The Toro Company

REVISED EMC TEST REPORT TO 106644-12

Radio Board
Model: INSPIRA RADIO P/N: 118-7243

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(DTS 902-928MHz)

Report No.: 106644-12A

Date of issue: January 27, 2023

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.

Test Certificate # 803.01

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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Project Number: 106644

DATE OF EQUIPMENT RECEIPT: June 28, 2022
DATE(S) OF TESTING: June 28 – July 7, 2022
January 10, 2023

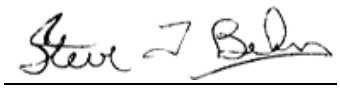
Revision History

Original: Testing of Radio Board Model: INSPIRA RADIO P/N: 118-7243 to FCC Part 15 Subpart C Section(s), 15.207 & 15.247 (DTS 902-928MHz).

Revision A: Updated test conditions on page 58 & 68. Added new measured antenna gain test data in Appendix A.

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.
110 Olinda Place
Brea, CA 92823

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 - 15.247 (DTS 902-928MHz)

Test Procedure	Description	Modifications	Results
15.247(a)(2)	6dB Bandwidth	NA	Pass
15.247(b)(3)	Output Power	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.247(e)	Power Spectral Density	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

ISO/IEC 17025 Decision Rule
The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment 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
No modifications were made during testing.

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 Tested:

Device	Manufacturer	Model #	S/N
Radio Board	The Toro Company	INSPIRA RADIO	P/N: 118-7243

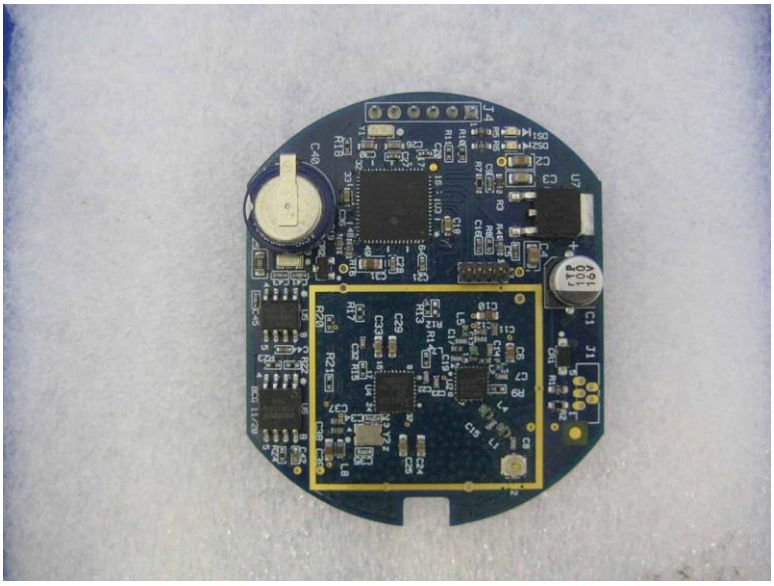
Support Equipment:

Device	Manufacturer	Model #	S/N
Low Voltage LED Lighting Transformer	UNIQUE LIGHTING SYSTEMS	150SSSL-LED	NA
LED Power Board	Forzlux	118-7304	NA
12W LED Light	Forzlux	118-7565	NA

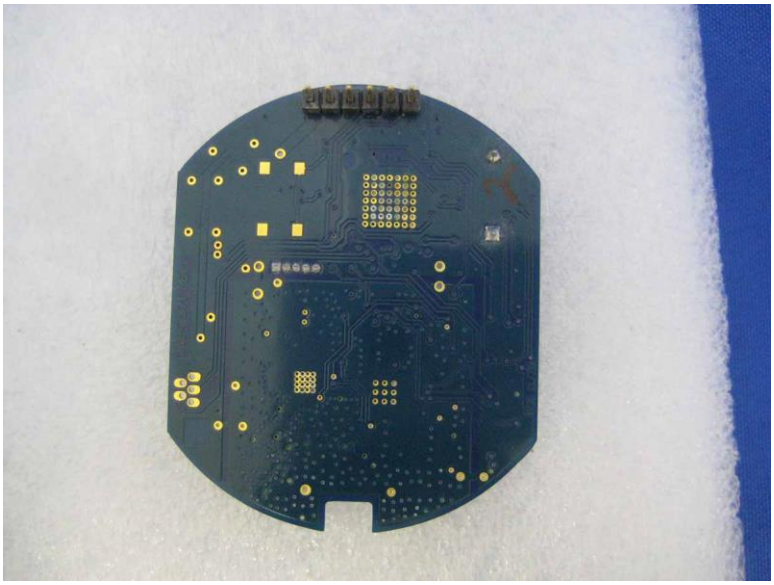
General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Radio Module
Type of Wideband System:	DTS
Operating Frequency Range:	914.0355MHz single channel
Modulation Type(s):	BPSK-40
Maximum Duty Cycle:	10%
Number of TX Chains:	1
Antenna Type(s) and Gain:	1. ¼ wave wire. total length 128mm, exposed center conductor length 89mm, 5.18dBi 2. ¼ wave wire. total length 165mm, exposed center conductor length 89mm, 1.97dBi 3. ¼ wave wire. total length 204mm, exposed center conductor length 89mm, 3.67dBi 4. ¼ wave wire. total length 394mm, exposed center conductor length 89mm, 5.57dBi
Beamforming Type:	N/A
Antenna Connection Type:	Integral
Nominal Input Voltage:	12.0VDC
Firmware / Software used for Test:	INSPIRA_TEST_CODE_File_1_-10.hex
The validity of results is dependent on the stated product details, the accuracy of which the manufacturer assumes full responsibility.	

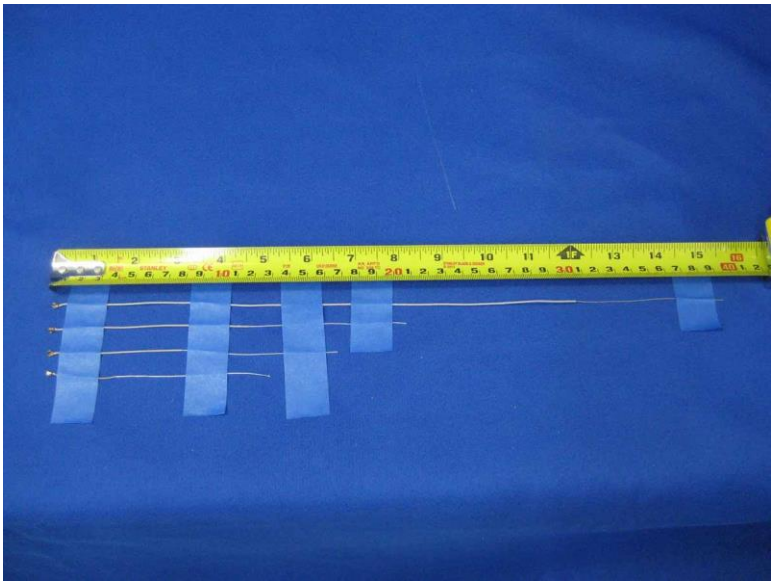
EUT Photo(s)



Side 1



Side 2

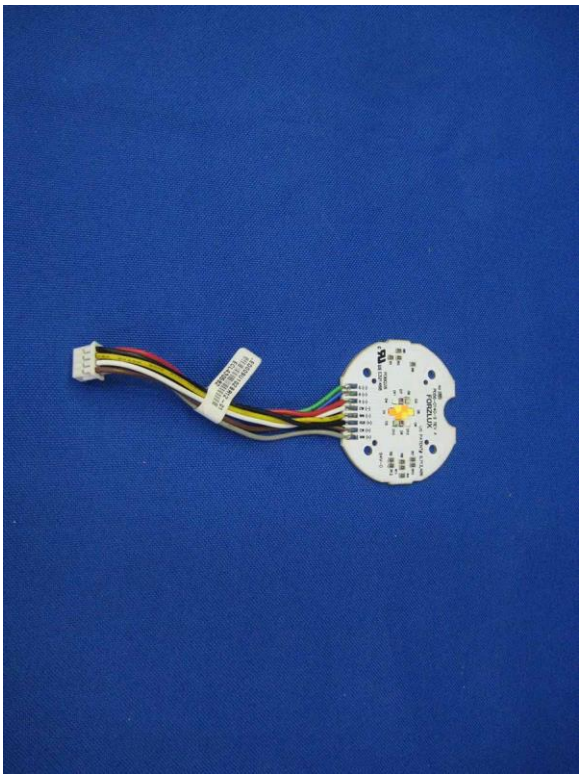


Antennas

Support Equipment Photo(s)

Transformer

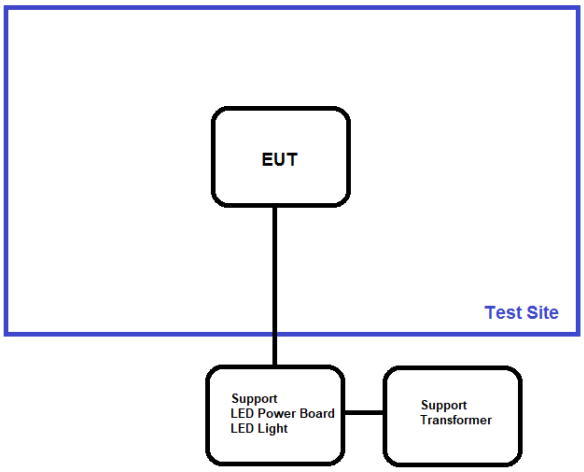
Power Board



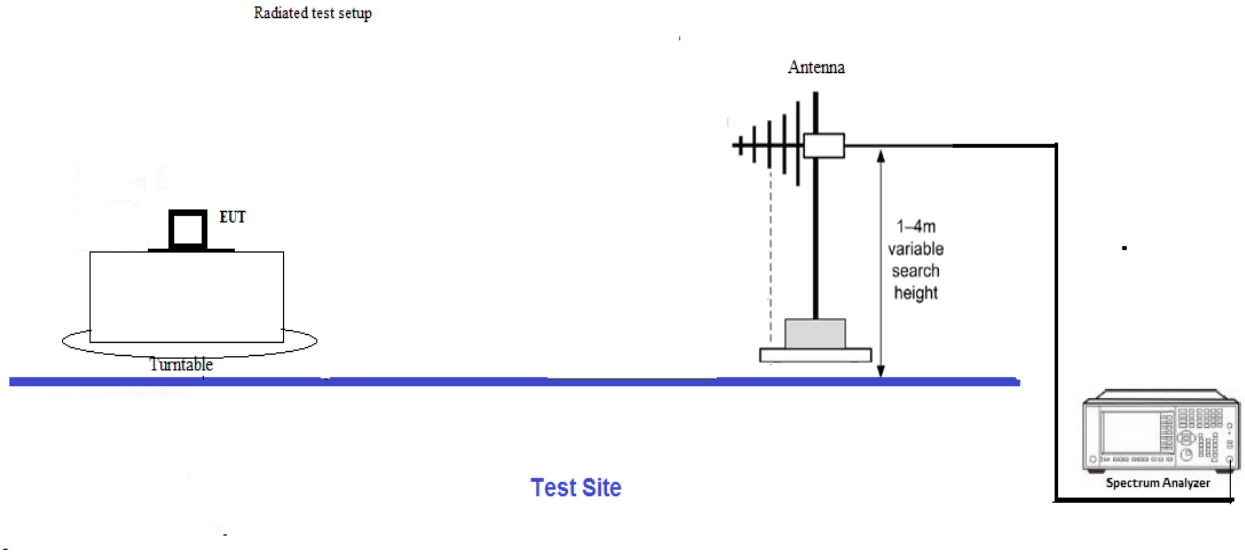
LED Light

Block Diagram of Test Setup(s)

Test Setup Block Diagram



Generic Block Diagram



Block Diagram Rev. C

FCC Part 15 Subpart C

15.247(a)(2) 6dB Bandwidth

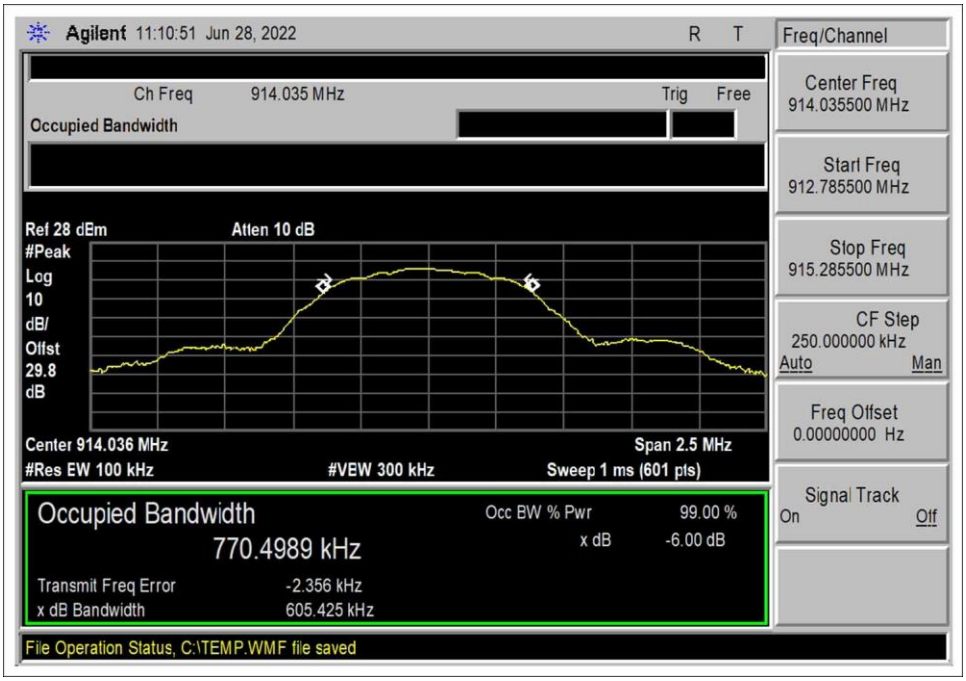
Test Setup / Conditions			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013), KDB 558074	Test Date(s):	6/28/2022
Configuration:	1		
Test Setup:	The LED lighting transformer is providing power to the LED power board. The power board is providing power to the 12W LED light and the equipment under test (EUT). The antenna port of the EUT is connected to the spectrum analyzer using a coaxial cable and attenuator. The EUT is powered on and transmitting continuously at its rated output power. The nominal voltage to the EUT is 12.0VDC.		

Environmental Conditions			
Temperature (ºC)	23	Relative Humidity (%):	41

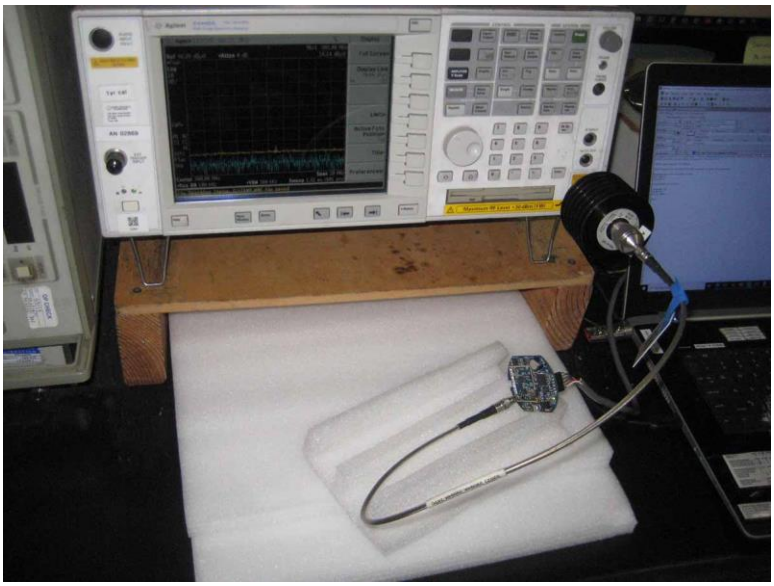
Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02869	Spectrum Analyzer	Agilent	E4440A	8/16/2021	8/16/2022
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/28/2021	10/28/2023
P07659	Cable	Astrolab, Inc.	32022-29094K-29094K-24TC	7/30/2020	7/30/2022

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
914.0355	1	BPSK-40	605.425	≥500	Pass

Plot(s)



Test Setup Photo(s)



15.247(b)(3) Output Power

Test Setup / Conditions			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013), KDB 558074	Test Date(s):	6/28/2022
Configuration:	1		
Test Setup:	The LED lighting transformer is providing power to the LED power board. The power board is providing power to the 12W LED light and the equipment under test (EUT). The antenna port of the EUT is connected to the spectrum analyzer using a coaxial cable and attenuator. The EUT is powered on and transmitting continuously at its rated output power. The nominal voltage to the EUT is 12.0VDC.		

Environmental Conditions			
Temperature (ºC)	23	Relative Humidity (%):	41

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02869	Spectrum Analyzer	Agilent	E4440A	8/16/2021	8/16/2022
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/28/2021	10/28/2023
P07659	Cable	Astrolab, Inc.	32022-29094K-29094K-24TC	7/30/2020	7/30/2022

Test Data Summary - Voltage Variations					
Frequency (MHz)	**Modulation / Ant Port**	**$V_{Minimum}$ (dBm)**	**$V_{Nominal}$ (dBm)**	**$V_{Maximum}$ (dBm)**	**Max Deviation from $V_{Nominal}$ (dB)**
914.0355	BPSK-40/1	8.40	8.40	8.40	0.00

Test performed using operational mode with the highest output power, representing worst case.

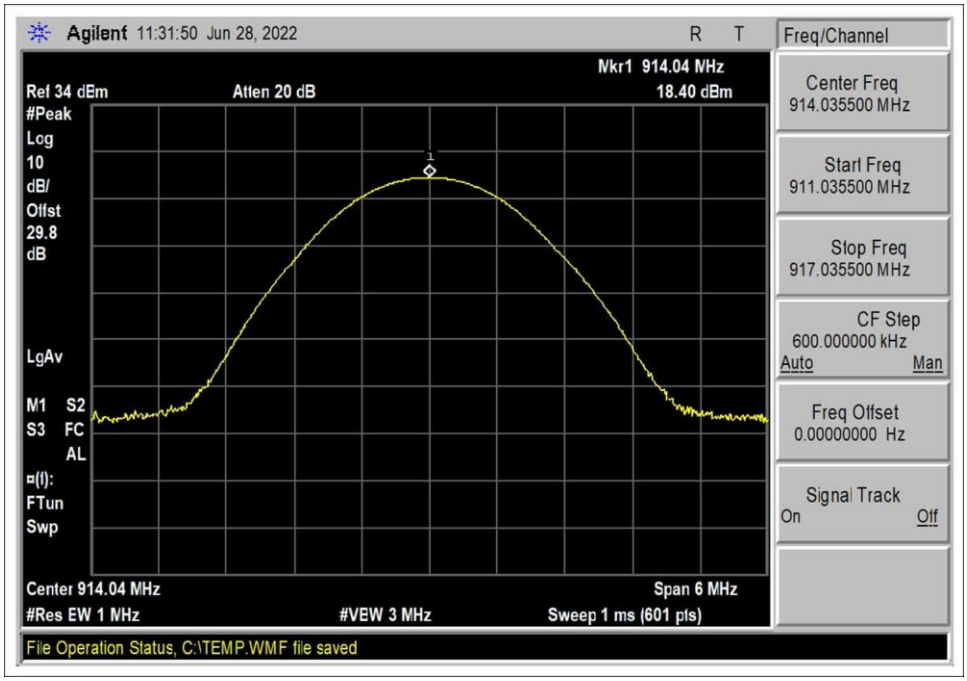
Parameter Definitions:

Measurements performed at input voltage Vnominal ± 15%.

