

Sure Power Industries, Inc.

RFID Model 2875352

September 30, 2004

Report No. SURE0042 Revision 02

Report Prepared By:



www.nwemc.com
1-888-EMI-CERT

Test Report

Certificate of Test

Issue Date: September 30, 2004
Sure Power Industries, Inc.
RFID Model 2875352

Specification	Emissions		
		Pass	Fail
FCC Part 15.209:2003	ANSI C63.4:2001 Radiated Spurious Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FCC Part 15.209:2003	ANSI C63.4:2001 Field Strength Fundamental Emission	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Modifications made to the product

See the Modifications section of this report

Test Facility

- The measurement facility used to collect the data is located at:
 Northwest EMC, Inc.; 22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124
 Phone: (503) 844-4066 Fax: 844-3826
 This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:



Don Facticeau, IS Manager

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested, the specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision Number	Description	Date	Page Number
01	Removed alpha characters from EUT per client's request.	10/01/2004	Cover Page, 2, 11, 13, 15, 16, 18, 20, 21
02	Updated Test Descriptions	11/2/04	13,14,18,19

FCC: Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities, have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.



NVLAP: Northwest EMC, Inc. is recognized under the United States Department of Commerce, National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 89/336/EEC, ANSI C63.4, MIL-STD 461E, DO-160D and SAE J1113. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada. Accreditation has been granted to Northwest EMC, Inc. under Certificate Numbers: 200629-0, 200630-0, and 200676-0.



Industry Canada: Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS 212, Issue 1 (Provisional) and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements.



CAB: Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement



TÜV Product Service: Included in TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements. Certificate No. USA0401C



TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.



NEMKO: Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).



Technology International: Assessed in accordance with ISO Guide 25 defining the general international requirements for the competence of calibration and testing laboratories and with ITI assessment criteria LAC0196. Based upon that assessment Interference Technology International, Ltd., has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC and amendments). The scope of the approval was provided on a Schedule of Assessment supplied with the certificate and is available upon request.



Australia/New Zealand: The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body. (NVLAP)



VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (Registration Nos. - Hillsboro: C-1071 and R-1025, Irvine: C-2094 and R-1943, Newberg: C-1877 and R-1760, Sultan: R-871, C-1784 and R-1761)



BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No. SL2-IN-E-1017.



GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification



SCOPE

For details on the Scopes of our Accreditations, please visit:
<http://www.nwemc.com/scope.asp>

What is measurement uncertainty?

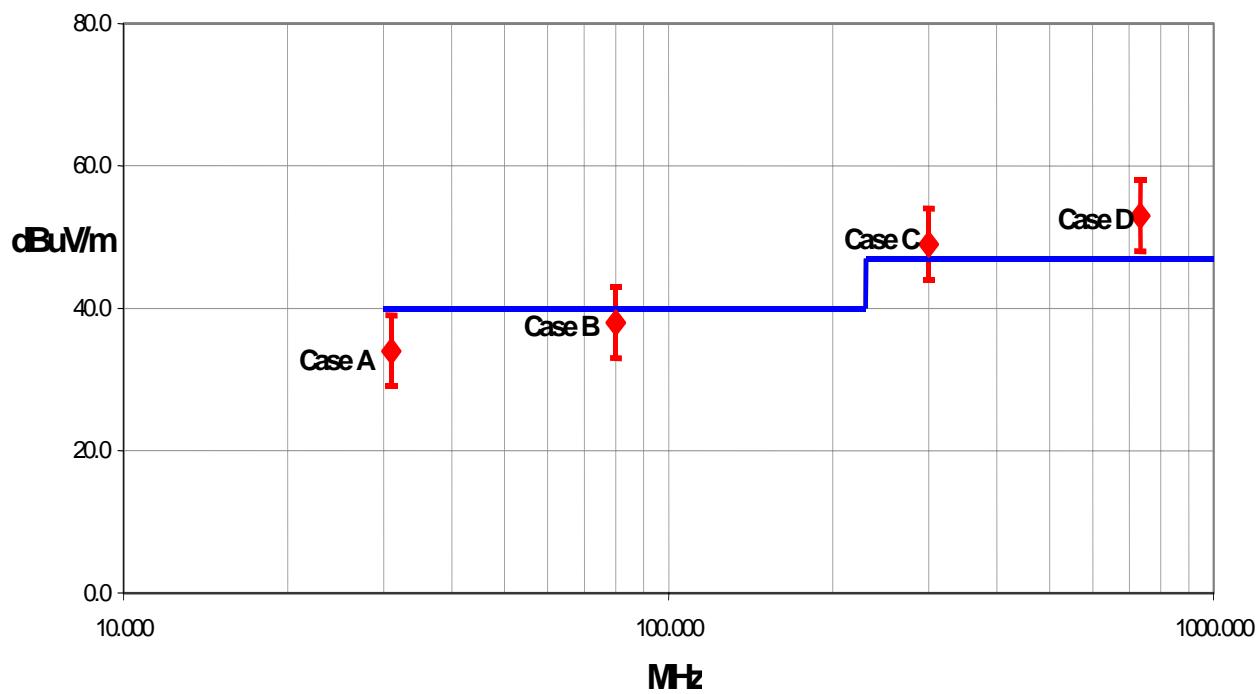
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following statement of measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" value. In the case of transient tests (ESD, EFT, Surge, Voltage Dips and Interruptions), the test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements.

