

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Siemens SITRANS LR560, 7ML5440 TLPR Foundation Fieldbus variant

FCC ID: NJA-LR560

To: FCC Part 2.1049

Test Report Serial No:
RFI-RPT-RP78054JD01F

This Test Report Is Issued Under The Authority
Of Scott D'Adamo, Operations Manager Global
Approvals:



Checked By:

Ian Watch

Signature:



Date of Issue:

18 October 2010

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1. Customer Information




Company Name:	Siemens Milltronics Process Instrument Inc.
Address:	1954 Technology Drive P.O. Box 4225 Peterborough, ON Canada K9J 7B1

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR2.1049 Tested in accordance with Notice of Proposed Rulemaking and Order to allow tank level probing radar devices to operate in the 77-81 GHz frequency band on an unlicensed basis under the provisions of Part 15 of the Commissions' rules, request released January 19, 2010. RM-11352 (ET Docket 10-23).
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2010: Part 2 Frequency Allocations and Radio Treaty Matters; General Rules and Regulations Sub-Part J – Measurements Required: Occupied Bandwidth
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH, England
Test Dates:	25 August 2010 to 26 August 2010

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 2.1049	Transmitter 20 dB Bandwidth	
Key to Results  = Complied  = Did not comply		

Notes

1. None

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2009)
Title:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

2.4. Deviations from the Test Specification

As there are no formal rules or regulations to govern the testing requirements for a TLPR operating in the 77-81 GHz band, a Notice of Proposed Rulemaking and order ET Docket 10-23 RM-11352 was released by the FCC to allow this type of product.

At the request of the customer, only 20 dB bandwidth measurements at nominal and extreme conditions were performed.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Description:	Tank Level Probing Radar
Brand Name:	Siemens SITRANS LR560
Model Name or Number:	7ML5440
Variant:	Foundation Fieldbus
Serial Number:	B3-055
Hardware Version Number:	1.00.00
Software Version Number:	None Stated
FCC ID Number:	NJA-LR560

Description:	TPLR Tank
Dimensions:	Height: 0.78 m
	Diameter: 0.50 m

3.2. Description of EUT

The equipment under test was a pulsed radar system operating in the 77 - 81 GHz band. Its primary function is to measure the level of substances stored within a tank using low duty cycle FMCW techniques.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Category of Equipment:	TLPR	
Type of Equipment	Low Duty Cycle FMCW Radar	
Intended Operating Environment:	Industrial	
Modulation Type:	Interrupted FMCW	
Duty Cycle	< 1% typically 4 ms / 8 seconds (every 2.5 seconds for test purposes)	
Antenna Connection Type:	Integral	
Power Supply Requirement:	Nominal	24.0 V DC
	Minimum	20.4 V DC
	Maximum	27.6 V DC
Tested Temperature Range:	Minimum	-40 °C
	Maximum	+55 °C
Transmit Frequency Range:	78 GHz – 79.3 GHz	
Receive Frequency Range:	78 GHz – 79.3 GHz	

3.5. Support Equipment

Description:	120 VAC 60 Hz AC/DC Power supply
Brand Name:	GW
Model Name or Number:	GPC-3030
Serial Number:	E835141

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Transmitting and receiving a CW swept pulsed radar signal.
- Two methods were used to verify that the EUT was operating as intended for testing. Firstly an ammeter was used to check that the current consumption was as defined by the Client. Second, the EUT display screen was monitored.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The EUT was powered from a DC power supply during the testing.
- The EUT display screen was attached to the EUT.
- 20 dB bandwidth tests were performed with the EUT fixed at a defined distance of 0.5m from the measurement antenna. To ensure that the measurement antenna was within the bore sight of the EUT, the EUT was pointing directly at the measurement antenna with both the EUT and measurement antenna fixed in position.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

5.2. Test Results

5.2.1. Transmitter 20 dB Bandwidth

Test Summary:

Test Engineer:	Fara Razally	Test Date:	26 August 2010
Test Sample Serial No:	B3-055		

FCC Part:	2.1049
Test Method Used:	As detailed in ANSI C63.4 Section 13.7

Environmental Conditions:

Ambient Temperature (°C):	25
Ambient Relative Humidity (%):	33

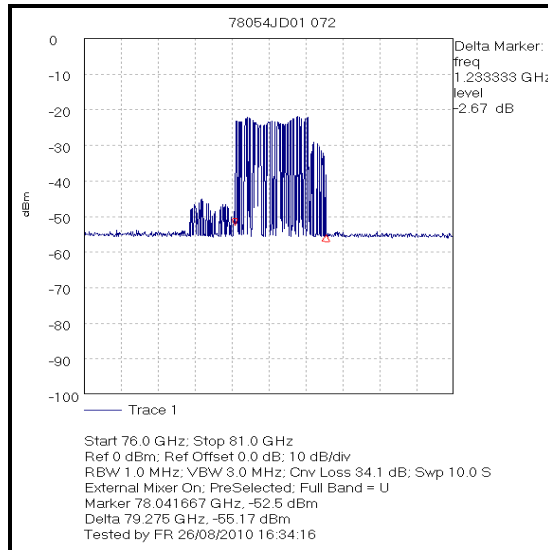
Results:

Temperature (°C)	Voltage (V)	Measured 20 dB Bandwidth (MHz)	Result
25	24.0	1233	Complied
-40	20.4	1250	Complied
	27.6	1250	Complied
+55	20.4	1292	Complied
	27.6	1292	Complied

Note(s):

