Zebra Technologies Corporation

P100i

July 30, 2007

Report No. ZEBR0020

Report Prepared By

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

EMC Test Report

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: July 30, 2007
Zebra Technologies Corporation
Model: P100i

Emissions				
Test Description	**Specification**	**Test Method**	**Pass**	**Fail**
Frequency Stability	FCC 15.225:2006	ANSI C63.4:2003	☒	☐
Field Strength of Fundamental Radiated Emissions	FCC 15.225:2006	ANSI C63.4:2003	☒	☐
Radiated Emissions of Digital Electronics	FCC 15.109(g) (CISPR 22:1997) Class A	ANSI C63.4:2003	☒	☐
Field Strength of Spurious Emissions	FCC 15.225:2006	ANSI C63.4:2003	☒	☐
Powerline Conducted Emissions	FCC 15.207:2006	ANSI C63.4:2003	☒	☐

Modifications made to the product
See the Modifications section of this report

Approved By:

Donald Facteau, 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
00	None		

Accreditations and Authorizations

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 accredited under the United States Department of Commerce, National Institute of Standards and Technology, and 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 2004/108/EC, and ANSI C63.4. 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.

NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 200676-0
NVLAP LAB CODE 200761-0

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. USA0604C.

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).

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).

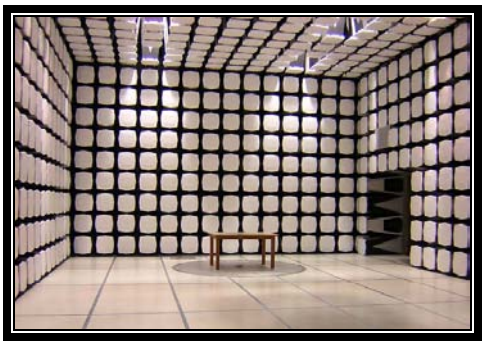
VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Numbers. - Hillsboro: C-1071, R-1025, C-2687, T-289, and R-2318, Irvine: R-1943, C-2766, and T-298, Sultan: R-871, C-1784, and T-294).*

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

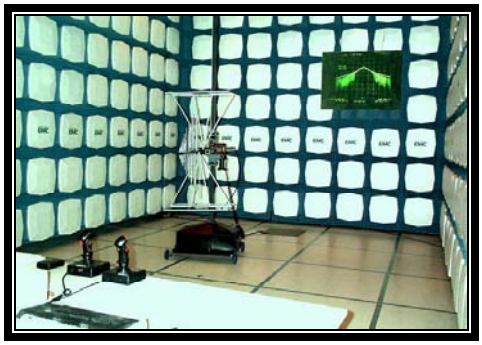
SCOPE

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



California – Orange County Facility
Labs OC01 – OC13

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



Oregon – Evergreen Facility
Labs EV01 – EV11

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

Washington – Sultan Facility
Labs SU01 – SU07

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

Party Requesting the Test

Company Name:	Zebra Technologies Corporation
Address:	1001 Flynn Road
City, State, Zip:	Camarillo, CA 93012-8706
Test Requested By:	George Anjargolian
Model:	P100i
First Date of Test:	July 24, 2007
Last Date of Test:	September 28, 2007
Receipt Date of Samples:	July 24, 2007
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
Card Printer with 13.56 MHz RFID (Card Reader)

Testing Objective:
These tests were selected to satisfy the requirements of the USA and Canada.

EUT Photo

CONFIGURATION 1 ZEBR0020

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Card Printer	Zebra Technologies Corp	P100i	P100i-EVT #5
AC/DC Adapter	Zebra Technologies Corp	FSP070-RDB	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	Latitude D510	CN-ON8829-48643-57S-2151

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Ethernet Cable	No	3.2m	No	Card Printer	Laptop
USB Cable	No	1.8m	No	Card Printer	Laptop
AC Cable	No	1.8m	No	AC Mains	AC/DC Adaptor
DC Cable	No	1.7m	Yes	AC/DC Adaptor	Card Printer
AC Cable	No	1.0m	No	AC Mains	AC/DC Adaptor
DC Cable	No	1.8m	Yes	AC/DC Adaptor	Laptop
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 2 ZEBR0020

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Card Printer	Zebra Technologies Corp	P100i	P100i-EVT #5
AC/DC Adapter	Zebra Technologies Corp	FSP070-RDB	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Ethernet Cable	No	3.2m	No	Card Printer	Un-terminated
USB Cable	No	1.8m	No	Card Printer	Un-terminated
AC Cable	No	1.8m	No	AC Mains	AC/DC Adaptor
DC Cable	No	1.7m	Yes	AC/DC Adaptor	Card Printer
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 3 ZEBR0020

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Card Printer	Zebra Technologies Corp	P100i	P100i-EVT #5
AC/DC Adapter	Zebra Technologies Corp	FSP070-RDB	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Cable	No	1.8m	No	AC Mains	AC/DC Adaptor
DC Cable	No	1.7m	Yes	AC/DC Adaptor	Card Printer
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	7/24/2007	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	7/24/2007	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	7/25/2007	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	7/25/2007	Radiated Emissions of Digital Electronics	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	7/26/2007	Field Strength of Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	9/27/2007	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	9/27/2007	Field Strength of Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
8	9/28/2007	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
Radio transmitting at 13.56 MHz

MODE USED FOR FINAL DATA
Radio transmitting at 13.56 MHz

POWER SETTINGS INVESTIGATED
120VAC/60Hz

POWER SETTINGS USED FOR FINAL DATA
120VAC/60Hz

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30 MHz	Stop Frequency	1000 MHz

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Biconilog	EMCO	3142	AXK	3/14/2006	24
OC08 cables b,c,d,f			OCB	8/23/2007	13
Pre-Amplifier	Miteq	AM-1551	AOX	8/19/2006	24
Spectrum Analyzer	Agilent	E4443A	AAR	1/18/2007	13
Antenna, Biconilog	EMCO	3142	AXK	3/14/2006	24

MEASUREMENT BANDWIDTHS

	Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level will be detected. This requires the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search is utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT.

Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance shall be 3 meters or 10 meters. At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the antenna clears the ground surface by at least 25 cm.

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

PSA 2007.05.07
EMI 2006.3.27

EUT:	P100i			Work Order:	ZEBR0021
Serial Number:	P100i-EVT #5.			Date:	09/27/07
Customer:	Zebra Technologies Corporation			Temperature:	20 °C
Attendees:	None			Humidity:	34%
Project:	None			Barometric Pres.:	29.94
Tested by:	Jaemi Suh	Power:	120VAC/60Hz	Job Site:	OC08

TEST SPECIFICATIONS	Test Method
FCC 15.109(g) (CISPR 22:1997):2006 Class A	ANSI C63.4

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	10

COMMENTS

Printer On. Not Printing. P100i-Mifare #5.