Parameter	Value
$V_{Nominal}$:	12.0VDC
$V_{Minimum}$:	13.8VDC
$V_{Maximum}$:	10.2VDC

Test Data Summary - RF Conducted Measurement					
Measurement Option: RBW > DTS Bandwidth					
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**Measured (dBm)**	**Limit (dBm)**	**Results**
914.0355	BPSK-40	¼ wave wire/5.18	18.40dBm	≤30	Pass
914.0355	BPSK-40	¼ wave wire/1.97	18.40dBm	≤30	Pass
914.0355	BPSK-40	¼ wave wire/3.67	18.40dBm	≤30	Pass
914.0355	BPSK-40	¼ wave wire/5.57	18.40dBm	≤30	Pass

Plot(s)



Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**15.247(b) Power Output (902-928 MHz DTS)**		
Work Order #:	**106644**	Date:	7/7/2022
Test Type:	**Conducted Emissions**	Time:	16:50:47
Tested By:	S. Yamamoto	Sequence#:	0
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT center frequency is 914.0355MHz.

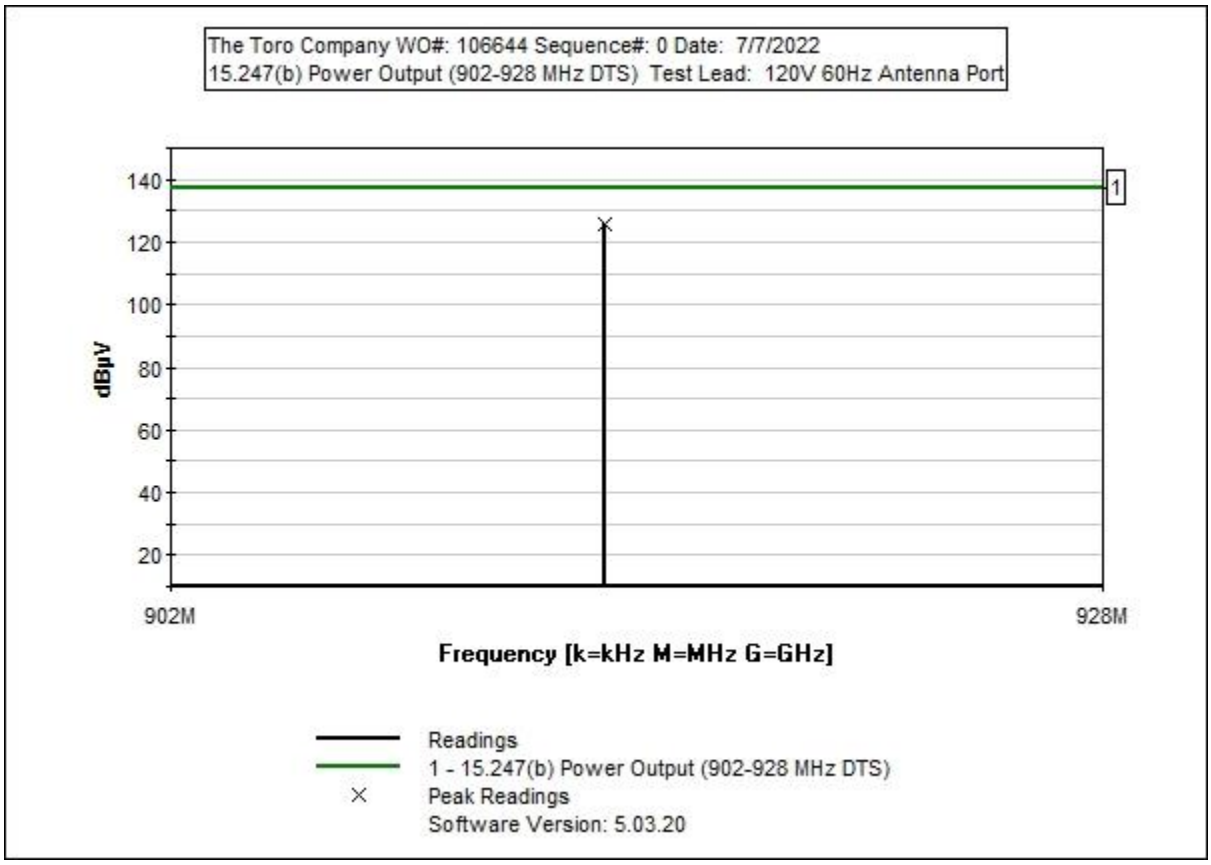
The EUT antenna port is connected to the spectrum analyzer via coaxial cable and attenuator.

Frequency range of data sheet is 911.04MHz to 917.04MHz
RBW=1MHz
VBW=3MHz

Test method ANSI C63.10 2013

Environmental Conditions:
Temperature: 23°C
Humidity: 41%
Pressure: 99kPa

Site A



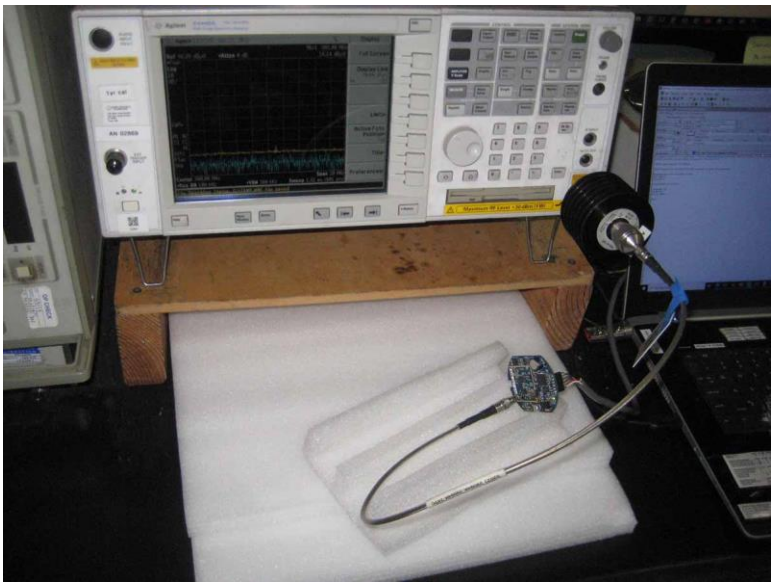
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T2	AN03432	Attenuator	90-30-34	10/28/2021	10/28/2023
T3	ANP07659	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	914.036M	95.6	+0.0	+29.6	+0.2		+0.0	125.4	137.0	-11.6	Anten

Test Setup Photo(s)



15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**106644**	Date:	6/28/2022
Test Type:	**Conducted Emissions**	Time:	12:45:07
Tested By:	S. Yamamoto	Sequence#:	1
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT center frequency is 914.0355MHz.

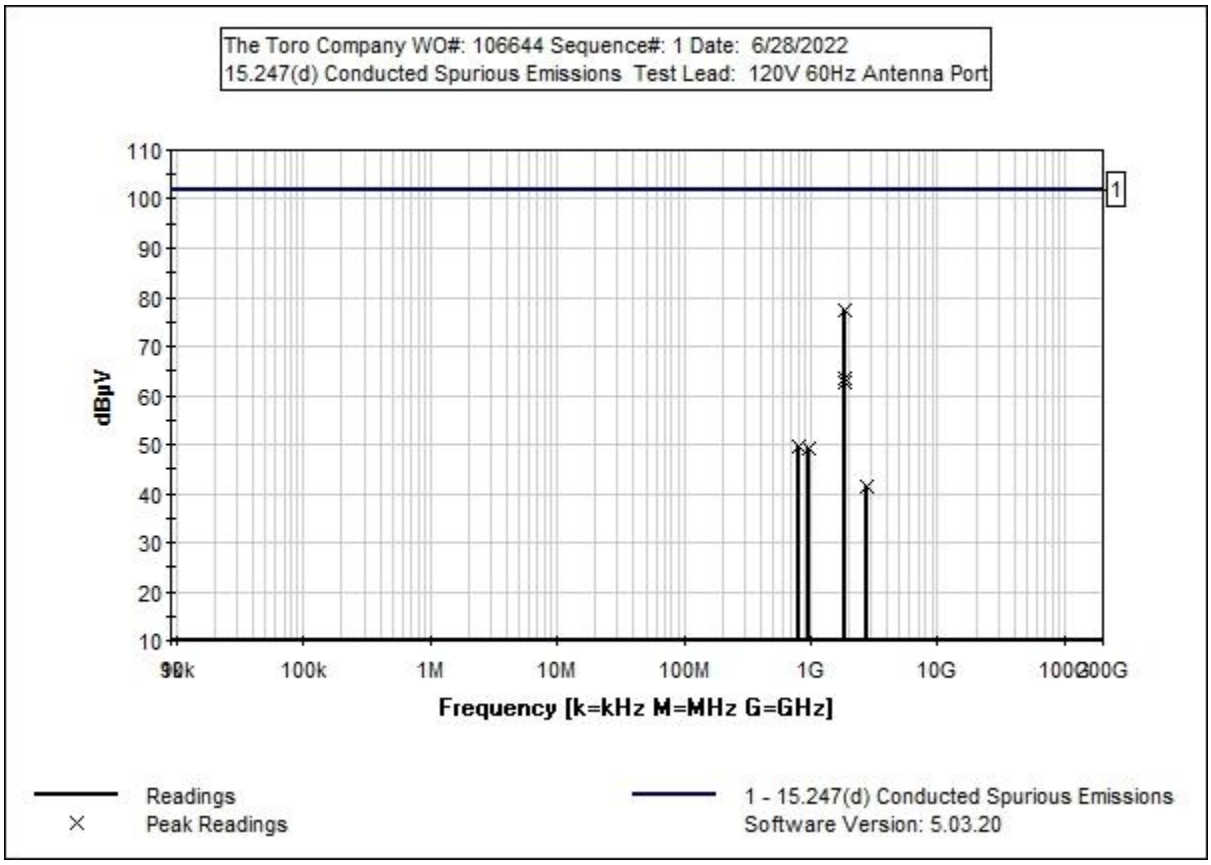
The EUT antenna port is connected to the spectrum analyzer via coaxial cable and attenuator.

Frequency range of data sheet is 9kHz to 10GHz.
RBW=100kHz
VBW=300kHz

Test method ANSI C63.10 2013

Environmental Conditions:
Temperature: 23°C
Humidity: 41%
Pressure: 99kPa

Site A



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T1	AN03432	Attenuator	90-30-34	10/28/2021	10/28/2023
T2	ANP07659	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022

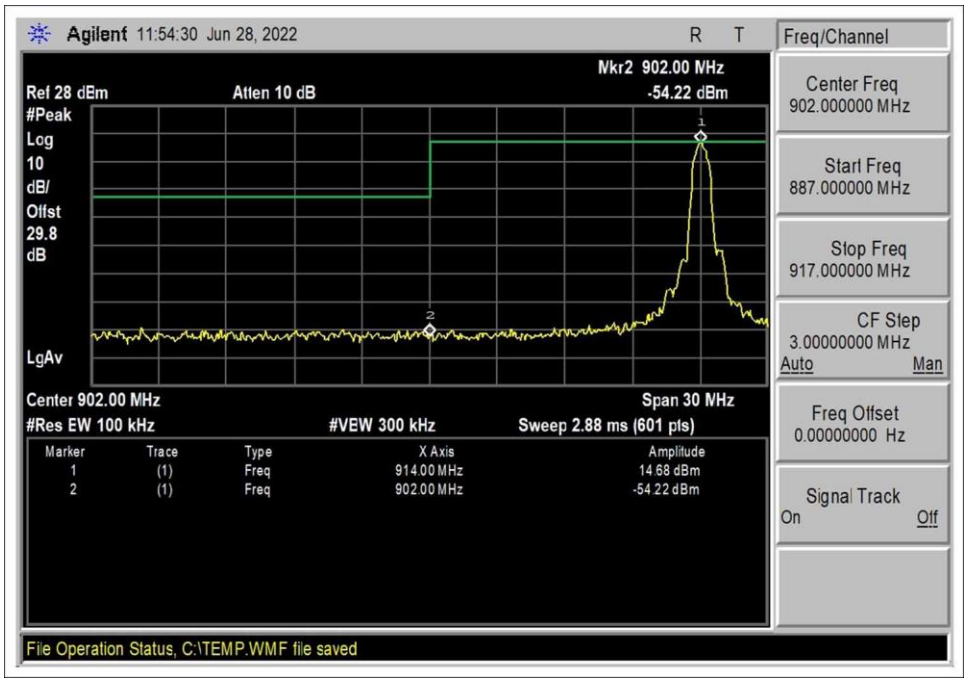
Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1828.073M	47.3	+29.6	+0.3			+0.0	77.2	101.7	-24.5	Anten
2	1828.651M	33.4	+29.6	+0.3			+0.0	63.3	101.7	-38.4	Anten
3	1827.474M	32.8	+29.6	+0.3			+0.0	62.7	101.7	-39.0	Anten
4	816.051M	20.0	+29.5	+0.2			+0.0	49.7	101.7	-52.0	Anten
5	978.000M	19.3	+29.6	+0.2			+0.0	49.1	101.7	-52.6	Anten
6	2742.103M	11.7	+29.6	+0.3			+0.0	41.6	101.7	-60.1	Anten

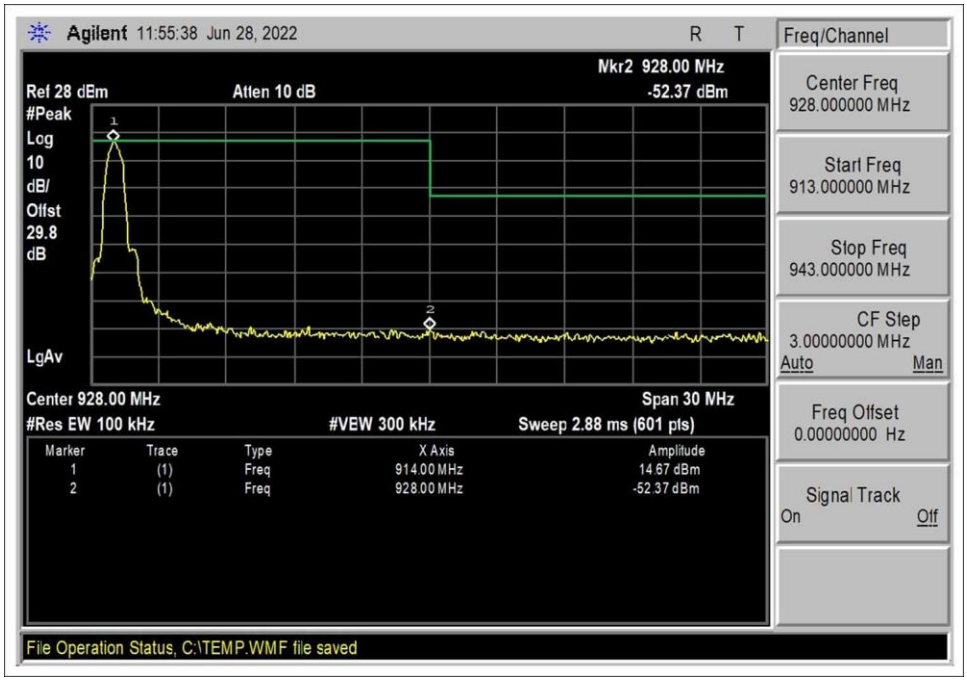
Band Edge

Band Edge Summary				
Limit applied: Max Power/100kHz - 20dB.				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
902	BPSK-40	-54.22	< -5.3	Pass
928	BPSK-40	-52.37	< -5.3	Pass

Band Edge Plots



902MHz



928MHz

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**15.247(d) Conducted Band Edge**		
Work Order #:	**106644**	Date:	7/7/2022
Test Type:	**Conducted Emissions**	Time:	17:12:34
Tested By:	S. Yamamoto	Sequence#:	0
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT center frequency is 914.0355MHz.

The EUT antenna port is connected to the spectrum analyzer via coaxial cable and attenuator.

Frequency range of data sheet is 887MHz to 943MHz
RBW=100kHz
VBW=300kHz

Test method ANSI C63.10 2013

Environmental Conditions:
Temperature: 23°C
Humidity: 41%
Pressure: 99kPa

Site A

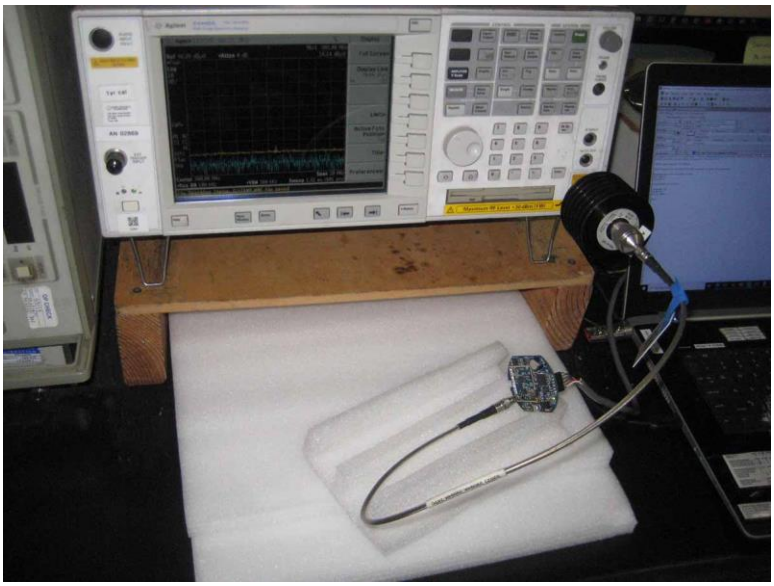
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T2	AN03432	Attenuator	90-30-34	10/28/2021	10/28/2023
T3	ANP07659	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	928.000M	24.8	+0.0	+29.6	+0.2		+0.0	54.6	101.7	-47.1	Anten
2	902.000M	23.0	+0.0	+29.6	+0.2		+0.0	52.8	101.7	-48.9	Anten

Test Setup Photo(s)



15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**106644**	Date:	6/29/2022
Test Type:	**Maximized Emissions**	Time:	16:11:15
Tested By:	S. Yamamoto	Sequence#:	9
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:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT is configured with the 128mm antenna P/N 118-8086B.