The following documents were the basis for determining the uncertainty levels of our measurements:

- "ISO Guide to the Expression of Uncertainty in Measurements", October 1993
- "NIS81: The Treatment of Uncertainty in EMC Measurements", May 1994
- "IEC CISPR 16-3 A1 f1 Ed.1: Radio-interference measurements and statistical techniques", December 2000

How might measurement uncertainty be applied to test results?

If the diamond marks the measured value for the test and the vertical bars bracket the range of + and – measurement uncertainty, then test results can be interpreted from the diagram below.



Test Result Scenarios:

Case A: Product complies.

Case B: Product conditionally complies. It is not possible to say with 95% confidence that the product complies.

Case C: Product conditionally does not comply. It is not possible to say with 95% confidence that the product does not comply.

Case D: Product does not comply.

Radiated Emissions ≤ 1 GHz		Value (dB)							
Test Distance	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna		3m	10m
		3m	10m	3m	10m	3m	10m		
Combined standard uncertainty $u_c(y)$	normal	+ 1.86 - 1.88	+ 1.82 - 1.87	+ 2.23 - 1.41	+ 1.29 - 1.26	+ 1.31 - 1.27	+ 1.25 - 1.25		
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k=2)	+ 3.72 - 3.77	+ 3.64 - 3.73	+ 4.46 - 2.81	+ 2.59 - 2.52	+ 2.61 - 2.55	+ 2.49 - 2.49		

Radiated Emissions > 1 GHz		Value (dB)			
	Probability Distribution	Without High Pass Filter		With High Pass Filter	
		3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25		+ 1.38 - 1.35	
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k=2)		+ 2.57 - 2.51	+ 2.76 - 2.70	

Conducted Emissions		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $uc(y)$	normal	1.48
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	2.97

Radiated Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $uc(y)$	normal	1.05
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	2.11

Conducted Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $uc(y)$	normal	1.05
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	2.10

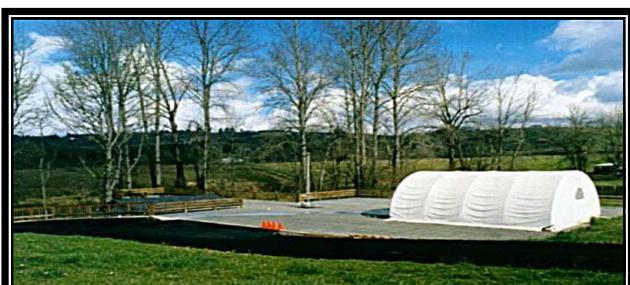
Legend		
$u_c(y)$ = square root of the sum of squares of the individual standard uncertainties		
U = combined standard uncertainty multiplied by the coverage factor: k . This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required, then $k=3$ (CL of 99.7%) can be used. Please note that with a coverage factor of one, $uc(y)$ yields a confidence level of only 68%.		