EUT OPERATING MODES

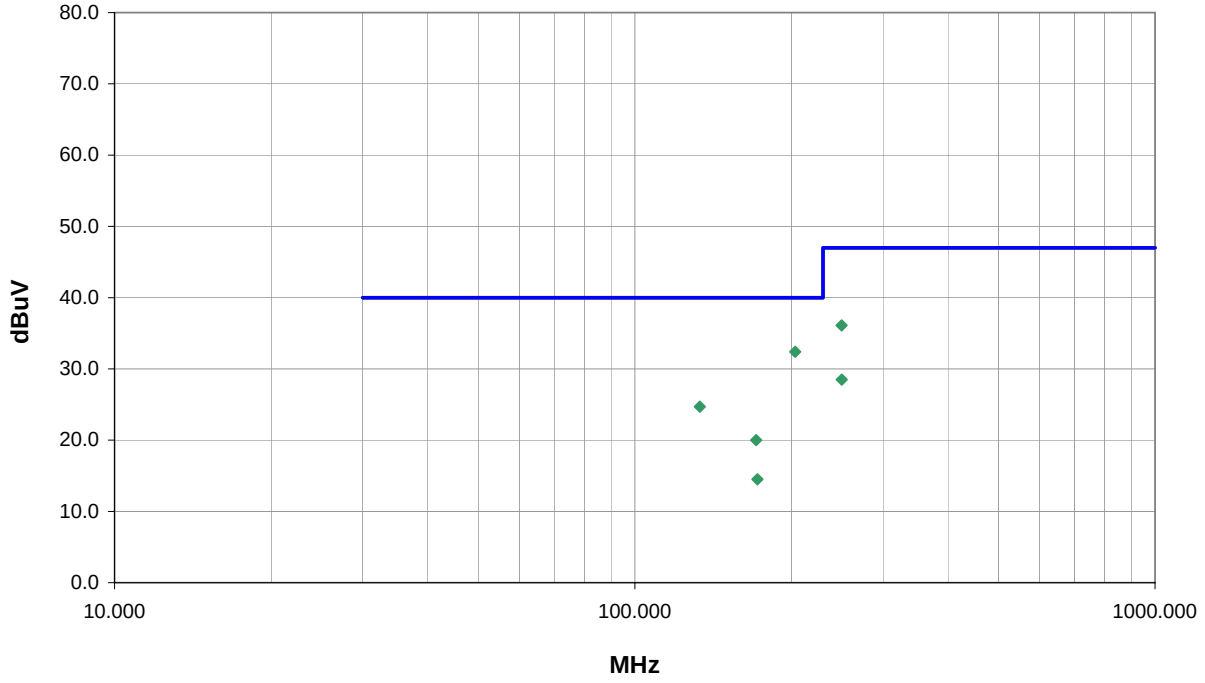
Radio transmitting at 13.56 MHz

DEVIATIONS FROM TEST STANDARD

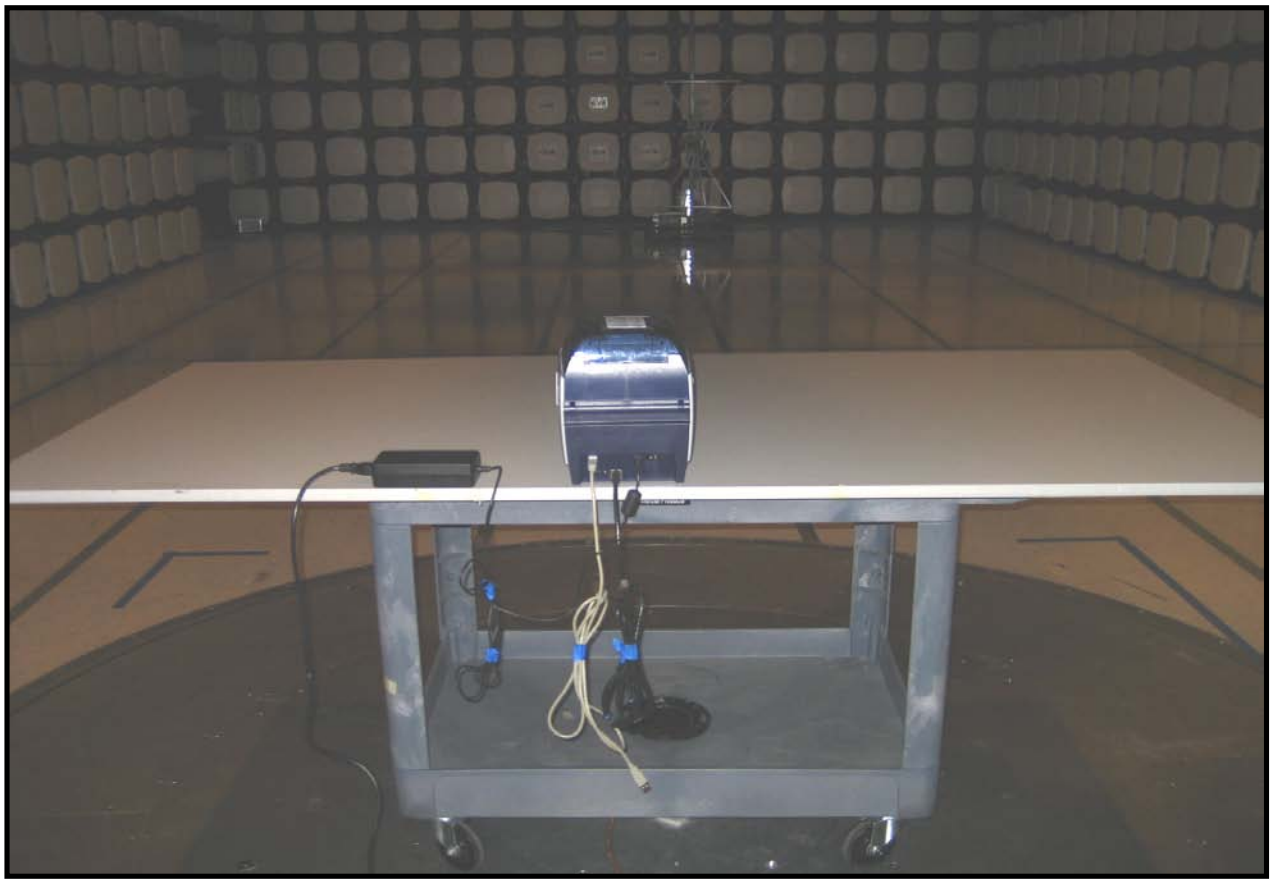
No deviations.