The EUT center frequency is 914.0355MHz.

Frequency range of data sheet is 9kHz to 9.28GHz.
9kHz to 150kHz, RBW=200Hz VBW=2000Hz restricted bands;
150kHz to 30MHz, RBW=9kHz VBW=91kHz restricted bands;
30MHz to 1000MHz RBW=120kHz VBW=1.2MHz restricted bands;
1000MHz to 9280MHz, RBW=1MHz VBW=3MHz restricted bands

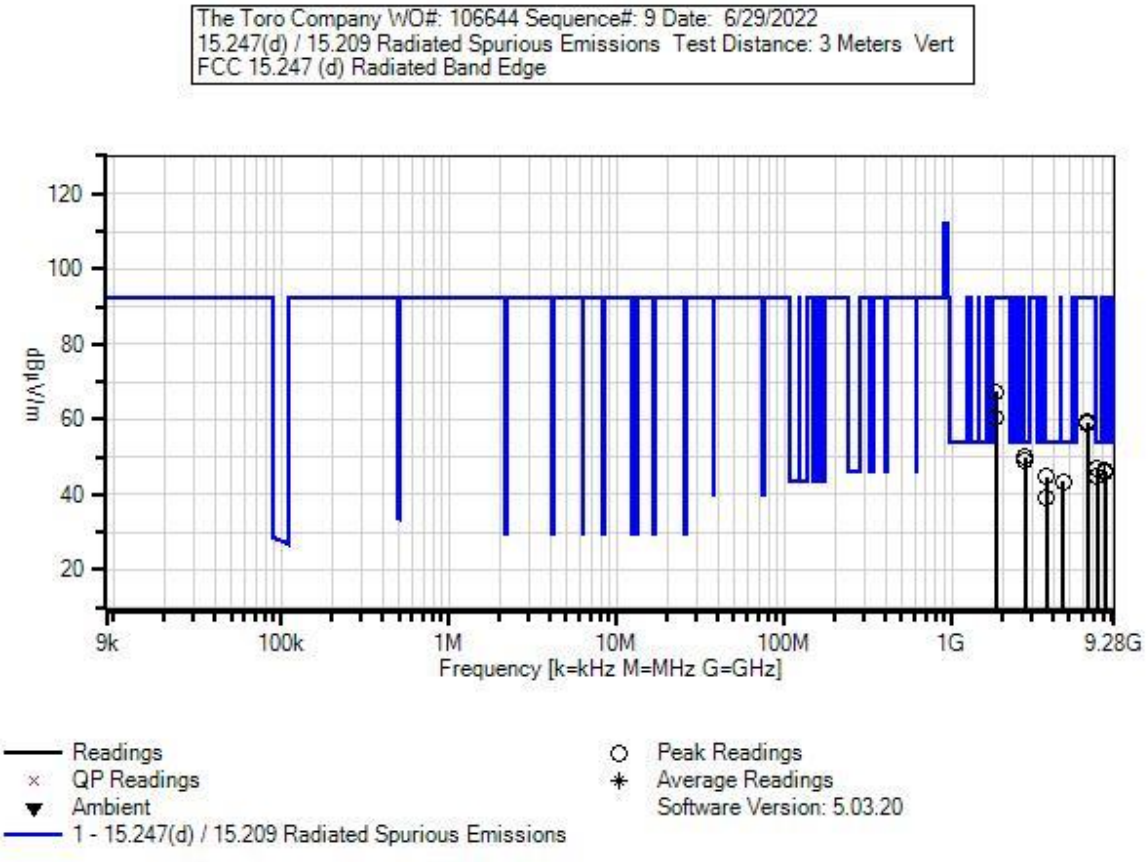
RBW=100kHz VBW=300kHz non-restricted bands

Test method ANSI C63.10 2013

The EUT was measured independently on each of three axes and the emission levels contained within this data sheet represents the maximum emissions.

Environmental Conditions:
Temperature: 23°C
Humidity: 47%
Pressure: 99kPa

Site A



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T1	ANP06360	Cable	L1-PNMNM-48	9/30/2021	9/30/2023
T2	AN00786	Preamp	83017A	5/23/2022	5/23/2024
T3	ANP07655	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022
T4	AN00849	Horn Antenna	3115	3/21/2022	3/21/2024
T5	AN02749	High Pass Filter	9SH10-1000/T10000-O/O	7/12/2021	7/12/2023
	AN00309	Preamp	8447D	12/13/2021	12/13/2023
	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024
	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022
	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
	AN00314	Loop Antenna	6502	3/29/2022	3/29/2024

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	2742.107M	54.5	+3.4 +0.6	-38.4	+0.5	+29.3	+0.0	49.9	54.0	-4.1	Vert
2	2742.063M	53.7	+3.4 +0.6	-38.4	+0.5	+29.3	+0.0	49.1	54.0	-4.9	Horiz
3	7312.279M	40.5	+6.1 +0.1	-36.9	+0.8	+36.3	+0.0	46.9	54.0	-7.1	Vert
4	8226.278M	38.9	+6.4 +0.3	-37.0	+0.8	+36.9	+0.0	46.3	54.0	-7.7	Vert
5	8226.242M	38.4	+6.4 +0.3	-37.0	+0.8	+36.9	+0.0	45.8	54.0	-8.2	Horiz
6	7312.272M	38.6	+6.1 +0.1	-36.9	+0.8	+36.3	+0.0	45.0	54.0	-9.0	Horiz
7	3656.136M	46.3	+4.0 +0.4	-37.9	+0.5	+31.5	+0.0	44.8	54.0	-9.2	Vert
8	4570.173M	43.0	+4.6 +0.2	-37.4	+0.6	+32.3	+0.0	43.3	54.0	-10.7	Horiz
9	4570.172M	43.0	+4.6 +0.2	-37.4	+0.6	+32.3	+0.0	43.3	54.0	-10.7	Vert
10	3656.137M	40.6	+4.0 +0.4	-37.9	+0.5	+31.5	+0.0	39.1	54.0	-14.9	Horiz
11	1828.061M	75.6	+2.7 +0.4	-38.8	+0.4	+27.1	+0.0	67.4	92.1	-24.7	Horiz
12	1828.070M	68.5	+2.7 +0.4	-38.8	+0.4	+27.1	+0.0	60.3	92.1	-31.8	Vert
13	6398.240M	55.1	+5.9 +0.1	-37.0	+0.8	+34.3	+0.0	59.2	92.1	-32.9	Vert
14	6398.267M	54.9	+5.9 +0.1	-37.0	+0.8	+34.3	+0.0	59.0	92.1	-33.1	Horiz

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**106644**	Date:	7/1/2022
Test Type:	**Maximized Emissions**	Time:	18:07:30
Tested By:	S. Yamamoto	Sequence#:	20
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:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT is configured with the 165mm antenna P/N 118-8086.

The EUT center frequency is 914.0355MHz.

Frequency range of data sheet is 9kHz to 9.28GHz.
9kHz to 150kHz, RBW=200Hz VBW=2000Hz restricted bands;
150kHz to 30MHz, RBW=9kHz VBW=91kHz restricted bands;
30MHz to 1000MHz RBW=120kHz VBW=1.2MHz restricted bands;
1000MHz to 9280MHz, RBW=1MHz VBW=3MHz restricted bands

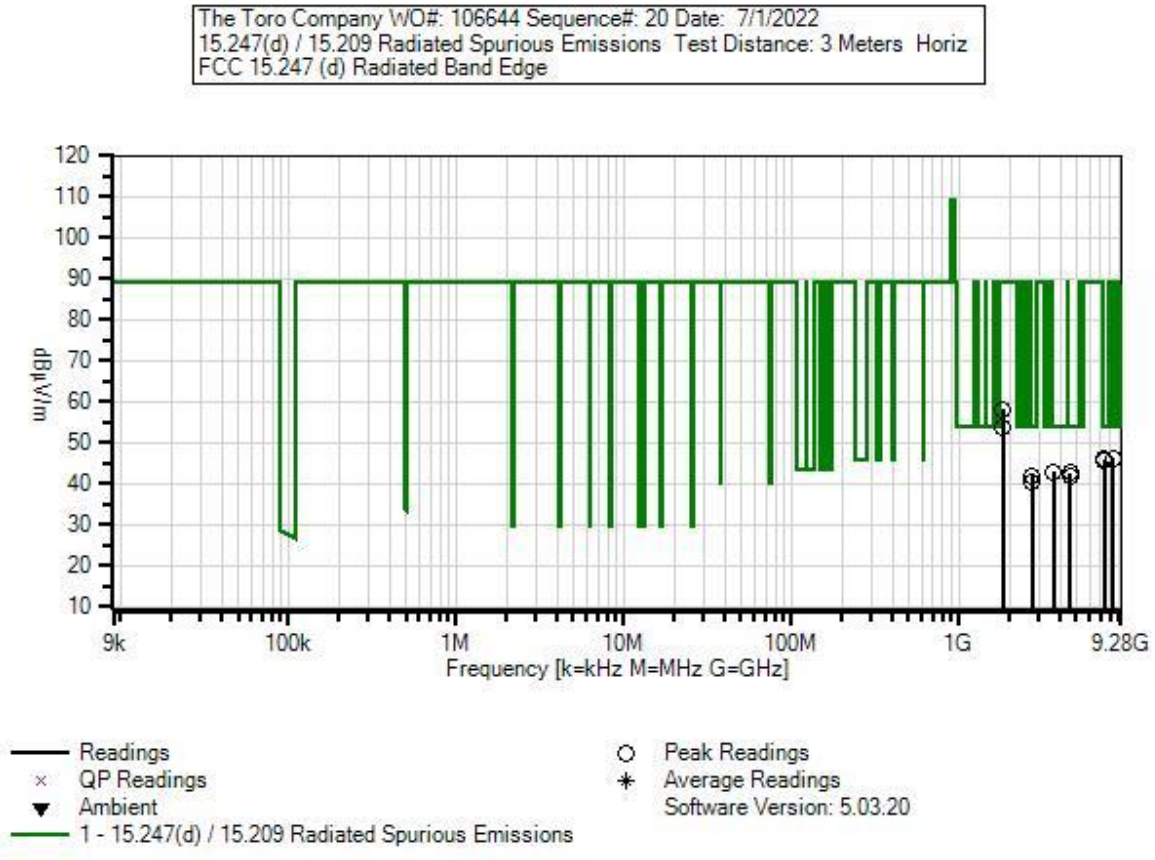
RBW=100kHz VBW=300kHz non-restricted bands

Test method ANSI C63.10 2013

The EUT was measured independently on each of three axes and the emission levels contained within this data sheet represents the maximum emissions.

Environmental Conditions:
Temperature: 24°C
Humidity: 40%
Pressure: 99kPa

Site A



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T1	ANP06360	Cable	L1-PNMNM-48	9/30/2021	9/30/2023
T2	AN00786	Preamp	83017A	5/23/2022	5/23/2024
T3	ANP07655	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022
T4	AN00849	Horn Antenna	3115	3/21/2022	3/21/2024
	AN02749	High Pass Filter	9SH10-1000/T10000-O/O	7/12/2021	7/12/2023
T5	AN03169	High Pass Filter	HM1155-11SS	5/10/2021	5/10/2023
	AN00309	Preamp	8447D	12/13/2021	12/13/2023
	AN00314	Loop Antenna	6502	3/29/2022	3/29/2024
	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024
	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022
	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022

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	8226.391M	39.0	+6.4 +0.2	-37.0	+0.8	+36.9	+0.0	46.3	54.0	-7.7	Vert
2	8226.351M	39.0	+6.4 +0.2	-37.0	+0.8	+36.9	+0.0	46.3	54.0	-7.7	Horiz
3	7312.272M	39.5	+6.1 +0.2	-36.9	+0.8	+36.3	+0.0	46.0	54.0	-8.0	Horiz
4	7312.332M	39.3	+6.1 +0.2	-36.9	+0.8	+36.3	+0.0	45.8	54.0	-8.2	Vert
5	3656.084M	44.5	+4.0 +0.4	-37.9	+0.5	+31.5	+0.0	43.0	54.0	-11.0	Horiz
6	4570.186M	42.3	+4.6 +0.3	-37.4	+0.6	+32.3	+0.0	42.7	54.0	-11.3	Horiz
7	3656.157M	44.2	+4.0 +0.4	-37.9	+0.5	+31.5	+0.0	42.7	54.0	-11.3	Vert
8	2742.028M	46.9	+3.4 +0.3	-38.4	+0.5	+29.3	+0.0	42.0	54.0	-12.0	Horiz
9	4570.176M	41.6	+4.6 +0.3	-37.4	+0.6	+32.3	+0.0	42.0	54.0	-12.0	Vert
10	2742.178M	45.5	+3.4 +0.3	-38.4	+0.5	+29.3	+0.0	40.6	54.0	-13.4	Vert
11	1828.013M	66.5	+2.7 +0.3	-38.8	+0.4	+27.1	+0.0	58.2	89.2	-31.0	Horiz
12	1828.076M	61.9	+2.7 +0.3	-38.8	+0.4	+27.1	+0.0	53.6	89.2	-35.6	Vert

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**106644**	Date:	6/30/2022
Test Type:	**Maximized Emissions**	Time:	08:38:19
Tested By:	S. Yamamoto	Sequence#:	10
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:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT is configured with the 204mm antenna P/N 118-8087B.

The EUT center frequency is 914.0355MHz.

Frequency range of data sheet is 9kHz to 9.28GHz.
9kHz to 150kHz, RBW=200Hz VBW=2000Hz restricted bands;
150kHz to 30MHz, RBW=9kHz VBW=91kHz restricted bands;
30MHz to 1000MHz RBW=120kHz VBW=1.2MHz restricted bands;
1000MHz to 9280MHz, RBW=1MHz VBW=3MHz restricted bands

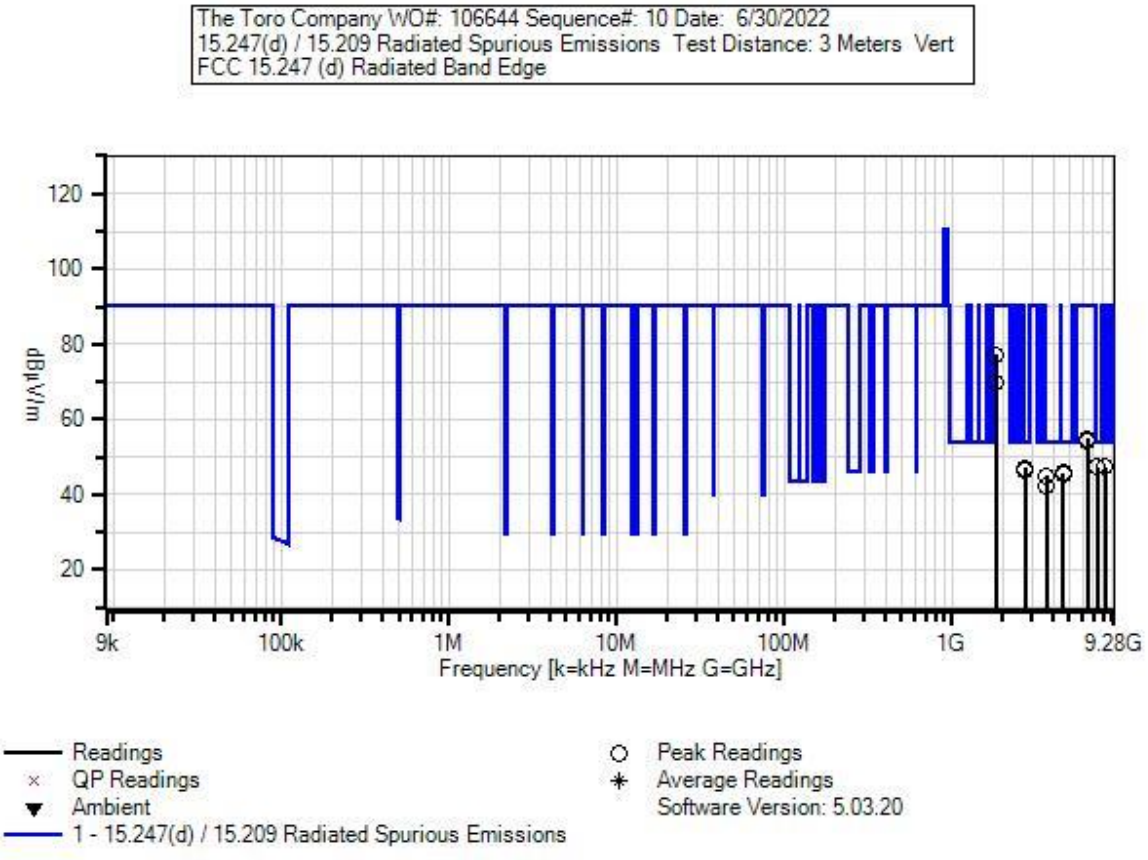
RBW=100kHz VBW=300kHz non-restricted bands

Test method ANSI C63.10 2013

The EUT was measured independently on each of three axes and the emission levels contained within this data sheet represents the maximum emissions.

Environmental Conditions:
Temperature: 23°C
Humidity: 53%
Pressure: 99kPa

Site A



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T1	ANP06360	Cable	L1-PNMNM-48	9/30/2021	9/30/2023
T2	AN00786	Preamp	83017A	5/23/2022	5/23/2024
T3	ANP07655	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022
T4	AN00849	Horn Antenna	3115	3/21/2022	3/21/2024
T5	AN02749	High Pass Filter	9SH10-1000/T10000-O/O	7/12/2021	7/12/2023
	AN00309	Preamp	8447D	12/13/2021	12/13/2023
	AN00314	Loop Antenna	6502	3/29/2022	3/29/2024
	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024
	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022
	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022

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	7312.287M	41.0	+6.1 +0.1	-36.9	+0.8	+36.3	+0.0	47.4	54.0	-6.6	Vert
2	7312.284M	40.9	+6.1 +0.1	-36.9	+0.8	+36.3	+0.0	47.3	54.0	-6.7	Horiz
3	8226.323M	39.9	+6.4 +0.3	-37.0	+0.8	+36.9	+0.0	47.3	54.0	-6.7	Vert
4	8226.320M	39.8	+6.4 +0.3	-37.0	+0.8	+36.9	+0.0	47.2	54.0	-6.8	Horiz
5	2742.106M	51.6	+3.4 +0.6	-38.4	+0.5	+29.3	+0.0	47.0	54.0	-7.0	Horiz
6	2742.050M	51.1	+3.4 +0.6	-38.4	+0.5	+29.3	+0.0	46.5	54.0	-7.5	Vert
7	4570.234M	45.4	+4.6 +0.2	-37.4	+0.6	+32.3	+0.0	45.7	54.0	-8.3	Vert
8	4570.178M	45.0	+4.6 +0.2	-37.4	+0.6	+32.3	+0.0	45.3	54.0	-8.7	Horiz
9	3656.322M	46.5	+4.0 +0.4	-37.9	+0.5	+31.5	+0.0	45.0	54.0	-9.0	Vert
10	3656.142M	43.9	+4.0 +0.4	-37.9	+0.5	+31.5	+0.0	42.4	54.0	-11.6	Horiz
11	1828.071M	85.4	+2.7 +0.4	-38.8	+0.4	+27.1	+0.0	77.2	90.3	-13.1	Horiz
12	1828.071M	78.1	+2.7 +0.4	-38.8	+0.4	+27.1	+0.0	69.9	90.3	-20.4	Vert
13	6398.282M	50.8	+5.9 +0.1	-37.0	+0.8	+34.3	+0.0	54.9	90.3	-35.4	Horiz
14	6398.128M	50.2	+5.9 +0.1	-37.0	+0.8	+34.3	+0.0	54.3	90.3	-36.0	Vert

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**106644**	Date:	7/1/2022
Test Type:	**Maximized Emissions**	Time:	17:37:30
Tested By:	S. Yamamoto	Sequence#:	19
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:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT is configured with the 394mm antenna P/N 118-8087.

