

Digital Control, Inc.

TT

Report No. DIGC0121

Report Prepared By



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

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EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Last Date of Test: October 12, 2010

Digital Control, Inc.

Model: TT

Emissions			
Test Description	Specification	Test Method	Pass/Fail
Field Strength of Fundamental	FCC 15.209:2010	ANSI C63.10:2009	Pass
Field Strength of Spurious Emissions	FCC 15.209:2010	ANSI C63.10:2009	Pass

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 (Site filing #2834D-1).

Approved By:

Don Fecteau, IS Manager



NVLAP Lab Code: 200630-0

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		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.



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
NVLAP LAB CODE 200881-0

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-Gen, Issue 2 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. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1*)



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.



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, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634).



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 (US0017). 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



KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157)



VIETNAM

Vietnam MIC has approved Northwest EMC as an accredited test lab. Per Decision No. 194/QD-QLCL (dated December 15, 2009), Northwest EMC test reports can be used for Vietnam approval submissions.



SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>



Northwest EMC Locations



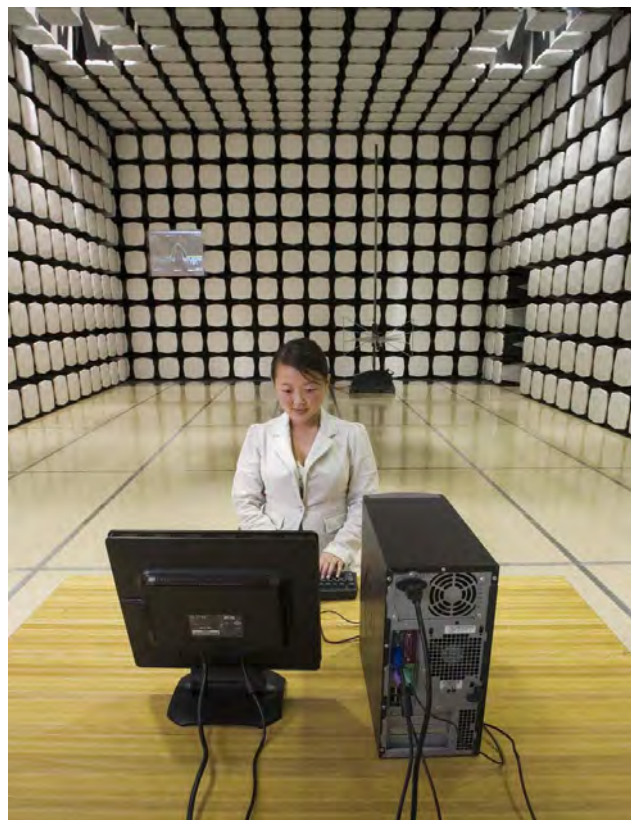
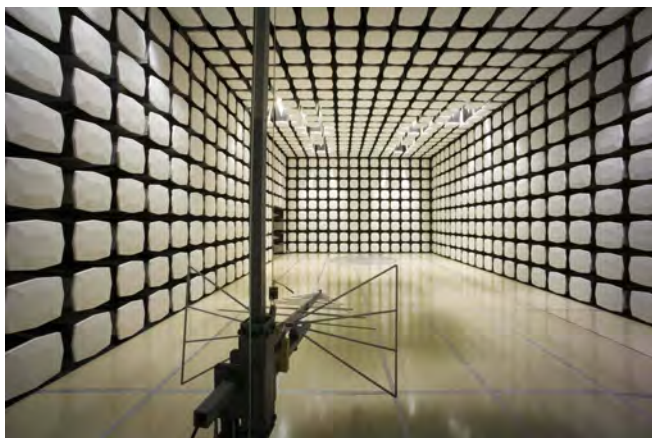
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

Minnesota
Labs MN01-MN08
9349 W Broadway Ave.
Brooklyn Park,
MN 55445
(763) 425-2281

Washington
Labs SU01-SU07
14128 339th Ave. SE
Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796



Party Requesting the Test

Company Name:	Digital Control, Inc.
Address:	19625 62nd Avenue South, Suite B103
City, State, Zip:	Kent, WA 98032
Test Requested By:	Amanda Hamm
Model:	TT
First Date of Test:	October 12, 2010
Last Date of Test:	October 12, 2010
Receipt Date of Samples:	October 4, 2010
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test**Functional Description of the EUT (Equipment Under Test):**

11.976 kHz - handheld device consisting of tri-axial magnetic loop antennas that detect the signal. Filters, amplifiers, and digital signal processors read the information from the TT's signal.

