Digital Control, Inc.

TEST REPORT FOR

DigiTrak 15" SuperCore Transmitter
Model: RTP

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.209

Report No.: 109798-14

Date of issue: July 22, 2025

Test Certificate # 803.01

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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Administrative Information

Test Report Information

REPORT PREPARED FOR:

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Representative: Ashley Olson
Customer Reference Number: 907148

REPORT PREPARED BY:

Viviana Prado
CKC Laboratories, Inc.
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Mariposa, CA 95338

Project Number: 109798

DATE OF EQUIPMENT RECEIPT: March 25, 2025
DATE(S) OF TESTING: June 10, 2025

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
Canyon Park
22116 23rd Drive SE, Suite A
Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.20

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Canada	Japan
Canyon Park, Bothell, WA	US0103	US1024	3082C	A-0136
Brea, CA	US0103	US1024	3082D	A-0136
Fremont, CA	US0103	US1024	3082B	A-0136
Mariposa, CA	US0103	US1024	3082A	A-0136

*CKC's list of NIST designated countries can be found at: https://standards.gov/cabs/designations.html

Summary of Results

Standard / Specification: FCC Part 15 Subpart C - 15.209

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	Mod. #1	Pass
15.209	Field Strength of Fundamental	Mod. #1	Pass
15.209	Field Strength of Spurious Emissions	Mod. #1	Pass
15.207	AC Conducted Emissions	NA	NA1

NA = Not Applicable
NA1 = Not applicable because the EUT is battery powered.

ISO/IEC 17025 Decision Rule
The equipment sample utilized for testing is selected by the manufacturer. The declaration of pass or fail herein is a binary statement for simple acceptance rule (ILAC G8) based upon assessment to the specification(s) listed above, without consideration of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
Modification #1: Power Board RevX10 that updated the RC snubber circuit and added ferrite beads.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

Equipment Under Test (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Under Test:

Device	Manufacturer	Model #	S/N
DigiTrak 15" SuperCore Transmitter	Digital Control, Inc.	RTP, FTp+ Variant* **See Appendix A for Manufacturer's Statement and Functional Description*	90001418

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

The manufacturer declares the FT5 setting is representative of worst case. It utilizes the highest signal strength and pre-scan data was performed to verify worst case emissions across various bands and power settings.

General Product Information:

Description of EUT
The EUT is an inductive device used underground in horizontal directional drilling applications. The scope of this report covers the emissions of the locator's UHF radio (various bands investigated from 9khz to 45khz). The highest band "43" sets the highest tone centered around 42kHz.

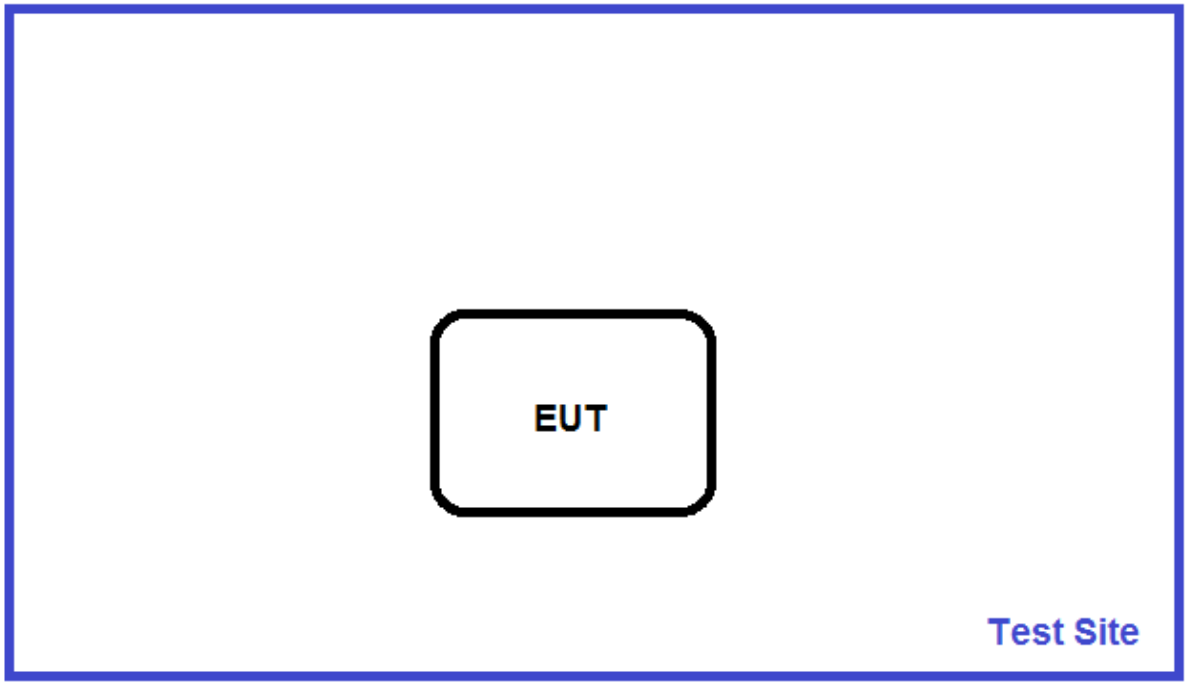
Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	CW Depth and FSK Data Tone
Maximum Duty Cycle:	Tested as 100%
Operating Frequency Range	0.033kHz to 45kHz The manufacturer declares that the worst-case frequency range/power setting was selected based on previous engineering scans.
Antenna Information:	Silicon steel core with windings (50µH per manufacturer)
Antenna Connection Type:	Integral
Nominal Input Voltage:	Battery, 7.28VDC DigiTrak SuperCell Li-Ion Rechargeable Battery, Models RBP2v1, RBP2v2
Firmware / Software used for Test:	Boot: 4.0.0.1 Main: 3.0.0.54
The validity of results is dependent on the stated product details, the accuracy of which the manufacturer assumes full responsibility.	

EUT and Accessory Photo(s)

Block Diagram of Test Setup(s)

Config#	Description of Block Diagram
1	EUT is on the test table continuously transmitting.

Test Setup Block Diagram



FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2020)	Test Date(s):	6/10/2025 & 8/27/2025
Configuration:	1		
Test Setup:	The EUT is on a test bench inside a semi anechoic chamber. The EUT was configured in the following configuration to show individual CW-depth tone and a single frequency data tone: Depth tone at 42kHz Alternating Data tone at 40.8kHz and 43.2kHz. The data tone at 40.8kHz was selected for measurement. **Modification #1 was in place during testing.**		