The EUT center frequency is 914.0355MHz.

Frequency range of data sheet is 9kHz to 9.28GHz.
9kHz to 150kHz, RBW=200Hz VBW=2000Hz restricted bands;
150kHz to 30MHz, RBW=9kHz VBW=91kHz restricted bands;
30MHz to 1000MHz RBW=120kHz VBW=1.2MHz restricted bands;
1000MHz to 9280MHz, RBW=1MHz VBW=3MHz restricted bands

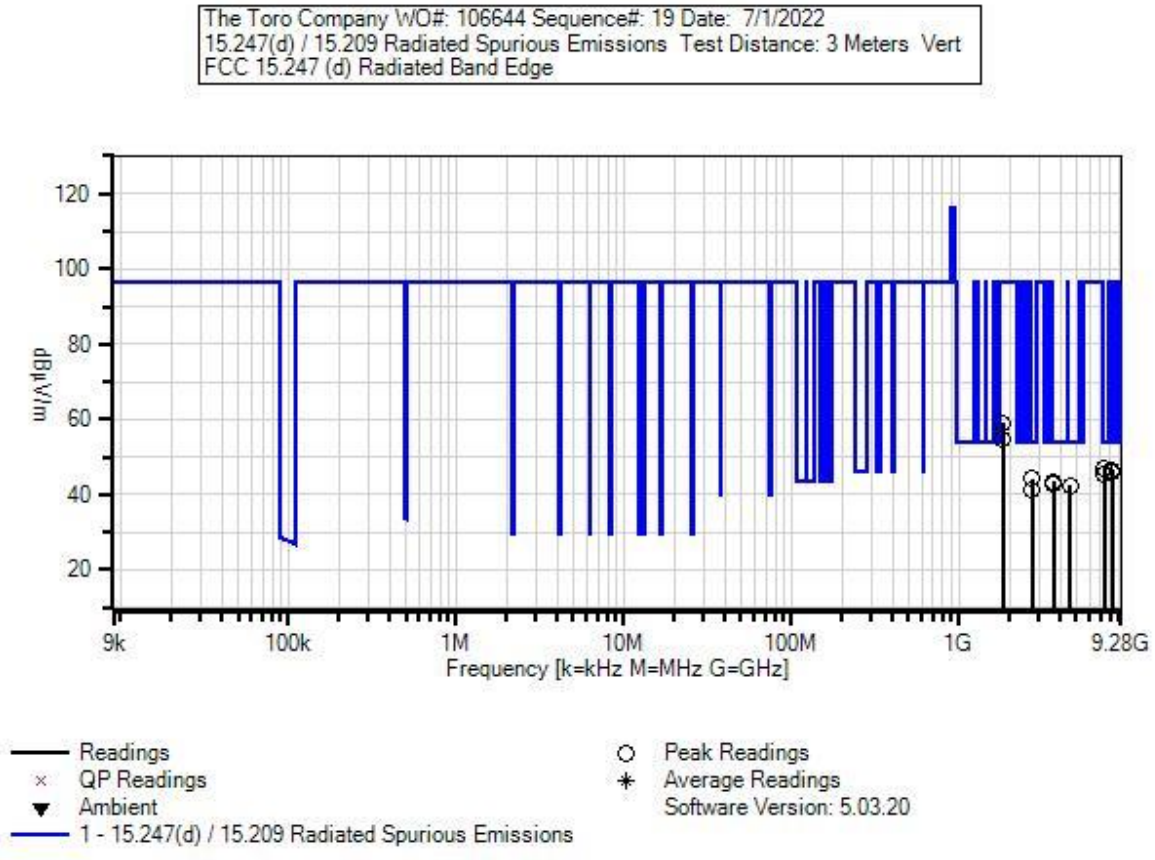
RBW=100kHz VBW=300kHz non-restricted bands

Test method ANSI C63.10 2013

The EUT was measured independently on each of three axes and the emission levels contained within this data sheet represents the maximum emissions.

Environmental Conditions:
Temperature: 24°C
Humidity: 40%
Pressure: 99kPa

Site A



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T1	ANP06360	Cable	L1-PNMNM-48	9/30/2021	9/30/2023
T2	AN00786	Preamp	83017A	5/23/2022	5/23/2024
T3	ANP07655	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022
T4	AN00849	Horn Antenna	3115	3/21/2022	3/21/2024
	AN02749	High Pass Filter	9SH10-1000/T10000-O/O	7/12/2021	7/12/2023
T5	AN03169	High Pass Filter	HM1155-11SS	5/10/2021	5/10/2023
	AN00309	Preamp	8447D	12/13/2021	12/13/2023
	AN00314	Loop Antenna	6502	3/29/2022	3/29/2024
	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024
	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022
	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022

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	7312.289M	40.2	+6.1 +0.2	-36.9	+0.8	+36.3	+0.0	46.7	54.0	-7.3	Vert
2	8226.328M	39.1	+6.4 +0.2	-37.0	+0.8	+36.9	+0.0	46.4	54.0	-7.6	Vert
3	8226.308M	38.4	+6.4 +0.2	-37.0	+0.8	+36.9	+0.0	45.7	54.0	-8.3	Horiz
4	7312.372M	38.8	+6.1 +0.2	-36.9	+0.8	+36.3	+0.0	45.3	54.0	-8.7	Horiz
5	2742.108M	49.1	+3.4 +0.3	-38.4	+0.5	+29.3	+0.0	44.2	54.0	-9.8	Horiz
6	3656.067M	44.9	+4.0 +0.4	-37.9	+0.5	+31.5	+0.0	43.4	54.0	-10.6	Vert
7	3656.114M	44.0	+4.0 +0.4	-37.9	+0.5	+31.5	+0.0	42.5	54.0	-11.5	Horiz
8	4570.126M	41.9	+4.6 +0.3	-37.4	+0.6	+32.3	+0.0	42.3	54.0	-11.7	Horiz
9	4570.199M	41.7	+4.6 +0.3	-37.4	+0.6	+32.3	+0.0	42.1	54.0	-11.9	Vert
10	2742.228M	46.0	+3.4 +0.3	-38.4	+0.5	+29.3	+0.0	41.1	54.0	-12.9	Vert
11	1828.059M	67.4	+2.7 +0.3	-38.8	+0.4	+27.1	+0.0	59.1	96.4	-37.3	Horiz
12	1828.049M	63.1	+2.7 +0.3	-38.8	+0.4	+27.1	+0.0	54.8	96.4	-41.6	Vert

Band Edge

Band Edge Summary (128mm antenna)					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	BPSK-40	¼ wave wire	40.6	<46	Pass
902	BPSK-40	¼ wave wire	44.8	<92.1	Pass
928	BPSK-40	¼ wave wire	46.2	<92.1	Pass
960	BPSK-40	¼ wave wire	45.1	<54	Pass

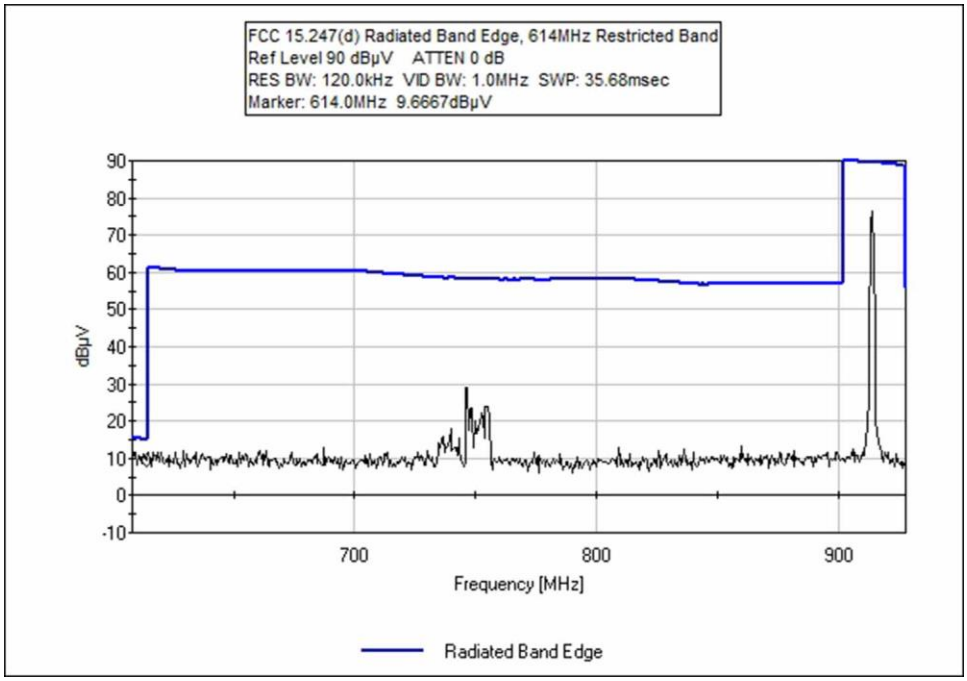
Band Edge Summary (165mm antenna)					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	BPSK-40	¼ wave wire	40.0	<46	Pass
902	BPSK-40	¼ wave wire	45.0	<89.2	Pass
928	BPSK-40	¼ wave wire	46.3	<89.2	Pass
960	BPSK-40	¼ wave wire	46.4	<54	Pass

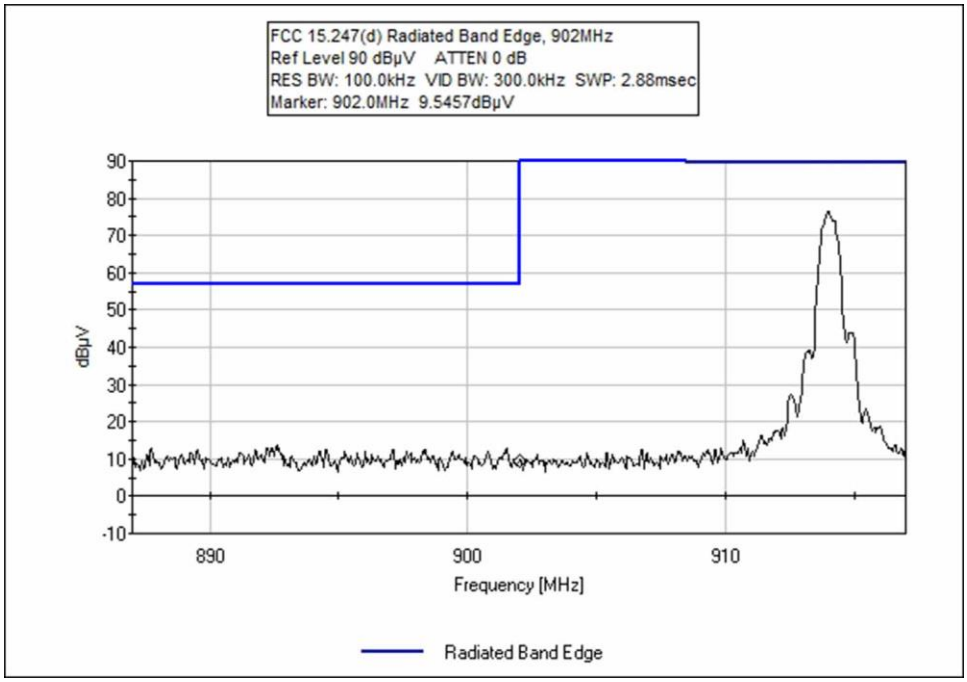
Band Edge Summary (204mm antenna)					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	BPSK-40	¼ wave wire	41.2	<46	Pass
902	BPSK-40	¼ wave wire	46.6	<90.3	Pass
928	BPSK-40	¼ wave wire	46.2	<90.3	Pass
960	BPSK-40	¼ wave wire	45.8	<54	Pass

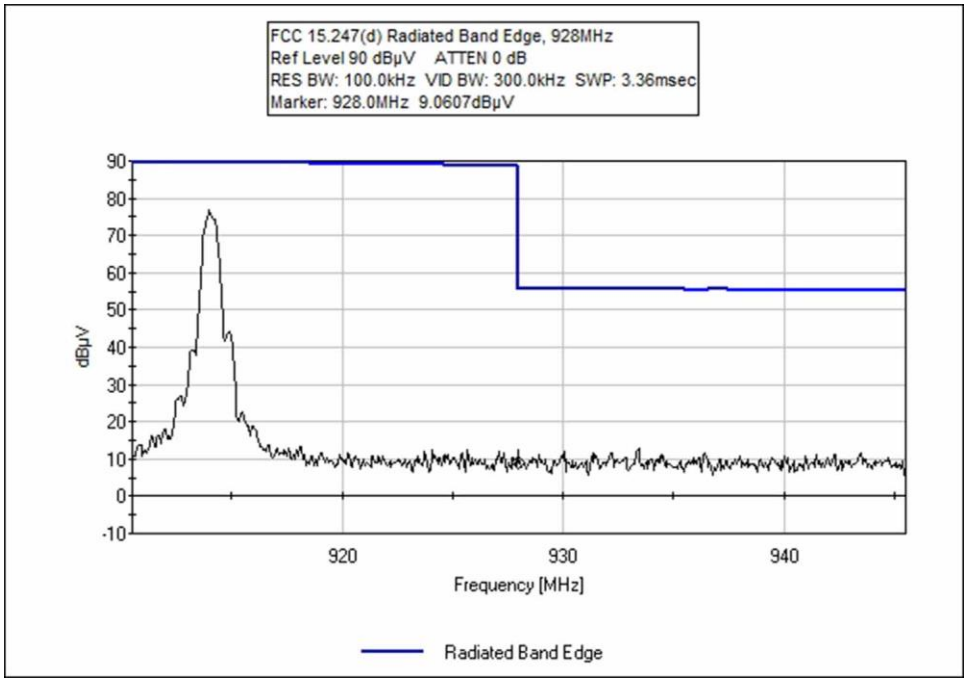
Band Edge Summary (394mm antenna)					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	BPSK-40	¼ wave wire	39.2	<46	Pass
902	BPSK-40	¼ wave wire	44.6	<96.4	Pass
928	BPSK-40	¼ wave wire	45.2	<96.4	Pass
960	BPSK-40	¼ wave wire	45.8	<54	Pass