Run #	1
Configuration #	2
Results	Pass

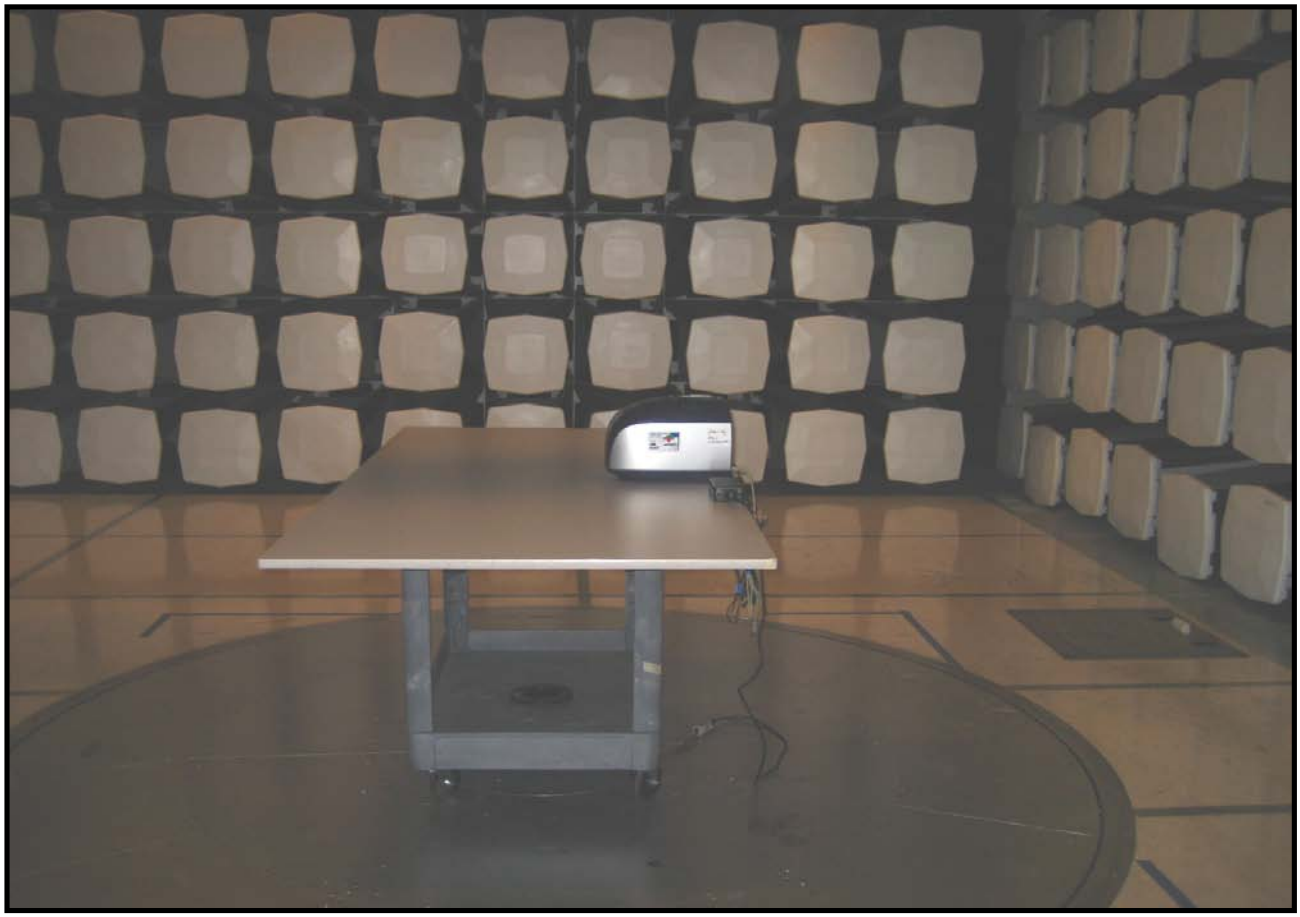
Signature



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)
203.406	56.0	-23.6	169.0	1.0	0.0	0.0	V-Bilog	QP	0.0	32.4	40.0	-7.6
249.816	57.4	-21.3	240.0	1.0	0.0	0.0	V-Bilog	QP	0.0	36.1	47.0	-10.9
133.344	51.8	-27.1	90.0	3.7	0.0	0.0	H-Bilog	QP	0.0	24.7	40.0	-15.3
249.978	49.8	-21.3	304.0	3.6	0.0	0.0	H-Bilog	QP	0.0	28.5	47.0	-18.5
171.116	44.5	-24.5	95.0	1.1	0.0	0.0	V-Bilog	QP	0.0	20.0	40.0	-20.0
172.046	39.0	-24.5	93.0	1.5	0.0	0.0	V-Bilog	QP	0.0	14.5	40.0	-25.5



Radiated Emissions



FIELD STRENGTH OF SPURIOUS EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Radio transmitting at 13.56 MHz

MODE USED FOR FINAL DATA

Radio transmitting at 13.56 MHz

POWER SETTINGS INVESTIGATED

120VAC/60Hz

POWER SETTINGS USED FOR FINAL DATA

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	150 KHz	Stop Frequency	1000 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4446A	AAQ	1/18/2007	13
Pre-Amplifier	Miteq	AM-1616-1000	AOM	12/17/2006	13
OC10 cables a,b,c,d Bilog			OCH	12/17/2006	13
Antenna, Biconilog	EMCO	3142	AXJ	3/14/2006	24
Antenna, Loop	EMCO	6502	AZB	12/2/2006	24

MEASUREMENT BANDWIDTHS

	Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and receiving while set at the lowest channel, a middle channel, and the highest channel available. 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 C63.4:1992).

NORTHWEST EMC

FIELD STRENGTH OF SPURIOUS EMISSIONS

PSA 2007.05.07
EMI 2006.4.26

EUT:	P100i	Work Order:	ZEBR0020
Serial Number:	P100i-EVT #5.	Date:	09/27/07
Customer:	Zebra Technologies Corporation	Temperature:	20c
Attendees:	None	Humidity:	34%
Project:	None	Barometric Pres.:	29.94
Tested by:	Jaemi Suh	Power: 120VAC/60Hz	Job Site: OC06

TEST SPECIFICATIONS	Test Method
FCC 15.225:2006	ANSI C63.4:2003

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

Printer On. Not Printing. P100i-Mifare #5.