**California****Orange County Facility**

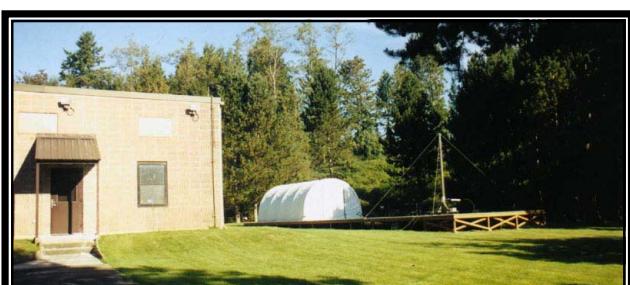
41 Tesla Ave.
Irvine, CA 92618
(888) 364-2378
FAX (503) 844-3826

**Oregon****Evergreen Facility**

22975 NW Evergreen Pkwy.,
Suite 400
Hillsboro, OR 97124
(503) 844-4066
FAX (503) 844-3826

**Oregon****Trails End Facility**

30475 NE Trails End Lane
Newberg, OR 97132
(503) 844-4066
FAX (503) 537-0735

**Washington****Sultan Facility**

14128 339th Ave. SE
Sultan, WA 98294
(888) 364-2378
FAX (360) 793-2536

Party Requesting the Test

Company Name:	Sure Power Industries, Inc.
Address:	10189 SW Avery
City, State, Zip:	Tualatin, OR 97062
Test Requested By:	Larry Harmon
Model:	RFID Model 2875352
First Date of Test:	09-27-2004
Last Date of Test:	09-28-2004
Receipt Date of Samples:	09-27-2004
Equipment Design Stage:	Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	125 kHz
I/O Ports:	None

Functional Description of the EUT (Equipment Under Test):

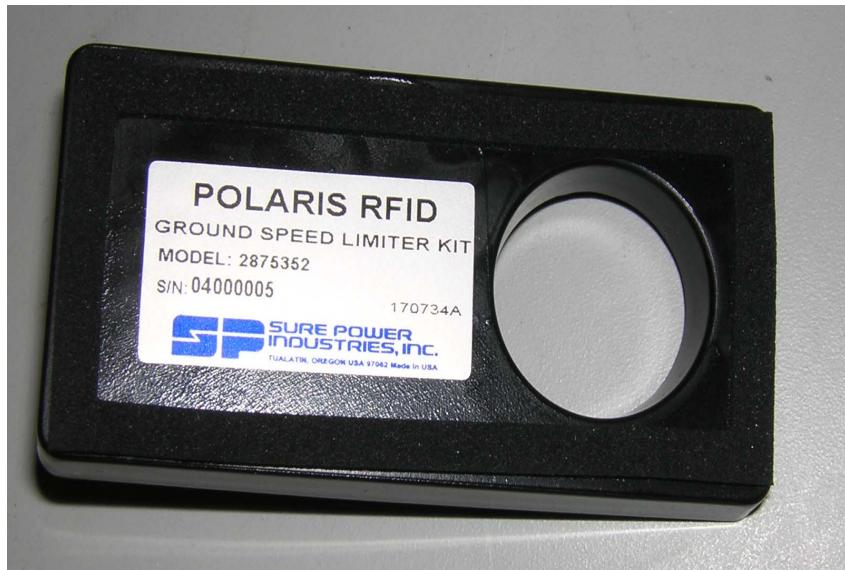
RFID Radio operating at 125 kHz. Mounted on motor vehicle. No provision for connection to AC mains.

Client Justification for EUT Selection:

The product is a representative production sample.

Client Justification for Test Selection:

For FCC Approval.

EUT Photo

Equipment modifications					
Item	Test	Date	Modification	Note	Disposition of EUT
1	Radiated Spurious Emissions	09/27/2004	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.	EUT remained at Northwest EMC.
2	Field Strength of Fundamental	09/27/2004	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.

Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

125 kHz

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Power Input Settings Investigated:

12 VDC

Software\Firmware Applied During Test

Exercise software	Standard Production Software	Version	Unknown
Description			
The radio was tested while reading RFID tags continuously during the test.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
RFID Radio	Sure Power	2875352	04000008

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Test Box	Sure Power	NA	NA
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Power and communications	Yes	8	No	RFID Radio	Test Box

Measurement Equipment					
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Antenna, Loop	EMCO	6502	AZB	02/12/2002	36 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/23/2003	13 mo
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/23/2003	13 mo
Spectrum Analyzer Display	Hewlett Packard	85662A	AALD	12/23/2003	13 mo

Test Description

Requirement: The field strength of the fundamental emission shall comply with the limits, as defined in 47 CFR 15.209.

Configuration: The only antenna to be used with the EUT was tested. The EUT was transmitting at its only available channel. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2001).

The emissions were measured at both 3 meters and 5 meters. Per 15.31(f)(2), the results were extrapolated to 30 meters based upon the measured extrapolation factor. This factor was determined for each emission, at each antenna polarity.

Completed by:



NORTHWEST
EMC

RADIATED EMISSIONS DATA SHEET

REV
d14.3
09/20/2004

EUT: RFID Model 2875352	Work Order: SURE0042
Serial Number: 04000008	Date: 09/27/04
Customer: Sure Power Industries, Inc.	Temperature: 72
Attendees: Jay and Larry	Humidity: 48%
Cust. Ref. No.:	Barometric Pressure: 30.06
Tested by: Dave Tolman	Job Site: EV01

TEST SPECIFICATIONS

Specification: FCC 15.209	Year: 2003
Method: ANSI C63.4	Year: 2001

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

With antenna perpendicular to ground and parallel to transmitter coil. (Maximum Orientation)

EUT OPERATING MODES

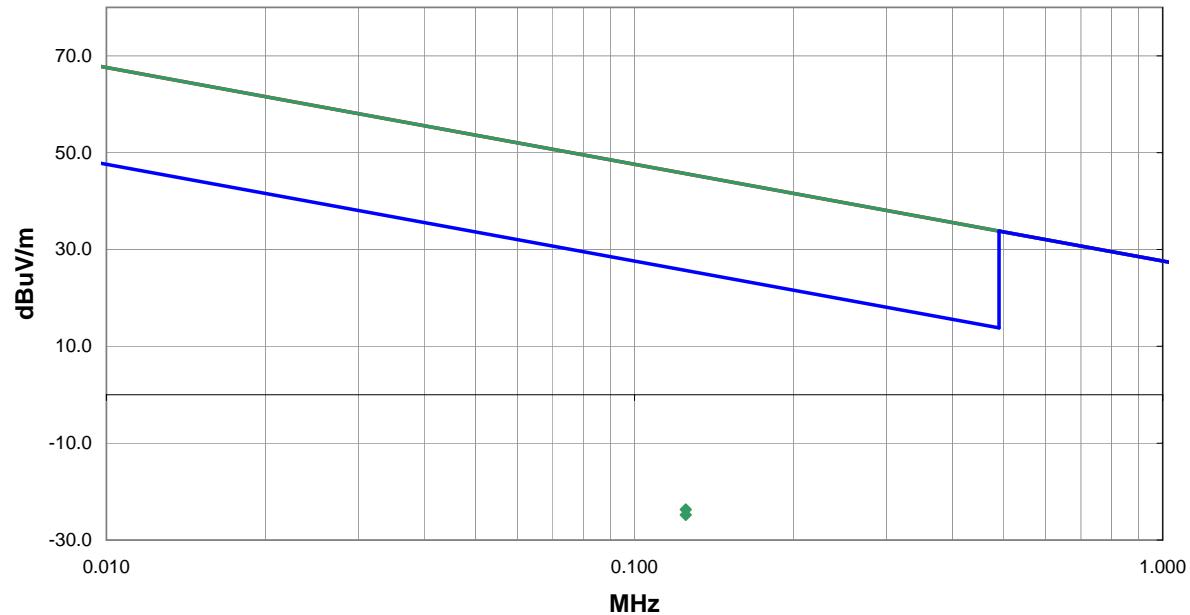
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS

