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CERTIFICATION TEST REPORT

Manufacturer:	**Dow AgroSciences LLC** **9330 Zionsville Road** **Indianapolis, Indiana 46268 USA**
Applicant:	**Same as Above**
Product Name:	**Scout**
Product Description:	The Scout device is an extended range 125kHz RFID reader with Bluetooth connectivity that is swept across the ground to detect and read RFID tag data.
Operating Voltage/Frequency:	Battery-Operated
Model:	**Scout**
FCC ID:	**QFG-SCOUT**
Testing Commenced:	2020-06-02
Testing Ended:	2020-06-02
Summary of Test Results:	**In Compliance**

Standards:

- **FCC Part 15 Subpart C, Section 15.209**
- **FCC Part 15 Subpart C, Section 15.215(c) – Additional provisions to the general radiated emission limitations**
- **FCC Part 15 Subpart A, Section 15.31(e) – Measurement Standards**

Evaluation Conducted by:

Julius Chiller, EMC/Wireless Engineer

Report Reviewed by:

Ken Littell, Director of EMC & Wireless Operations

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1 ADMINISTRATIVE INFORMATION

1.1 Measurement Location:

F2 Labs in Middlefield, Ohio. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.

1.2 Measurement Procedure:

All measurements were performed according to the 2013 version of ANSI C63.10 and recommended FCC procedure of measurement of equipment operating under Section 15.209. A list of the measurement equipment can be found in Section 6.

1.3 Uncertainty Budget:

The uncertainty in EMC measurements arises from several factors which affect the results, some associated with environmental conditions in the measurement room, the test equipment being used, and the measurement techniques adopted.

The measurement uncertainty budgets detailed below are calculated from the test and calibration data and are expressed with a 95% confidence factor using a coverage factor of k=2. The Uncertainty for a laboratory is referred to as *U*lab. For Radiated and Conducted Emissions, the Expanded Uncertainty is compared to the *U*cispr values to determine if a specific margin is required to deem compliance.

*U*lab

Measurement Range	Combined Uncertainty	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	2.54	5.07dB
Radiated Emissions <1 GHz @ 10m	2.55	5.09dB
Radiated Emissions 1 GHz to 2.7 GHz	1.81	3.62dB
Radiated Emissions 2.7 GHz to 18 GHz	1.55	3.10dB
AC Power Line Conducted Emissions, 150kHz to 30 MHz	1.38	2.76dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	1.66	3.32dB

*U*cispr

Measurement Range	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	5.2dB
Radiated Emissions <1 GHz @ 10m	5.2dB
Radiated Emissions 1 GHz to 2.7 GHz	Under Consideration
Radiated Emissions 2.7 GHz to 18 GHz	Under Consideration
AC Power Line Conducted Emissions, 150kHz to 30 MHz	3.6dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	4.0dB

If *U*lab is less than or equal to *U*cispr, then:
- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If *U*lab is greater than *U*cispr in table 1, then:
- compliance is deemed to occur if no measured disturbance, increased by (*U*lab – *U*cispr), exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance, increased by (*U*lab – *U*cispr), exceeds the disturbance limit.

Note: Only measurements listed in the tables above that relate to tests included in this Test Report are applicable.

1.4 Document History

Document Number	Description	Issue Date	Approved By
F2P22228C-01E	First Issue	2020-06-09	K. Littell

2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
-20dB Occupied Bandwidth	CFR 47 Part 15.215(c)	Complies
Field Strength of Emissions	CFR 47 Part 15.209	Complies
Radiated Spurious Emissions	CFR 47 Part 15.209	Complies
Variation of the Input Power	CFR 47 Part 15.31(e)	Complies[1]
Conducted Emissions	CFR 47, Part 15.207	N/A[2]

[1]Complies by using fully charged batteries.
[2]EUT does not operate while charging. Battery must be removed to charge.

Modifications Made to the Equipment
No modifications were made to the EUT.