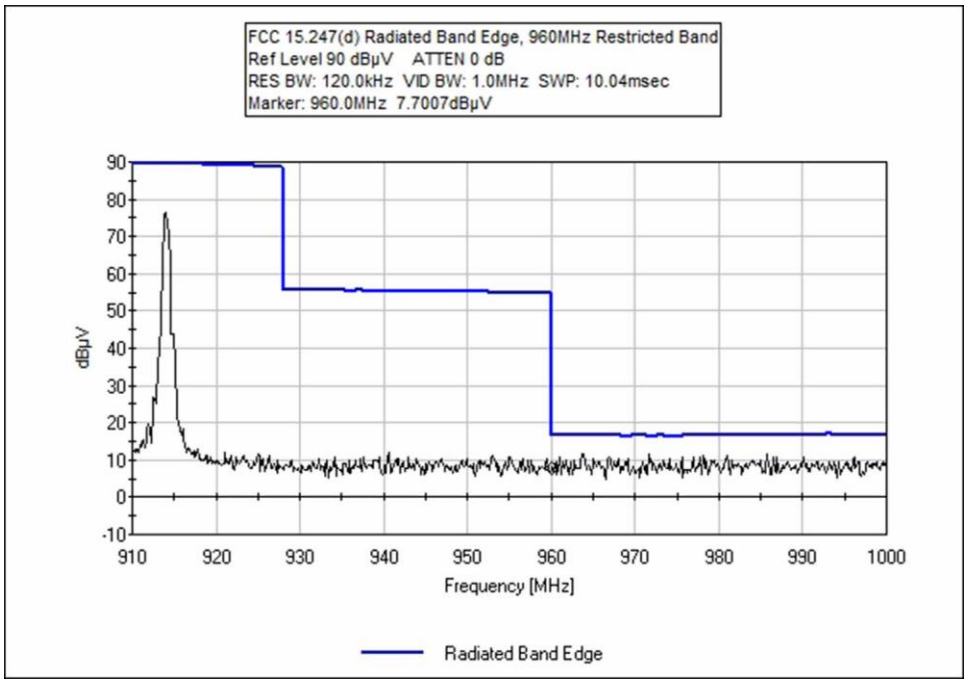
Band Edge Plots

128mm Antenna

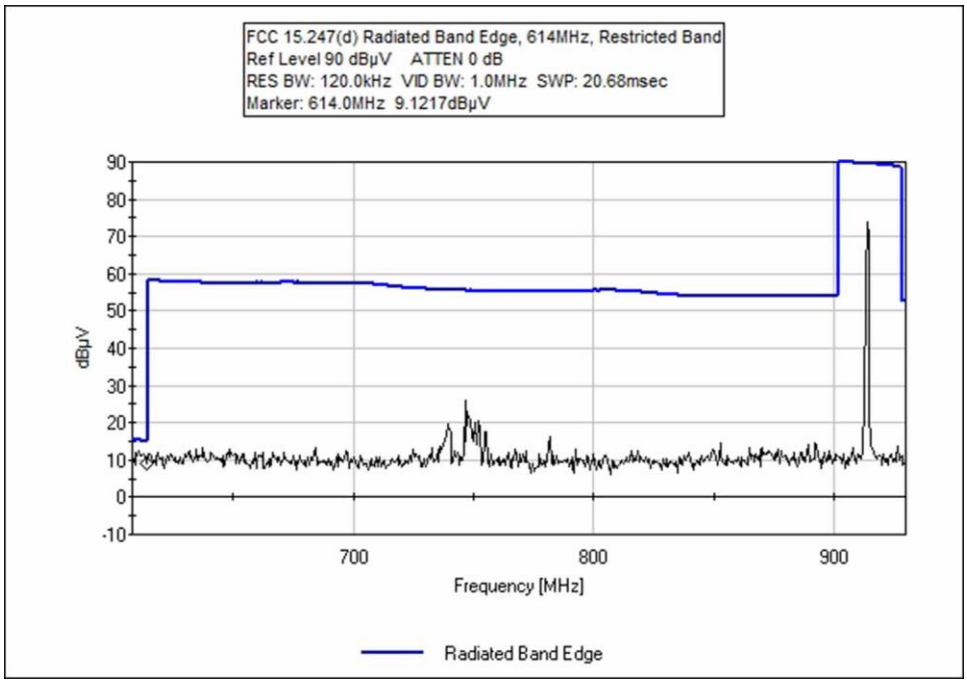


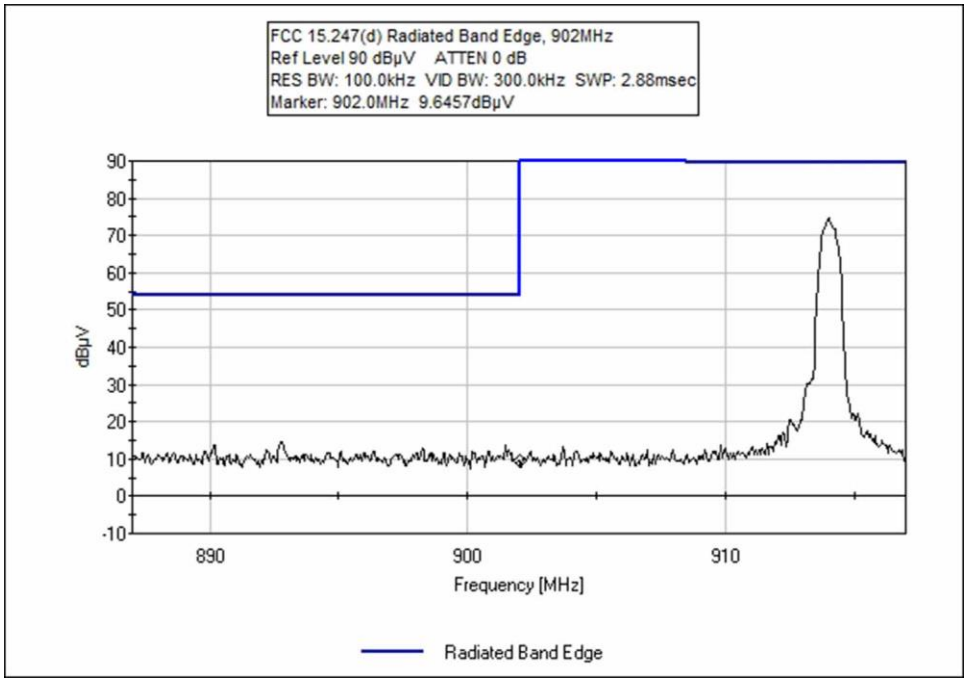


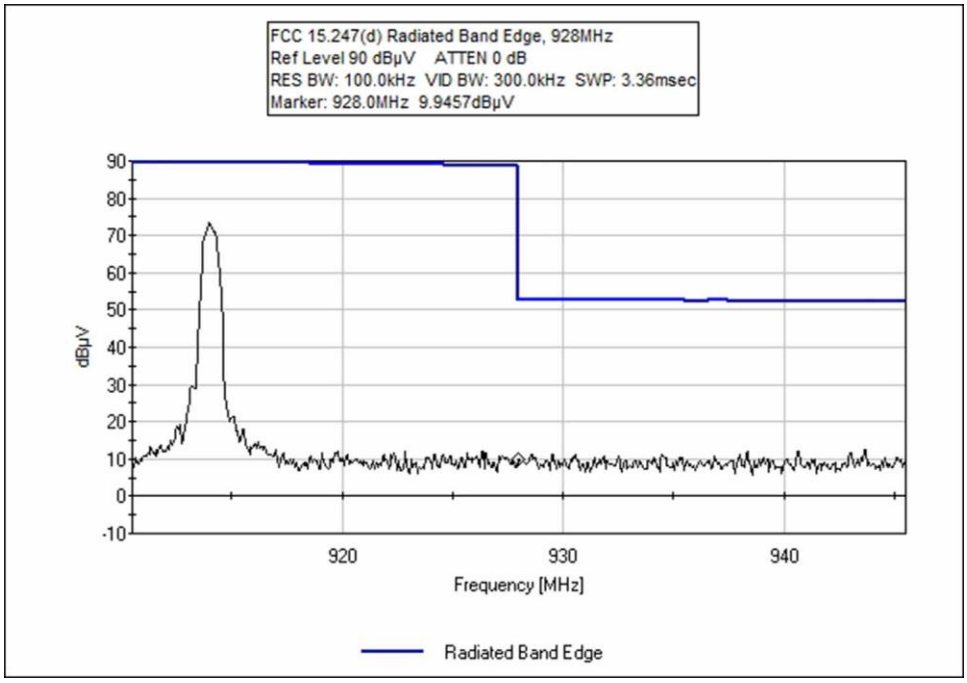

FCC 15.247(d) Radiated Band Edge, 928MHz
Ref Level 90 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 3.36msec
Marker: 928.0MHz 9.0607dBµV
dBµV
Frequency [MHz]
Radiated Band Edge

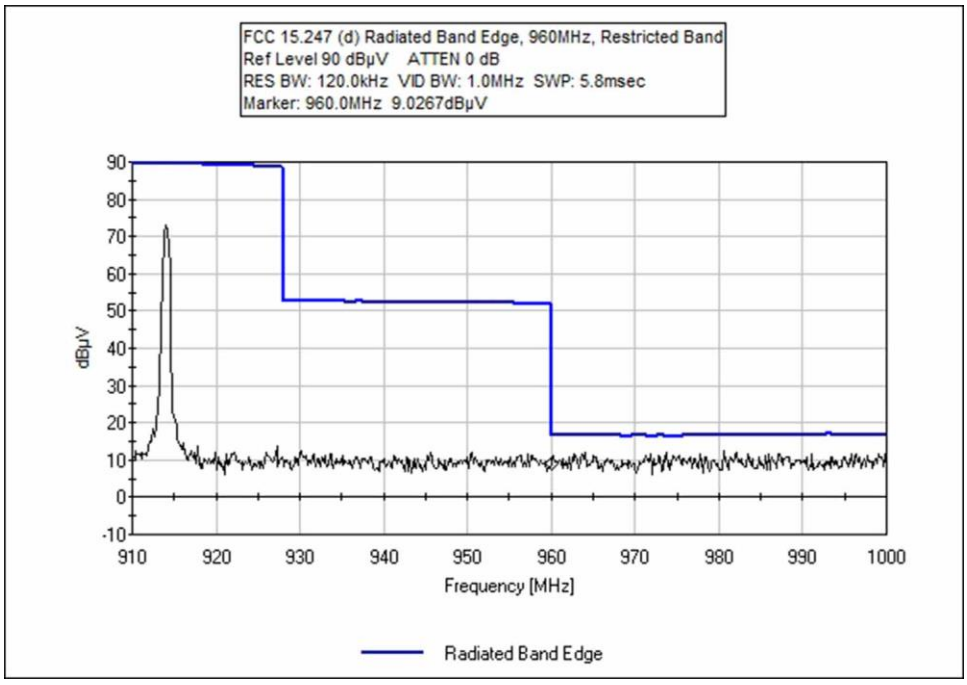

FCC 15.247(d) Radiated Band Edge, 960MHz Restricted Band
Ref Level 90 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 1.0MHz SWP: 10.04msec
Marker: 960.0MHz 7.7007dBµV
dBµV
Frequency [MHz]
Radiated Band Edge

165mm Antenna

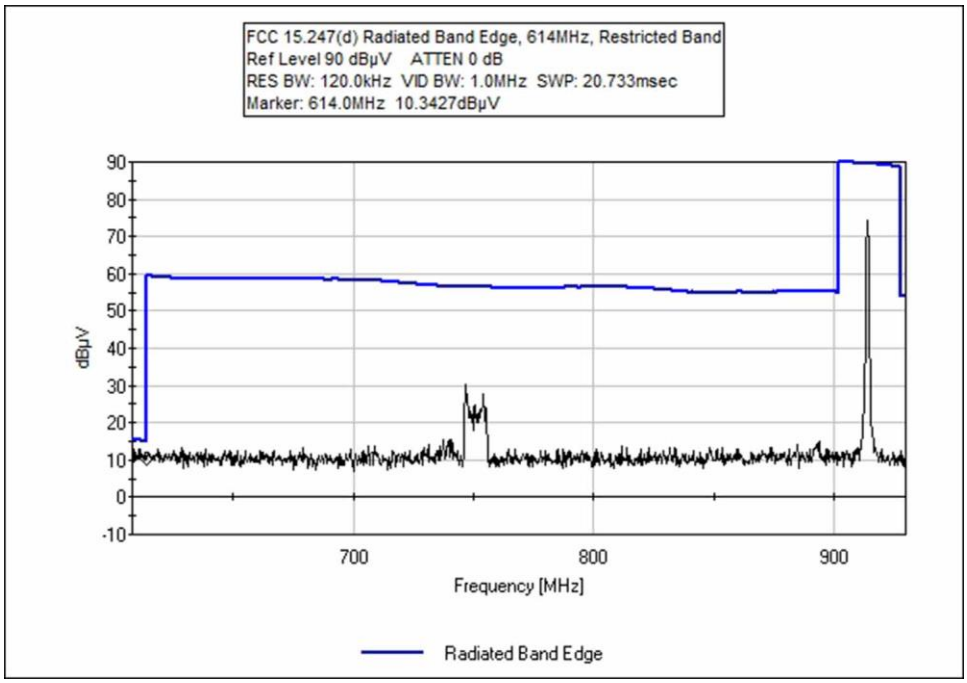


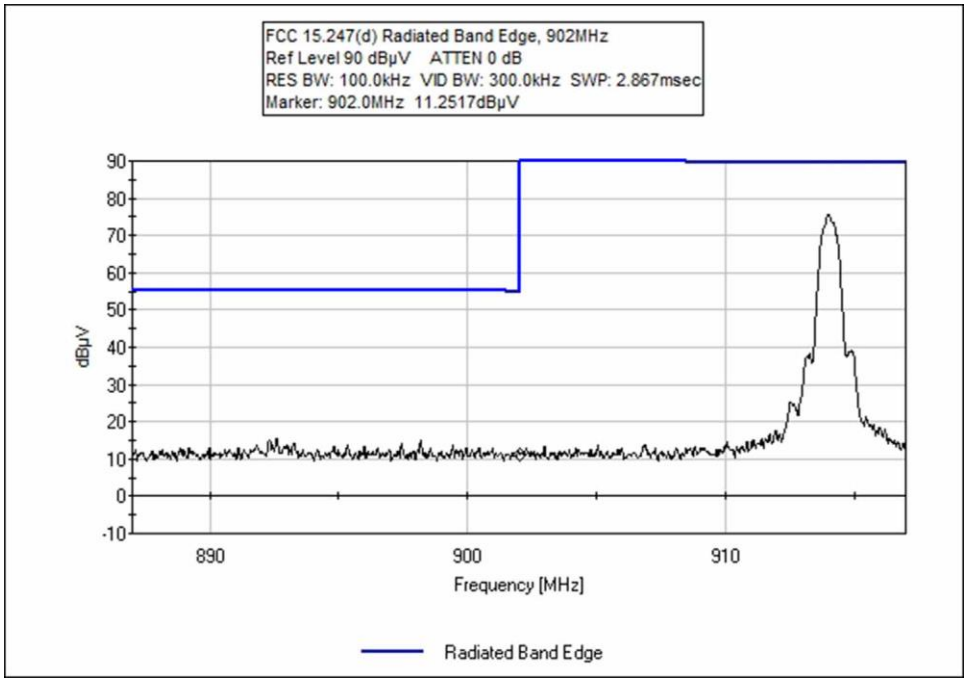


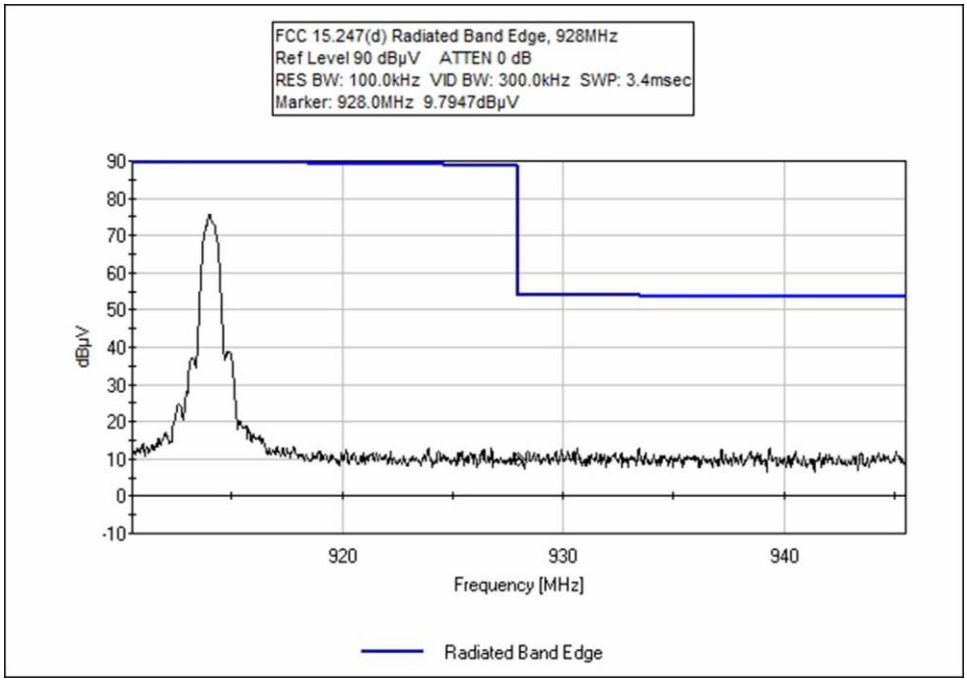

FCC 15.247(d) Radiated Band Edge, 928MHz
Ref Level 90 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 3.36msec
Marker: 928.0MHz 9.9457dBµV
dBµV
Frequency [MHz]
Radiated Band Edge

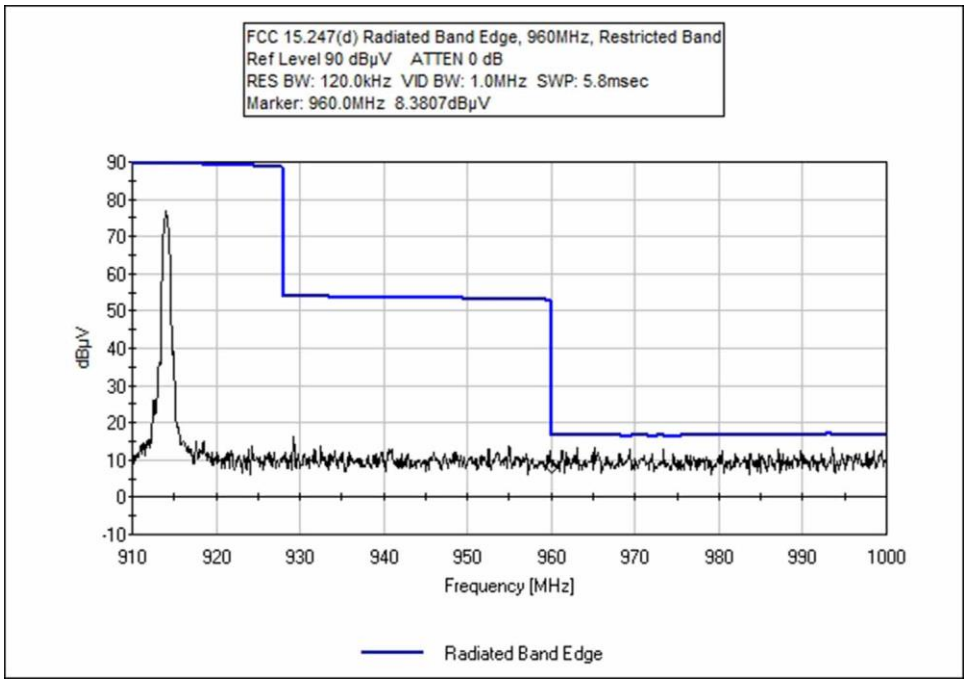

FCC 15.247 (d) Radiated Band Edge, 960MHz, Restricted Band
Ref Level 90 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 1.0MHz SWP: 5.8msec
Marker: 960.0MHz 9.0267dBµV
dBµV
Frequency [MHz]
Radiated Band Edge