Pass	Run #
	1

Other	<i>Dave Tolman</i>
	Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
0.125	62.6	10.4	260.0	1.5	5.0	0.0	Loop	AV	-77.0	-24.8	25.7	-50.5
0.125	63.7	10.4	260.0	1.5	5.0	0.0	Loop	PK	-77.0	-23.7	45.7	-69.4

Distance Adjustment Factor for Radiated Emissions below 30 MHz

Method: Per 47 CFR 15.31(f)(2), the data was extrapolated based upon a the measured fall-off (at each frequency / polarity).

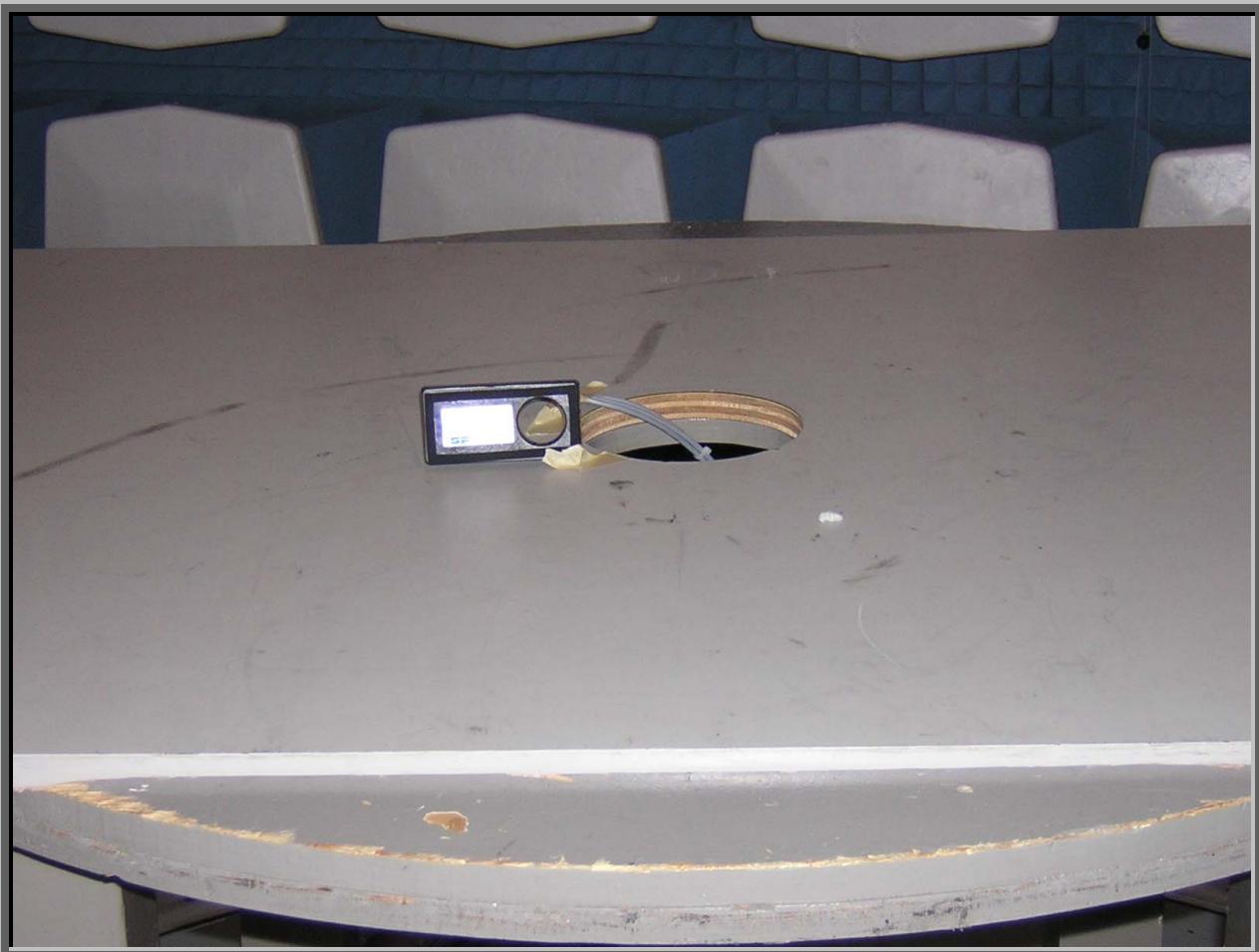
EUT: RFID Model 2875352

S/N: 4000008

Date: 9/27/2004

Job Number: SURE0042

Frequency (MHz)	Loop Antenna Polarity	Test Distance (meters)	Adjusted Level (dBuV/m)	Fall-Off from 3 to 5 m (dB)	Extrapolation Factor for Specification Limit (dB / decade)	Test Distance of Spec. Limit (meters)	Distance Adjustment Factor (dB)
0.125	Perp/Grnd Par/EUT	3	73.0	9.7	43.7	300.0	87.4
0.125	Perp/Grnd Par/EUT	5	63.3				77.7



Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

125 kHz

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Power Input Settings Investigated:

12 VDC

Frequency Range Investigated

Start Frequency	10 kHz	Stop Frequency	30 MHz
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Software\Firmware Applied During Test

