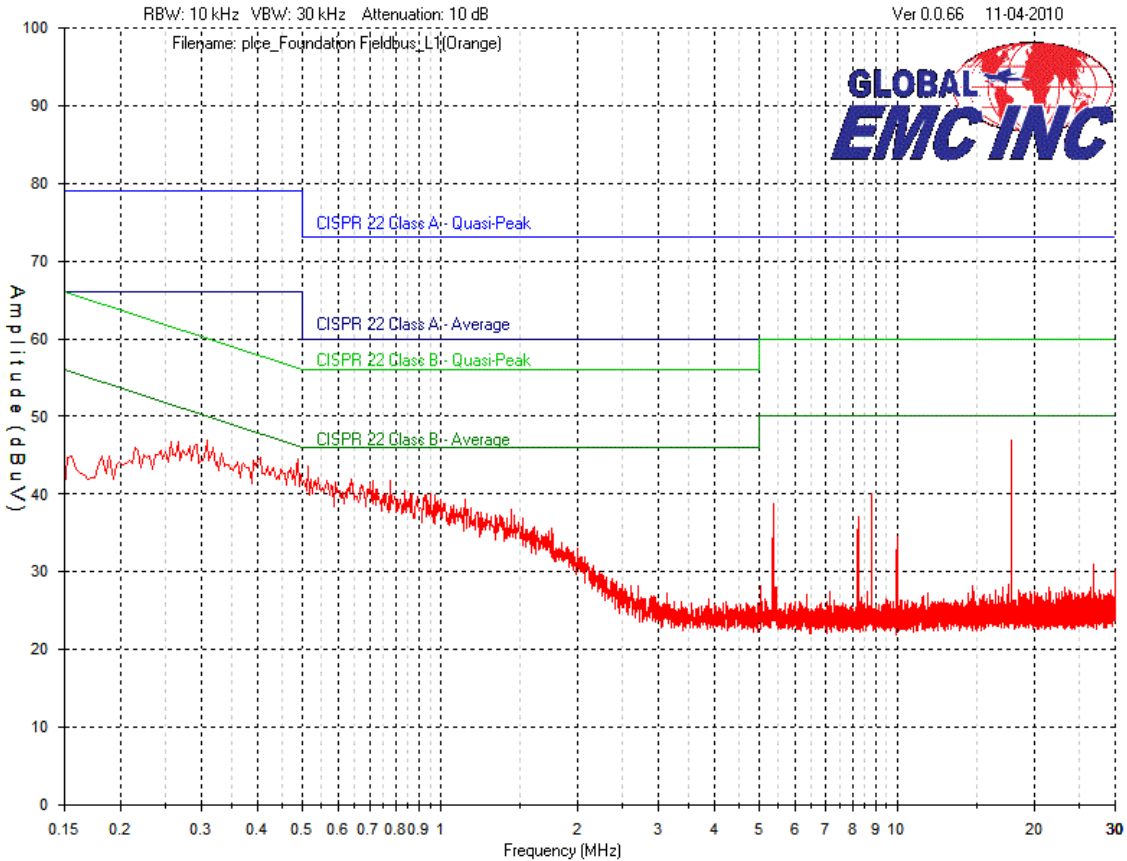
The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is ± 3.6 dB with a 'k=2' coverage factor and a 95% confidence level.


Preliminary Graphs

Note the graphs shown below are for graphical illustration only. For final measurements with the appropriate detector where applicable, please refer to the table. The graph shown below is a peak measurement graph, measured with a resolution bandwidth greater than or equal to the final required detector. These graphs are performed as a worst case measurement to enable the detection of frequencies of concern and for considerable time savings.

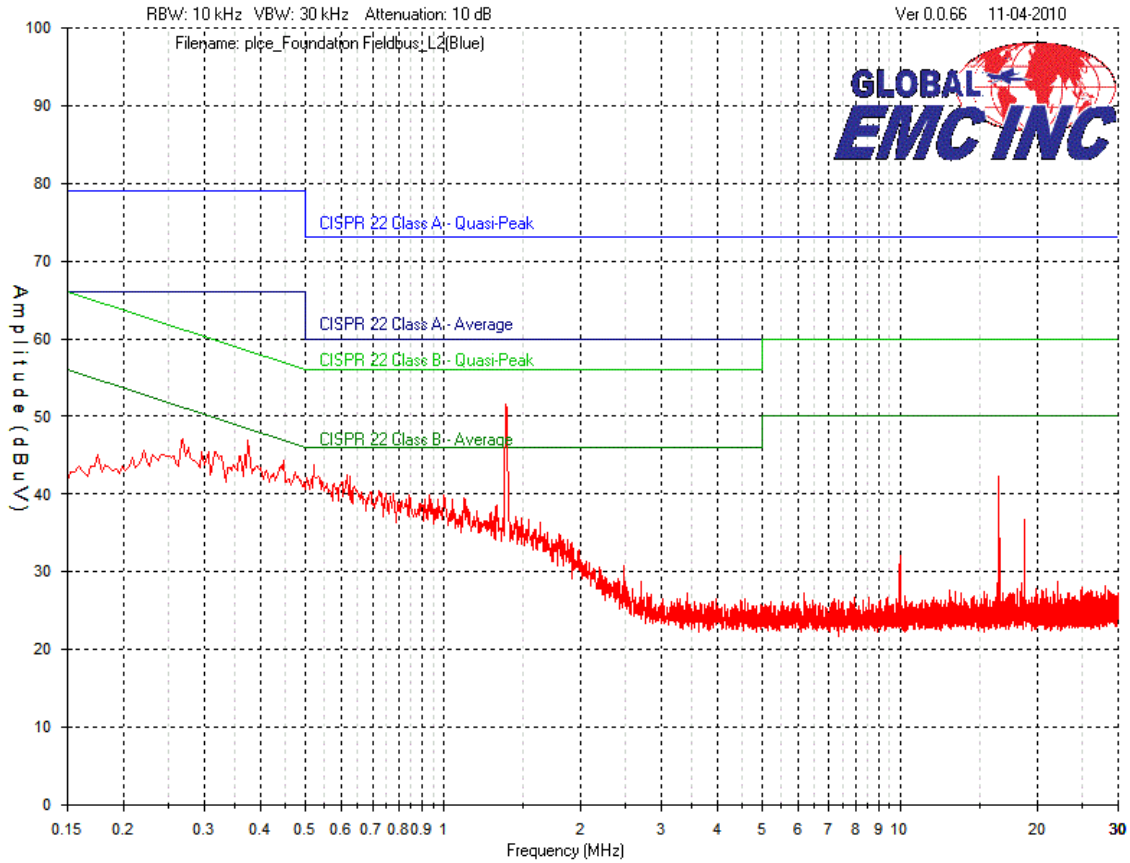
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Positive 24Vdc



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Negative 24Vdc



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Final Measurements

Product Category	Class B							
Product	SITRANS LR560 Foundation Fieldbus							
Supply	24 Vdc							
Positive (Red) – Peak Emission with respect to Quasi-Peak Limit								
Frequency (MHz)	Raw (dBuV)	Atten Factor (dB)	Cable Loss (dB)	LISN Factor (dB)	Level (dBuV)	Limit (dB)	Margin (dB)	Pass/Fail
17.8228	36.2	10	0.3	0.4	46.9	60	13.1	Pass
0.30898	36.3	10	0.1	0.5	46.9	60	13.1	Pass
17.8617	33.7	10	0.3	0.4	44.4	60	15.6	Pass
8.8193	29.7	10	0.2	0.2	40.1	60	19.9	Pass
5.36391	28.5	10	0.2	0.2	38.9	60	21.1	Pass
8.22232	26.7	10	0.2	0.2	37.1	60	22.9	Pass
Positive (Red) – Average								
18.755	25.26	10	0.3	0.4	35.96	50	14.04	Pass
0.233	24.74	10	0.1	0.5	35.34	50	14.66	Pass
17.185	17.63	10	0.3	0.4	28.33	50	21.67	Pass
Positive (Red) – Peak Emission with respect to Average Limits								
8.8193	29.7	10	0.2	0.2	40.1	50	9.9	Pass
5.36391	28.5	10	0.2	0.2	38.9	50	11.1	Pass
8.22232	26.7	10	0.2	0.2	37.1	50	12.9	Pass
Negative (White) – Peak Emission with respect to Quasi-Peak Limit								
1.37318	41.3	10	0.1	0.2	51.6	56	4.4	Pass
0.27005	36.4	10	0.1	0.7	47.2	61.1	13.9	Pass
16.4114	31.6	10	0.3	0.4	42.3	60	17.7	Pass
16.4958	30.7	10	0.3	0.4	41.4	60	18.6	Pass
18.754	25.9	10	0.4	0.5	36.8	60	23.2	Pass
10.0003	21.8	10	0.2	0.2	32.2	60	27.8	Pass
Negative (White) – Average								
1.37318	27.39	10	0.1	0.2	37.69	46	8.31	Pass
0.27005	25.16	10	0.1	0.7	35.96	51.1	15.14	Pass

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16.4114	16.65	10	0.3	0.4	27.35	50	22.65	Pass
Negative (White) – Peak Emission with respect to Average Limits								
16.4958	30.7	10	0.3	0.4	41.4	50	8.6	Pass
18.754	25.9	10	0.4	0.5	36.8	50	13.2	Pass
10.0003	21.8	10	0.2	0.2	32.2	50	17.8	Pass


Note 1: No peak emission exceeded Quasi-Peak limits; thus, the EUT was deemed to meet Quasi-Peak requirements base on peak emissions.