204mm Antenna

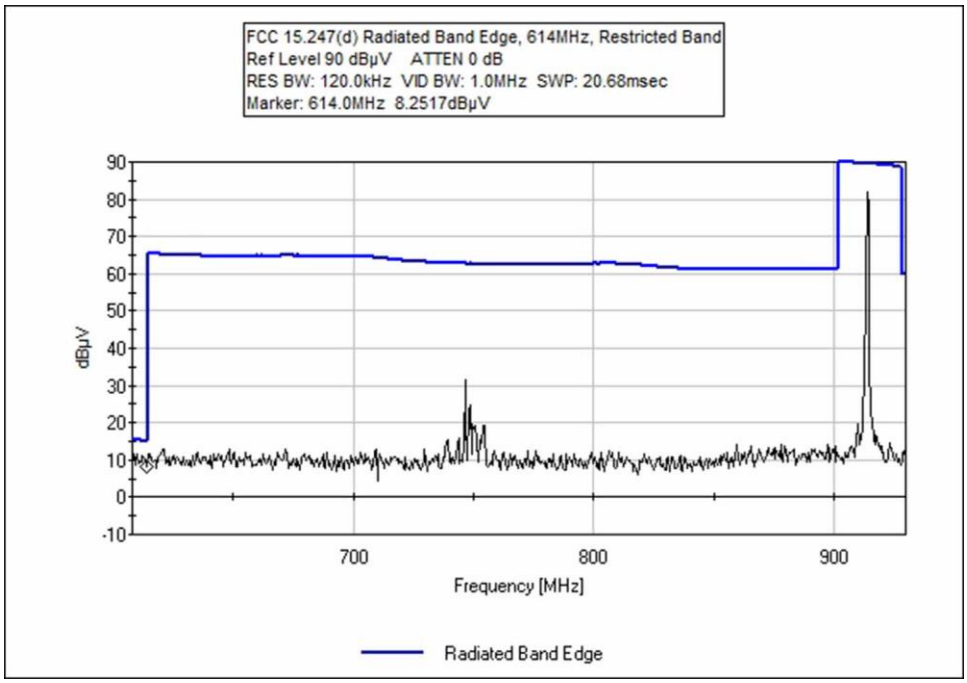


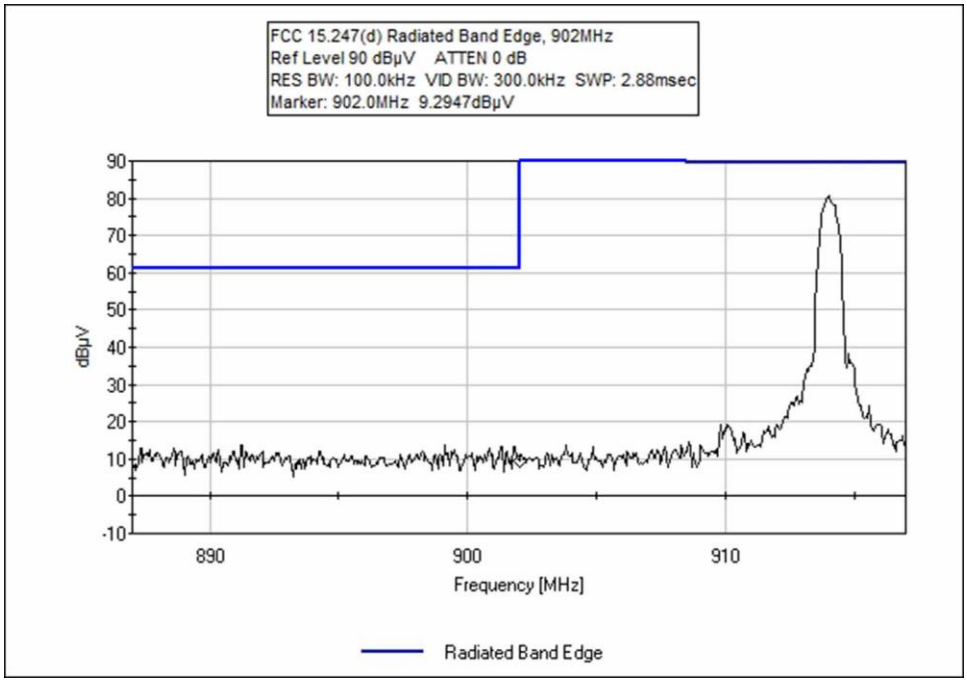


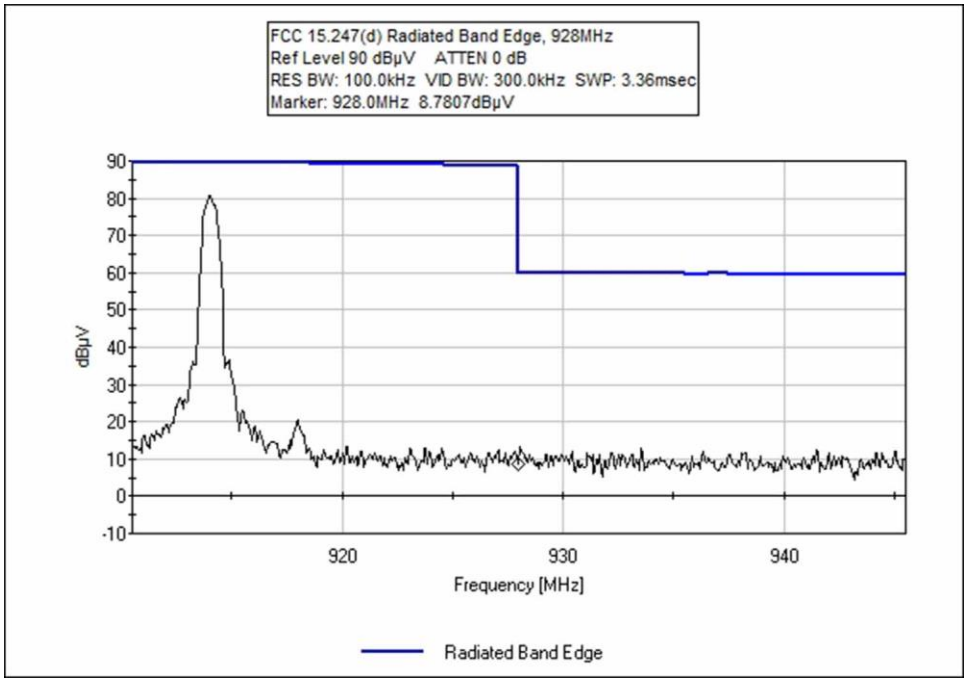

FCC 15.247(d) Radiated Band Edge, 928MHz
Ref Level 90 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 3.4msec
Marker: 928.0MHz 9.7947dBµV
dBµV
Frequency [MHz]
Radiated Band Edge

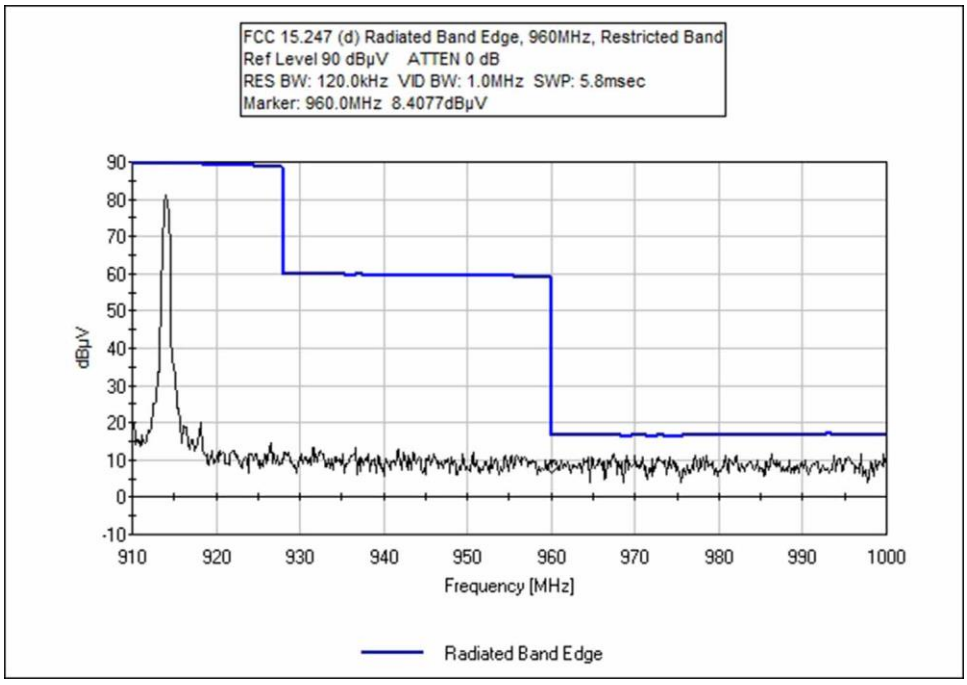

FCC 15.247(d) Radiated Band Edge, 960MHz, Restricted Band
Ref Level 90 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 1.0MHz SWP: 5.8msec
Marker: 960.0MHz 8.3807dBµV
dBµV
Frequency [MHz]
Radiated Band Edge

394mm Antenna






FCC 15.247(d) Radiated Band Edge, 928MHz
Ref Level 90 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 3.36msec
Marker: 928.0MHz 8.7807dBµV
dBµV
Frequency [MHz]
Radiated Band Edge


FCC 15.247 (d) Radiated Band Edge, 960MHz, Restricted Band
Ref Level 90 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 1.0MHz SWP: 5.8msec
Marker: 960.0MHz 8.4077dBµV
dBµV
Frequency [MHz]
Radiated Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**Radiated Band Edge**		
Work Order #:	**106644**	Date:	6/29/2022
Test Type:	**Maximized Emissions**	Time:	09:04:51
Tested By:	S. Yamamoto	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:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT is configured with the 128mm antenna P/N 118-8086B.

The EUT center frequency is 914.0355MHz.

FCC 15.247(d) Band Edge Compliance

Test method ANSI C63.10 2013

Environmental Conditions:
Temperature: 23°C
Humidity: 47%
Pressure: 99kPa

Site A

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T2	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
T3	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	614.000M	9.7	+0.0	+4.6	+26.3		+0.0	40.6	46.0	-5.4	Horiz
2	960.000M	7.7	+0.0	+6.0	+31.4		+0.0	45.1	54.0	-8.9	Horiz
3	928.000M	9.8	+0.0	+5.9	+30.5		+0.0	46.2	92.1	-45.9	Horiz
4	902.000M	9.5	+0.0	+5.8	+29.5		+0.0	44.8	92.1	-47.3	Horiz

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**Radiated Band Edge**		
Work Order #:	**106644**	Date:	7/1/2022
Test Type:	**Maximized Emissions**	Time:	10:50:47
Tested By:	S. Yamamoto	Sequence#:	14
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:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT is configured with the 165mm antenna P/N 118-8086.

The EUT center frequency is 914.0355MHz.

FCC 15.247(d) Band Edge Compliance

Test method ANSI C63.10 2013

Environmental Conditions:
Temperature: 23°C
Humidity: 47%
Pressure: 99kPa

Site A

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T2	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
T3	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	614.000M	9.1	+0.0	+4.6	+26.3		+0.0	40.0	46.0	-6.0	Horiz
2	960.000M	9.0	+0.0	+6.0	+31.4		+0.0	46.4	54.0	-7.6	Horiz
3	928.000M	9.9	+0.0	+5.9	+30.5		+0.0	46.3	89.2	-42.9	Horiz
4	902.000M	9.6	+0.0	+5.8	+29.5		+0.0	45.0	89.2	-44.3	Horiz

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**Radiated Band Edge**		
Work Order #:	**106644**	Date:	6/29/2022
Test Type:	**Maximized Emissions**	Time:	08:25:18
Tested By:	S. Yamamoto	Sequence#:	4
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:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT is configured with the 204mm antenna P/N 118-8087B.

The EUT center frequency is 914.0355MHz.

FCC 15.247(d) Band Edge Compliance

Test method ANSI C63.10 2013

Environmental Conditions:
Temperature: 23°C
Humidity: 47%
Pressure: 99kPa

Site A

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T2	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
T3	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	614.000M	10.3	+0.0	+4.6	+26.3		+0.0	41.2	46.0	-4.8	Horiz
2	960.000M	8.4	+0.0	+6.0	+31.4		+0.0	45.8	54.0	-8.2	Horiz
3	902.000M	11.3	+0.0	+5.8	+29.5		+0.0	46.6	90.3	-43.8	Horiz
4	928.000M	9.8	+0.0	+5.9	+30.5		+0.0	46.2	90.3	-44.1	Horiz

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**Radiated Band Edge**		
Work Order #:	**106644**	Date:	7/1/2022
Test Type:	**Maximized Emissions**	Time:	11:39:02
Tested By:	S. Yamamoto	Sequence#:	15
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:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT is configured with the 394mm antenna P/N 118-8087.

The EUT center frequency is 914.0355MHz.

FCC 15.247(d) Band Edge Compliance

Test method ANSI C63.10 2013

Environmental Conditions:
Temperature: 23°C
Humidity: 47%
Pressure: 99kPa

Site A

Test Equipment:

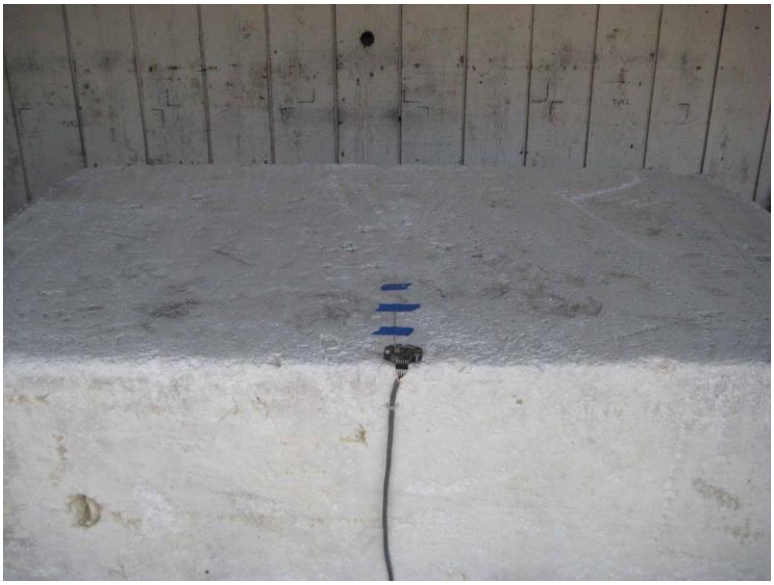
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T2	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
T3	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	614.000M	8.3	+0.0	+4.6	+26.3		+0.0	39.2	46.0	-6.8	Horiz
2	960.000M	8.4	+0.0	+6.0	+31.4		+0.0	45.8	54.0	-8.2	Horiz
3	928.000M	8.8	+0.0	+5.9	+30.5		+0.0	45.2	96.4	-51.2	Horiz
4	902.000M	9.3	+0.0	+5.8	+29.5		+0.0	44.6	96.4	-51.8	Horiz

Test Setup Photo(s)

Below 1GHz



Below 1GHz

Above 1GHz

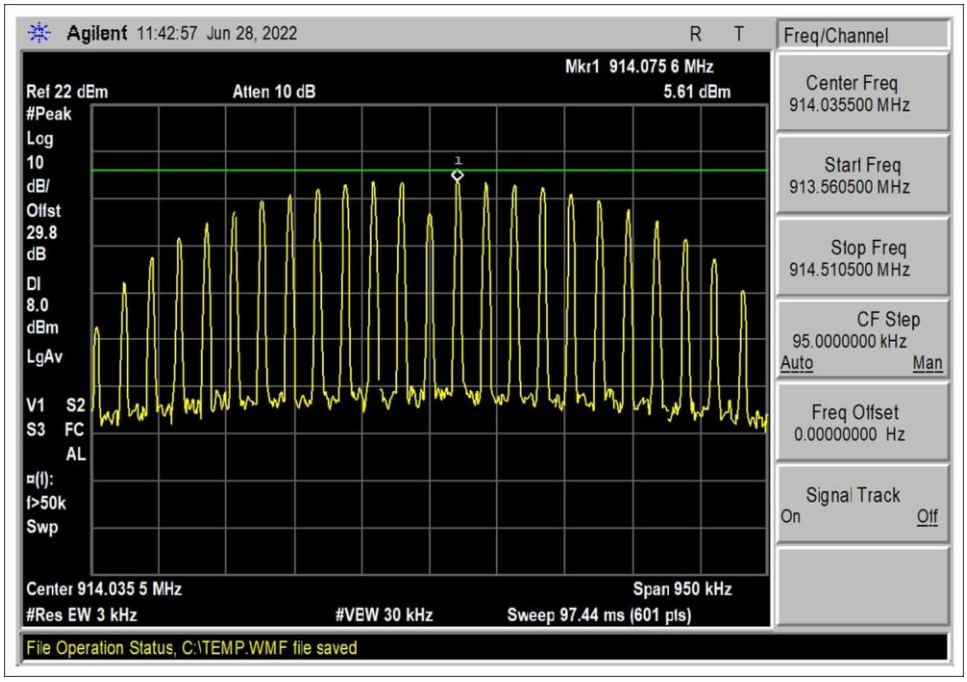
15.247(e) Power Spectral Density

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013), KDB 558074	Test Date(s):	6/28/2022
Configuration:	1		
Test Setup:	The LED lighting transformer is providing power to the LED power board. The power board is providing power to the 12W LED light and the equipment under test (EUT). The antenna port of the EUT is connected to the spectrum analyzer using a coaxial cable and attenuator. The EUT is powered on and transmitting continuously at its rated output power. The nominal voltage to the EUT is 12.0VDC.		

Environmental Conditions			
Temperature (ºC)	23	Relative Humidity (%):	41

Test Data Summary - RF Conducted Measurement				
Measurement Method: PKPSD				
Frequency (MHz)	**Modulation**	**Measured (dBm/3kHz)**	**Limit (dBm/3kHz)**	**Results**
914.0355	BPSK-40	5.61	≤8	Pass

Plot(s)



Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**15.247(e) Peak Power Spectral Density (902-928 MHz DTS)**		
Work Order #:	**106644**	Date:	7/7/2022
Test Type:	**Conducted Emissions**	Time:	17:00:11
Tested By:	S. Yamamoto	Sequence#:	0
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is the RF board.
The LED power board is providing power to the EUT and a 12W LED light.
The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT center frequency is 914.0355MHz.

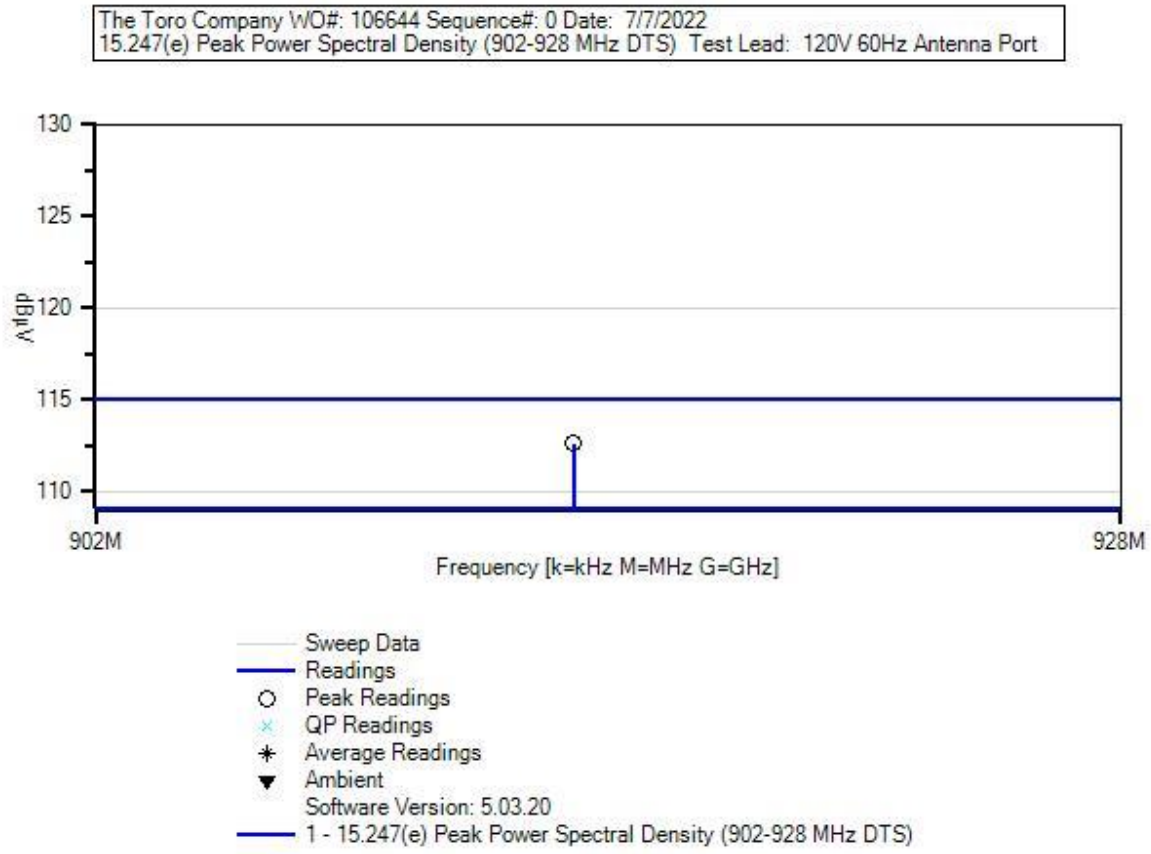
The EUT antenna port is connected to the spectrum analyzer via coaxial cable and attenuator.