Testing Objective:

To demonstrate compliance to FCC 15.209 requirements.

Northwest

EMC

Configurations

Revision 9/21/05

CONFIGURATION 1 DIGC0121

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
EUT - Pressure and pull sensor	Digital Control, Inc.	TT	TT1026014

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	10/12/2010	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.
2	10/12/2010	Field Strength of Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

Field Strength of Fundamental

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

Transmitting

POWER SETTINGS INVESTIGATED

Battery

FREQUENCY RANGE INVESTIGATED

Start Frequency	11.976kHz	Stop Frequency	11.976kHz
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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	1/6/2010	12
EV01 Cables	N/A	Bilog Cables	EVA	7/9/2010	13
Antenna, Loop	EMCO	6502	AZC	8/3/2009	24

MEASUREMENT BANDWIDTHS

	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(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.				

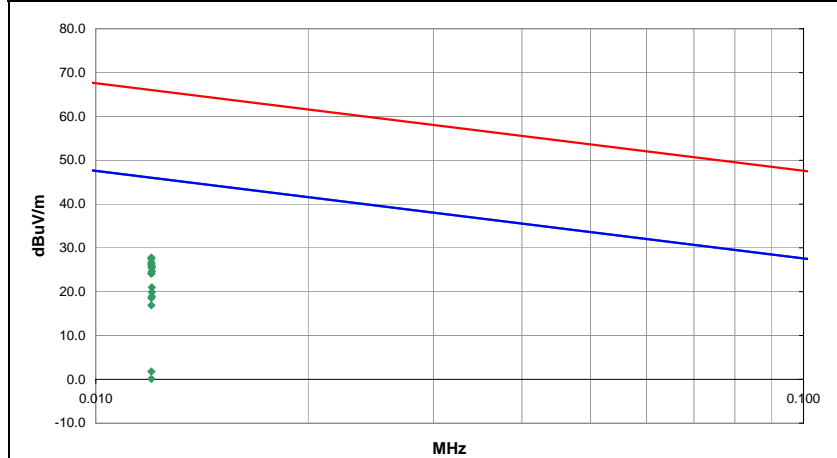
MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The antenna to be used with the EUT was tested. The EUT was transmitting while set at the channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal plane, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2003). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST		PSA 2008.07.21	
EMC		EMI 2008.1.9	
Field Strength of Fundamental			
EUT: TT		Work Order: DiGC0121	
Serial Number: TT1026014		Date: 10/12/10	
Customer: Digital Control, Inc.		Temperature: 22	
Attendees: none		Humidity: 44%	
Project: None		Barometric Pres.: 1015.0 mb	
Tested by: Jennifer Herrett		Power: Battery	
Job Site: EV01			
TEST SPECIFICATIONS		Test Method	
FCC 15.209 Field Strength of Fundamental:2010		ANSI C63.10:2009	
TEST PARAMETERS			
Antenna Height(s) (m)		1.85m -2.5m	
Test Distance (m)		3	
COMMENTS			
None			
EUT OPERATING MODES			
Transmitting			
DEVIATIONS FROM TEST STANDARD			
No deviations.			
Run #		1	
Configuration #		1	
Results		Pass	
		Signature <i>Jennifer Herrett</i>	