Note 2: See ‘Appendix B – EUT & Test Setup Photographs’ for photos showing the test set-up for the highest line conducted emission

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
IFR Spectrum Analyzer	AN940	IFR	12/29/2009	12/29/2011	GEMC 6350
LISN	FCC-LISN-50/250-16-2-01	FCC	2009-02-11	2011-02-11	GEMC 65
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 28
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
Attenuator 10 dB	FP-50-10	Trilithic	NCR	NCR	GEMC 42

This report module is based on GEMC template “CISPR11 – Power Line Conducted Emissions Class B_Rev1”

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Radiated Emissions

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT does not exceed the limits listed below as defined in the applicable test standard, as measured from a receiving antenna. This helps protect broadcast radio services such as television, FM radio, pagers, cellular telephones, emergency services, and so on, from unwanted interference.

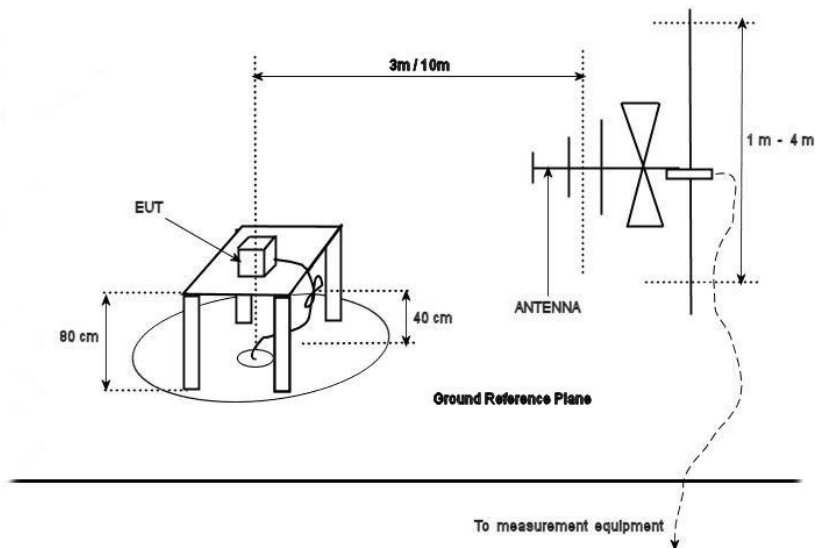
Limit(s) and Method

The limits are as defined in CISPR 11 and FCC Section 15.109(g) and the methods are given in CISPR 11 and ANSI C63.4:2003:


30 MHz – 230 MHz, 30 dBuV/m at 10m, extrapolated to 40.5 dBuV/m at 3m
 230 MHz – 1000 MHz, 37 dBuV/m at 10m, extrapolated to 47.5 dBuV/m at 3m

This limit is specified as being measured with a 120 kHz measurement bandwidth and a using a Quasi Peak detector.

Typical Radiated Emissions Setup



Note: In accordance with CISPR 11 section 5.2.2, testing was performed at a 3 meter test distance. Group 2 Class A equipment must be performed at 10 m or 30 m. An extrapolation factor of 10.5 dB was applied based on guidance provided in CISPR 11 section 7.2.3.

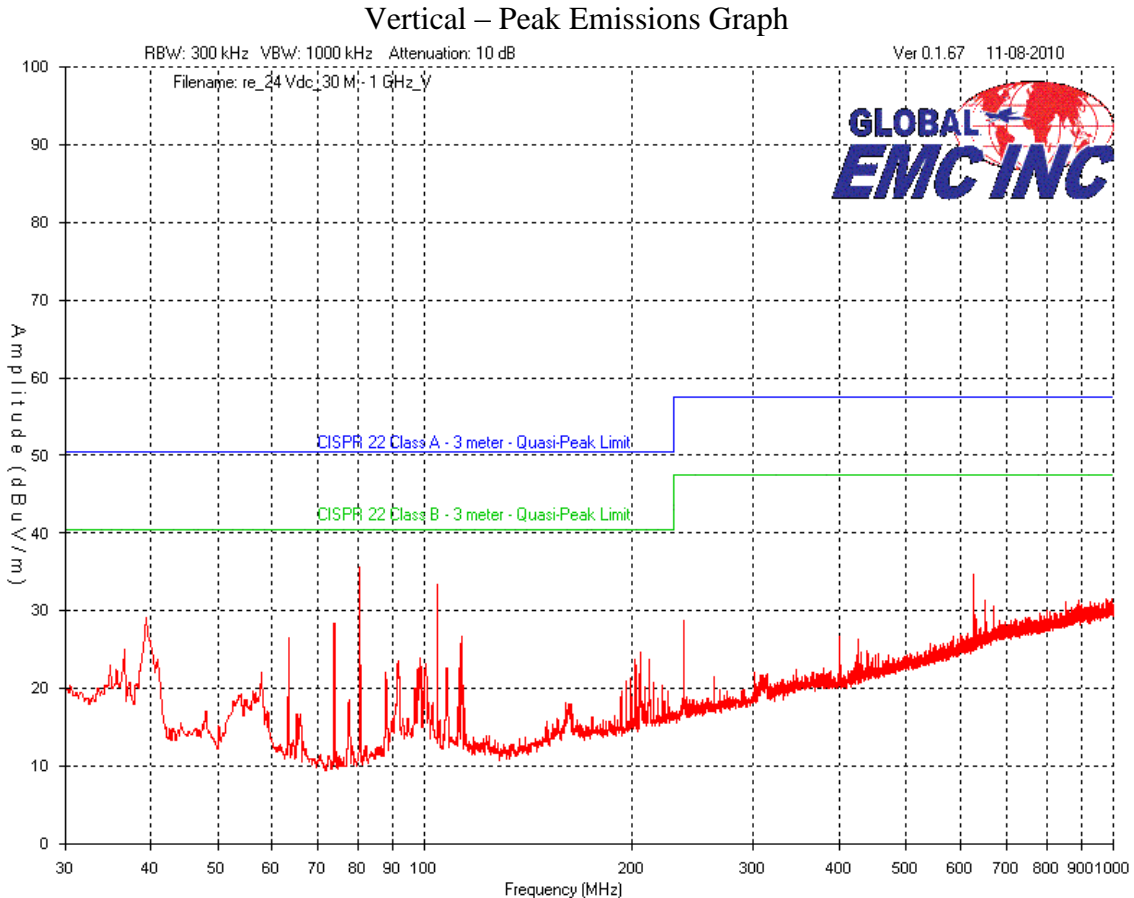
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Measurement Uncertainty

The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is +/-4.4 dB with a ‘k=2’ coverage factor and a 95% confidence level.

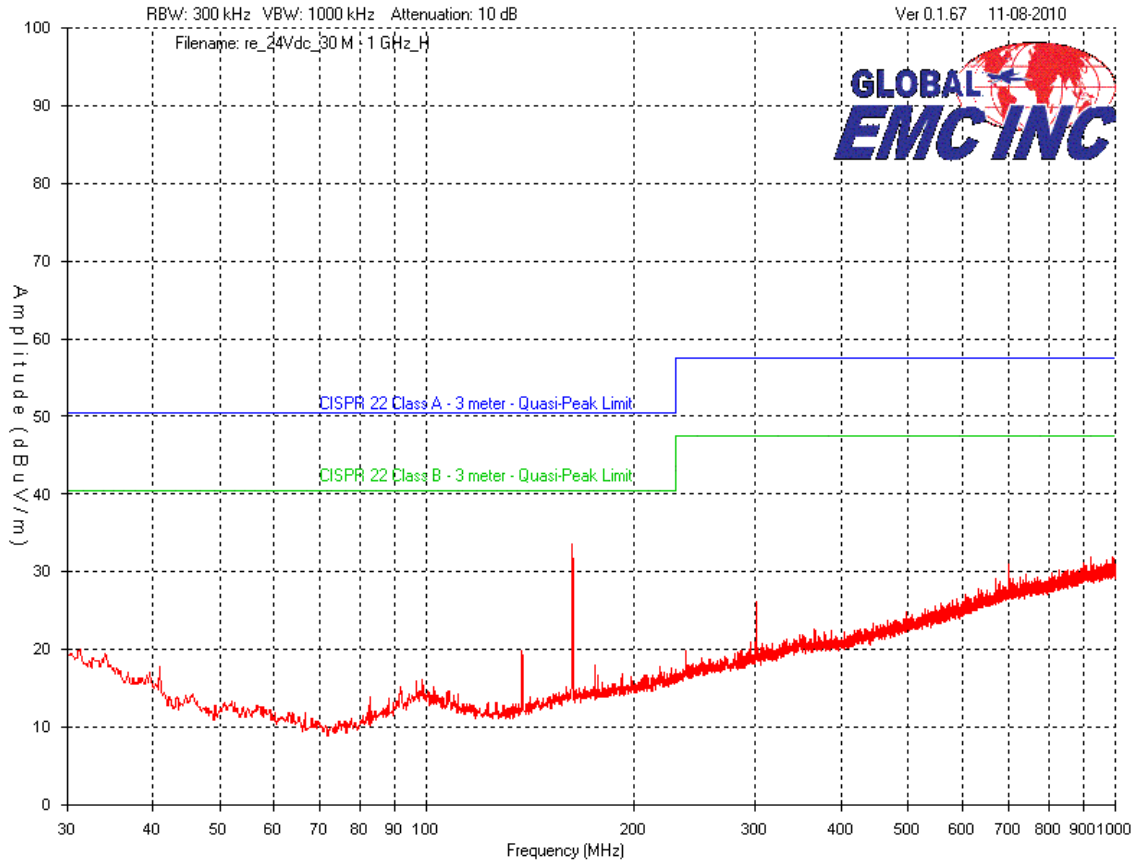
Preliminary Graphs


Note the graphs shown below are for graphical illustration only. For final measurements with the appropriate detector, please refer to the final measurement table where applicable. The graph shown below is a maximized peak measurement graph, measured over a full 0-360 rotation. This peaking process is done as a worst case measurement. This process enables the detection of frequencies of concern for final measurement, and provides considerable time savings.