3 TABLE OF MEASURED RESULTS

Test	125 kHz
Limit for Fundamental at 300 meters	25.66 dBµV/m (-25.84 dBµA/m)
Limit for Fundamental with 40dB/decade correction for 3m.	105.66 dBµV/m (54.16 dBµA/m)
Field Strength of Fundamental at 3m distance.	46.04 dBµV/m (-5.46 dBµA/m)
Field Strength of Fundamental corrected for 40dB/decade to 300m.	-33.96 dBµV/m (-85.46 dBµA/m)
-20dB Occupied Bandwidth	118.7kHz

4 ENGINEERING STATEMENT

This report has been prepared on behalf of Dow AgroSciences LLC to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15.209 of the FCC Rules using ANSI C63.10 2013 and Part 15 standards. The test results found in this test report relate only to the items tested.

5 EUT INFORMATION AND DATA

5.1 Equipment Under Test:

Product: RFID Tag Reader
Model: Scout
Serial Number: EPAUN1A
Software Version: Model 500G, SW Version 1.0.3
FCC ID: QFG-SCOUT

5.2 Trade Name:

Dow AgroSciences LLC

5.3 Power Supply:

Battery-Operated

5.4 Applicable Rules:

CFR 47, Part 15.209, subpart C

5.5 Equipment Category:

RFID Reader

5.6 Antenna:

Internal loop

5.7 Accessories:

N/A

5.8 Test Item Condition:

The equipment to be tested was received in good condition.

5.9 Testing Algorithm:

EUT was on and sending a continuous signal on 125 kHz. During emissions testing, the EUT was continuously reading a client-supplied RFID tag. The highest emissions were recorded in the data tables.

6 LIST OF MEASUREMENT INSTRUMENTATION

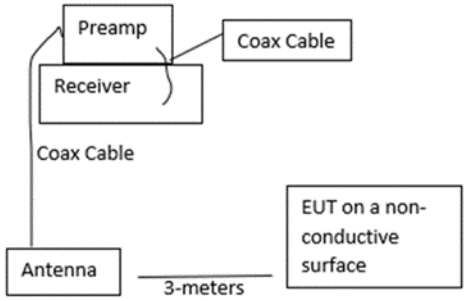
Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166-E	Albatross Projects	B83117-DF435-T261	US140023	2021-01-03
Temp/Hum. Recorder	CL261	Extech	445814	04	2021-02-12
Receiver	CL151	Rohde & Schwarz	ESU40	100319	2020-10-21
Receiver	CL204	Rohde & Schwarz	ESR7	101714	2020-10-16
Antenna, JB3 Combination	CL175	Sunol Sciences, Inc.	JB3	A030315	2020-10-14
Pre-amplifier	CL153	Agilent	83006-69007	MY39500791	2020-03-19
Amplifier w/Monopole & 18" Loop	CL163-Loop	AH Systems, Inc.	EHA-52B	100	2020-07-24
Low Loss Cable Set	--	Pasternack	PE3C0666-252 / PE3C066-50CM	None Spec.	2020-08-31
Software:	Tile Version 3.4.B.3		Software Verified: 2020-06-02		
Software:	EMC 32, Version 8.53.0		Software Verified: 2020-06-02		

7 OCCUPIED BANDWIDTH

7.1 Requirements:

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the -20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