EUT OPERATING MODES

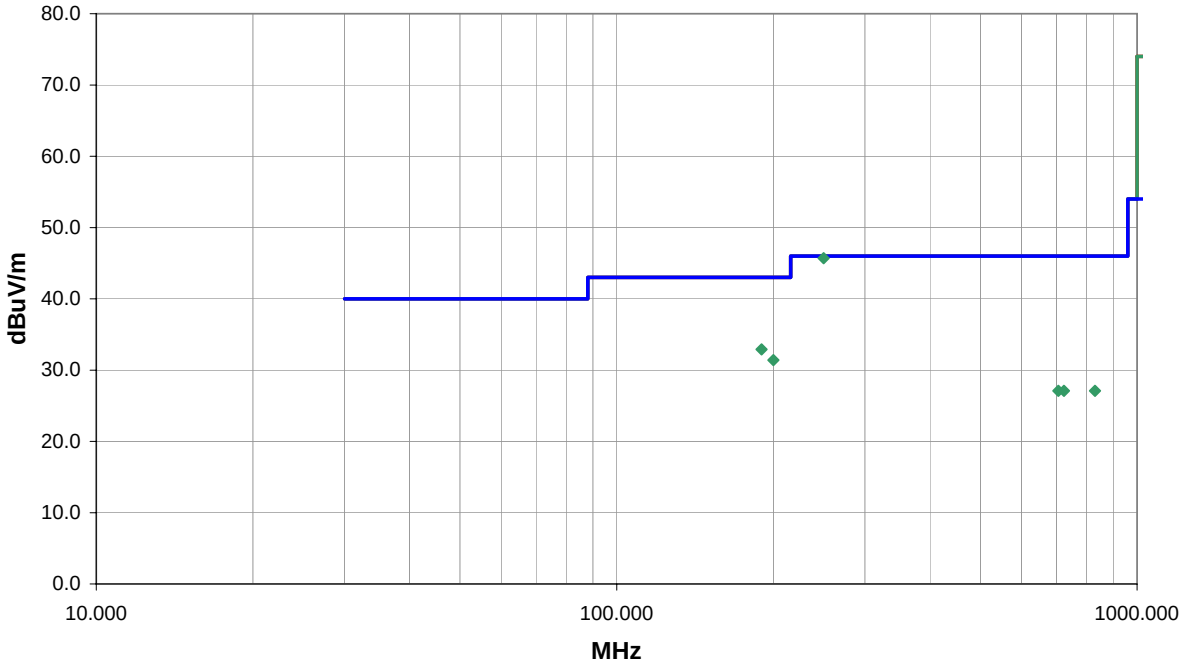
Radio transmitting at 13.56 MHz

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	5
Configuration #	2
Results	Pass

Signature



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)
249.851	47.5	-1.8	187.0	1.1	3.0	0.0	H-Bilog	QP	0.0	45.7	46.0	-0.3
189.852	37.1	-4.2	210.0	1.4	3.0	0.0	V-Bilog	QP	0.0	32.9	43.0	-10.1
200.015	35.4	-4.0	43.0	1.4	3.0	0.0	H-Bilog	QP	0.0	31.4	43.0	-11.6
723.340	17.9	9.2	212.0	2.0	3.0	0.0	H-Bilog	QP	0.0	27.1	46.0	-18.9
705.826	17.9	9.2	17.0	2.0	3.0	0.0	H-Bilog	QP	0.0	27.1	46.0	-18.9
830.335	17.4	9.7	229.0	1.5	3.0	0.0	V-Bilog	QP	0.0	27.1	46.0	-18.9

NORTHWEST EMC

FIELD STRENGTH OF SPURIOUS EMISSIONS

PSA 2007.05.07
EMI 2006.4.26

EUT:	P100i			Work Order:	ZEBR0020
Serial Number:	P100i-EVT #5.			Date:	09/27/07
Customer:	Zebra Technologies Corporation			Temperature:	20c
Attendees:	None			Humidity:	34%
Project:	None			Barometric Pres.:	29.94
Tested by:	Jaemi Suh	Power:	120VAC/60Hz	Job Site:	OC06

TEST SPECIFICATIONS	Test Method
FCC 15.225:2006	ANSI C63.4:2003

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

Printer On. Not Printing. P100i-Mifare #5.

EUT OPERATING MODES

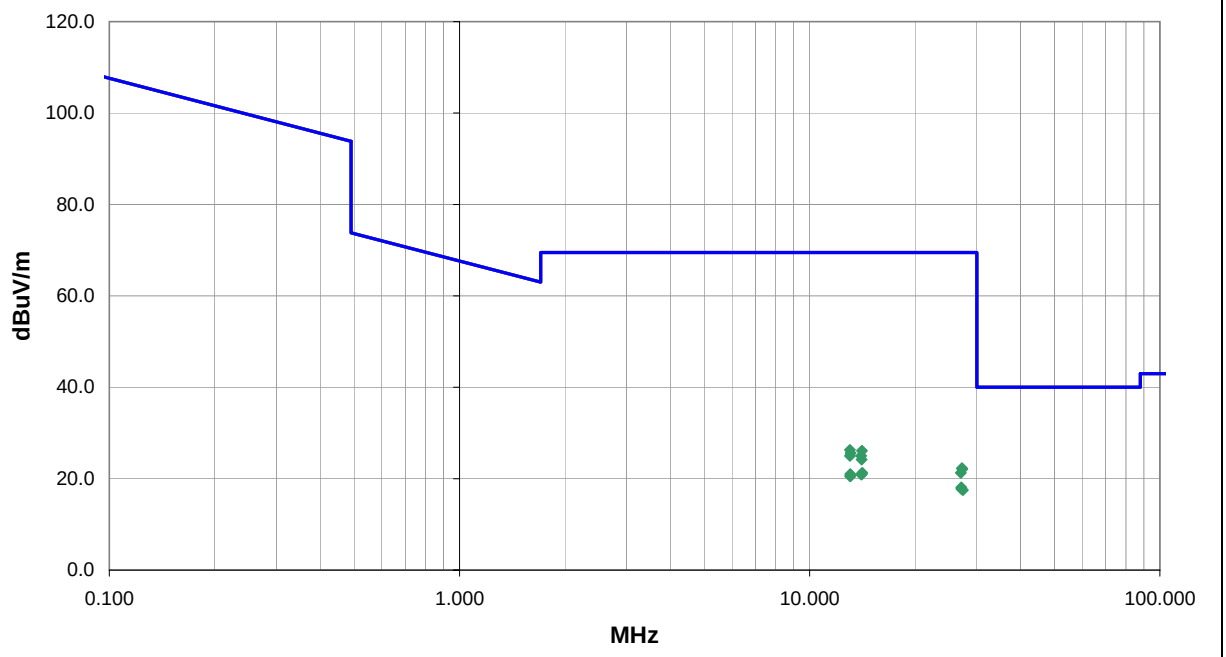
Radio transmitting at 13.56 MHz

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	6
Configuration #	2
Results	Pass