Frequency range of data sheet is 913.5605MHz to 914.5105MHz
RBW=3kHz
VBW=30kHz

Test method ANSI C63.10 2013

Environmental Conditions:
Temperature: 23°C
Humidity: 41%
Pressure: 99kPa

Site A



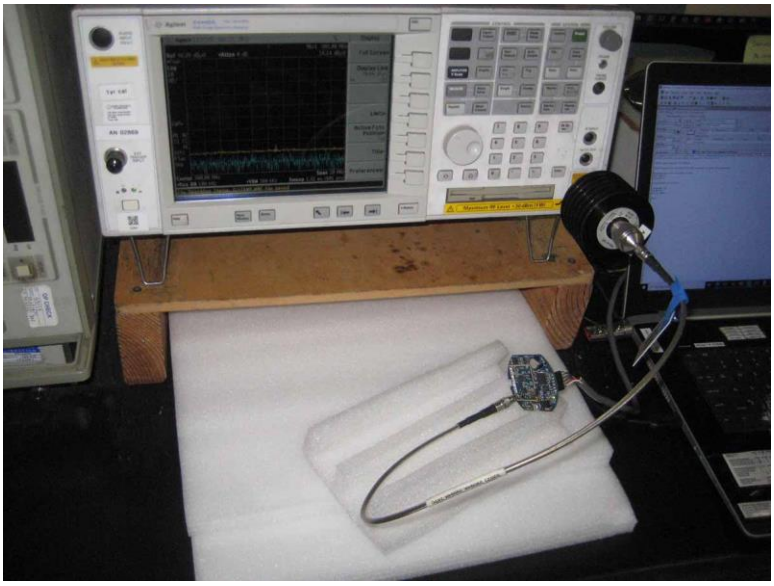
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T2	AN03432	Attenuator	90-30-34	10/28/2021	10/28/2023
T3	ANP07659	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	914.036M	82.8	+0.0	+29.6	+0.2		+0.0	112.6	115.0	-2.4	Anten

Test Setup Photo(s)



15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**106644**	Date:	6/28/2022
Test Type:	**Conducted Emissions**	Time:	2:12:43 PM
Tested By:	S. Yamamoto	Sequence#:	2
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is the RF board. The LED power board is providing power to the EUT and a 12W LED light. The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex
Connected to the EUT antenna port is antenna 118-8086-B.
This configuration tested was determined to be representative of worst case.

The EUT center frequency is 914.0355MHz.

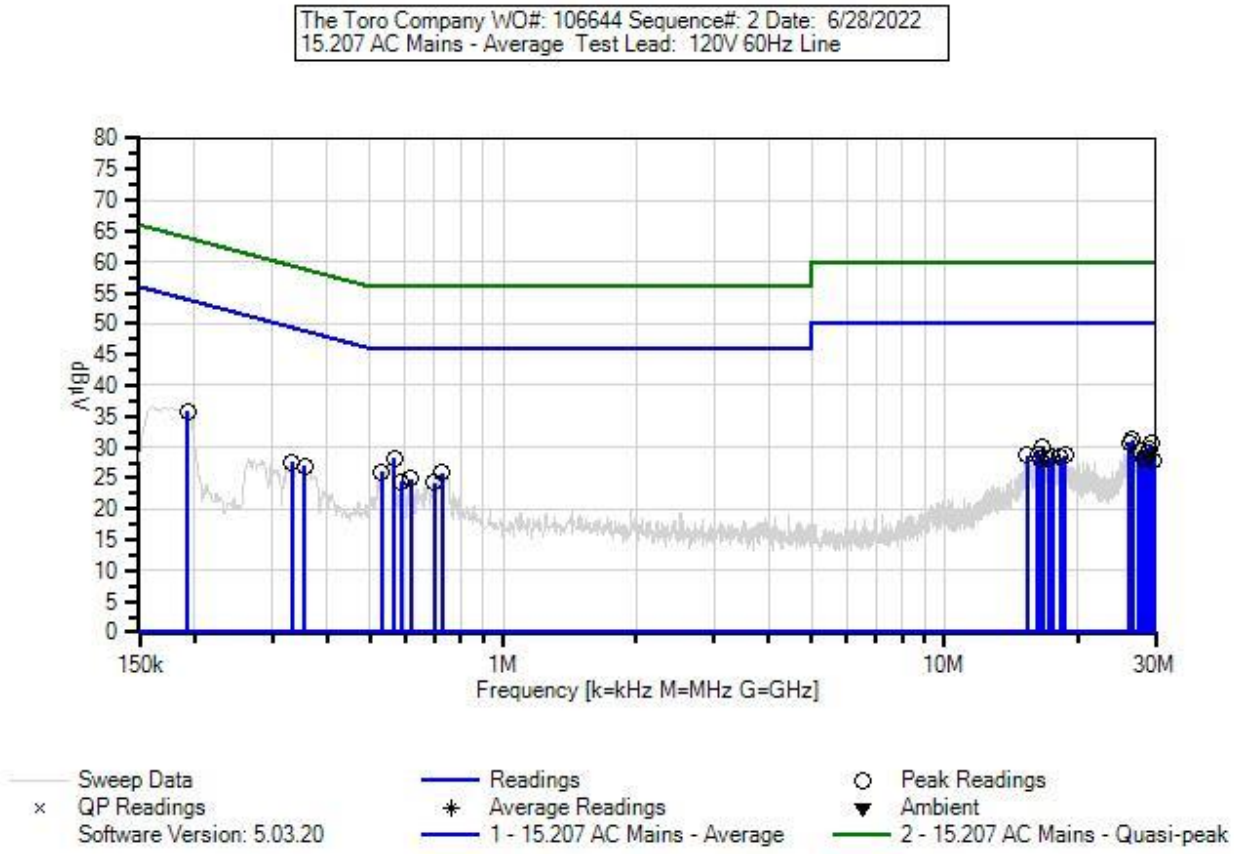
The LED lighting transformer is connected to the LISN.

Frequency range of data sheet is 150kHz to 30MHz.
RBW=9kHz
VBW=30kHz

Test method ANSI C63.10 2013

Environmental Conditions:
Temperature: 23°C
Humidity: 41%
Pressure: 99kPa

Site A



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T1	AN02610	High Pass Filter	HE9615-150K-50-720B	9/8/2021	9/8/2023
T2	ANP07338	Cable	2249-Y-240	1/3/2022	1/3/2024
T3	ANP07545	Attenuator	SA18N10W-06	1/4/2021	1/4/2023
T4	AN00847.1	50uH LISN-(L) Line 1	3816/2NM	3/18/2022	3/18/2023
	AN00847.1	50uH LISN-(N) Line 2	3816/2NM	3/18/2022	3/18/2023

Measurement Data: Reading listed by margin. Test Lead: Line

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	565.961k	22.2	+0.3	+0.0	+5.8	+0.0	+0.0	28.3	46.0	-17.7	Line
2	192.905k	29.9	+0.2	+0.0	+5.7	+0.0	+0.0	35.8	53.9	-18.1	Line
3	26.574M	24.9	+0.2	+0.4	+5.8	+0.0	+0.0	31.3	50.0	-18.7	Line
4	26.183M	24.4	+0.2	+0.4	+5.8	+0.0	+0.0	30.8	50.0	-19.2	Line
5	29.308M	24.1	+0.2	+0.4	+5.8	+0.1	+0.0	30.6	50.0	-19.4	Line
6	16.661M	23.8	+0.2	+0.3	+5.8	+0.0	+0.0	30.1	50.0	-19.9	Line
7	531.055k	20.0	+0.3	+0.0	+5.7	+0.0	+0.0	26.0	46.0	-20.0	Line
8	725.947k	19.9	+0.3	+0.0	+5.7	+0.0	+0.0	25.9	46.0	-20.1	Line
9	28.986M	23.3	+0.2	+0.4	+5.8	+0.1	+0.0	29.8	50.0	-20.2	Line
10	27.732M	22.9	+0.2	+0.4	+5.8	+0.1	+0.0	29.4	50.0	-20.6	Line
11	27.526M	22.9	+0.2	+0.4	+5.8	+0.0	+0.0	29.3	50.0	-20.7	Line
12	28.835M	22.7	+0.2	+0.4	+5.8	+0.1	+0.0	29.2	50.0	-20.8	Line
13	28.732M	22.6	+0.2	+0.4	+5.8	+0.1	+0.0	29.1	50.0	-20.9	Line
14	619.047k	18.8	+0.3	+0.0	+5.8	+0.0	+0.0	24.9	46.0	-21.1	Line
15	16.229M	22.5	+0.2	+0.3	+5.8	+0.0	+0.0	28.8	50.0	-21.2	Line
16	15.400M	22.4	+0.2	+0.3	+5.8	+0.0	+0.0	28.7	50.0	-21.3	Line
17	18.716M	22.3	+0.2	+0.3	+5.8	+0.1	+0.0	28.7	50.0	-21.3	Line
18	17.526M	22.3	+0.2	+0.3	+5.8	+0.0	+0.0	28.6	50.0	-21.4	Line
19	587.778k	18.3	+0.3	+0.0	+5.8	+0.0	+0.0	24.4	46.0	-21.6	Line
20	17.472M	22.1	+0.2	+0.3	+5.8	+0.0	+0.0	28.4	50.0	-21.6	Line
21	18.265M	22.0	+0.2	+0.3	+5.8	+0.1	+0.0	28.4	50.0	-21.6	Line
22	699.040k	18.3	+0.3	+0.0	+5.7	+0.0	+0.0	24.3	46.0	-21.7	Line
23	28.314M	21.8	+0.2	+0.4	+5.8	+0.1	+0.0	28.3	50.0	-21.7	Line
24	28.397M	21.8	+0.2	+0.4	+5.8	+0.1	+0.0	28.3	50.0	-21.7	Line

25	332.528k	21.7	+0.1	+0.0	+5.8	+0.0	+0.0	27.6	49.4	-21.8	Line
26	355.072k	21.0	+0.2	+0.0	+5.8	+0.0	+0.0	27.0	48.8	-21.8	Line
27	16.463M	21.8	+0.2	+0.3	+5.8	+0.0	+0.0	28.1	50.0	-21.9	Line
28	17.211M	21.7	+0.2	+0.3	+5.8	+0.0	+0.0	28.0	50.0	-22.0	Line
29	28.554M	21.5	+0.2	+0.4	+5.8	+0.1	+0.0	28.0	50.0	-22.0	Line
30	29.767M	21.4	+0.2	+0.4	+5.8	+0.1	+0.0	27.9	50.0	-22.1	Line

Test Location:	CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**The Toro Company**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**106644**	Date:	6/28/2022
Test Type:	**Conducted Emissions**	Time:	2:16:57 PM
Tested By:	S. Yamamoto	Sequence#:	3
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is the RF board. The LED power board is providing power to the EUT and a 12W LED light. The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex
Connected to the EUT antenna port is antenna 118-8086-B.
This configuration tested was determined to be representative of worst case.

The EUT center frequency is 914.0355MHz.

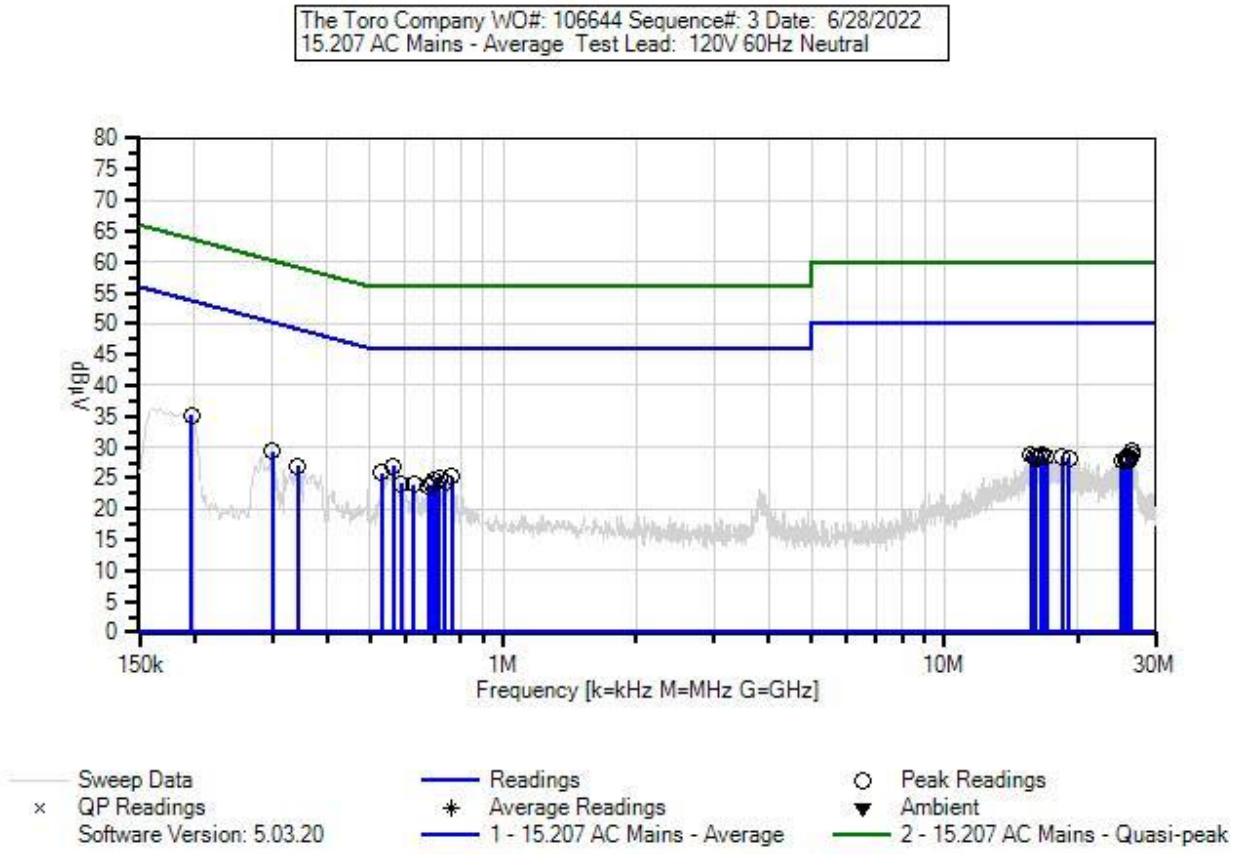
The LED lighting transformer is connected to the LISN.

Frequency range of data sheet is 150kHz to 30MHz.
RBW=9kHz
VBW=30kHz

Test method ANSI C63.10 2013

Environmental Conditions:
Temperature: 23°C
Humidity: 41%
Pressure: 99kPa

Site A



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	8/16/2021	8/16/2022
T1	AN02610	High Pass Filter	HE9615-150K-50-720B	9/8/2021	9/8/2023
T2	ANP07338	Cable	2249-Y-240	1/3/2022	1/3/2024
T3	ANP07545	Attenuator	SA18N10W-06	1/4/2021	1/4/2023
	AN00847.1	50uH LISN-(L) Line 1	3816/2NM	3/18/2022	3/18/2023
T4	AN00847.1	50uH LISN-(N) Line 2	3816/2NM	3/18/2022	3/18/2023

Measurement Data: Reading listed by margin. Test Lead: Neutral

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	197.268k	29.3	+0.2	+0.0	+5.7	+0.0	+0.0	35.2	53.7	-18.5	Neutr
2	564.507k	20.8	+0.3	+0.0	+5.8	+0.0	+0.0	26.9	46.0	-19.1	Neutr
3	530.328k	19.8	+0.3	+0.0	+5.7	+0.0	+0.0	25.8	46.0	-20.2	Neutr
4	26.499M	22.9	+0.2	+0.4	+5.8	+0.2	+0.0	29.5	50.0	-20.5	Neutr
5	766.670k	19.2	+0.3	+0.0	+5.7	+0.0	+0.0	25.2	46.0	-20.8	Neutr
6	299.804k	23.5	+0.1	+0.0	+5.7	+0.0	+0.0	29.3	50.2	-20.9	Neutr
7	717.220k	19.0	+0.3	+0.0	+5.7	+0.0	+0.0	25.0	46.0	-21.0	Neutr
8	15.697M	22.5	+0.2	+0.3	+5.8	+0.1	+0.0	28.9	50.0	-21.1	Neutr
9	698.313k	18.8	+0.3	+0.0	+5.7	+0.0	+0.0	24.8	46.0	-21.2	Neutr
10	16.679M	22.4	+0.2	+0.3	+5.8	+0.1	+0.0	28.8	50.0	-21.2	Neutr
11	26.485M	22.1	+0.2	+0.4	+5.8	+0.2	+0.0	28.7	50.0	-21.3	Neutr
12	16.535M	22.2	+0.2	+0.3	+5.8	+0.1	+0.0	28.6	50.0	-21.4	Neutr
13	15.977M	22.1	+0.2	+0.3	+5.8	+0.1	+0.0	28.5	50.0	-21.5	Neutr
14	18.445M	22.1	+0.2	+0.3	+5.8	+0.1	+0.0	28.5	50.0	-21.5	Neutr
15	25.944M	21.8	+0.2	+0.4	+5.8	+0.2	+0.0	28.4	50.0	-21.6	Neutr
16	736.855k	18.4	+0.3	+0.0	+5.7	+0.0	+0.0	24.4	46.0	-21.6	Neutr
17	17.004M	22.0	+0.2	+0.3	+5.8	+0.1	+0.0	28.4	50.0	-21.6	Neutr
18	16.076M	21.9	+0.2	+0.3	+5.8	+0.1	+0.0	28.3	50.0	-21.7	Neutr
19	19.166M	22.0	+0.2	+0.3	+5.7	+0.1	+0.0	28.3	50.0	-21.7	Neutr
20	25.971M	21.7	+0.2	+0.4	+5.8	+0.2	+0.0	28.3	50.0	-21.7	Neutr
21	25.868M	21.6	+0.2	+0.4	+5.8	+0.2	+0.0	28.2	50.0	-21.8	Neutr
22	586.323k	18.0	+0.3	+0.0	+5.8	+0.0	+0.0	24.1	46.0	-21.9	Neutr
23	629.228k	17.9	+0.3	+0.0	+5.8	+0.0	+0.0	24.0	46.0	-22.0	Neutr
24	691.768k	18.0	+0.3	+0.0	+5.7	+0.0	+0.0	24.0	46.0	-22.0	Neutr

25	26.416M	21.4	+0.2	+0.4	+5.8	+0.2	+0.0	28.0	50.0	-22.0	Neutr
26	25.183M	21.3	+0.2	+0.4	+5.8	+0.2	+0.0	27.9	50.0	-22.1	Neutr
27	26.094M	21.2	+0.2	+0.4	+5.8	+0.2	+0.0	27.8	50.0	-22.2	Neutr
28	341.982k	21.0	+0.1	+0.0	+5.8	+0.0	+0.0	26.9	49.2	-22.3	Neutr
29	678.678k	17.7	+0.3	+0.0	+5.7	+0.0	+0.0	23.7	46.0	-22.3	Neutr
30	25.683M	21.1	+0.2	+0.4	+5.8	+0.2	+0.0	27.7	50.0	-22.3	Neutr

Test Setup Photo(s)

Appendix A: Additional Data

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013)	Test Date(s):	1/10/2023
Test Setup:	The equipment under test (EUT) is placed on a styrofoam table. The EUT is powered on and transmitting continuously at its rated output power. The nominal voltage to the EUT is 12.0VDC. INSPIRA_TEST_CODE_File_1_-10.hex The EUT was measured independently in each of the three axes with the following antennas attached. Antenna is 128mm (118-8086-B). Antenna is 165mm (118-8086-A). Antenna is 204mm (118-8087-B). Antenna is 394mm (118-8087-A). The maximum amplitude for each antenna is listed below.		