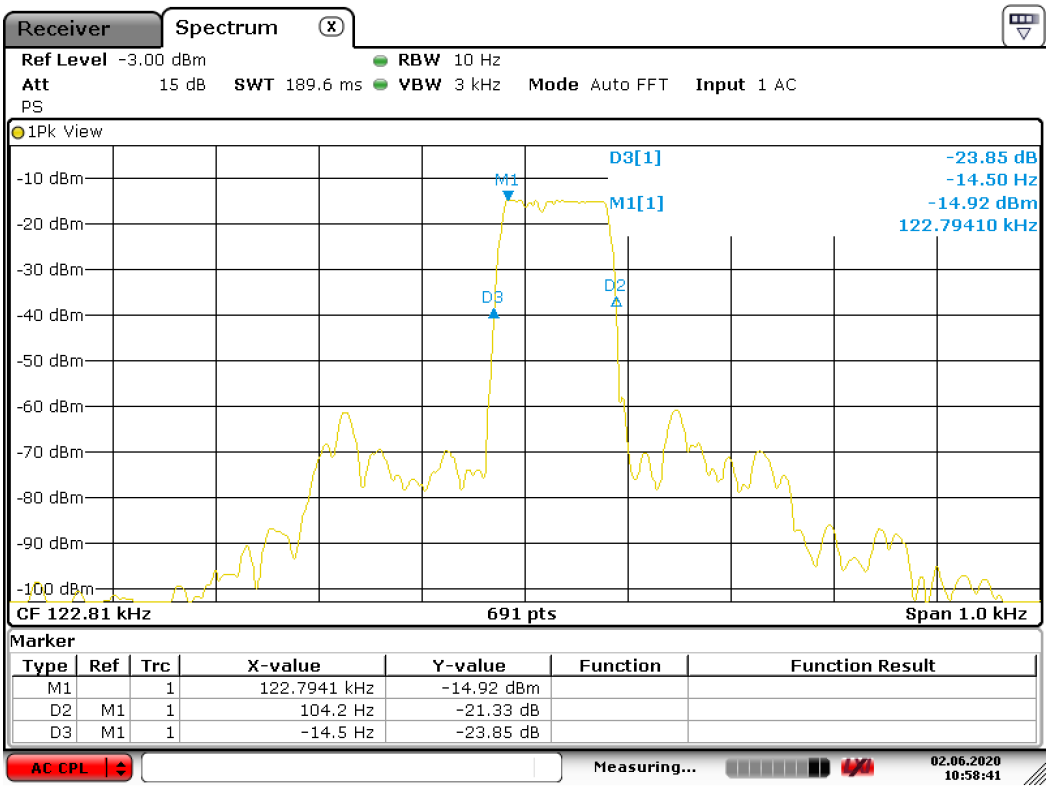
Bandwidth measurements were made at 10Hz RBW using the Marker Delta method.



7.2 Test Data - Occupied Bandwidth

Test Date(s):	2020-06-02	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.215(c)	Air Temperature:	24.1ºC
		Relative Humidity:	37%

125kHz: -20dB



Date: 2.JUN.2020 10:58:41

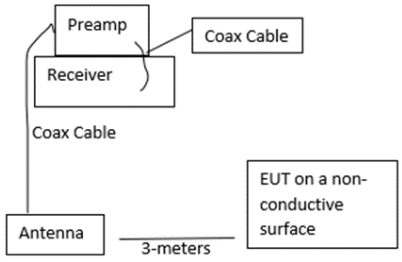
8 FIELD STRENGTH OF EMISSIONS FROM INTENTIONAL RADIATORS

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Notes:
During the pre-scan evaluation, the EUT was rotated in all possible directions and all three orthogonal positions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. The following plots are just prescan plots and do not necessarily reflect the actual limits. The measurement table has the correct limits.

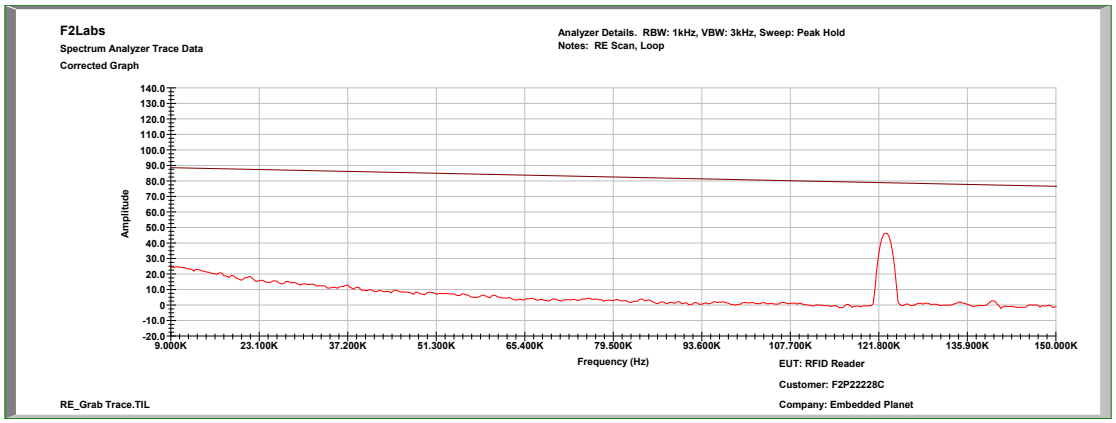
125 kHz Field Strength was measured at 3m.