Signature



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)
13.025	15.4	10.9	181.0	1.0	3.0	0.0	H-Loop	PK	0.0	26.3	69.5	-43.2
14.100	15.2	10.9	8.0	1.0	3.0	0.0	V-loop	PK	0.0	26.1	69.5	-43.4
13.086	14.7	10.9	43.0	1.3	3.0	0.0	H-Loop	PK	0.0	25.6	69.5	-43.9
14.023	14.1	10.9	190.0	1.0	3.0	0.0	V-loop	PK	0.0	25.0	69.5	-44.5
13.031	14.1	10.9	172.0	1.0	3.0	0.0	V-loop	PK	0.0	25.0	69.5	-44.5
14.075	13.3	10.9	1.0	1.0	3.0	0.0	H-Loop	PK	0.0	24.2	69.5	-45.3
27.224	13.3	9.0	164.0	1.0	3.0	0.0	H-Loop	PK	0.0	22.3	69.5	-47.2
27.284	13.1	9.0	20.0	1.0	3.0	0.0	V-loop	PK	0.0	22.1	69.5	-47.4
14.127	10.4	10.9	8.0	1.0	3.0	0.0	V-loop	QP	0.0	21.3	69.5	-48.2
27.024	12.3	9.0	92.0	1.0	3.0	0.0	H-Loop	PK	0.0	21.3	69.5	-48.2
14.089	10.1	10.9	1.0	1.0	3.0	0.0	V-loop	QP	0.0	21.0	69.5	-48.5
13.059	10.1	10.9	181.0	1.0	3.0	0.0	V-loop	QP	0.0	21.0	69.5	-48.5
14.036	10.0	10.9	190.0	1.0	3.0	0.0	V-loop	QP	0.0	20.9	69.5	-48.6
13.061	9.7	10.9	172.0	1.0	3.0	0.0	V-loop	QP	0.0	20.6	69.5	-48.9
13.063	9.6	10.9	43.0	1.3	3.0	0.0	H-Loop	QP	0.0	20.5	69.5	-49.0
27.107	9.1	9.0	164.0	1.0	3.0	0.0	H-Loop	QP	0.0	18.1	69.5	-51.4
27.115	8.8	9.0	92.0	1.0	3.0	0.0	H-Loop	QP	0.0	17.8	69.5	-51.7
27.391	8.6	8.9	20.0	1.0	3.0	0.0	V-loop	QP	0.0	17.5	69.5	-52.0


CELLU-PLANK (R) 220 2X48X108

FIELD STRENGTH OF FUNDAMENTALS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Radio transmitting at 13.56 MHz

MODE USED FOR FINAL DATA

Radio transmitting at 13.56 MHz

POWER SETTINGS INVESTIGATED

120VAC/60Hz

POWER SETTINGS USED FOR FINAL DATA

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	13.110 MHz	Stop Frequency	14.010 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4446A	AAQ	1/18/2007	13
Pre-Amplifier	Miteq	AM-1616-1000	AOM	12/17/2006	13
OC10 cables a,b,c,d Bilog			OCH	12/17/2006	13
Antenna, Biconilog	EMCO	3142	AXJ	3/14/2006	24
Antenna, Loop	EMCO	6502	AZB	12/2/2006	24

MEASUREMENT BANDWIDTHS

	Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and receiving while set at the lowest channel, a middle channel, and the highest channel available. 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 C63.4:1992).

NORTHWEST EMC

FIELD STRENGTH OF FUNDAMENTALS DATA SHEETS

PSA 2007.05.07
EMI 2006.4.26

EUT:	P100i			Work Order:	ZEBR0020
Serial Number:	P100i-EVT #5.			Date:	09/27/07
Customer:	Zebra Technologies Corporation			Temperature:	20c
Attendees:	None			Humidity:	34%
Project:	None			Barometric Pres.:	29.94
Tested by:	Jaemi Suh	Power:	120VAC/60Hz	Job Site:	CO10

TEST SPECIFICATIONS	Test Method
FCC 15.225:2006	ANSI C63.4:2003

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

Fundamental Center Frequency and Band Edges per FCC 15.225 (a)-(c). Printer On. Not Printing. P100i-Mifare #5.

EUT OPERATING MODES

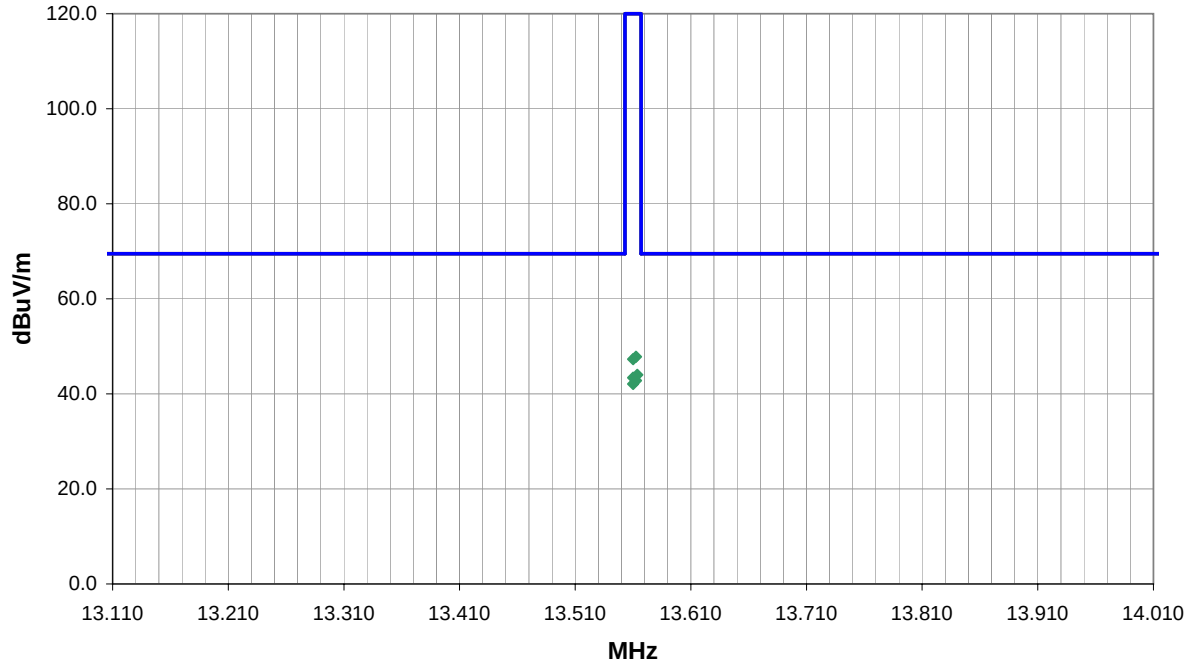
Transmitting at 13.56 MHz

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	7
Configuration #	2
Results	Pass