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Horizontal – Peak Emissions Graph




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Final Measurements

Product Category		Class B						
Product Name		SITRANS LR560 Foundation Fieldbus						
Supply		24 Vdc						
Quasi-Peak Emissions Table - Vertical								
Frequency (MHz)	Raw (dBuV)	Antenna Factor (dB/m)	Cable RE Factor (dB)	Pre-Amp (dB)	Level (dBuV/m)	Limit (dB)	Margin (dB)	Pass/Fail
91.1	47.9	6.5	0.4	-32	22.8	40.5	17.7	Pass
98.1	49.2	9	0.5	-32	26.7	40.5	13.8	Pass
Peak Emission with respect to Quasi-Peak Limits – Vertical								
39.312	49.5	11.3	0.3	-32	29.1	40.5	11.4	Pass
73.941	54.1	5.9	0.4	-32	28.4	40.5	12.1	Pass
624.707	44.8	19.8	0.9	-30.8	34.7	47.5	12.8	Pass
112.935	50	8.2	0.5	-32	26.7	40.5	13.8	Pass
Quasi Peak Emissions Table - Horizontal								
162.696	41.9	9.5	0.5	-31.8	20.1	40.5	20.4	Pass
Peak Emission with respect to Quasi-Peak Limits – Horizontal								
919.393	38.2	22.6	1.4	-30.2	32	47.5	15.5	Pass
31.358	36.3	15.5	0.3	-32	20.1	40.5	20.4	Pass
137.379	43.5	7.8	0.5	-31.9	19.9	40.5	20.6	Pass
300.727	43.4	13.6	0.6	-31.5	26.1	47.5	21.4	Pass


Note: See ‘Appendix B – EUT & Test Setup Photographs’ for photos showing the test set-up for the highest line conducted emission

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
IFR Spectrum Analyzer	AN940	IFR	12/29/2009	12/29/2011	GEMC 6350
BiLog Antenna	3142-C	ETS	2009-02-12	2011-02-12	GEMC 8
Attenuator 3 dB	FP-50-3	Trilithic	NCR	NCR	GEMC 40
Chase Preamp 9kHz - 2 GHz	CPA9231A	Chase	8/25/2010	8/25/2012	GEMC 6403
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 28
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
RF Cable 0.5M	LMR-400-0.5M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 31

This report module is based on GEMC template "CISPR11 – Radiated Emissions Class B_Rev1"

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Electro-Static Discharge


Purpose

The purpose of this immunity test is to apply a static electricity discharge from the operator to the EUT, or create a nearby discharge field. An example of can be seen in low humidity when a person touches an object and creates is a small spark. This spark may be potentially harmful to the operation of the EUT. Most real life discharges are ‘air’ as shown in the previous example. The ‘contact’ method, with related reduced voltages, has been shown to be roughly equivalent ‘air’ in it is severity. ‘Contact’ is the preferred method due to its reproducibility. Contact method will be performed unless the discharge point is significantly insulated and the insulation can not be easily broken through. This test ensures a minimum level of immunity which is likely to occur. This test does not guarantee that the EUT will not experience a higher level which may cause it to fail.

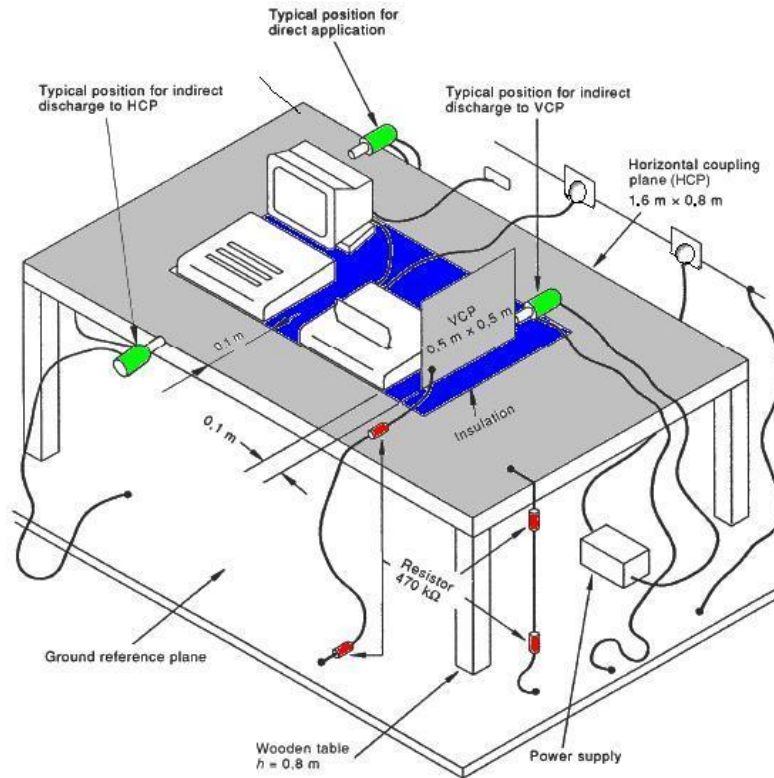
Application Level Requirement

This test is performed in accordance with the methodology defined in IEC 61000-4-2. 25 hits in negative and positive polarity will be performed at each defined discharge point on the EUT. These are called direct discharges, irrespective of contact or air being applied. Also, Horizontal Coupling Plane (HCP) and the Vertical Coupling Plane(VCP) discharges will be performed. These are called indirect discharges. For a picture representation of the EUT discharge points, see Appendix B - EUT and Test Setup Photos. For a text description of the EUT discharge points, see Appendix A - Client Provided Details. For a EUT criteria description, see Appendix A - Client Provided Details.

A level of $\pm 2, 4, 6$ kV contact, or $\pm 2, 4, 8$ kV air where applicable, was applied to each defined discharge point. Each level was ramped up by applying the lower levels first. Criteria level ‘B’ as defined in “Appendix A - Client Provided Details” was applied to this test, however all anomalies are noted.

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Typical ESD Setup



Application Level Accuracy

Contact discharge: +/- 15% as measured at tip.


Test Results

The EUT passed the requirements. For discharge to exterior points, the EUT meet criteria A; and for discharge to interior points, the EUT meet criteria C. The performance criteria are defined in Appendix A “Client Provided Details.”

During the application of ESD to the Display contact PCB traces and Terminal Block, the EUT resets at +/- 4 and 6 kV. The EUT recovers without operator intervention.


No other anomalies are observed.

Note: The maximum measured distance variation allow is ± 25 mm and the status must be good for the EUT to meet Criteria A.

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Exterior			
Location	Test Voltage	Discharge Type	Pass / Fail
1. Body of EUT – Lid: Top, Left, Right	+/- 2, 4, 6 kV	Contact	Pass
2. Lid Screw	+/- 2, 4, 6 kV	Contact	Pass
3. Grounding Lug	+/- 2, 4, 6 kV	Contact	Pass
4. Lower Body of EUT: Top, Left, Right	+/- 2, 4, 6 kV	Contact	Pass
5. Purge Adaptor	+/- 2, 4, 6 kV	Contact	Pass
6. Upper Body of EUT: Top, Left, Right	+/- 2, 4, 6 kV	Contact	Pass
7. Flange: Top, Left, Right	+/- 2, 4, 6 kV	Contact	Pass
8. VCP & HCP	+/- 2, 4, 6 kV	Contact	Pass
9. Lid window	+/- 2, 4, 8 kV	Air	Pass (No Discharge)
10. Conduit Adaptor	+/- 2, 4, 8 kV	Air	Pass (No Discharge)
11. I/O Cable	+/- 2, 4, 8 kV	Air	Pass
12. Ground Cable	+/- 2, 4, 8 kV	Air	Pass

Interior			
Location	Test Voltage	Discharge Type	Pass / Fail
1. LCD Display	+/- 2, 4, 8 kV	Air	Pass (No Discharge)
2. Buttons x4	+/- 2, 4, 8 kV	Air	Pass (No Discharge)
3. Terminal Block	+/- 2, 4, 6 kV	Contact	Pass

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

4. Ground Screw	+/- 2, 4, 6 kV	Contact	Pass
5. Display Contact Traces	+/- 2, 4, 6 kV	Contact	Pass


The following tables summarize the test results recorded:

ESD	6kV Contact Enclosure		
	Measured distances (mm)		
	Initial	Variation	Results
Average	976.2		
Minimum	975.6	968.9	-7.3
Maximum	976.4	976.5	0.3
Criteria			A
Status:	128.00000		Good

ESD	2, 4kV Contact Enclosure		
	Measured distances (mm)		
	Initial	Variation	Results
Average	978.2		
Minimum	975.2	971.0	-7.3
Maximum	980.4	980.4	2.1
Criteria			A
Status:	128.00000		Good

ESD	2, 4, 8kV Air Enclosure		
	Measured distances (mm)		
	Initial	Variation	Results
Average	974.7		
Minimum	971.2	971.2	-3.4
Maximum	976.4	976.4	1.8
Criteria			A
Status:	128.00000		Good

ESD	2, 4 6kV Contact Inside Display Contacts		
	Measured distances (mm)		
	Initial	Variation	Results
Average	973.3		
Minimum	972.1	0.0	-973.3
Maximum	974.3	976.5	3.2
Criteria			C

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Status:	77.43887	Bad
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ESD	2, 4, 6kV Contact Inside Terminal Blocks		
	Measured distances (mm)		
	Initial	Variation	Results
Average	973.5		
Minimum	972.8	0.0	-973.5
Maximum	975.3	980.6	7.1
Criteria			C
Status:	114.61628		Bad

ESD	2, 4, 8kV Air Inside_LCD_Buttons		
	Measured distances (mm)		
	Initial	Variation	Results
Average	971.2		
Minimum	968.8	968.8	-2.3
Maximum	971.8	972.0	0.9
Criteria			A
Status:	128.00000		Good

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Minizap ESD Simulator	Minizap	Thermo Electron Corp	Feb. 11, 2009	Feb. 11, 2011	GEMC 1
ESD HCP	80CMX160CM	Global EMC	NCR	NCR	GEMC 50
ESD VCP	50CMX50CM1	Global EMC	NCR	NCR	GEMC 51
ESD 470K A	2X470KOHM100CM	Global EMC	NCR	NCR	GEMC 52
ESD 470K B	2X470KOHM100CM	Global EMC	NCR	NCR	GEMC 53

This report module is based on GEMC report template 'IEC61000-4-2_ESD_Rev1'

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Radiated Field Immunity

Purpose


The EUT will likely be exposed to intentional sources of RF energy during the EUTs application. Sources of such radiations can be cellular phones, FM radio, television, remote car alarms, garage door openers, and other broadcast transmissions. These sources of radiations are licensed or certified for broadcast; hence the EUT should be immune to their RF energy. This test gives the test levels that the EUT should be immune to in order to assure the EUTs operation in expected field strengths. This test does not guarantee that the EUT will not experience a higher level field during its' operation, which may cause the EUT to fail.