8.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date(s):	2020-06-02	**Test Engineer(s):**	J. Chiller
Standards:	CFR 47 Part 15.209	**Air Temperature:**	22.6ºC
Results:	Complies	**Relative Humidity:**	36%

125kHz: Characterization Scan, 0.009 MHz to 0.15 MHz (Loop Antenna)



8.2 Test Data – Spurious Emissions

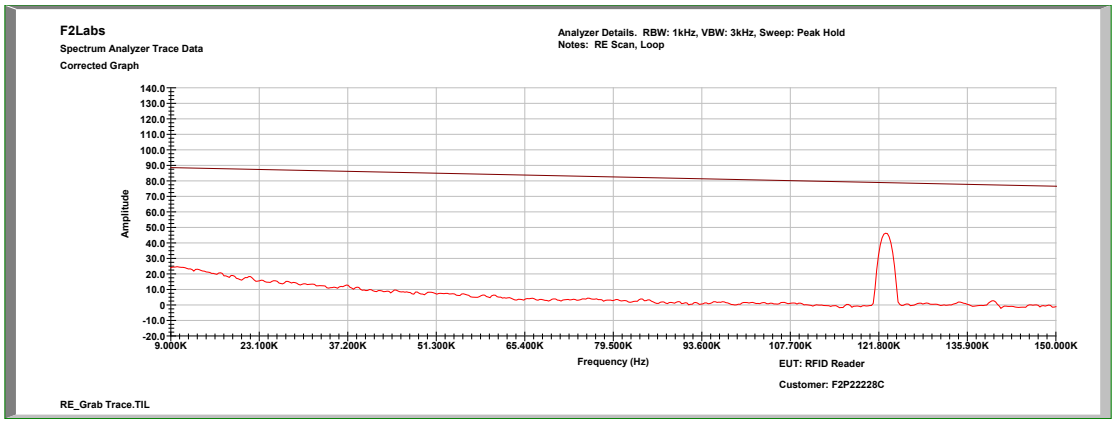
Notes: Plots are peak, max hold pre-scan data included only to determine what frequencies to investigate and measure. During the pre-scan evaluation, the EUT was rotated in all possible directions and three orthogonal positions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. At some frequencies, no emissions from the EUT were measurable over the ambient noise floor. The readings did not change with EUT on and EUT off.

At least 6 of the highest frequencies were measured per ANSI 63.4 in a 3-meter anechoic chamber. Frequencies below 1GHz were measured using a quasi-peak detector. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. Some of the frequencies did not change with the EUT on or off. At those frequencies, the test distance was shortened to 1 meter and still no emissions from the EUT were visible or over the ambient or limit. Frequencies were scanned from 9kHz to 1000 MHz and the highest emissions are presented.