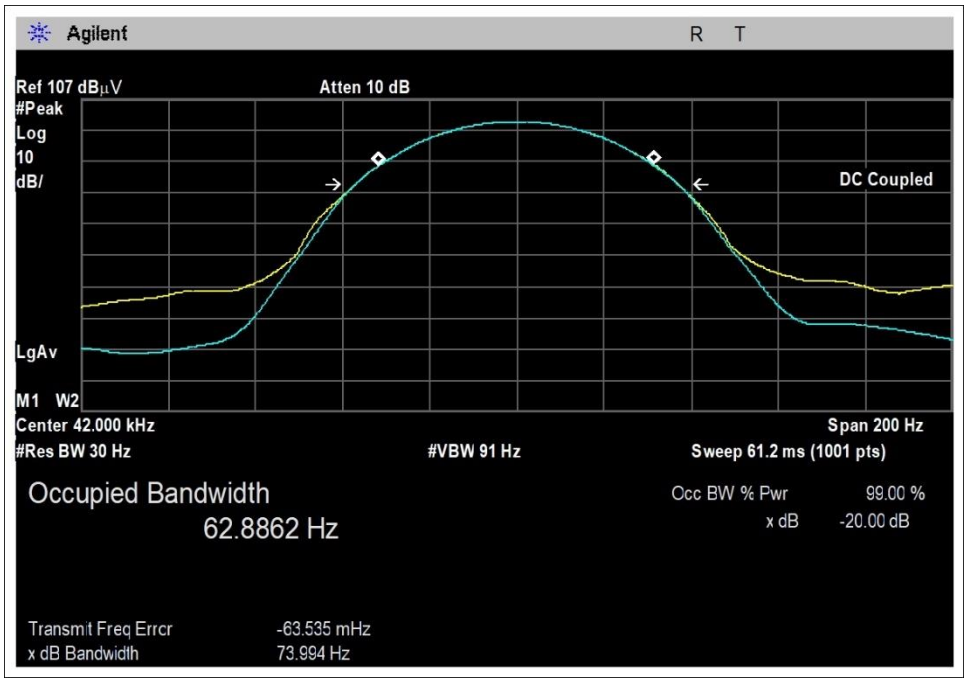
Environmental Conditions			
Temperature (ºC)	22-24	Relative Humidity (%):	40-45

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02871	Spectrum Analyzer	Agilent	E4440A	9/19/2024	9/19/2026
P08205	Flex Cable	Mini-Circuits	CBL-6FT-NMNM+	1/22/2025	1/22/2027
P07485	Cable	Andrews	FSJ1	1/29/2025	1/29/2027
00052	Loop Antenna	EMCO	6502	4/21/2025	4/21/2027

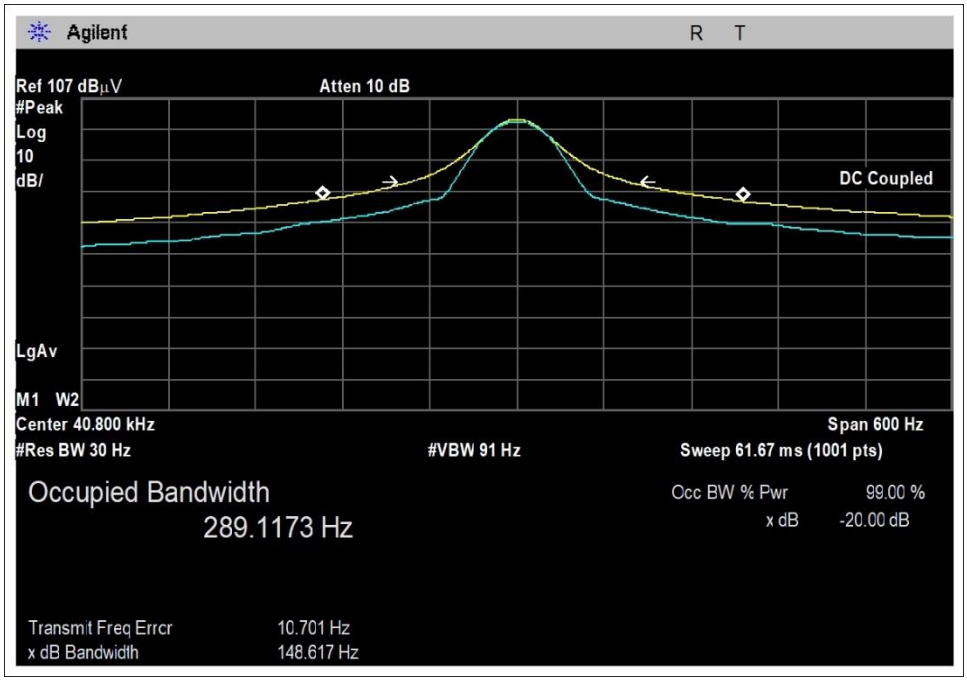
Test Data Summary					
Frequency	**Antenna Port**	**Modulation**	**Measured (Hz)**	**Limit (Hz)**	**Results**
42.0kHz	1	CW Depth Tone	73.994	None	Pass
40.8kHz	1	Data Tone	148.617	None	Pass

* Unable to meet RBW ratio in 6.9 of ANSI C63.10

Plot(s)



CW Depth



Data Tone

Test Setup Photo(s)

15.209 Field Strength of Fundamental

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2020)	Test Date(s):	6/10/2025 and 8/27/2025
Configuration:	1		
Test Setup:	See datasheet for notes.		

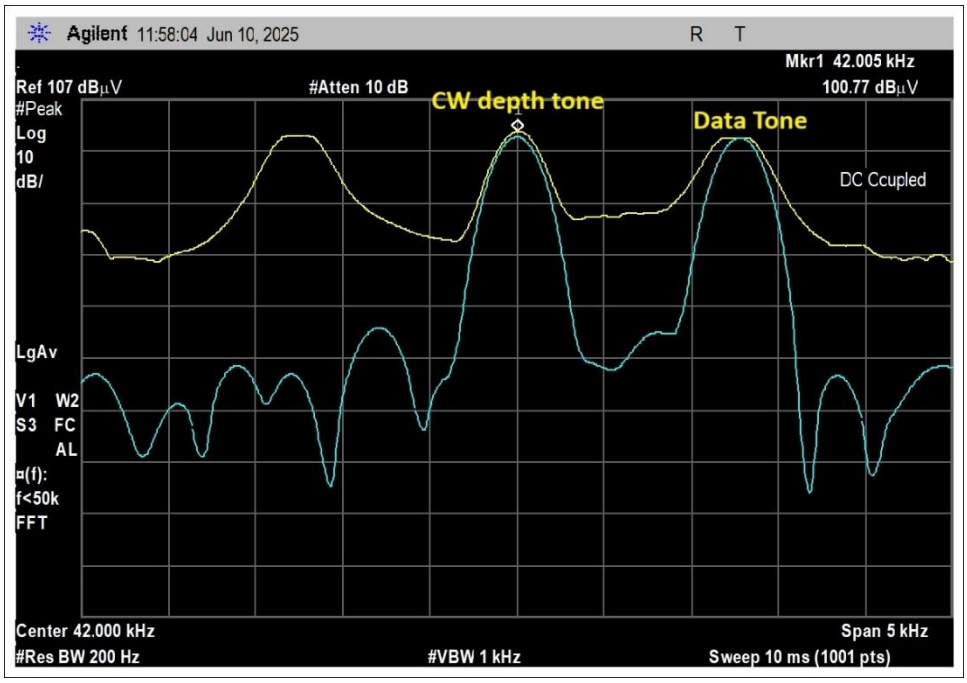
Test Data Summary - Voltage Variations

This equipment is battery powered. Power output tests were performed using a fresh battery.