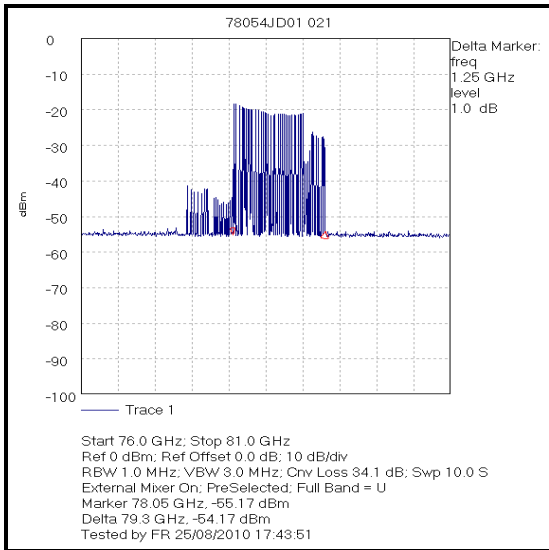
1. The EUT and spectrum analyser were configured for radiated measurements. The EUT was mounted onto a measurement fixture to allow a constant and stable measurement. The measurement antenna was also mounted into a fixture at a fixed distance of 50 cm from the EUT's antenna aperture.
2. The spectrum analyser was configured with a resolution bandwidth and video bandwidth of 1 MHz & 3 MHz respectively.
3. The analyser was set for a maximum hold scan with a positive peak detector to capture the profile of the signal. The spectrum analyser was allowed to continuously sweep for a long period of time until the emission had maximised.
4. As the emission on the plot is vertical at the -20 dBc points it was not possible to place markers at exactly the -20 dBc levels. The markers were moved away from the centre of the carrier to record the upper and lower frequencies at levels in excess of -20 dBc. These frequencies are greater than the -20 dBc point frequencies and the results confirm compliance.

Transmitter 20 dB Bandwidth (continued)

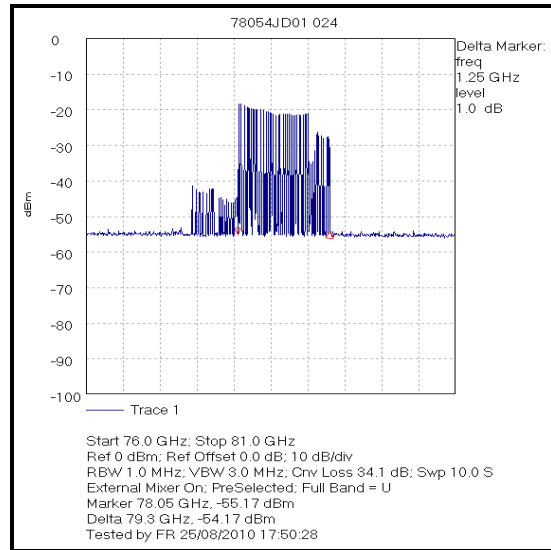


Nominal

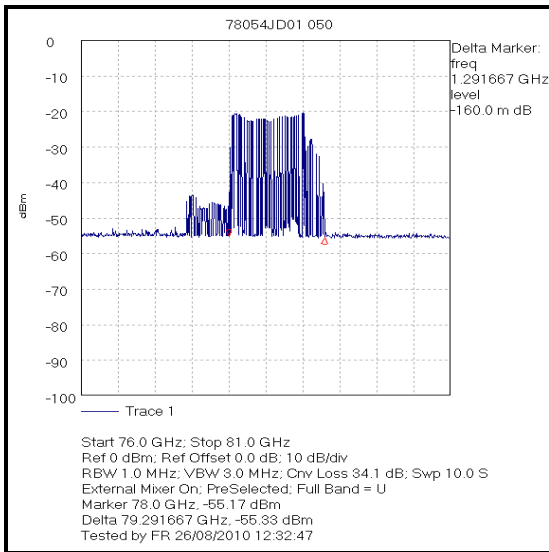
Transmitter 20 dB Bandwidth (continued)



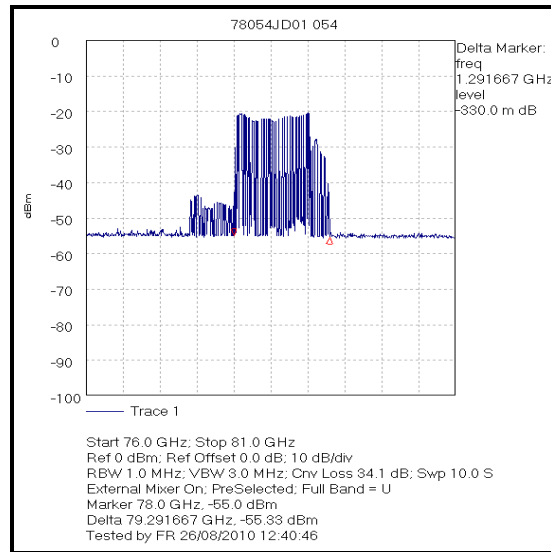
Low Voltage Extreme -40°C



High Voltage Extreme -40°C



Low Voltage Extreme +55°C



High Voltage Extreme +55°C

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
20 dB Bandwidth	77 GHz to 81 GHz	95%	±0.92 ppm

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A1916	Horn Antenna	Flann	25240-25	166399	11 May 2011	12
G080	Preselector Power Supply	Hewlett Packard	11974-60028	0680	Calibration not required	-
M1068	Thermometer	Iso-Tech	RS55	93102884	02 Oct 2010	12
M1223	Votsch VT4002	Votsch	VT4002	58566072720010	Calibrated before use	-
M1229	Digital Multimeter	Fluke	179	87640015	15 Jul 2011	12
M1253	Spectrum Analyser	Hewlett Packard	8564E	3442A00262	26 Jan 2011	12
M177	Mixer	Hewlett Packard	11974V	3001A00273	Calibrated before use	-

NB In accordance with UKAS requirements all the measurement equipment is on a calibration schedule.