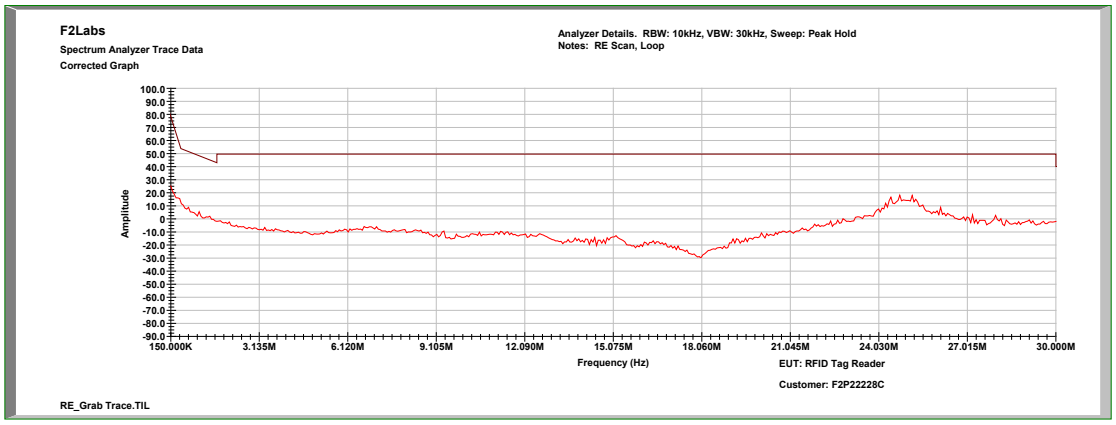
In the following plots, the red line indicates the measurement with the EUT on. Emissions to be found by the EUT were measured and listed in tables below.

Test Date(s):	2020-06-02	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.209	Air Temperature:	22.6ºC
		Relative Humidity:	36%
Results:	Complies		

125kHz: Characterization Scan, 0.009 MHz to 0.15 MHz (Loop Antenna)

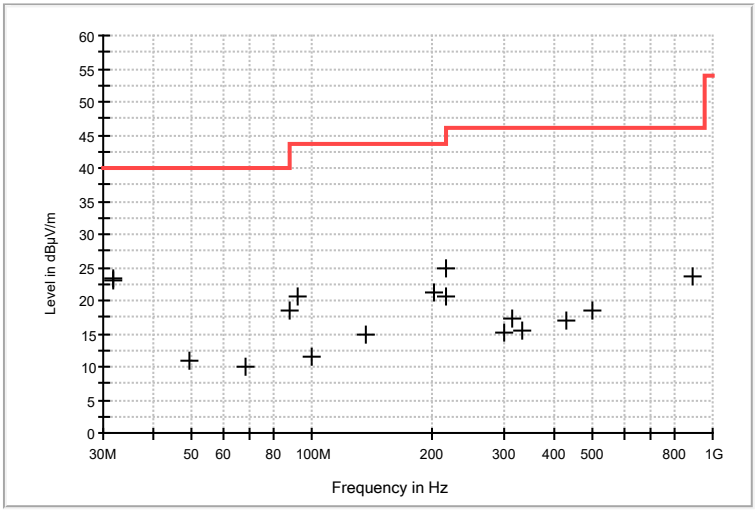


125kHz: Characterization Scan, 0.15 MHz to 30 MHz (Loop Antenna)