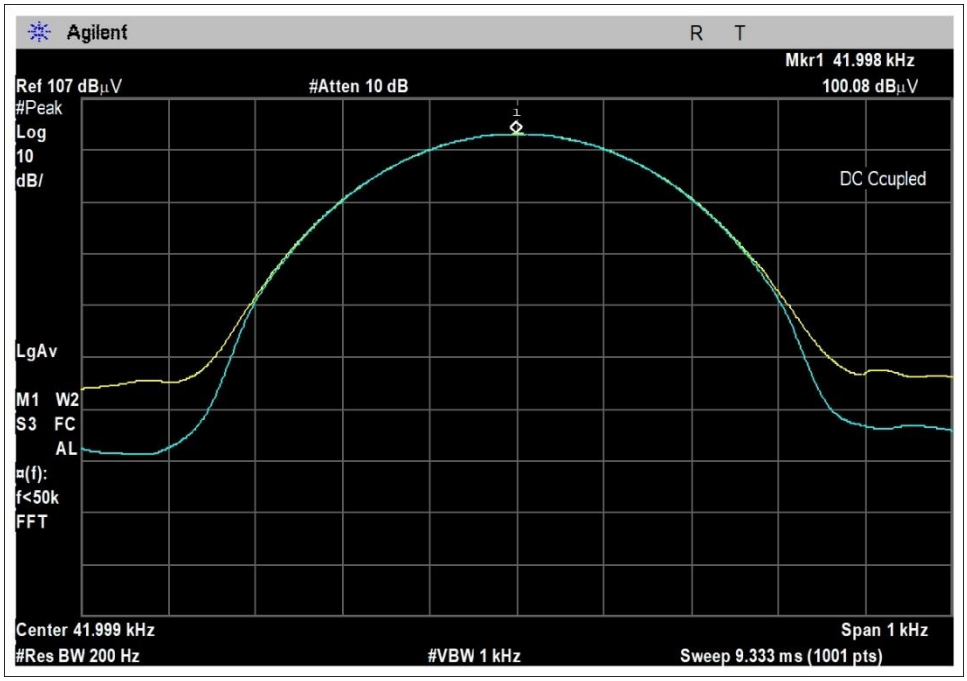
Test Data Summary – Radiated Field Strength Measurement

Frequency	Modulation	Ant. Type	Measured (dBµV/m @ 300m)	Limit (dBµV/m @ 300m)	Results
42.0kHz	CW Depth + Data tone with typical spacing	Core with windings	31.2	≤35.1	Pass
42.0kHz	CW Depth	Core with windings	30.5	≤35.1	Pass
40.8kHz	Data Tone	Core with windings	30.7	≤35.4	Pass

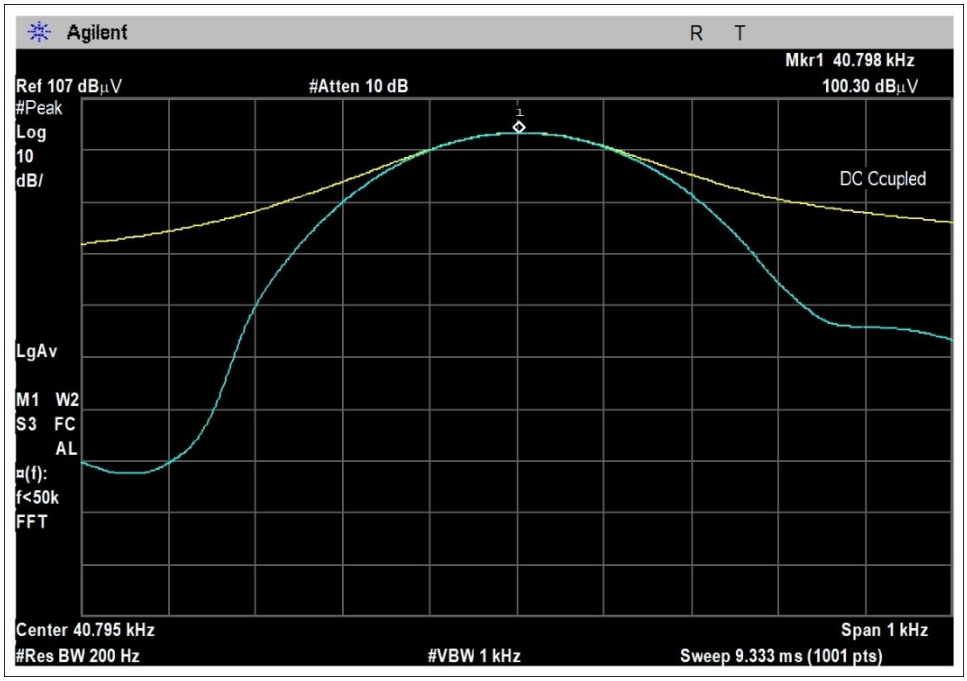
Plot(s)



Worst Case



CW Depth


Agilent
R T
Mkr1 40.798 kHz
Ref 107 dBµV
#Atten 10 dB
100.30 dBµV
#Peak
Log
10
dB/
DC Ccupled
LgAv
M1 W2
S3 FC
AL
¤(f):
f<50k
FFT
Center 40.795 kHz
Span 1 kHz
#Res BW 200 Hz
#VBW 1 kHz
Sweep 9.333 ms (1001 pts)

Data Tone

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717		
Customer:	**Digital Control, Inc.**		
Specification:	**15.209 Radiated Emissions**		
Work Order #:	**109798**	Date:	8/27/2025
Test Type:	**Maximized Emissions**	Time:	09:11:46
Tested By:	M. Atkinson	Sequence#:	7
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
See Test Cond			

Support Equipment:

Device	Manufacturer	Model #	S/N
See Test Cond			

Test Conditions / Notes:

Test Environment Conditions:
Temperature: 24°C
Humidity: 40%
Pressure: 101.2kPa

Frequency: Fundamental

Test Method: ANSI C63.10 (2020)

Test Setup:
The EUT is on a test bench inside a semi anechoic chamber. Measurements are made at 3m test distance with distance correction applied for a 300m limit.

The EUT is transmitting continuously.

An investigation was performed to find the worst case fundamental and spurious emissions. Various data and depth tones were investigated and a representative worst case configuration was found mode which uses normal operation and switching data tones with the following settings:

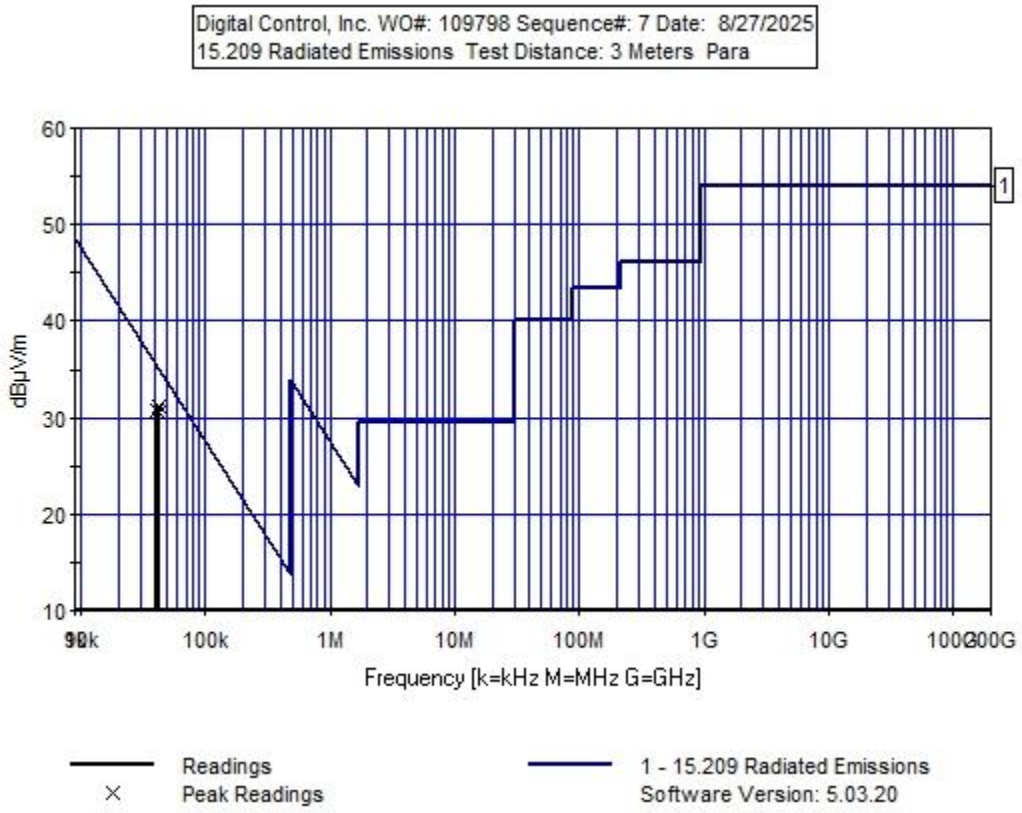
Depth tone at 42kHz
12 Data tones at 1.2kHz below depth tone with 10Hz spacing
12 Data tones at 1.2kHz above depth tone with 10Hz spacing

Additionally the fundamental was also measured in a mode to better isolate the CW Depth and a single data tone frequency in the following configuration:

Depth tone at 42kHz
Alternating Data tone at 40.8kHz and 43.2kHz only. The data tone at 40.8kHz was selected for measurement.

XYZ EUT axes investigated with worst case reported.
3 x orthogonal axes investigated, worst case reported.

Modification #1 was in place during testing.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02871	Spectrum Analyzer	E4440A	9/19/2024	9/19/2026
T2	ANP08205	Cable	CBL-6FT-NMNM+	1/22/2025	1/22/2027
T3	ANP07485	Cable	FSJ1	1/29/2025	1/29/2027
T4	AN00052	Loop Antenna	6502	4/21/2025	4/21/2027

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	42.005k	100.8	+0.0	+0.0	+0.0	+10.4	-80.0	31.2	35.1 Worst case normal operation	-3.9	Para
2	41.998k	100.1	+0.0	+0.0	+0.0	+10.4	-80.0	30.5	35.1 CW depth	-4.6	Para
3	40.799k	100.3	+0.0	+0.0	+0.0	+10.4	-80.0	30.7	35.4 Data tone	-4.7	Para

Test Setup Photo(s)

Below 1GHz, 0.8m

X-Axis

Y-Axis

Z-Axis

15.209 Radiated Emissions

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2020)	Test Date(s):	6/10/2025
Configuration:	1		

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717
Customer: **Digital Control, Inc.**
Specification: **15.209 Radiated Emissions**
Work Order #: **109798** Date: 6/10/2025
Test Type: **Maximized Emissions** Time: 11:51:55
Tested By: M. Atkinson Sequence#: 6
Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Environment Conditions:
Temperature: 24°C
Humidity: 40%
Pressure: 101.2kPa

Frequency: 9kHz-30MHz

Test Method: ANSI C63.10 (2020)

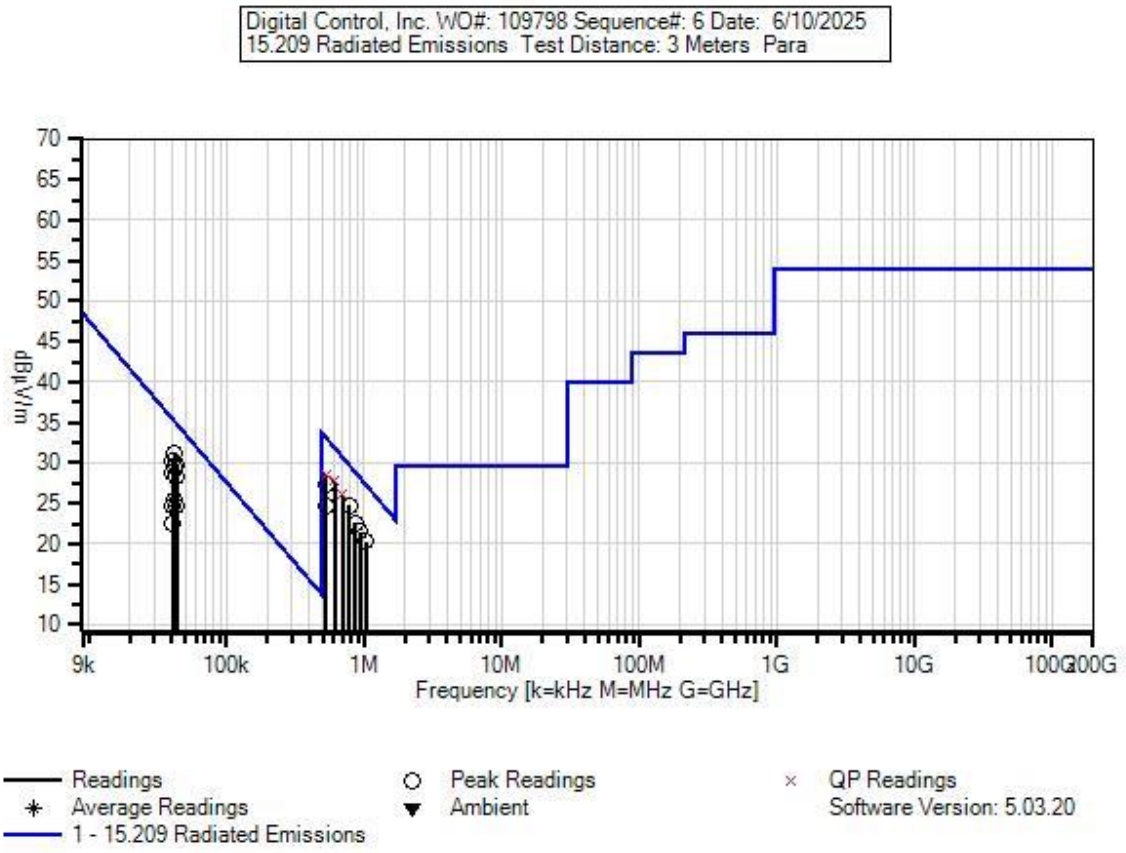
Test Setup:
The EUT is transmitting continuously centered around 42kHz. The frequency and settings are worst case from previous investigations performed by the manufacturer at the test log to find worst case emissions. The following is additional information on the transmit settings:

Hardware: 600-0261-00 X10 Power board
Frequencies: 42000.CSV
Waveshape: True Square

The 42000.CSV mode sets the EUT with the following settings:
Depth tone at 42kHz
12 Data tones at 1.2kHz below depth tone with 10Hz spacing
12 Data tones at 1.2kHz above depth tone with 10Hz spacing

XYZ EUT axes investigated with worst case reported.
3 x orthogonal axes investigated, worst case reported.