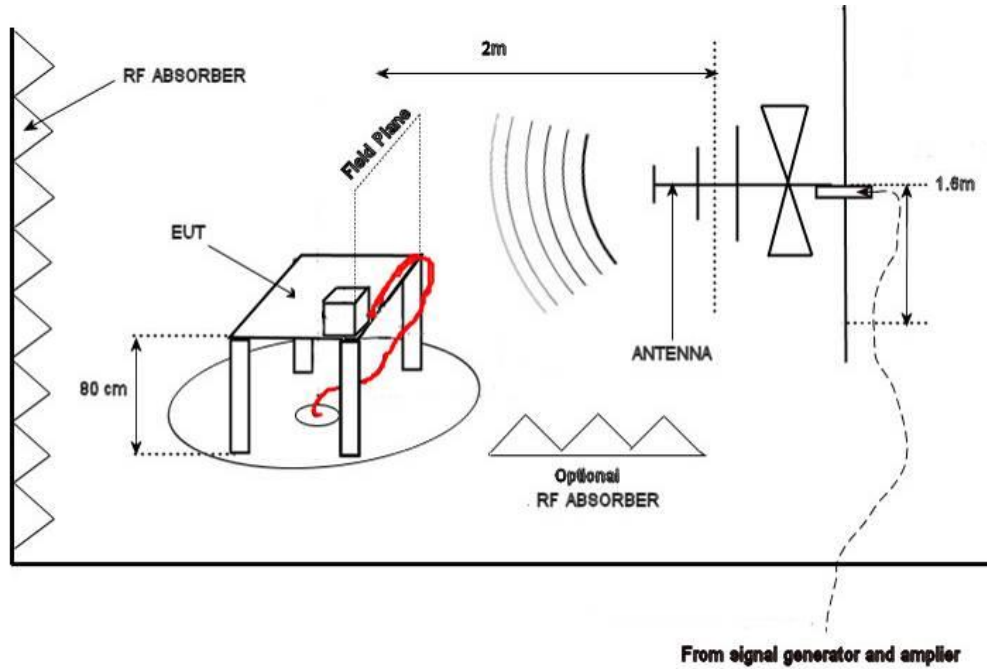
Application Level Requirement

This test is performed in accordance with the methodology defined in IEC 61000-4-3. The immunity tests were performed over the frequency range of 80 MHz to 1 GHz and 1.4 GHz to 2.7 GHz ranges. Frequency steps used were calculated at 1% step size of the previous frequency, rounded down to the nearest kHz, as the frequency range is ramped up. The level applied to the EUT was calibrated at 10 V/m. A modulation of 80% AM 1 kHz sine wave was applied during the application of the RF energy at each frequency. Both horizontal and vertical polarization was applied. 6 sides of the EUT were subjected to RF field. The dwell time used was 2.0 seconds. Forward power was monitored, and kept on file at Global EMC Inc. An isotropic field probe was placed in near proximity of the EUT to verify the application of the field. Criteria level 'A' as defined in "Appendix A – Client Provided Details" was applied to this test.

Input Voltage and Frequency	24Vdc
Frequency range and signal strength	80 MHz – 1 GHz – 10 V/m (80% AM) 1.4 GHz – 2.0 GHz – 10 V/m (80% AM) 2.0 GHz – 2.7 GHz - 1 V/m (80% AM) (tested at 10 V/m)
Sweep step	1% of fundamental.
Dwell time	2 s
EUT type	Table top

Typical Test Setup

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	



Application Level Accuracy

As per IEC61000-4-3, the RF field is specified as 0 to +6 dB for at least 12 of the 16 calibration points. For a 10 V/m field, this allows for the EUT to be subjected to a field of 10 V/m to 20 V/m with at least 75% coverage at this level.

Test Results

The EUT passed the requirements. The EUT met Criteria A as defined in “Appendix A – Client Provided Details”. No anomalies were observed.


Note: The maximum measured distance variation allow is ± 25 mm and the status must be good for the EUT to meet Criteria A.

The following tables summarize the test results recorded:

Radiated Immunity 80 MHz – 1 GHz

BH			
Measured distances (mm)			
	Initial	Variation	Results
Average	899.2		
Minimum	898.6	896.3	-2.9
Maximum	900.0	900.0	0.7

BV			
Measured distances (mm)			
	Initial	Variation	Results
Average	897.7		
Minimum	897.1	896.5	-1.1
Maximum	898.3	899.4	1.7

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

m			
Criteria			A
Status:	128.00000		Good

m			
Criteria			A
Status:	128.00000		Good

	BtH		
	Measured distances (mm)		
	Initial	Variation	Results
Average	1064.1		
Minimum	1060.1	1059.9	-4.2
Maximum	1066.9	1071.9	7.9
Criteria			A
Status:	128.00000		Good

	BtV		
	Measured distances (mm)		
	Initial	Variation	Results
Average	1064.9		
Minimum	1061.0	1056.3	-8.7
Maximum	1067.7	1074.1	9.1
Criteria			A
Status:	128.00000		Good

	FH		
	Measured distances (mm)		
	Initial	Variation	Results
Average	974.7		
Minimum	971.2	971.2	-3.5
Maximum	975.4	977.5	2.8
Criteria			A
Status:	128.00000		Good


	FV		
	Measured distances (mm)		
	Initial	Variation	Results
Average	973.6		
Minimum	973.0	969.5	-4.1
Maximum	974.1	979.9	6.4
Criteria			A
Status:	128.00000		Good

	LH		
	Measured distances (mm)		
	Initial	Variation	Results
Average	946.5		
Minimum	946.2	942.9	-3.6
Maximum	946.6	950.8	4.2
Criteria			A
Status:	128.00000		Good

	LV		
	Measured distances (mm)		
	Initial	Variation	Results
Average	948.2		
Minimum	944.8	942.9	-5.3
Maximum	950.2	950.8	2.6
Criteria			A
Status:	128.00000		Good

	RH		
	Measured distances (mm)		

	RV		
	Measured distances (mm)		

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

	Initial	Variation	Results
Average	874.9		
Minimum	869.8	869.8	-5.1
Maximum	879.7	880.8	5.9
Criteria			A
Status:	128.00000		Good

	Initial	Variation	Results
Average	876.1		
Minimum	873.2	871.0	-5.2
Maximum	883.1	884.4	8.3
Criteria			A
Status:	128.00000		Good

TH			
Measured distances (mm)			
	Initial	Variation	Results
Average	915.0		
Minimum	912.7	910.9	-4.1
Maximum	918.0	918.0	3.0
Criteria			A
Status:	128.00000		Good

TV			
Measured distances (mm)			
	Initial	Variation	Results
Average	914.1		
Minimum	913.6	909.0	-5.0
Maximum	914.7	916.2	2.1
Criteria			A
Status:	128.00000		Good


Radiated Immunity 1.4 GHz – 2.7 GHz

BH			
Measured distances (mm)			
	Initial	Variation	Results
Average	788.5		
Minimum	786.9	786.9	-1.6
Maximum	793.0	793.0	4.5
Criteria			A
Status:	128.00000		Good

BV			
Measured distances (mm)			
	Initial	Variation	Results
Average	787.6		
Minimum	786.9	786.9	-0.7
Maximum	788.4	788.8	1.2
Criteria			A
Status:	128.00000		Good

BtH			
Measured distances (mm)			
	Initial	Variation	Results
Average	1067.9		
Minimum	1066.9	1065.2	-2.7
Maximum	1069.2	1069.2	1.3
Criteria			A
Status:	128.00000		Good

BtV			
Measured distances (mm)			
	Initial	Variation	Results
Average	1070.3		
Minimum	1069.8	1065.4	-5.0
Maximum	1070.9	1070.9	0.5
Criteria			A
Status:	128.00000		Good

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

FH			
Measured distances (mm)			
	Initial	Variation	Results
Average	820.0		
Minimum	819.5	817.7	-2.3
Maximum	820.5	820.5	0.5
Criteria			A
Status:		128.00000	Good

FV			
Measured distances (mm)			
	Initial	Variation	Results
Average	817.7		
Minimum	817.0	816.7	-1.0
Maximum	818.4	822.8	5.1
Criteria			A
Status:		128.00000	Good

LH			
Measured distances (mm)			
	Initial	Variation	Results
Average	786.4		
Minimum	786.1	786.1	-0.3
Maximum	786.8	787.6	1.2
Criteria			A
Status:		128.00000	Good


LV			
Measured distances (mm)			
	Initial	Variation	Results
Average	787.0		
Minimum	786.9	781.8	-5.3
Maximum	787.1	787.5	0.5
Criteria			A
Status:		128.00000	Good

RH			
Measured distances (mm)			
	Initial	Variation	Results
Average	783.1		
Minimum	782.7	781.4	-1.7
Maximum	783.5	783.5	0.4
Criteria			A
Status:		128.00000	Good

RV			
Measured distances (mm)			
	Initial	Variation	Results
Average	781.9		
Minimum	781.6	781.6	-0.3
Maximum	782.6	783.3	1.5
Criteria			A
Status:		128.00000	Good