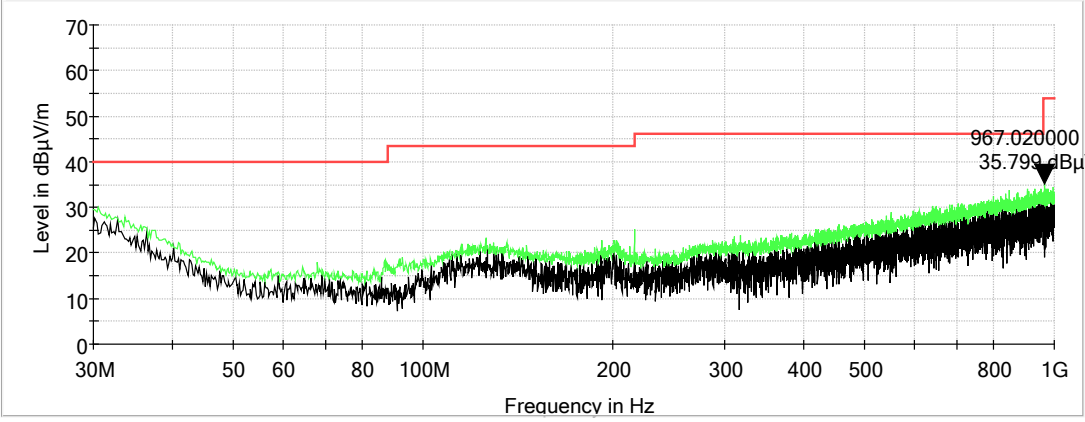


125kHz: 30 MHz to 1000 MHz

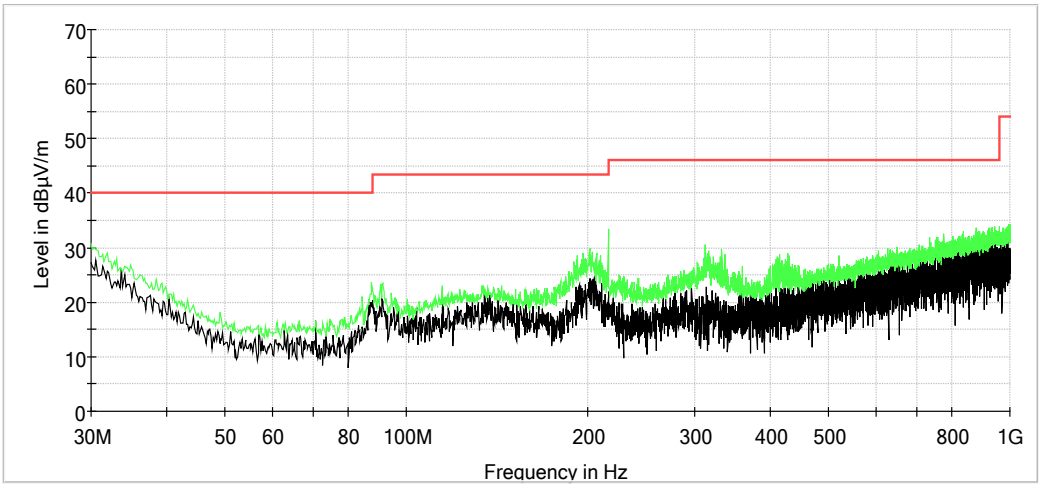
Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	Reading (dBµV)	Cable Loss & Antenna Factor (dB)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
0.125000	Loop	100.00	0.00	-5.3	51.3	46.04	105.7	-59.6
31.760000	V	100.00	0.00	17.4	5.7	23.10	40.0	-16.9
31.960000	H	100.00	0.00	17.6	5.6	23.20	40.0	-16.8
49.000000	H	100.00	0.00	16.7	-5.9	10.80	40.0	-29.2
68.040000	V	100.00	0.00	16.4	-6.4	10.00	40.0	-30.0
87.600000	H	100.00	0.00	25.4	-6.9	18.50	40.0	-21.5
91.320000	H	100.00	0.00	27.0	-6.5	20.50	43.5	-23.0
99.080000	V	100.00	0.00	15.9	-4.3	11.60	43.5	-31.9
136.120000	V	100.00	0.00	14.8	0.0	14.80	43.5	-28.7
201.120000	H	100.00	0.00	21.4	0.0	21.40	43.5	-22.1
216.040000	H	100.00	0.00	26.8	-1.9	24.90	46.0	-21.1
216.040000	V	100.00	0.00	22.5	-1.9	20.60	46.0	-25.4
301.400000	V	100.00	0.00	13.7	1.5	15.20	46.0	-30.8
317.320000	H	100.00	0.00	15.2	2.1	17.30	46.0	-28.7
333.240000	H	100.00	0.00	13.3	2.3	15.60	46.0	-30.4
428.480000	V	100.00	0.00	11.9	4.9	16.80	46.0	-29.2



Characterization Scan, 30 MHz to 1000 MHz, Vertical



Characterization Scan, 30 MHz to 1000 MHz, Horizontal



9 PHOTOGRAPHS – TEST SETUP

Occupied Bandwidth & Field Strength

Radiated Spurious Emissions: Less than 30 MHz

Radiated Spurious Emissions: 30 MHz to 1000 MHz