Modification #1 was in place during testing.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02871	Spectrum Analyzer	E4440A	9/19/2024	9/19/2026
T2	ANP08205	Cable	CBL-6FT-NMNM+	1/22/2025	1/22/2027
T3	ANP07485	Cable	FSJ1	1/29/2025	1/29/2027
T4	AN00052	Loop Antenna	6502	4/21/2025	4/21/2027

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	42.005k	100.8	+0.0	+0.0	+0.0	+10.4	-80.0	31.2	35.1	-3.9	Para
2	614.136k QP	58.1	+0.0	+0.0	+0.0	+9.7	-40.0	27.8	31.8	-4.0	Para
^	614.135k	59.4	+0.0	+0.0	+0.0	+9.7	-40.0	29.1	31.8	-2.7	Para
4	530.808k QP	59.0	+0.0	+0.0	+0.0	+9.6	-40.0	28.6	33.1	-4.5	Para
^	530.508k	61.2	+0.0	+0.0	+0.0	+9.6	-40.0	30.8	33.1	-2.3	Para
6	697.764k QP	56.2	+0.0	+0.0	+0.0	+9.8	-40.0	26.0	30.7	-4.7	Para
^	697.763k	57.1	+0.0	+0.0	+0.0	+9.8	-40.0	26.9	30.7	-3.8	Para
8	779.301k	54.8	+0.0	+0.0	+0.0	+9.9	-40.0	24.7	29.7	-5.0	Para
9	43.270k	99.5	+0.0	+0.0	+0.0	+10.3	-80.0	29.8	34.9	-5.1	Para
10	40.805k	99.8	+0.0	+0.0	+0.0	+10.4	-80.0	30.2	35.4	-5.2	Para
11	41.991k	99.1	+0.0	+0.0	+0.0	+10.4	-80.0	29.5	35.1	-5.6	Para
12	533.400k	57.7	+0.0	+0.0	+0.0	+9.6	-40.0	27.3	33.1	-5.8	Perp
13	858.747k	52.8	+0.0	+0.0	+0.0	+9.8	-40.0	22.6	28.9	-6.3	Para
14	940.285k	51.8	+0.0	+0.0	+0.0	+9.7	-40.0	21.5	28.1	-6.6	Para
15	43.246k	97.9	+0.0	+0.0	+0.0	+10.3	-80.0	28.2	34.9	-6.7	Para
16	40.736k	98.3	+0.0	+0.0	+0.0	+10.4	-80.0	28.7	35.4	-6.7	Para
17	1.026M	50.6	+0.0	+0.0	+0.0	+9.7	-40.0	20.3	27.3	-7.0	Para
18	532.400k	55.1	+0.0	+0.0	+0.0	+9.6	-40.0	24.7	33.1	-8.4	GndPa
19	42.030k	95.0	+0.0	+0.0	+0.0	+10.4	-80.0	25.4	35.1	-9.7	Perp
20	43.260k	94.3	+0.0	+0.0	+0.0	+10.3	-80.0	24.6	34.9	-10.3	Perp
21	40.710k	94.3	+0.0	+0.0	+0.0	+10.4	-80.0	24.7	35.4	-10.7	Perp
22	40.770k	92.0	+0.0	+0.0	+0.0	+10.4	-80.0	22.4	35.4	-13.0	GndPa

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717		
Customer:	**Digital Control, Inc.**		
Specification:	**15.209 Radiated Emissions**		
Work Order #:	**109798**	Date:	6/10/2025
Test Type:	**Maximized Emissions**	Time:	10:11:17
Tested By:	M. Atkinson	Sequence#:	3
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Environment Conditions:
Temperature: 24°C
Humidity: 40%
Pressure: 101.2kPa

Frequency: 30-1000MHz

Test Method: ANSI C63.10 (2020)

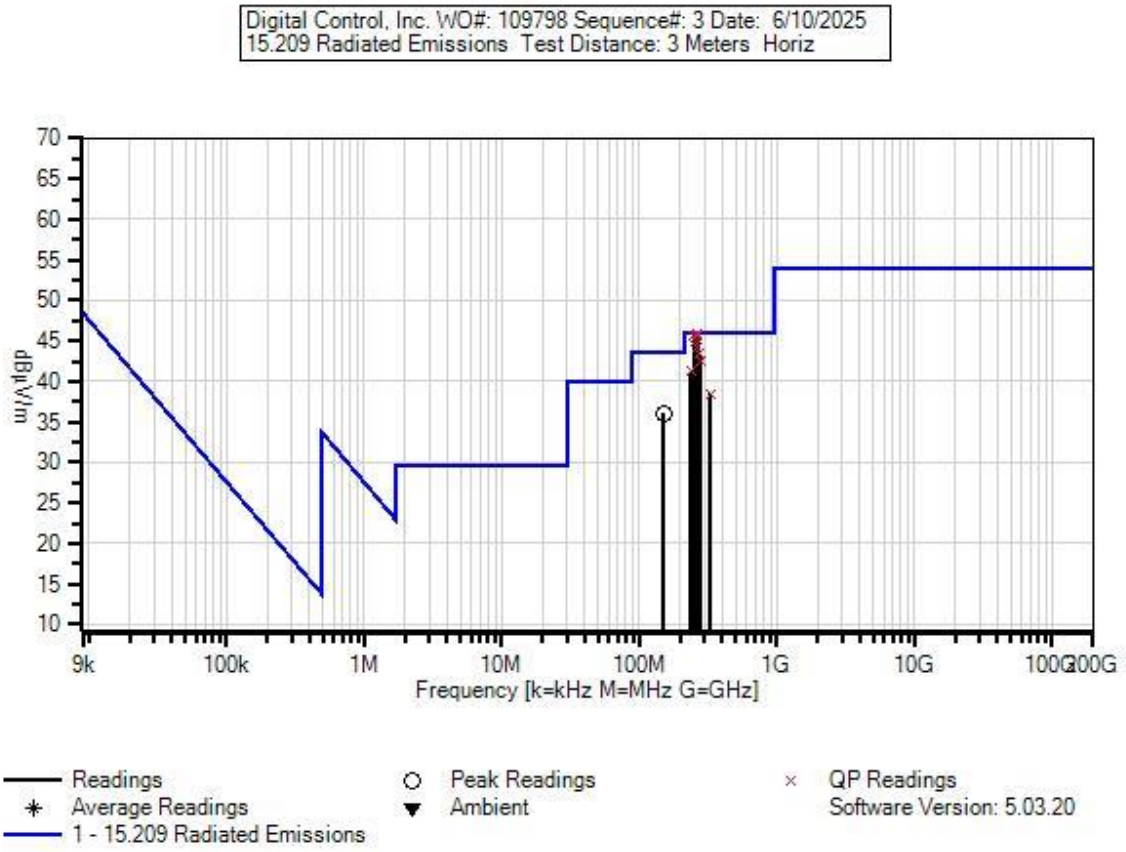
Test Setup:
The EUT is transmitting continuously centered around 42kHz. The frequency and settings are worst case from previous investigations performed by the manufacturer at the test log to find worst case emissions. The following is additional information on the transmit settings:

Hardware: 600-0261-00 X10 Power board
Frequencies: 42000.CSV
Waveshape: True Square

The 42000.CSV mode sets the EUT with the following settings:
Depth tone at 42kHz
12 Data tones at 1.2kHz below depth tone with 10Hz spacing
12 Data tones at 1.2kHz above depth tone with 10Hz spacing

XYZ EUT axes investigated with worst case reported.