Exercise software	Standard Production Software	Version	Unknown
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Description

The radio was tested while reading RFID tags continuously during the test.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
RFID Radio	Sure Power	2875352	04000008

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Test Box	Sure Power	NA	NA

Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Power and communications	Yes	8	No	RFID Radio	Test Box

Measurement Equipment					
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Antenna, Loop	EMCO	6502	AZB	02/12/2002	36 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/23/2003	13 mo
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/23/2003	13 mo
Spectrum Analyzer Display	Hewlett Packard	85662A	AALD	12/23/2003	13 mo

Test Description

Requirement: The field strength of any emissions shall not exceed the general radiated emission limits shown in Sec. 15.209.

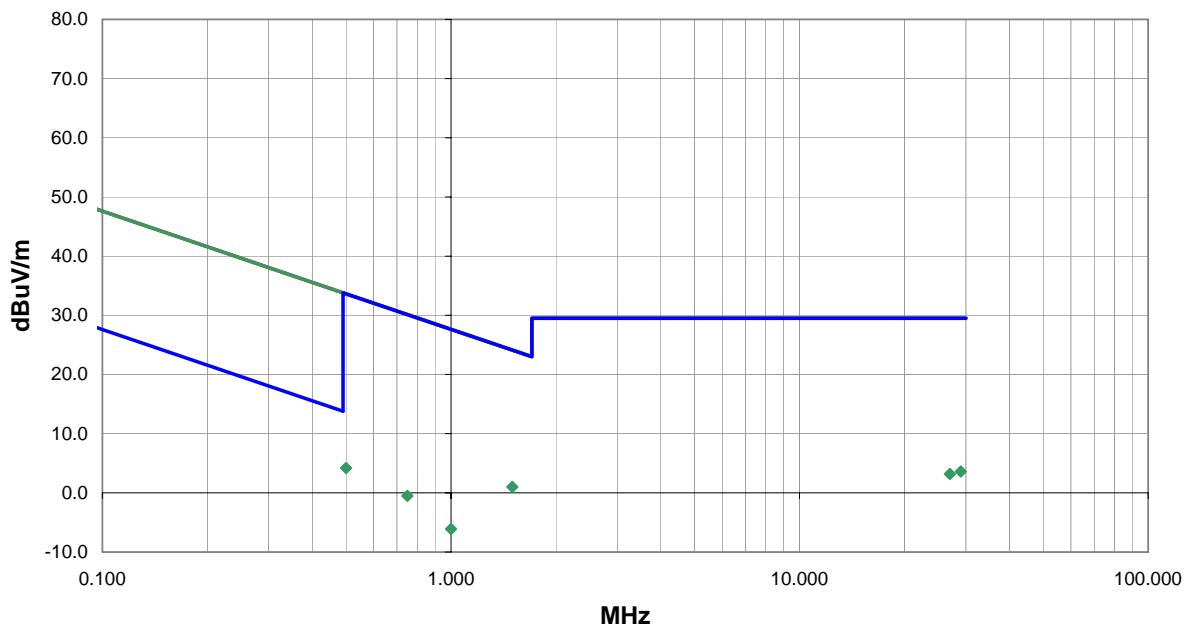
Configuration: The only antenna to be used with the EUT was tested. The EUT was transmitting at its only available channel. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2001).