Signature



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)
13.563	36.9	10.9	241.0	1.0	3.0	0.0	V-Loop	PK	0.0	47.8	120.0	-72.2
13.560	36.4	10.9	241.0	1.0	3.0	0.0	V-Loop	QP	0.0	47.3	120.0	-72.7
13.564	33.1	10.9	1.0	2.7	3.0	0.0	H-Loop	PK	0.0	44.0	120.0	-76.0
13.560	32.5	10.9	1.0	2.7	3.0	0.0	H-Loop	QP	0.0	43.4	120.0	-76.6
13.563	31.9	10.9	1.0	1.8	3.0	0.0	H-Loop	PK	0.0	42.8	120.0	-77.2
13.560	31.2	10.9	1.0	1.8	3.0	0.0	H-Loop	QP	0.0	42.1	120.0	-77.9

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Radio transmitting at 13.56 MHz

POWER SETTINGS INVESTIGATED

120V/60Hz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-24-BNC	LIB	5/8/2006	24
OC11 cables a-b-e-f			OCM	1/8/2007	13
Receiver	Rohde & Schwartz	ESCI	ARF	12/14/2006	13

MEASUREMENT BANDWIDTHS

	Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at it's only transmit channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz.

Per the FCC's procedure for this type of transmitter (see FCC / TCBC Conference Call Minutes, April 12. 2005), the EUT was tested in two configurations: (1) with the antenna disconnected, but still transmitting; and (2) in it's normal configuration with the antenna connected and transmitting. The FCC said:

> "we are willing to accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions. First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band, and then retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. For the second portion of these tests, only the fundamental emission band of the transmitter needs to be retested."

.

In short, the FCC does not want 15.225 devices to use the power line as an antenna. However they understand that energy from the antenna can couple onto the power line (field to wire). So compliance was demonstrated with the antenna disconnected but with the radio still transmitting.

NORTHWEST

EMC

CONDUCTED EMISSIONS

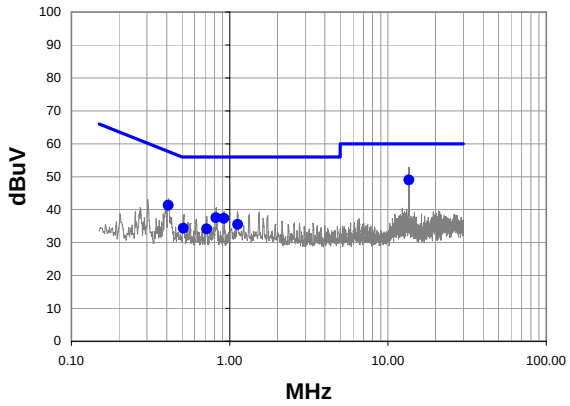
Version 2006.11.12
PSA-ESCI 2007.05.07

Work Order:	ZEBR0020	**Date:**	09/27/07		
Project:	None	**Temperature:**	20 °C		
Job Site:	OC06	**Humidity:**	34		
Serial Number:	P100i-EVT #5.	**Barometric Pres.:**	29.94	**Tested by:**	Jaemi Suh
EUT:	P100i				
Configuration:	1				
Customer:	Zebra Technologies Corporation				
Attendees:	None				
EUT Power:	120V/60Hz				
Operating Mode:	Radio transmitting at 13.56 MHz				
Deviations:	No deviations.				
Comments:	Printer On. Not Printing. P100i-Mifare #5. Internal antenna cable disconnected. Ethernet and USB link established with laptop				

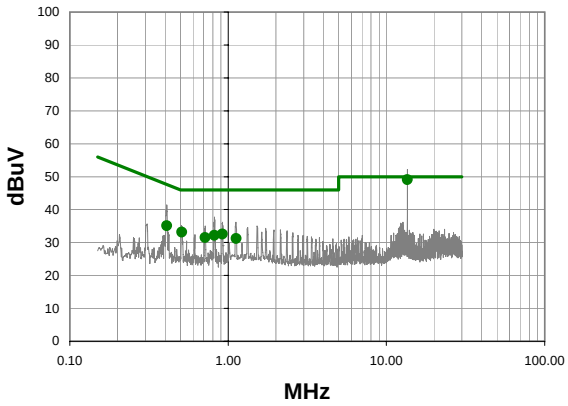
Test Specifications	**Test Method**
FCC 15.207:2006	ANSI C63.4:2003

Run #	12	**Line:**	High Line	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.560	27.9	1.1	49.0	60.0	-11.0
0.410	20.2	1.1	41.3	57.6	-16.4
0.820	16.7	0.8	37.5	56.0	-18.5
0.922	16.6	0.7	37.3	56.0	-18.7
1.124	14.8	0.7	35.5	56.0	-20.5
0.511	13.4	0.9	34.3	56.0	-21.7
0.718	13.3	0.8	34.1	56.0	-21.9

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.560	28.0	1.1	49.1	50.0	-0.9
0.410	14.0	1.1	35.1	47.6	-12.6
0.511	12.2	0.9	33.1	46.0	-12.9
0.922	11.8	0.7	32.5	46.0	-13.5
0.820	11.4	0.8	32.2	46.0	-13.8
0.718	10.7	0.8	31.5	46.0	-14.5
1.124	10.5	0.7	31.2	46.0	-14.8