TH			
Measured distances (mm)			
	Initial	Variation	Results
Average	919.2		
Minimum	918.8	918.7	-0.5
Maximum	919.7	919.7	0.5
Criteria			A
Status:		128.00000	Good


TV			
Measured distances (mm)			
	Initial	Variation	Results
Average	919.1		
Minimum	918.8	918.7	-0.4
Maximum	919.4	919.4	0.3
Criteria			A
Status:		128.00000	Good

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Signal Generator	SMT 03	Rhode and Schwarz	July 1, 2009	July 1, 2011	GEMC 2
BiLog Antenna	3142-C	ETS	Feb. 12, 2009	Feb. 12, 2011	GEMC 8
Horn Antenna 1 – 4.2GHz	AT 4510	AR	NCR	NCR	GEMC 26
Power Amplifier	150W1000	AR	NCR	NCR	GEMC 23
Power Amplifier	10S1G4A	AR	NCR	NCR	GEMC 24
Field probe	FL 7006	AR	Aug 19, 2010	Aug 19, 2012	GEMC 25
Field Mon.	FM7004	AR	Aug 19, 2010	Aug 19, 2012	GEMC 13
Power Head	PH 2000	AR	Feb. 11, 2009	Feb. 11, 2011	GEMC 15
Power meter	PM 2002	AR	Feb. 9, 2009	Feb. 9, 2011	GEMC 16

This report is based upon GEMC report template 'IEC61000-4-3_RadiatedImmunity_Rev1'

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Electrical Fast Transients / Bursts

Purpose

Electronic fast transients / bursts are simulated in this test on the supply and I/O lines of the EUT. In a typical application environment, fast voltage disturbances may be injected into these ports of the EUT. These signals usually arise from nearby switching circuitry such as a light switch, relay bounces, electric motor noise, or other such electrical phenomenon. The EUT should be immune to such disturbances. This test does not guarantee that the EUT will not experience a higher level field during its' operation, which may cause the EUT to fail.

Application Level Requirement


This test is performed in accordance with the methodology defined in IEC 61000-4-4. The voltage waveform applied has the following characteristics:

- Pulse rise time 5 ns \pm 30%
- Pulse duration (to 50% value) 50ns \pm 30%
- Pulse repetition frequency 5kHz (75 pulses per burst train)
- Burst duration should be 15 ms \pm 20%
- Burst period should be 300 ms \pm 20%

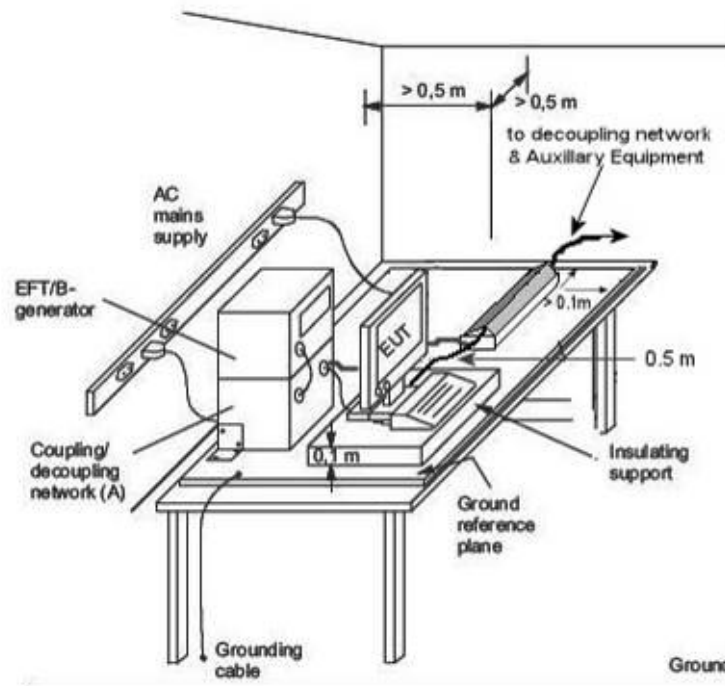
Bursts are applied for 1 minute each at positive and negative for DC power and/or I/O lines and Ground Line.

A test level of 500 V and 1 kV was applied to I/O and/or DC power lines, and ground line via a capacitive coupling clamp. Lower levels were evaluated by ramping up to the required level. Criteria level 'A' as defined in "Appendix A – Client Provided Details" was applied to this test.

Test Voltage	Repetition rate	Coupling Lines	Result
+/- 1 kV, +/- 0.5 kV	5 kHz	I/O and/or DC Lines	Pass
+/- 1 kV, +/- 0.5 kV	5 kHz	Ground Line	Pass

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Typical Test Setup



Application Level Accuracy


As per IEC61000-4-4, the level is specified as being within +/- %20. For an application level of 1kV, this allows for the EUT to be subjected to 980 V to 1.2 kV.

Test Results

The EUT passed the requirements. The EUT met Criteria A as defined in “Appendix A – Client Provided Details”. No anomalies were observed.

Note: The maximum measured distance variation allow is ± 25 mm and the status must be good for the EUT to meet Criteria A.

The following tables summarize the test results recorded:

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Cable	I/O		
	Measured distances (mm)		
	Initial	Variation	Results
Average	1019.4		
Minimum	1017.1	1017.1	-2.3
Maximum	1021.6	1022.7	3.3
Criteria			A
Status:	128.00000		Good


Cable	Gnd		
	Measured distances (mm)		
	Initial	Variation	Results
Average	1011.0		
Minimum	1008.9	1008.0	-2.9
Maximum	1014.1	1014.1	3.2
Criteria			A
Status:	128.00000		Good

Equipments Used

Following equipments were used for EFT immunity testing of the device.

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Immunity generator	EMC Pro Plus	Keytek Thermo Corp	Feb. 13, 2009	Feb. 13, 2011	GEMC 4
CCL Clamp	EMC Pro Plus	Keytek Thermo Corp	NCR	NCR	GEMC 5

This report module is based on GEMC report template 'IEC61000-4-4_EFTB_Rev1'

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Surge

Purpose


Surge occurs when a high energy disturbance takes place on the power, or less frequently I/O lines. These disturbances can cause significant temporary increases in current and/or voltage. These disturbances can arise during a nearby storm due to lightning, circuit trips, short-circuits on the same power line the equipment is connected to. The sudden rise in voltage over a very short period of time could cause damage to the components of the EUT. Surges are simulated during this test to test the EUTs immunity to surges. This test differs from EFT / B in that this waveform has more sufficient time to allow for damage to the EUT. This test does not guarantee that the EUT will not experience a higher level field during its' operation, which may cause the EUT to fail. This test does not ensure operation of the EUT in the presence of direct lightning effects.

Application Level Requirement

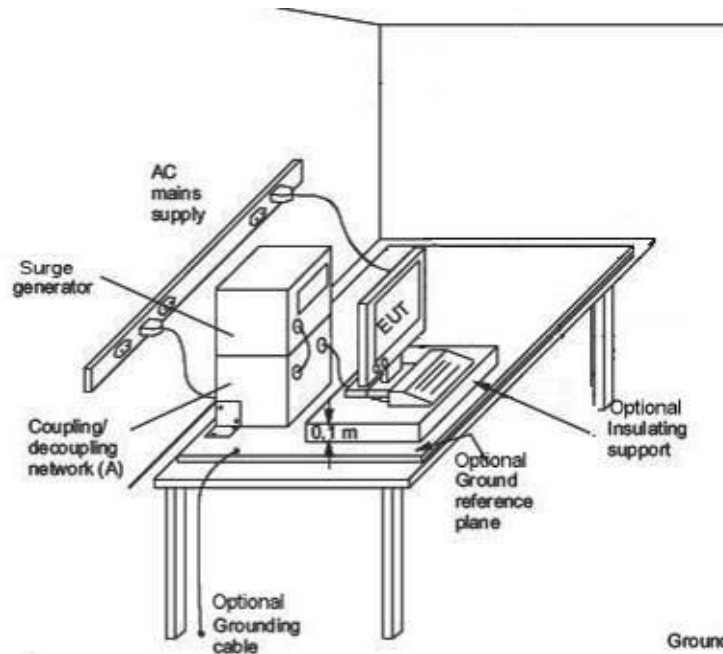
This test was performed in accordance with the methodology defined in IEC61000-4-5. Surges are simulated using a waveform generator. The characteristics of the waveform generated are as follows –

- Rise time of 1.2 μ S and wave duration of 50 μ S (to 50%) into an open circuit
- Rise time of 8 μ S and wave duration of 20 μ S (to 50%) into a short circuit
- Dwell time between each surge was 60s.
- 5 surges in positive and 5 surges in negative are performed
- For AC systems; 0 °, 90 °, and 270 ° phases of waveform are tested
- For AC systems; Line – PE is performed at 2 times the Line – Line voltage

A test level of ± 0.5 kV and ± 1.0 kV was directly to the shield of the shielded cable. Lower levels were evaluated by ramping up to the required level. Criteria level ‘A’ as defined in “Appendix A – Client Provided Details” was applied to this test.

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Typical Test Setup




Application Level Accuracy

As per IEC61000-4-5 the level is specified as being within +/- 10% for open circuit voltage calibration or +/- 10% short circuit current calibration. The EUTs input impedance or whether Line – PE or Line – Line is being performed, combined with the calibrated generators output impedance will effect the timing and voltage/current of the waveform applied to the EUT.

Test Results

The EUT passed the requirements. The EUT meet Criteria A as defined in “Appendix A – Client Provided Details.” No anomalies were observed. The EUT operated within manufacturer tolerances.

Test Voltage	Phase angles	Number of surges	Coupling lines	Pass / Fail
+/- 1 kV	Random	5	Shield – PE	Pass
+/- 1 kV	Random	5	Shield – PE	Pass
+/- 0.5 kV	Random	5	Shield – PE	Pass

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

+/- 0.5 kV	Random	5	Shield – PE	Pass
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Note: The maximum measured distance variation allow is ± 25 mm and the status must be good for the EUT to meet Criteria A.