The emissions were measured at both 3 meters and 5 meters. Per 15.31(f)(2), the results were extrapolated to 30 meters based upon the measured extrapolation factor. This factor was determined for each emission, at each antenna polarity.

Completed by:



EUT: RFID Model 2875352	Work Order: SURE0042
Serial Number: 04000008	Date: 09/27/04
Customer: Sure Power Industries, Inc.	Temperature: 72
Attendees: Jay Rider and Larry Harmon	Humidity: 48%
Cust. Ref. No.:	Barometric Pressure: 30.06
Tested by: Dave Tolman	Job Site: EV01
TEST SPECIFICATIONS	
Specification: FCC 15.209	Year: 2003
Method: ANSI C63.4	Year: 2001
SAMPLE CALCULATIONS	
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation	
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator	
COMMENTS	
With antenna perpendicular to ground and parallel to transmitter coil. (Maximum Position)	
EUT OPERATING MODES	
DEVIATIONS FROM TEST STANDARD	
No deviations.	
RESULTS	
Pass	Run # 1
Other	
Tested By: _____	



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
0.500	33.0	10.2	67.0	1.5	5.0	0.0	Loop	QP	-18.6	4.2	33.6	-29.4
0.750	27.2	10.2	247.0	1.5	5.0	0.0	Loop	QP	-17.5	-0.5	30.1	-30.6
1.000	24.3	10.1	260.0	1.5	5.0	0.0	Loop	QP	-20.3	-6.1	27.6	-33.7
1.500	20.6	10.1	67.0	1.5	5.0	0.0	Loop	QP	-9.5	1.0	24.1	-23.1
29.003	13.3	8.6	288.0	1.5	5.0	0.0	Loop	QP	-1.1	3.6	29.5	-25.9
27.000	12.2	9.0	277.0	1.5	5.0	0.0	Loop	QP	0.0	3.2	29.5	-26.3

Distance Adjustment Factor for Radiated Emissions below 30 MHz

Method: Per 47 CFR 15.31(f)(2), the data was extrapolated based upon a the measured fall-off (at each frequency / polarity).

EUT: RFID Model 2875352

S/N: 4000008

Date: 9/27/2004

Job Number: SURE0042

Frequency (MHz)	Loop Antenna Polarity	Test Distance (meters)	Adjusted Level (dBuV/m)	Fall-Off from 3 to 5 m (dB)	Extrapolation Factor for Specification Limit (dB / decade)	Test Distance of Spec. Limit (meters)	Distance Adjustment Factor (dB)
0.500	Perp/Grnd Par/EUT	3	44.9	5.3	23.9	30.0	23.9
0.500	Perp/Grnd Par/EUT	5	39.6				18.6
0.750	Perp/Grnd Par/EUT	3	12.3	-5.0	-22.5	30.0	-22.5
0.750	Perp/Grnd Par/EUT	5	17.3				-17.5
1.000	Perp/Grnd Par/EUT	3	8.7	-5.8	-26.1	30.0	-26.1
1.000	Perp/Grnd Par/EUT	5	14.5				-20.3
1.500	Perp/Grnd Par/EUT	3	9.0	-0.3	-1.4	30.0	-1.4
1.500	Perp/Grnd Par/EUT	5	9.3				-1.1
27.000	Perp/Grnd Par/EUT	3	8.7	0.0	0.0	30.0	0.0
27.000	Perp/Grnd Par/EUT	5	8.7				0.0
29.000	Perp/Grnd Par/EUT	3	14.0	1.0	4.5	30.0	4.5
29.000	Perp/Grnd Par/EUT	5	13.0				3.5