NORTHWEST

EMC

CONDUCTED EMISSIONS

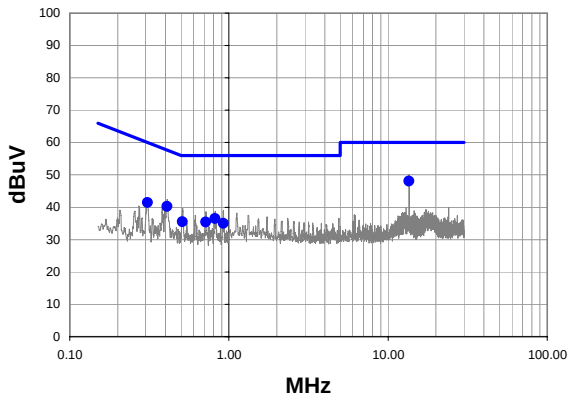
Version 2006.11.12
PSA-ESCI 2007.05.07

Work Order:	ZEBR0020	**Date:**	09/27/07		
Project:	None	**Temperature:**	20 °C		
Job Site:	OC06	**Humidity:**	34		
Serial Number:	P100i-EVT #5.	**Barometric Pres.:**	29.94	**Tested by:**	Jaemi Suh
EUT:	P100i				
Configuration:	1				
Customer:	Zebra Technologies Corporation				
Attendees:	None				
EUT Power:	120V/60Hz				
Operating Mode:	Radio transmitting at 13.56 MHz				
Deviations:	No deviations.				
Comments:	Printer On. Not Printing. P100i-Mifare #5. Internal antenna cable disconnected. Ethernet and USB link established with laptop				

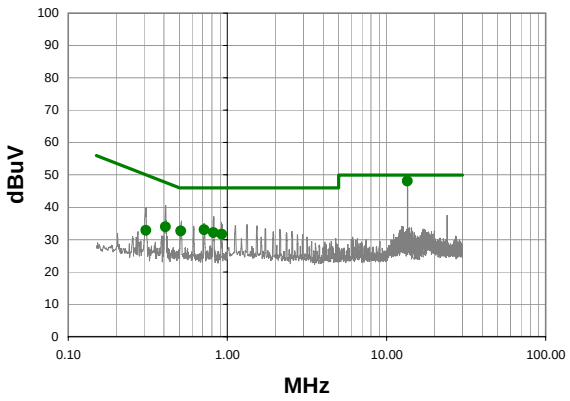
Test Specifications	**Test Method**
FCC 15.207:2006	ANSI C63.4:2003

Run #	13	**Line:**	Neutral	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.560	27.0	1.1	48.1	60.0	-11.9
0.408	19.2	1.1	40.3	57.7	-17.4
0.308	20.3	1.1	41.4	60.0	-18.6
0.817	15.7	0.8	36.5	56.0	-19.5
0.510	14.6	0.9	35.5	56.0	-20.5
0.714	14.6	0.8	35.4	56.0	-20.6
0.921	14.3	0.7	35.0	56.0	-21.0

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.560	27.0	1.1	48.1	50.0	-1.9
0.714	12.2	0.8	33.0	46.0	-13.0
0.510	11.7	0.9	32.6	46.0	-13.4
0.408	12.9	1.1	34.0	47.7	-13.7
0.817	11.3	0.8	32.1	46.0	-13.9
0.921	10.9	0.7	31.6	46.0	-14.4
0.308	11.7	1.1	32.8	50.0	-17.2

NORTHWEST

EMC

CONDUCTED EMISSIONS

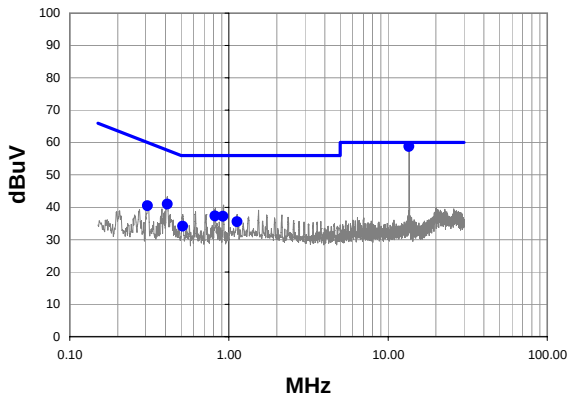
Version 2006.11.12
PSA-ESCI 2007.05.07

Work Order:	ZEBR0020	**Date:**	09/28/07		
Project:	None	**Temperature:**	20 °C		
Job Site:	OC06	**Humidity:**	34		
Serial Number:	P100i-EVT #5.	**Barometric Pres.:**	29.94	**Tested by:**	Jaemi Suh
EUT:	P100i				
Configuration:	1				
Customer:	Zebra Technologies Corporation				
Attendees:	None				
EUT Power:	230V/50Hz				
Operating Mode:	Radio transmitting at 13.56 MHz				
Deviations:	No deviations.				
Comments:	Printer On. Not Printing. P100i-Mifare #5. Internal antenna cable connected. Ethernet and USB link established with laptop				

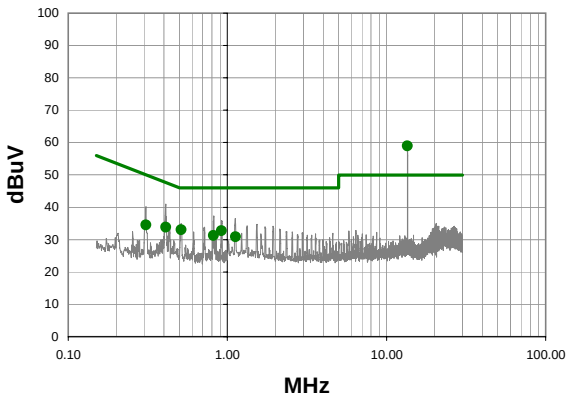
Test Specifications	**Test Method**
FCC 15.207:2006	ANSI C63.4:2003

Run #	16	**Line:**	High Line	**Ext. Attenuation:**	20	**Results**	Fail

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.560	37.7	1.1	58.8	60.0	-1.2
0.410	19.9	1.1	41.0	57.6	-16.7
0.817	16.5	0.8	37.3	56.0	-18.7
0.920	16.4	0.8	37.2	56.0	-18.9
0.308	19.3	1.1	40.4	60.0	-19.6
1.128	14.8	0.7	35.5	56.0	-20.5
0.512	13.2	0.9	34.1	56.0	-21.9

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.560	37.9	1.1	59.0	50.0	9.0
0.512	12.1	0.9	33.0	46.0	-13.0
0.920	12.0	0.8	32.8	46.0	-13.3
0.410	12.8	1.1	33.9	47.6	-13.8
0.817	10.4	0.8	31.2	46.0	-14.8
1.128	10.2	0.7	30.9	46.0	-15.1
0.308	13.4	1.1	34.5	50.0	-15.5