Modification #1 was in place during testing.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02871	Spectrum Analyzer	E4440A	9/19/2024	9/19/2026
T1	AN03863	Biconilog Antenna	3142E	1/15/2025	1/15/2027
T2	ANP08256	Attenuator	WA1/6-6-0403	3/18/2025	3/18/2027
T3	ANP05333	Cable	Heliax	1/8/2025	1/8/2027
T4	ANP05360	Cable	RG214	1/7/2025	1/7/2027
T5	ANP08205	Cable	CBL-6FT-NMNM+	1/22/2025	1/22/2027
T6	AN02307	Preamp	8447D	4/25/2025	4/25/2027

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	265.049M	50.8	+13.6	+6.1	+0.8	+1.0	+0.0	45.8	46.0	-0.2	Horiz
	QP		+0.6	-27.1							
^	265.049M	57.0	+13.6	+6.1	+0.8	+1.0	+0.0	52.0	46.0	+6.0	Horiz
			+0.6	-27.1							
3	250.677M	51.6	+12.7	+6.1	+0.8	+1.0	+0.0	45.7	46.0	-0.3	Horiz
	QP		+0.6	-27.1							
^	250.714M	57.4	+12.7	+6.1	+0.8	+1.0	+0.0	51.5	46.0	+5.5	Horiz
			+0.6	-27.1							
5	260.676M	51.0	+13.3	+6.1	+0.8	+1.0	+0.0	45.7	46.0	-0.3	Horiz
	QP		+0.6	-27.1							
^	260.676M	56.9	+13.3	+6.1	+0.8	+1.0	+0.0	51.6	46.0	+5.6	Horiz
			+0.6	-27.1							
7	252.901M	51.1	+12.8	+6.1	+0.8	+1.0	+0.0	45.3	46.0	-0.7	Horiz
	QP		+0.6	-27.1							
^	252.901M	57.5	+12.8	+6.1	+0.8	+1.0	+0.0	51.7	46.0	+5.7	Horiz
			+0.6	-27.1							
9	258.400M	50.8	+13.1	+6.1	+0.8	+1.0	+0.0	45.3	46.0	-0.7	Horiz
	QP		+0.6	-27.1							
^	258.400M	57.4	+13.1	+6.1	+0.8	+1.0	+0.0	51.9	46.0	+5.9	Horiz
			+0.6	-27.1							
11	257.870M	50.5	+13.1	+6.1	+0.8	+1.0	+0.0	45.0	46.0	-1.0	Horiz
	QP		+0.6	-27.1							
^	257.870M	56.8	+13.1	+6.1	+0.8	+1.0	+0.0	51.3	46.0	+5.3	Horiz
			+0.6	-27.1							
13	268.208M	49.3	+13.4	+6.1	+0.8	+1.0	+0.0	44.1	46.0	-1.9	Horiz
	QP		+0.6	-27.1							
^	268.208M	56.5	+13.4	+6.1	+0.8	+1.0	+0.0	51.3	46.0	+5.3	Horiz
			+0.6	-27.1							
15	273.067M	48.9	+13.1	+6.1	+0.8	+1.0	+0.0	43.4	46.0	-2.6	Horiz
	QP		+0.6	-27.1							
^	273.067M	55.1	+13.1	+6.1	+0.8	+1.0	+0.0	49.6	46.0	+3.6	Horiz
			+0.6	-27.1							
17	280.357M	48.4	+12.5	+6.1	+0.8	+1.1	+0.0	42.4	46.0	-3.6	Horiz
	QP		+0.6	-27.1							
^	280.357M	54.6	+12.5	+6.1	+0.8	+1.1	+0.0	48.6	46.0	+2.6	Horiz
			+0.6	-27.1							
19	237.350M	47.7	+12.3	+6.1	+0.8	+1.0	+0.0	41.3	46.0	-4.7	Horiz
	QP		+0.6	-27.2							
^	237.350M	54.5	+12.3	+6.1	+0.8	+1.0	+0.0	48.1	46.0	+2.1	Horiz
			+0.6	-27.2							
21	150.959M	46.0	+9.9	+6.1	+0.6	+0.7	+0.0	36.1	43.5	-7.4	Horiz
			+0.4	-27.6							
22	328.951M	43.3	+13.6	+6.1	+0.9	+1.2	+0.0	38.5	46.0	-7.5	Horiz
	QP		+0.6	-27.2							
^	328.951M	49.2	+13.6	+6.1	+0.9	+1.2	+0.0	44.4	46.0	-1.6	Horiz
			+0.6	-27.2							

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717		
Customer:	**Digital Control, Inc.**		
Specification:	**15.209 Radiated Emissions**		
Work Order #:	**109798**	Date:	6/10/2025
Test Type:	**Maximized Emissions**	Time:	10:41:40
Tested By:	M. Atkinson	Sequence#:	5
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Environment Conditions:
Temperature: 24°C
Humidity: 40%
Pressure: 101.2kPa

Frequency: 30-1000MHz

Test Method: ANSI C63.10 (2020)

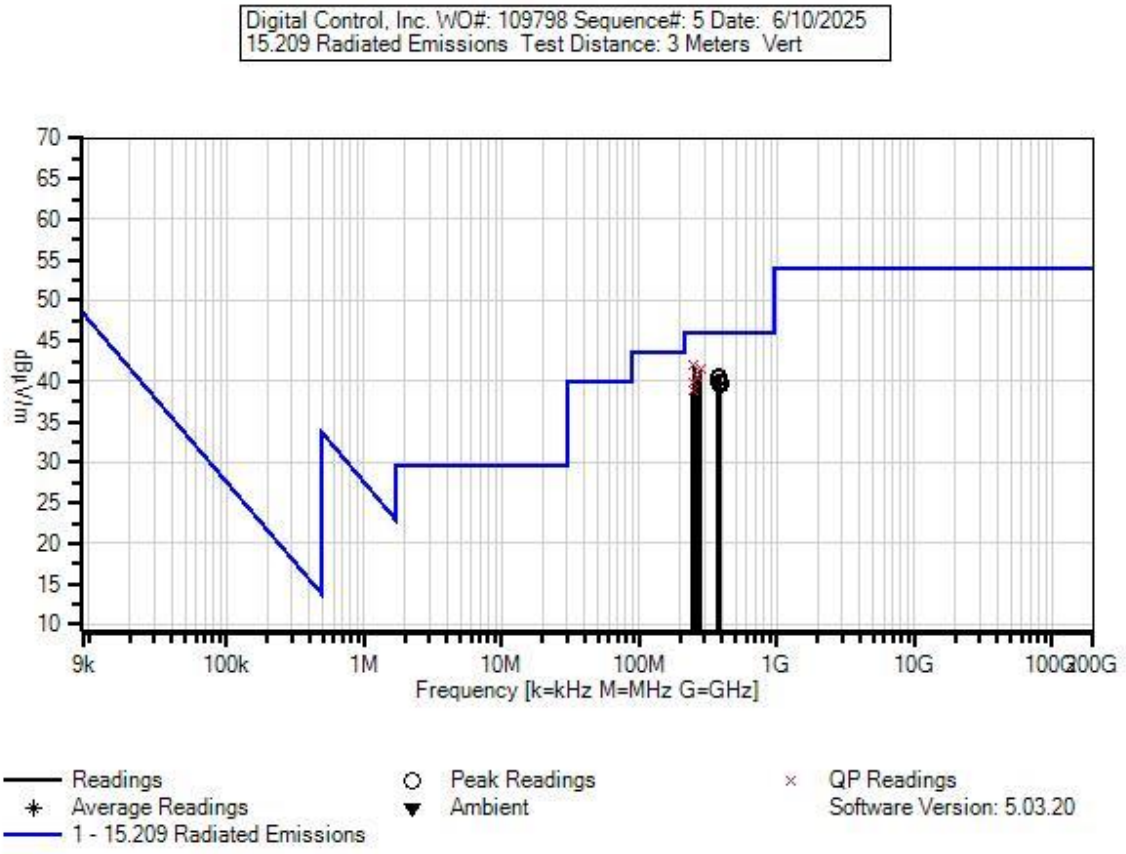
Test Setup:
The EUT is transmitting continuously centered around 42kHz. The frequency and settings are worst case from previous investigations performed by the manufacturer at the test log to find worst case emissions. The following is additional information on the transmit settings:

Hardware: 600-0261-00 X10 Power board
Frequencies: 42000.CSV
Waveshape: True Square

The 42000.CSV mode sets the EUT with the following settings:
Depth tone at 42kHz
12 Data tones at 1.2kHz below depth tone with 10Hz spacing
12 Data tones at 1.2kHz above depth tone with 10Hz spacing

XYZ EUT axes investigated with worst case reported.

Modification #1 was in place during testing.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02871	Spectrum Analyzer	E4440A	9/19/2024	9/19/2026
T2	AN03863	Biconilog Antenna	3142E	1/15/2025	1/15/2027
T3	ANP08256	Attenuator	WA1/6-6-0403	3/18/2025	3/18/2027
T4	ANP05333	Cable	Heliax	1/8/2025	1/8/2027
T5	ANP05360	Cable	RG214	1/7/2025	1/7/2027
T6	ANP08205	Cable	CBL-6FT-NMNM+	1/22/2025	1/22/2027
T7	AN02307	Preamp	8447D	4/25/2025	4/25/2027

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3 T7	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	250.685M	47.9	+0.0	+12.7	+6.1	+0.8	+0.0	42.0	46.0	-4.0	Vert
	QP		+1.0	+0.6	-27.1						
^	250.714M	52.8	+0.0	+12.7	+6.1	+0.8	+0.0	46.9	46.0	+0.9	Vert
			+1.0	+0.6	-27.1						
^	250.610M	52.2	+0.0	+12.6	+6.1	+0.8	+0.0	46.2	46.0	+0.2	Vert
			+1.0	+0.6	-27.1						
4	280.140M	47.5	+0.0	+12.5	+6.1	+0.8	+0.0	41.5	46.0	-4.5	Vert
	QP		+1.1	+0.6	-27.1						
^	280.140M	53.0	+0.0	+12.5	+6.1	+0.8	+0.0	47.0	46.0	+1.0	Vert
			+1.1	+0.6	-27.1						
6	266.840M	45.8	+0.0	+13.5	+6.1	+0.8	+0.0	40.7	46.0	-5.3	Vert
	QP		+1.0	+0.6	-27.1						
^	266.840M	51.9	+0.0	+13.5	+6.1	+0.8	+0.0	46.8	46.0	+0.8	Vert
			+1.0	+0.6	-27.1						
8	263.348M	45.9	+0.0	+13.4	+6.1	+0.8	+0.0	40.7	46.0	-5.3	Vert
	QP		+1.0	+0.6	-27.1						
^	263.348M	52.1	+0.0	+13.4	+6.1	+0.8	+0.0	46.9	46.0	+0.9	Vert
			+1.0	+0.6	-27.1						
10	375.360M	43.1	+0.0	+15.9	+6.1	+1.0	+0.0	40.5	46.0	-5.5	Vert
			+1.3	+0.7	-27.6						
11	379.976M	42.8	+0.0	+16.1	+6.1	+1.0	+0.0	40.4	46.0	-5.6	Vert
			+1.3	+0.7	-27.6						
12	388.723M	41.7	+0.0	+16.7	+6.1	+1.0	+0.0	39.9	46.0	-6.1	Vert
			+1.4	+0.7	-27.7						
13	248.171M	45.9	+0.0	+12.6	+6.1	+0.8	+0.0	39.9	46.0	-6.1	Vert
	QP		+1.0	+0.6	-27.1						
^	248.171M	51.7	+0.0	+12.6	+6.1	+0.8	+0.0	45.7	46.0	-0.3	Vert
			+1.0	+0.6	-27.1						
15	377.303M	42.3	+0.0	+16.0	+6.1	+1.0	+0.0	39.8	46.0	-6.2	Vert
			+1.3	+0.7	-27.6						
16	386.293M	41.7	+0.0	+16.6	+6.1	+1.0	+0.0	39.8	46.0	-6.2	Vert
			+1.4	+0.7	-27.7						
17	387.508M	41.4	+0.0	+16.7	+6.1	+1.0	+0.0	39.6	46.0	-6.4	Vert
			+1.4	+0.7	-27.7						
18	244.575M	45.0	+0.0	+12.5	+6.1	+0.8	+0.0	38.8	46.0	-7.2	Vert
	QP		+1.0	+0.6	-27.2						
^	244.575M	51.1	+0.0	+12.5	+6.1	+0.8	+0.0	44.9	46.0	-1.1	Vert
			+1.0	+0.6	-27.2						

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717		
Customer:	**Digital Control, Inc.**		
Specification:	**15.209 Radiated Emissions**		
Work Order #:	**109798**	Date:	6/10/2025
Test Type:	**Maximized Emissions**	Time:	08:37:08
Tested By:	M. Atkinson	Sequence#:	1
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Environment Conditions:
Temperature: 24°C
Humidity: 40%
Pressure: 101.2kPa

Frequency: 1-13GHz

Test Method: ANSI C63.10 (2020)

Test Setup:
The EUT is transmitting continuously centered around 42kHz. The frequency and settings are worst case from previous investigations performed by the manufacturer at the test log to find worst case emissions. The following is additional information on the transmit settings:

Hardware: 600-0261-00 X10 Power board
Frequencies: 42000.CSV
Waveshape: True Square