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)	Comments
0.012	87.6	18.5	80.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	26.1	46.0	-19.9	EUT horizontal-eyes-horizontal. Antenna parallel to EUT, perp to gnd.
0.012	87.1	18.5	360.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	25.6	46.0	-20.4	EUT horizontal-eyes-horizontal. Antenna perp to EUT, perp to gnd.
0.012	86.2	18.5	87.0	2.5	3.0	0.0	oop/Active I	AV	-80.0	24.7	46.0	-21.3	EUT horizontal-eyes-horizontal. Antenna perp to EUT, parallel to gnd.
0.012	85.7	18.5	4.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	24.2	46.0	-21.8	EUT horizontal-eyes-to-sky. Antenna perp to EUT, perp to gnd.
0.012	85.6	18.5	264.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	24.1	46.0	-21.9	EUT horizontal-eyes-to-sky. Antenna parallel to EUT, perp to gnd.
0.012	81.4	18.5	257.0	2.5	3.0	0.0	oop/Active I	AV	-80.0	19.9	46.0	-26.1	EUT horizontal-eyes-to-sky. Antenna perp to EUT, parallel to gnd.
0.012	80.4	18.5	342.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	18.9	46.0	-27.1	EUT vertical. Antenna perp to EUT, parallel to gnd.
0.012	78.4	18.5	-1.0	2.5	3.0	0.0	oop/Active I	AV	-80.0	16.9	46.0	-29.1	EUT vertical. Antenna parallel to EUT, perp to gnd.
0.012	89.3	18.5	80.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	27.8	66.0	-38.2	EUT horizontal-eyes-horizontal. Antenna parallel to EUT, perp to gnd.
0.012	89.0	18.5	264.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	27.5	66.0	-38.5	EUT horizontal-eyes-to-sky. Antenna parallel to EUT, perp to gnd.
0.012	88.2	18.5	360.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	26.7	66.0	-39.3	EUT horizontal-eyes-horizontal. Antenna perp to EUT, perp to gnd.
0.012	87.9	18.5	4.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	26.4	66.0	-39.6	EUT horizontal-eyes-to-sky. Antenna perp to EUT, perp to gnd.
0.012	87.3	18.5	87.0	2.5	3.0	0.0	oop/Active I	PK	-80.0	25.8	66.0	-40.2	EUT horizontal-eyes-horizontal. Antenna perp to EUT, parallel to gnd.
0.012	87.0	18.5	257.0	2.5	3.0	0.0	oop/Active I	PK	-80.0	25.5	66.0	-40.5	EUT horizontal-eyes-to-sky. Antenna perp to EUT, parallel to gnd.
0.012	82.5	18.5	342.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	21.0	66.0	-45.0	EUT vertical. Antenna perp to EUT, parallel to gnd.
0.012	61.6	18.5	85.0	2.5	3.0	0.0	oop/Active I	AV	-80.0	0.1	46.0	-45.9	EUT vertical. Antenna perp to EUT, perp to gnd.
0.012	80.1	18.5	-1.0	2.5	3.0	0.0	oop/Active I	PK	-80.0	18.6	66.0	-47.4	EUT vertical. Antenna parallel to EUT, perp to gnd.
0.012	63.3	18.5	85.0	2.5	3.0	0.0	oop/Active I	PK	-80.0	1.8	66.0	-64.2	EUT vertical. Antenna perp to EUT, perp to gnd.

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

Transmitting

POWER SETTINGS INVESTIGATED

Battery

FREQUENCY RANGE INVESTIGATED

Start Frequency	10kHz	Stop Frequency	30MHz
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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	1/6/2010	12
EV01 Cables	N/A	Bilog Cables	EVA	7/9/2010	13
Antenna, Loop	EMCO	6502	AZC	8/3/2009	24

MEASUREMENT BANDWIDTHS

	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(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.				

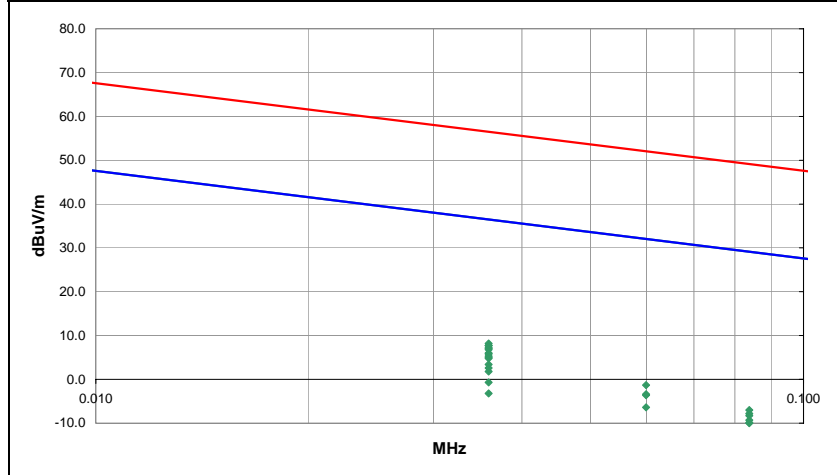
MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