NORTHWEST

EMC

CONDUCTED EMISSIONS

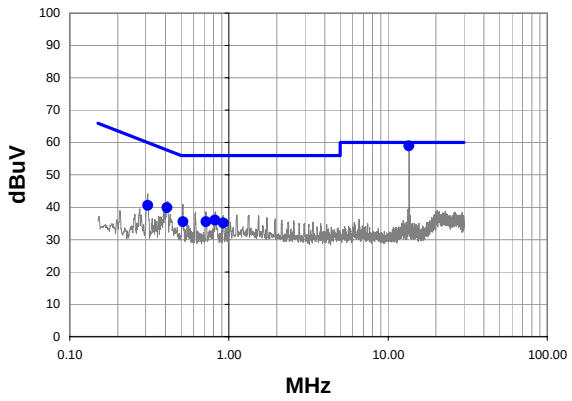
Version 2006.11.12
PSA-ESCI 2007.05.07

Work Order:	ZEBR0020	**Date:**	09/28/07		
Project:	None	**Temperature:**	20 °C		
Job Site:	OC06	**Humidity:**	34		
Serial Number:	P100i-EVT #5.	**Barometric Pres.:**	29.94	**Tested by:**	Jaemi Suh
EUT:	P100i				
Configuration:	1				
Customer:	Zebra Technologies Corporation				
Attendees:	None				
EUT Power:	230V/50Hz				
Operating Mode:	Radio transmitting at 13.56 MHz				
Deviations:	No deviations.				
Comments:	Printer On. Not Printing. P100i-Mifare #5. Internal antenna cable connected. Ethernet and USB link established with laptop				

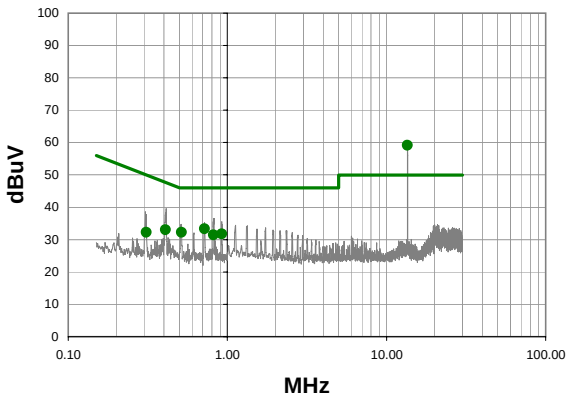
Test Specifications	**Test Method**
FCC 15.207:2006	ANSI C63.4:2003

Run #	17	**Line:**	Neutral	**Ext. Attenuation:**	20	**Results**	Fail

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.560	37.9	1.1	59.0	60.0	-1.0
0.408	18.8	1.1	39.9	57.7	-17.8
0.309	19.4	1.1	40.5	60.0	-19.5
0.819	15.2	0.8	36.0	56.0	-20.0
0.718	14.7	0.8	35.5	56.0	-20.5
0.514	14.6	0.9	35.5	56.0	-20.5
0.922	14.4	0.7	35.1	56.0	-20.9

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
13.560	38.1	1.1	59.2	50.0	9.2
0.718	12.5	0.8	33.3	46.0	-12.7
0.514	11.3	0.9	32.2	46.0	-13.8
0.922	11.0	0.7	31.7	46.0	-14.3
0.819	10.6	0.8	31.4	46.0	-14.6
0.408	12.0	1.1	33.1	47.7	-14.6
0.309	11.1	1.1	32.2	50.0	-17.8

Frequency Stability

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Programmable Power Supply	Hewlett-Packard	6843A	THB	12/14/2006	13
Spectrum Analyzer	Hewlett Packard	8593E	AAP	12/14/2006	13
Temperature Chamber	Cincinnati Sub Zero	Z-32 PLUS		5/2/2007	12

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

Variation of Supply Voltage

The primary supply voltage was varied from 85% to 115% of nominal. The EUT can only be operated from the public AC mains, so an AC lab supply was used to vary the supply voltage from 115% to 85% of 120 V, 60 Hz.

Variation of Ambient Temperature

Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range (-20° to +50° C) and at 10°C intervals.

Measurements were made at the single transmit frequency. The antenna is integral to the EUT, so a radiated measurement was made using a spectrum analyzer and a near field probe. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

NORTHWEST EMC

Frequency Stability

XMit 2007.06.13

EUT:	P100i			**Work Order:**	ZEBR0020
Serial Number:	P100i-EVT #5.			**Date:**	07/25/07
Customer:	Zebra Technologies Corporation			**Temperature:**	24°C
Attendees:	None			**Humidity:**	34%
Project:	None			**Barometric Pres.:**	29.94
Tested by:	Jaemi Suh	**Power:**	120VAC/60Hz	**Job Site:**	OC13

TEST SPECIFICATIONS	Test Method
FCC 15.225:2006	ANSI C63.4:2003

COMMENTS

Printer On. Not Printing. P100i-Mifare #5.

DEVIATIONS FROM TEST STANDARD

Configuration #	3	Signature

	Value	Limit	Results
Temperature Frequency Stability	22.35 ppm	0.01% = 100 ppm	Pass
Voltage Frequency Stability	22.05 ppm	0.01% = 100 ppm	Pass

Frequency Stability

Temperature Frequency Stability					
Result:	Pass	**Value:**	22.35 ppm	**Limit:**	0.01% = 100 ppm

Frequency Stability with Variation of Ambient Temperature (Primary Supply = 120 VAC)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
50	13.560000	13.559722	20.50	100
40	13.560000	13.559760	17.70	100
30	13.560000	13.559735	19.54	100
20	13.560000	13.559697	22.35	100
10	13.560000	13.559697	22.35	100
0	13.560000	13.559736	19.47	100
-10	13.560000	13.559735	19.54	100
-20	13.560000	13.559697	22.35	100

Voltage Frequency Stability					
Result:	Pass	**Value:**	22.05 ppm	**Limit:**	0.01% = 100 ppm

Frequency Stability with Variation of AC Supply Voltage (Ambient Temperature = 20°C)

Voltage (Vac)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
138.0	13.560000	13.559775	16.59	100
132.0	13.560000	13.559707	21.61	100
126.0	13.560000	13.559713	21.17	100
120.0	13.560000	13.559713	21.17	100
114.0	13.560000	13.559775	16.59	100
108.0	13.560000	13.559800	14.75	100
102.0	13.560000	13.559701	22.05	100


OCO2

Frequency Stability