The following tables summarize the test results recorded:

Cable	I/O		
	Measured distances (mm)		
	Initial	Variation	Results
Average	1011.1		
Minimum	1008.6	997.7	-13.4
Maximum	1013.6	1013.6	2.5
Criteria			A
Status:	128.00000		Good

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Immunity generator	EMC Pro Plus	Keytek Thermo Corp	Feb. 13, 2009	Feb. 13, 2011	GEMC 4

This report module is based on GEMC report template 'IEC61000-4-5_Surge_Rev1'

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	


Conducted RF Immunity

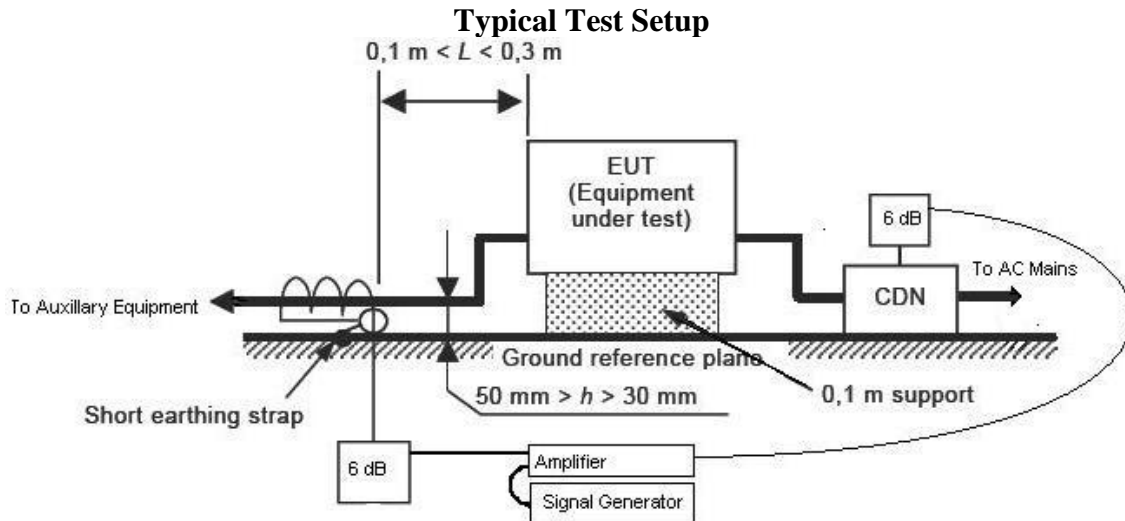
Purpose

The EUT will likely be exposed to low frequency intentional sources of RF energy during the EUTs application. Sources of such radiations can be AM radio, shortwave radio, CB transmissions, and other low frequency broadcast transmissions. These sources of radiations are licensed or certified for broadcast; hence the EUT should be immune to their RF energy. Due to the properties of radio, the power or I/O lines on the EUT would likely be the passive receiving antenna that induces the disturbance to the EUT. Since this is the main method of coupling at this frequency range, the direct application of the RF energy to the line being tested is used. At this frequency range and level, this method is easier to produce and reproduce in a laboratory environment than subjecting the EUT to an equivalent RF field.

Application Level Requirement

This test is performed in accordance with the methodology defined in IEC 61000-4-6. I/O cables and DC power lines were performed using a bulk current injection probe. The immunity test is performed over the frequency range of 10 kHz to 80 MHz. Frequency steps used were calculated at 1% step size of the previous frequency, rounded down to the nearest kHz, as the frequency range is ramped up. The level applied to the EUT was calibrated at 10 Vrms. A modulation of 80% AM 1kHz sine wave was applied during the application of the RF energy at each frequency. The dwell time used was 3.0 seconds. A current probe was placed between the coupling device and the EUT to verify the application of the RF energy. Criteria level 'A' as defined in "Appendix A – Client Provided Details" was applied to this test.

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	



Application Level Accuracy


As per IEC 61000-4-6, the CDN must meet a common mode impedance $|Z_{CE}| = 150 \Omega \pm 20 \Omega$ for 150 kHz to 26 MHz and $|Z_{CE}| = 150 \Omega + 60 \Omega$ or $150 \Omega - 45 \Omega$ for 26 MHz \rightarrow 80 MHz. During tests using the bulk current injection probe, the impedance of each cable will affect the current injected, so current was monitored. The calibration performed according to IEC 61000-4-6 allows for +/- 2dB.

Test Results

The EUT passed the requirements. The EUT met Criteria A as defined in “Appendix A – Client Provided Details”. No anomalies were observed.

Input Voltage and Frequency	24 Vdc
Frequency range and signal strength	10 kHz – 80 MHz – 10 Vrms (80% AM)
Sweep step	1% of fundamental.
Dwell time	3 s
EUT type	Table top

Note: The maximum measured distance variation allow is ± 25 mm and the status must be good for the EUT to meet Criteria A.

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

The following tables summarize the test results recorded:

Cable	I/O w/ GND 10 – 150 kHz		
	Measured distances (mm)		
	Initial	Variation	Results
Average	942.3		
Minimum	939.0	934.2	-8.1
Maximum	946.1	946.1	3.8
Criteria			A
Status:	128.00000		Good

Cable	I/O w/ GND 0.15 – 80 MHz		
	Measured distances (mm)		
	Initial	Variation	Results
Average	933.0		
Minimum	928.2	925.5	-7.5
Maximum	935.2	935.4	2.4
Criteria			A
Status:	128.00000		Good


Cable	I/O No GND 10 – 150 kHz		
	Measured distances (mm)		
	Initial	Variation	Results
Average	938.3		
Minimum	935.5	934.2	-4.2
Maximum	941.5	946.0	7.6
Criteria			A
Status:	128.00000		Good

Cable	I/O No GND 0.15 – 80 MHz		
	Measured distances (mm)		
	Initial	Variation	Results
Average	947.0		
Minimum	942.2	934.3	-12.8
Maximum	948.9	950.8	3.8
Criteria			A
Status:	128.00000		Good

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
CDN	CDN-M3	Vican	Feb. 11, 2009	Feb. 11, 2011	GEMC 11
Power Amplifier	75A250A	AR	NCR	NCR	GEMC 14
RF Current probe	F-33-2	FCC	Feb. 11, 2009	Feb. 11, 2011	GEMC 19
Bulk Current Injection Probe	F-120-9A	FCC	Feb. 11, 2009	Feb. 11, 2011	GEMC 20
Signal Generator	SMT 03	Rhode and Schwarz	July 1, 2009	July 1, 2011	GEMC 2
Power Attenuator 6 dB	100-A-FFN-06	Bird	NCR	NCR	GEMC 48

This report module is based on GEMC report template 'IEC61000-4-6_ConductedImmunity_Rev1'

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Power Frequency Magnetic Field

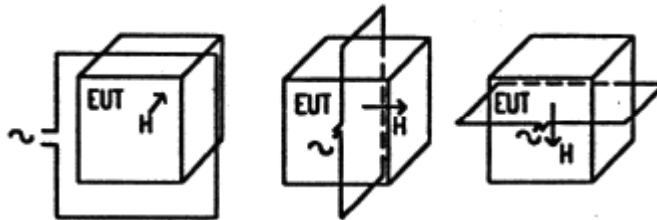
Purpose

A magnetic field with a frequency of the power line is generated around the EUT. In practice, the EUT will be subjected to power frequency magnetic fields from nearby power lines, transformers, or devices such as televisions or monitors. Since the EUT is usually used in conjunction with other electrical equipment, it is subjected to the Steady State Magnetic Fields – these are magnetic fields that the device is exposed to under constant operating conditions. These fields have a lower field strength compared to typical Transient Magnetic fields.

Application Level Requirement

This test is performed in accordance with the methodology defined in IEC 61000-4-8. 3 orthogonal axes of the EUT are subjected to the field within the magnetic loop. Transient magnetic field level, if applicable, was tested for 1 minute. Steady state magnetic field level was tested for 3 minutes, or longer. The frequency applied was 50 and 60 Hz. A level of 100 A/m was applied to the EUT in each axis. Criteria level ‘A’ as defined in “Appendix A – Client Provided Details” was applied to this test.

Typical Setup Diagram




Application Level Accuracy

As per IEC61000-4-8, the field over the area the EUT occupies within the loop must be calibrated to be within +/- 3 dB. For field strength of 3 A/m, this means the empty calibrated field strength will be between 2.1 A/m and 4.2 A/m over the area the EUT occupies.

Test Results

The EUT passed the requirements. The EUT met Criteria A as defined in “Appendix A – Client Provided Details”. No anomalies were observed. The EUT operated within manufacturer specified tolerance.

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Note: The maximum measured distance variation allow is ± 25 mm and the status must be good for the EUT to meet Criteria A.