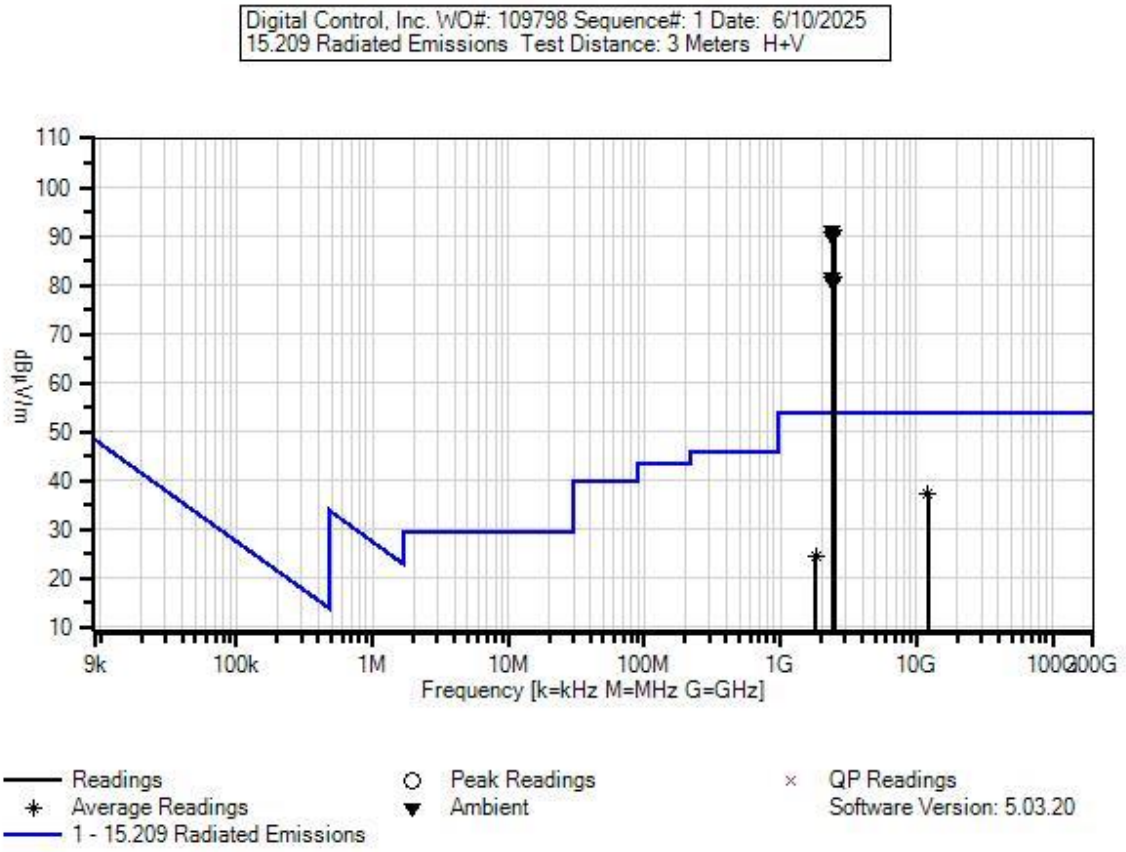
The 42000.CSV mode sets the EUT with the following settings:
Depth tone at 42kHz
12 Data tones at 1.2kHz below depth tone with 10Hz spacing
12 Data tones at 1.2kHz above depth tone with 10Hz spacing

XYZ EUT axes investigated with worst case reported.
Horizontal and Vertical axes investigated, worst case reported.

Up to 13GHz investigated per ANSI C63.10 (2020) 5.5, Table 3, due to the EUT including a Bluetooth radio.

Fundamental emissions from the Bluetooth radio are marked as ambient and are to be ignored against this limit.

Modification #1 was in place during testing.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02871	Spectrum Analyzer	E4440A	9/19/2024	9/19/2026
T1	AN03540	Preamp	83017A	1/7/2025	1/7/2027
T2	AN02374ANSI	Horn Antenna	RGA-60	1/8/2025	1/8/2027
T3	ANP07212	Cable	32026-29801-29801-18	4/23/2025	4/23/2027
T4	ANP07485	Cable	FSJ1	1/29/2025	1/29/2027
T5	ANP08205	Cable	CBL-6FT-NMNM+	1/22/2025	1/22/2027

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2425.800M Ambient	93.8	-34.7 +1.1	+28.4	+0.4	+2.2	+0.0	91.2	54.0	+37.2	Horiz
2	2480.200M Ambient	92.2	-34.6 +1.1	+29.0	+0.4	+2.2	+0.0	90.3	54.0	+36.3	Horiz
3	2401.800M Ambient	93.0	-34.7 +1.1	+28.2	+0.4	+2.2	+0.0	90.2	54.0	+36.2	Horiz
4	2402.000M Ambient	84.5	-34.7 +1.1	+28.2	+0.4	+2.2	+0.0	81.7	54.0	+27.7	Vert
5	2480.000M Ambient	82.8	-34.6 +1.1	+29.0	+0.4	+2.2	+0.0	80.9	54.0	+26.9	Vert
6	2426.000M Ambient	83.4	-34.7 +1.1	+28.4	+0.4	+2.2	+0.0	80.8	54.0	+26.8	Vert
7	12196.000 M Ave	23.4	-35.1 +2.9	+39.5	+1.0	+5.6	+0.0	37.3	54.0	-16.7	Horiz
^	12196.000 M	38.3	-35.1 +2.9	+39.5	+1.0	+5.6	+0.0	52.2	54.0	-1.8	Horiz
9	1817.000M Ave	28.6	-35.1 +0.8	+28.1	+0.3	+1.9	+0.0	24.6	54.0	-29.4	Horiz
^	1817.000M	42.4	-35.1 +0.8	+28.1	+0.3	+1.9	+0.0	38.4	54.0	-15.6	Horiz

Test Setup Photo(s)

Below 1GHz, 0.8m

Above 1GHz, 1.5m

X-Axis

Y-Axis

Z-Axis

Appendix A : Manufacturer's Declaration and Functional Description

The DigiTrak® SuperCore™ Transmitter, model RTP, is an underground, low frequency induction device (sonde) used for guiding purposes during a horizontal directional drilling operation. The RTP utilizes a wound, hollow silicon steel solenoid (aka antenna) to generate a low frequency AC magnetic field. An above ground, DigiTrak® hand-held locator detects the magnitude and shape of the generated dipole magnetic field to properly locate the downhole sonde. The exact operational frequency is transferred to the sonde via an IR or Bluetooth communication link from the locator device (frequency pairing process).

Model variants including FT+, FTp+, and DT1m are electrically and mechanically identical to each other with the exception of labeling and the addition of a fluid pressure transducer and front cap assembly in the FTp+ and DT1m variants to measure fluid pressure. The fluid pressure enabled variants include a piezoresistive silicon pressure sensor in the front cap which is connected to the main circuit board via a ribbon cable. The associated signal circuitry is populated on the main circuit board regardless of whether the pressure sensor is installed or not.

The RTP can be paired with a DigiTrak® locator and configured as an FT2, FT5 or FTR using the transmitter selection menu.

All testing is representative of the FTp+, per the manufacturer.

Supplemental Information

Measurement Uncertainty

Uncertainty Value	Parameter
5.77 dB	Radiated Emissions
0.673 dB	RF Conducted Measurements
5.77×10^{-10}	Frequency Deviation
0.00005 s	Time Deviation
3.18 dB	Mains Conducted Emissions

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2.
Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point, the measuring device is set into the linear mode and the scan time is reduced.

End of Report