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NORTHWEST		Field Strength of Spurious Emissions		PSA 2008.07.21	
EMC				EMI 2008.1.9	
EUT: TT		Work Order: DiGC0121			
Serial Number: TT1026014		Date: 10/12/10			
Customer: Digital Control, Inc.		Temperature: 22			
Attendees: None		Humidity: 44%			
Project: None		Barometric Pres.: 1015.0 mb			
Tested by: Jennifer Herrett		Power: Battery		Job Site: EV01	
TEST SPECIFICATIONS		Test Method			
FCC 15.209:2010		ANSI C63.10:2009			
TEST PARAMETERS					
Antenna Height(s) (m)		1.85m - 2.5m		Test Distance (m)	
				3	
COMMENTS					
None					
EUT OPERATING MODES					
Transmitting					
DEVIATIONS FROM TEST STANDARD					
No deviations.					
Run #		2			
Configuration #		1			
Results		Pass		Signature <i>Jennifer Herrett</i>	



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	Spec. (dB)	Comments
0.036	74.2	13.5	81.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	7.7	36.5	-28.8	EUT horizontal-eyes-horizontal. Antenna parallel to EUT, perp to gnd.
0.036	73.7	13.5	259.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	7.2	36.5	-29.3	EUT horizontal-eyes-to-sky. Antenna parallel to EUT, perp to gnd.
0.036	71.8	13.5	-1.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	5.3	36.5	-31.2	EUT horizontal-eyes-to-sky. Antenna perp to EUT, perp to gnd.
0.036	71.5	13.5	-1.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	5.0	36.5	-31.5	EUT horizontal-eyes-horizontal. Antenna perp to EUT, perp to gnd.
0.036	71.3	13.5	90.0	2.5	3.0	0.0	oop/Active I	AV	-80.0	4.8	36.5	-31.7	EUT horizontal-eyes-to-sky. Antenna perp to EUT, parallel to gnd.
0.036	69.9	13.5	273.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	3.4	36.5	-33.1	EUT horizontal-eyes-horizontal. Antenna perp to EUT, parallel to gnd.
0.036	68.3	13.5	360.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	1.8	36.5	-34.7	EUT vertical. Antenna perp to EUT, parallel to gnd.
0.060	64.6	12.0	84.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	-3.4	32.0	-35.4	EUT horizontal-eyes-horizontal. Antenna parallel to EUT, perp to gnd.
0.084	58.5	12.2	-1.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	-9.3	29.1	-38.4	EUT horizontal-eyes-to-sky. Antenna perp to EUT, perp to gnd.
0.060	61.6	12.0	98.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	-6.4	32.0	-38.4	EUT horizontal-eyes-to-sky. Antenna perp to EUT, parallel to gnd.
0.084	57.9	12.2	257.0	1.9	3.0	0.0	oop/Active I	AV	-80.0	-9.9	29.1	-39.0	EUT horizontal-eyes-horizontal. Antenna parallel to EUT, perp to gnd.
0.084	57.8	12.2	271.0	2.5	3.0	0.0	oop/Active I	AV	-80.0	-10.0	29.1	-39.1	EUT horizontal-eyes-to-sky. Antenna perp to EUT, parallel to gnd.
0.036	63.3	13.5	360.0	2.5	3.0	0.0	oop/Active I	AV	-80.0	-3.2	36.5	-39.7	EUT vertical. Antenna parallel to EUT, perp to gnd.
0.036	74.7	13.5	81.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	8.2	56.5	-48.3	EUT horizontal-eyes-horizontal. Antenna parallel to EUT, perp to gnd.
0.036	74.2	13.5	259.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	7.7	56.5	-48.8	EUT horizontal-eyes-to-sky. Antenna parallel to EUT, perp to gnd.
0.036	73.6	13.5	-1.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	7.1	56.5	-49.4	EUT horizontal-eyes-horizontal. Antenna perp to EUT, perp to gnd.
0.036	73.3	13.5	-1.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	6.8	56.5	-49.7	EUT horizontal-eyes-to-sky. Antenna perp to EUT, perp to gnd.
0.036	72.5	13.5	90.0	2.5	3.0	0.0	oop/Active I	PK	-80.0	6.0	56.5	-50.5	EUT horizontal-eyes-to-sky. Antenna perp to EUT, parallel to gnd.
0.036	72.3	13.5	273.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	5.8	56.5	-50.7	EUT horizontal-eyes-horizontal. Antenna perp to EUT, parallel to gnd.
0.060	66.7	12.0	84.0	1.9	3.0	0.0	oop/Active I	PK	-80.0	-1.3	52.0	-53.3	EUT horizontal-eyes-horizontal. Antenna parallel to EUT, perp to gnd.