The following tables summarize the test results recorded:


Side	F-B		
	Measured distances (mm)		
	Initial	Variation	Results
Average	954.5		
Minimum	950.0	950.0	-4.5
Maximum	955.8	961.8	7.3
Criteria			A
Status:	128.00000		Good

Side	L-R		
	Measured distances (mm)		
	Initial	Variation	Results
Average	945.0		
Minimum	944.4	943.2	-1.8
Maximum	945.5	945.5	0.5
Criteria			A
Status:	128.00000		Good

Side	T-B		
	Measured distances (mm)		
	Initial	Variation	Results
Average	1003.7		
Minimum	998.3	998.3	-5.3
Maximum	1007.2	1008.3	4.7
Criteria			A
Status:	128.00000		Good


Test Equipment Used

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
100 Turn Magnetic Loop	1mx1m	Global EMC	NCR	NCR	GEMC 136
Variac	PWRSTA 3PN126	Powerstat	NCR	NCR	GEMC 6032


Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

milligauss meter	4180	F W Bell	NCR	NCR	GEMC 74
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This report module is based on GEMC report template 'IEC61000-4-8_MagneticImmunity_Rev1'

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	


Appendix A – Client Provided Details

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Client Details	
Organization / Address	Siemens Canada – Siemens Milltronics Process Instruments 1954 Technology Drive Peterborough, ON K9J 6X7
Contact	Lee Rogers
Phone	1-705-740-7103
Email	lee.rogers@siemens.com
EUT (Equipment Under Test) Details	
EUT Name (for report title)	SITRANS LR560 Foundation Fieldbus
EUT Model / SN (if known)	Model: 7ML5440-xxx00-xCxx SN: B3P-180
Software version	1.00.00-32
Equipment category	Equipment intended for use in Industrial locations
EUT is powered using	24VDC current loop/2-wire shielded Foundation Fieldbus communication
Input voltage range(s) (V)	14-32 VDC
Frequency range(s) (Hz)	N/A
Rated input current (A)	22.6mA max
Nominal power consumption (W)	0.48W
Number of power supplies in EUT	1
Transmits RF energy? (describe)	Yes 78-79GHz
Basic EUT functionality description	SITRANS LR560 Foundation Fieldbus (EUT) is radar level measurement device. The product is used in industrial locations for level monitoring of liquids, solids and slurries in a “continuous monitored operation”. The EUT powered up by 24VDC current loop/2-wire Foundation Fieldbus Communication. It operated by transmitting Interrupted Frequency Modulated Carrier Wave (FMCW) radar pulses at 78-79GHz from it’s antenna and the same antenna will receive the reflection signals from


Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

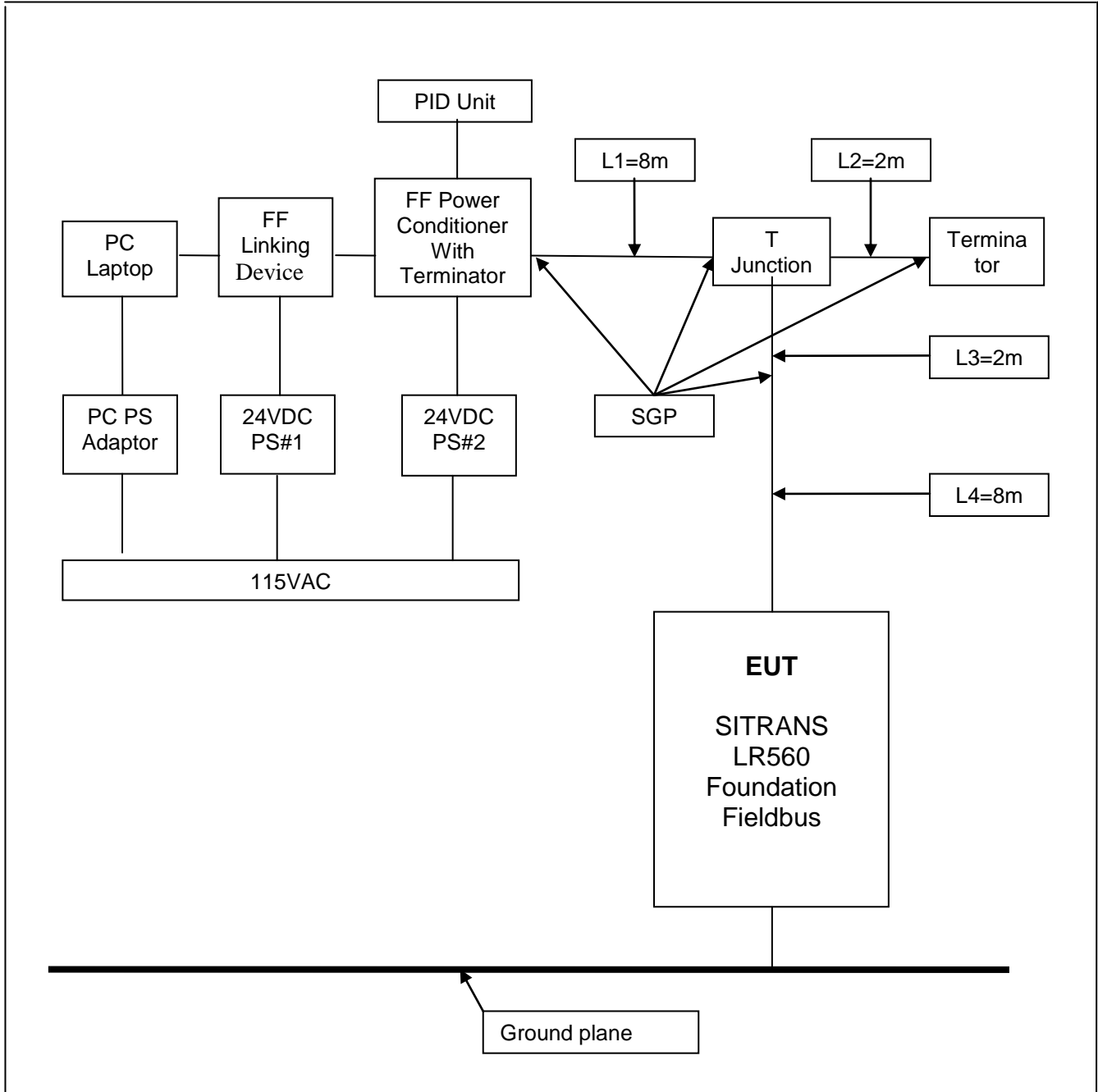
	the surface of the material. A receiver registers the reflection signals and links it with the simultaneously transmitted signals, the different between the received and transmitted frequency is then analyzed and calculated to determine the distance of material. This distance is used as a basic for display of material level; an external Foundation Fieldbus Communication of a PC may also be used to communicate this information.
High level block diagram of EUT (attachment)	See the below block diagram
Modes of operation	Measurement Mode: Device displays distance on display
Step by step instructions for setup and operation	Perform a master reset, then run the quickstart setup as follow: <ul style="list-style-type: none"> - Units=mm - Lo calibration point = 2000mm - Speed of Response = Fast - Operation: Distance
Customer to setup EUT on site?	Yes
EUT response time (ms)	1sec
EUT setup time (min)	15 minutes
Frequency of all clocks present in EUT	Oscillators' Frequencies: 2MHz, 100MHz, 125-145MHz, 25-29MHz, 1.5GHz, 1.625-1.645GHz and 13.0-13.1GHz CPU's Frequencies: 32.768KHz and 10MHz
I/O cable description Specify length and type	24VDC current loop/2-wire shielded Foundation Fieldbus communication
Available connectors on EUT	Terminal Block
Peripherals required to exercise EUT Ex. Signal generator	1. GPS-3030 GW DC Power Supply, SN: C831617

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	


	<p>2. GPS-3030 GW DC Power Supply, SN: C831622</p> <p>3. FG-100 FF Linking Device - Softing, SN: 1E6D11-4000</p> <p>4. KLD2-PC-1.1IEC FF Power Conditioner – Pepperl + Fuchs, SN: 802561</p> <p>5. D810 Dell Latitude (Laptop), SN: 38337875677</p> <p>6. E & H M (PID) Host Unit SN: 8C00481508D</p> <p>7. Terminator</p>
Dimensions of product	<p>L 100mm</p> <p>W 200mm</p> <p>H 190mm</p>
Method of monitoring EUT and description of failure for immunity.	<p>During testing, the EUT was mounted with its antenna facing to a target (the target distance is approximately 1m from the flange of the antenna), and the measured distance was continuously monitored.</p> <p>A PC (Laptop) with Foundation Field Bus Configurator will log the measured distance and control status of the EUT via the FF Linking Device to determine pass/fail criteria during testing. For immunity criteria A, a maximum measured distance variation allow for ± 25mm and the status must be good (Status byte = 128 – 255) with the retries limit = 2.</p>


The following drawings show details of the EUT test setup for:
Radiated and Conducted Emission measurements and Radiated, Conducted,
Magnetic Field ESD, EFT and Surge Immunity.

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	



1. SGP: Shield Ground Point.
2. L1 – L4: Shielded BELDEN-M 3076F DATABUS (R) cable.
3. PID: Proportional Integral Derivative.

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

EUT Functional Description

EUT Configuration

Please see Appendix B for a picture of the unit running in normal conditions and figure above.

Operational Setup

These devices are required to be attached to the EUT for its normal operation.

- Please see above table.

Modifications for Compliance

The following modifications were made during testing for the sample to achieve compliance with the testing requirements:


- None - the production sample provided met the requirements without need for modification

Criteria Description


Performance criterion A: During testing, normal performance as specified by the manufacturer.

Performance criterion B: During testing, temporary degradation, or loss of function or performance which is self-recovering.

Performance criterion C: During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs. This performance criterion was not used during the application of immunity on this product.


Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	

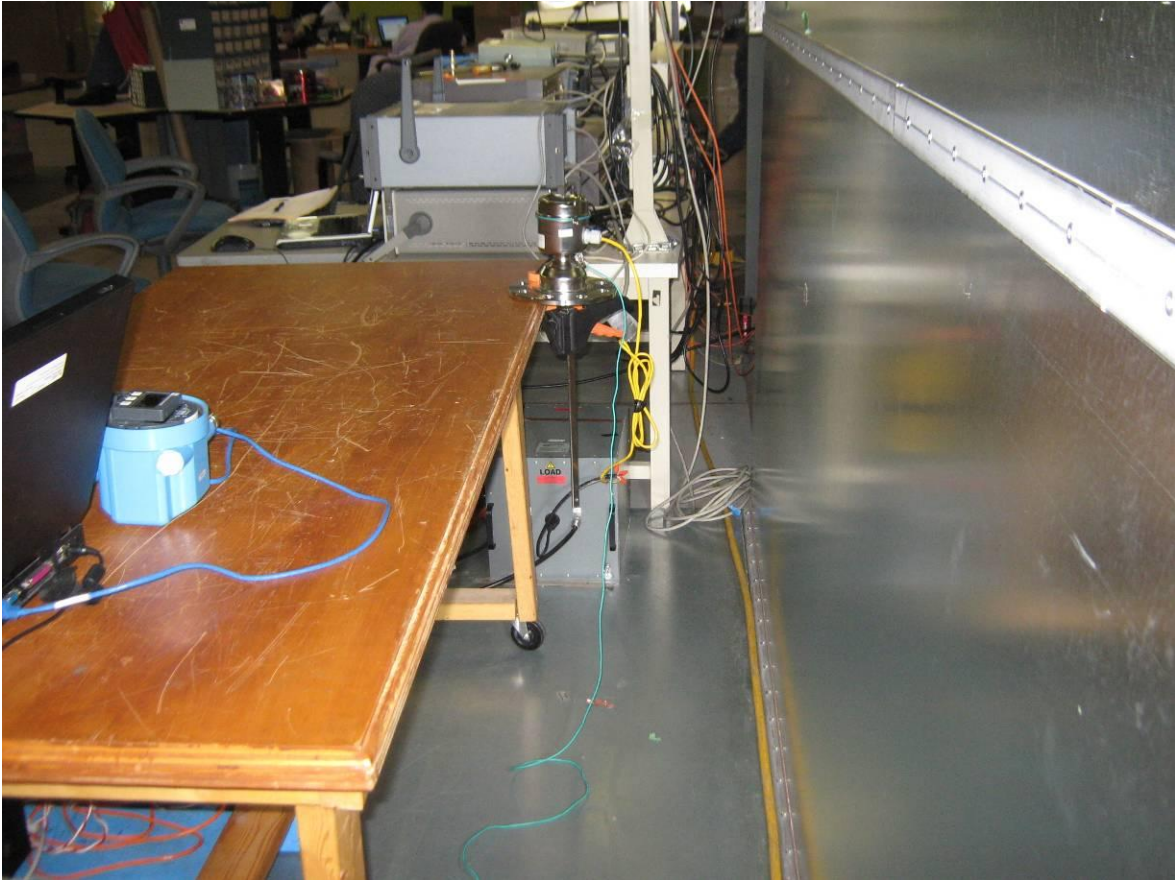
Appendix B – EUT & Test Setup Photos

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	



Conducted Emission Setup – Photo 1

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	




Conducted Emission Setup – Photo 2

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	




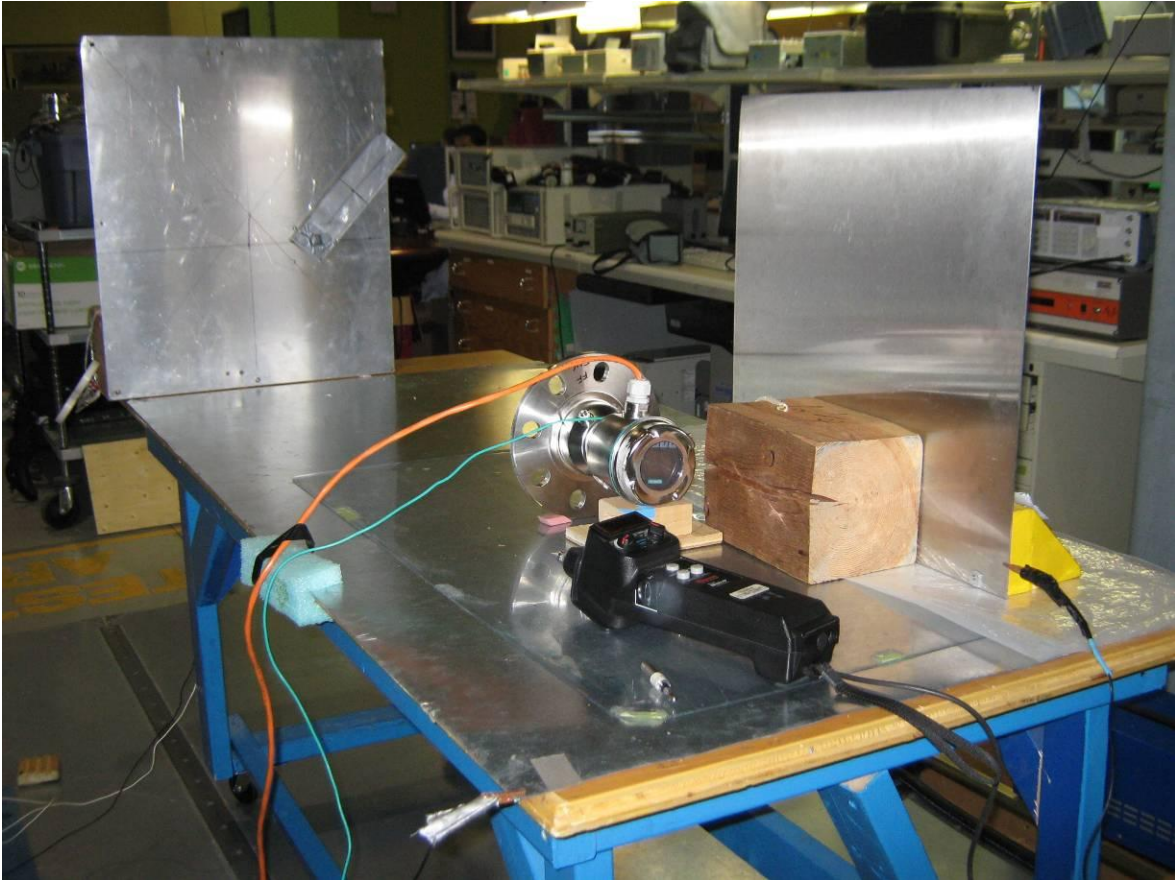
Radiated Emission Setup – Photo 1

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	



Radiated Emission Setup – Photo 2

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	



ESD Setup

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	



Radiated Immunity Setup – Photo 1

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	




Radiated Immunity Setup – Photo 2

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	




Radiated Immunity Setup – Photo 3

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	




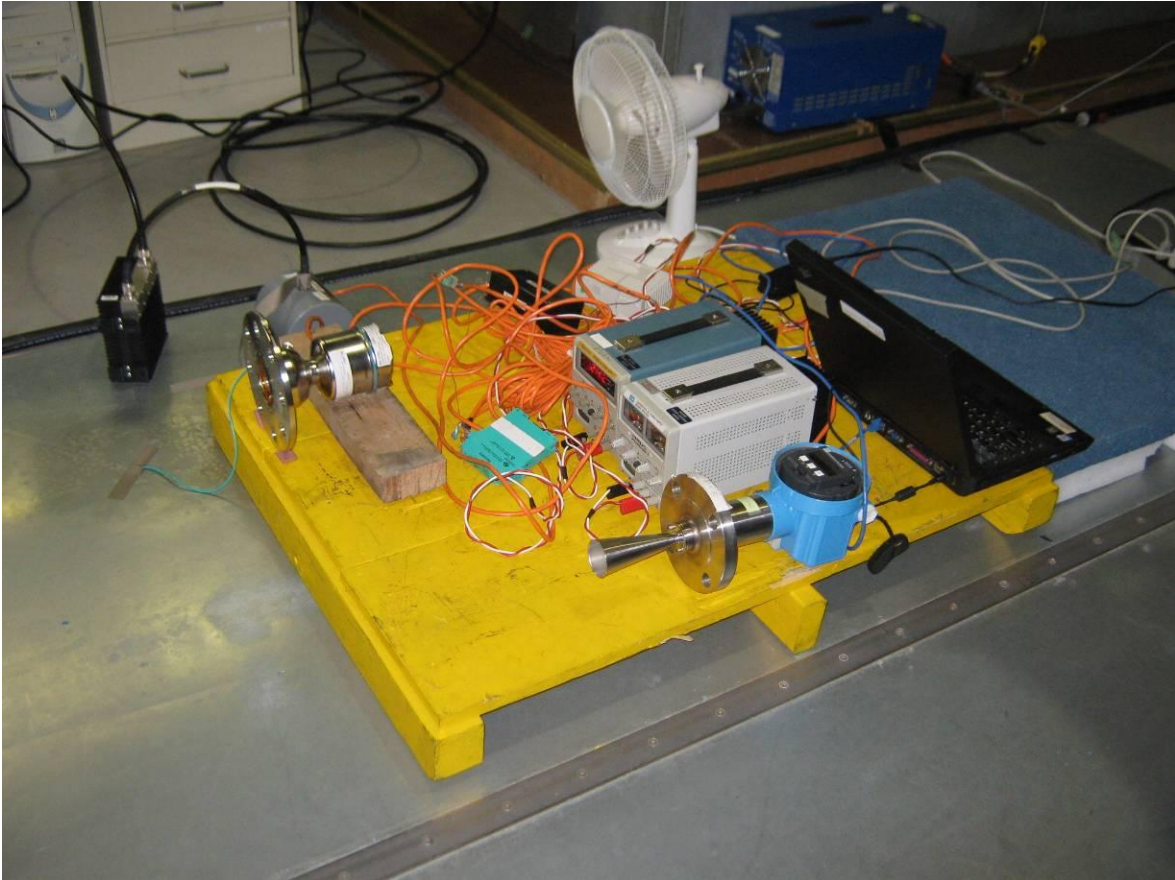
Electronic Fast Transient / Burst Setup – Photo

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	




Surge Setup – Photo

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	



Conducted Immunity Setup – Photo

Client	Siemens Canada – Siemens Milltronics Process Instruments	
Product	SITRANS LR560 Foundation Fieldbus	
Model	7ML5440-xxx00-xCxx	
Standard(s)	IEC / EN 61326-1:2005 & IEC / EN 61326-2-5:2006	



Power Frequency Magnetic Field Immunity Setup - Photo