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
03745	Spectrum Analyzer	Agilent	E4443	7/13/2021	7/13/2023
P05198	Cable	Belden	8268	12/31/2022	12/31/2024
00851	Biconilog Antenna	Chase	CBL6111C	4/21/2022	4/21/2024

Test Data Summary				
Antenna Identification	**Antenna Type**	**Measured Input Power (dBm)**	**Field Strength (dBuV/m @3m)**	**Calculated Gain (dBi)**
118-8086-B (128mm)	¼ wave wire	18.4	118.8	5.18
118-8086-A (165mm)	¼ wave wire	18.4	115.6	1.97
118-8087-B (204mm)	¼ wave wire	18.4	117.3	3.67
118-8087-A (394mm)	¼ wave wire	18.4	119.2	5.57

From ANSI C63.10, the formula for converting power to electric field strength is written as:

$$P(W) = \frac{(E \cdot d)^2}{30\ G}$$

This formula can be rewritten in logarithmic form and converted to units of dBm and dBuV/m:

$$P(dBm) = E(dBuV/m) + 20LOG(d) - G(dBi) - 104.77$$

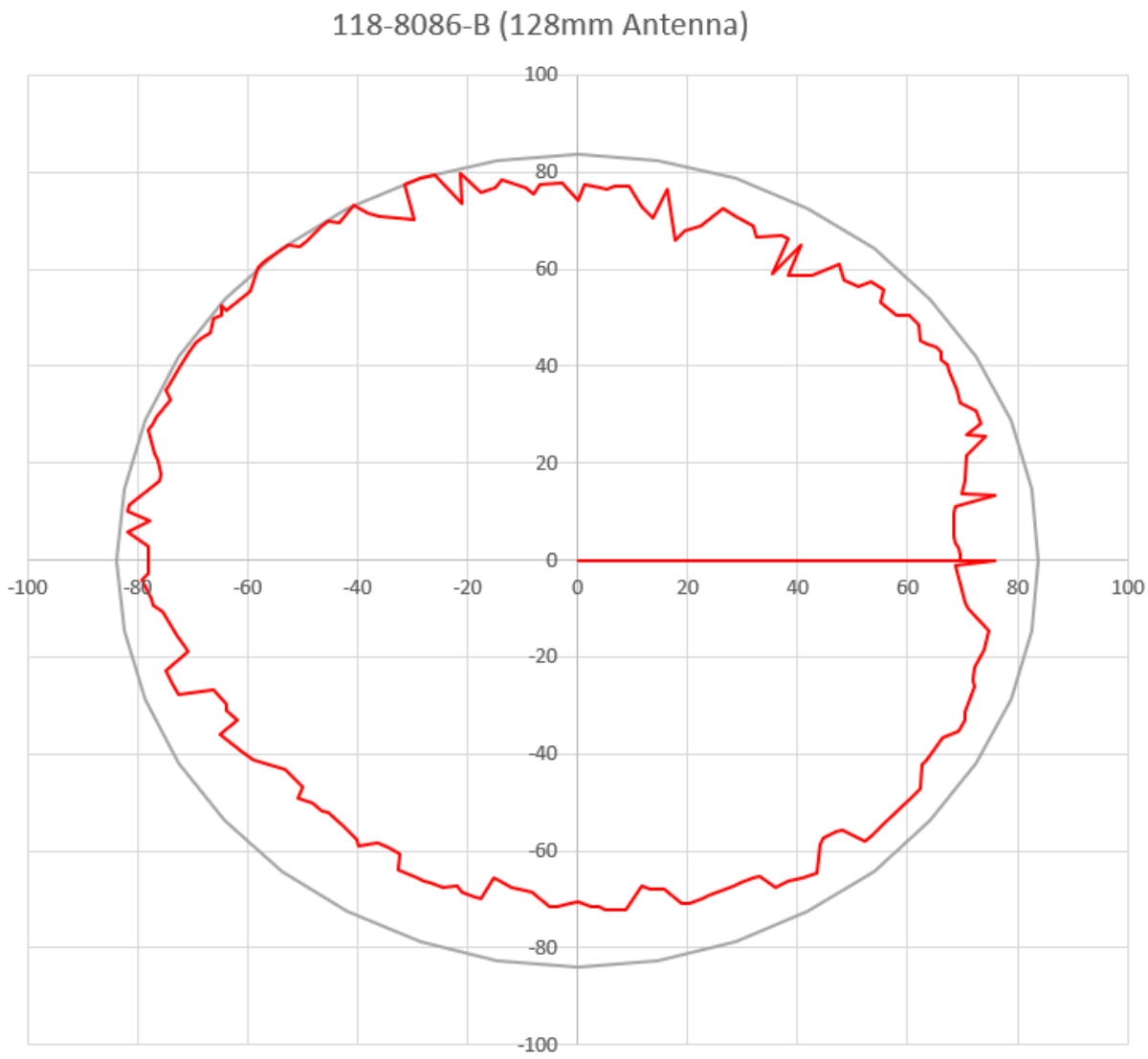
Solving this for gain produces:

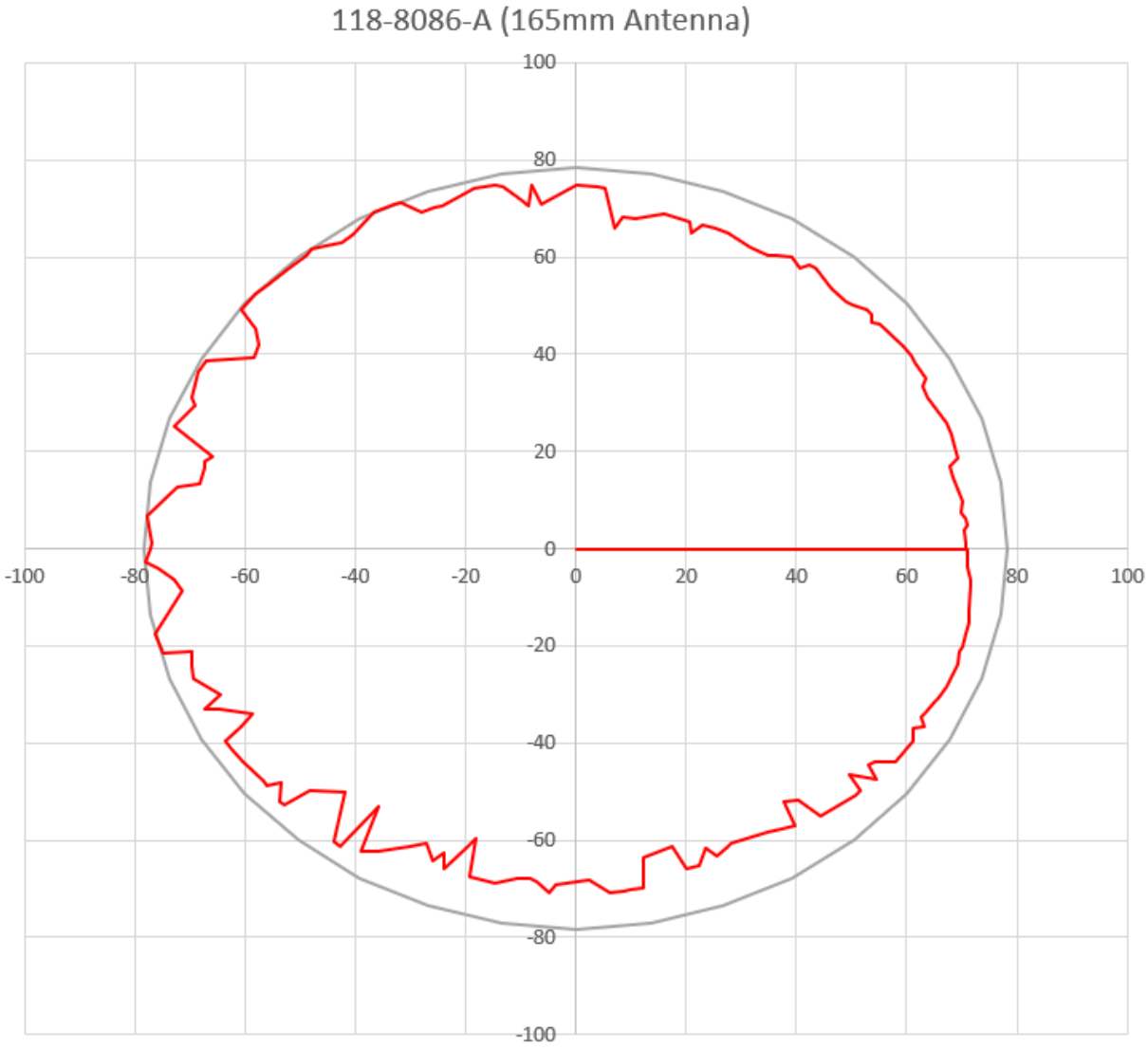
$$G(dBi) = E(dBuV/m) - P(dBm) + 20LOG(d)\ - 104.77$$

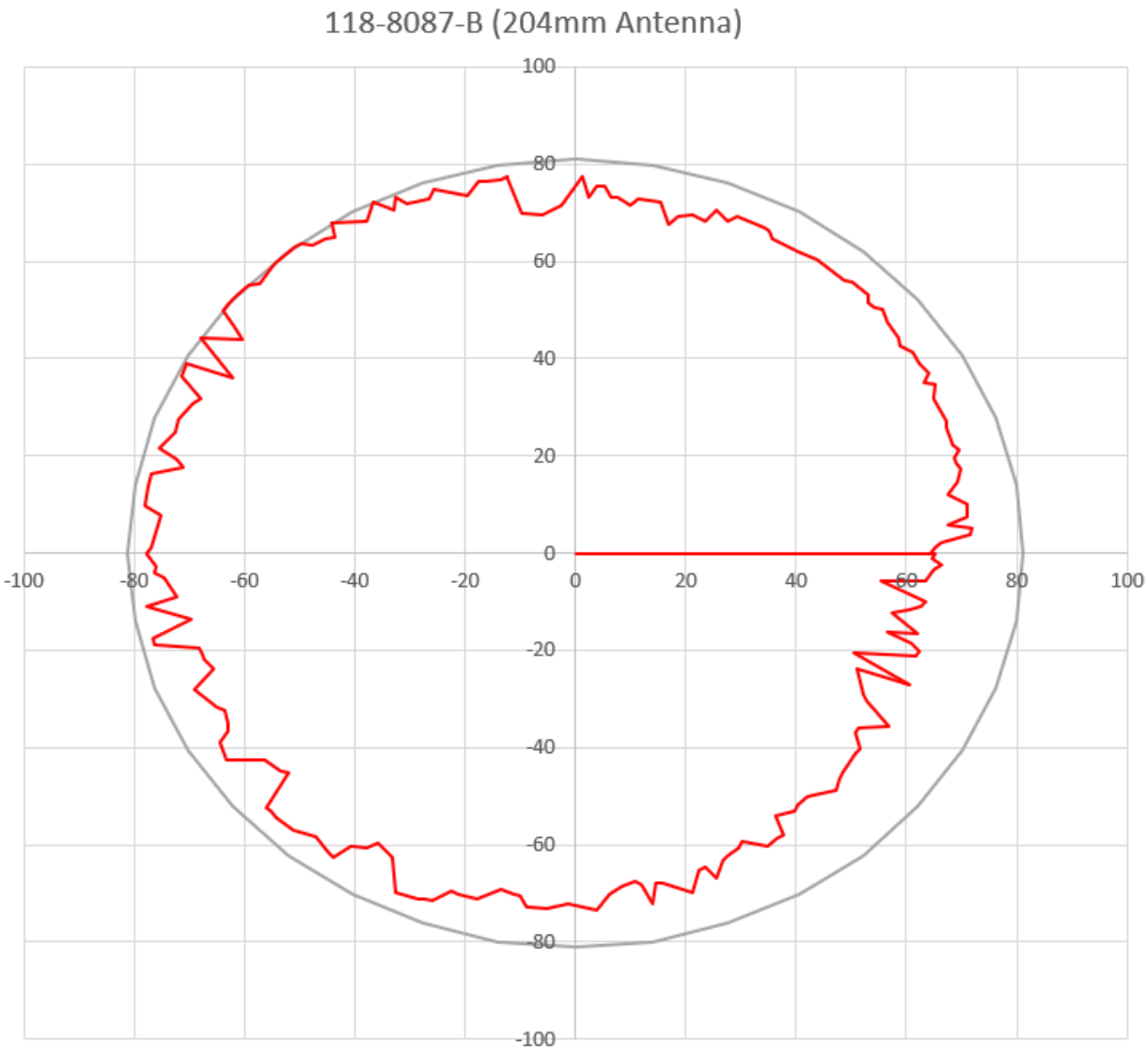
Unless otherwise specified, the antenna pattern test was performed at the midpoint of the declared operating band(s). Measurements are recorded below using a peak detector.

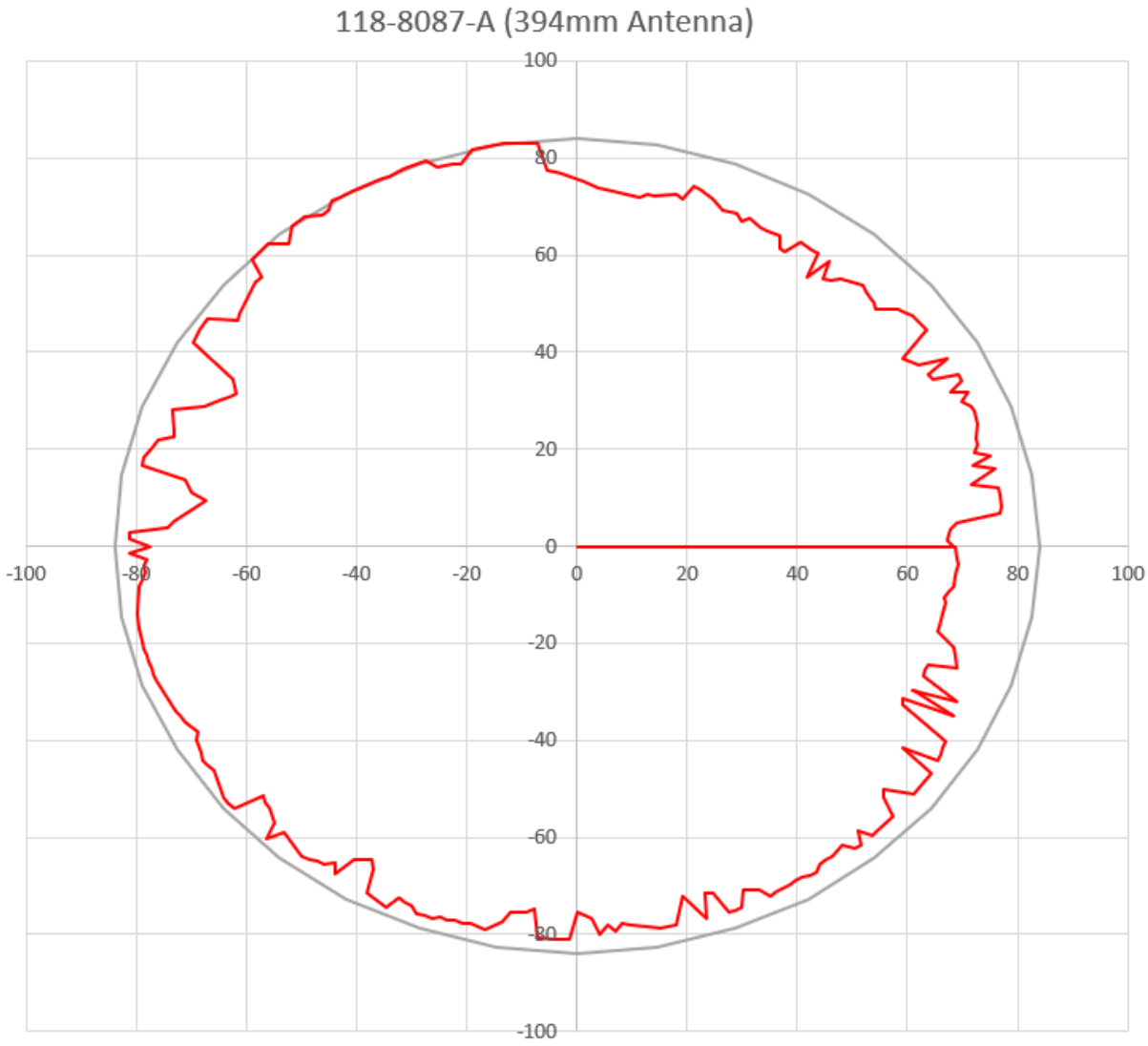
Antenna Pattern Plot(s)

Antenna pattern plots provided for horizontal polarity which produced highest measured EIRP




118-8086-A (165mm Antenna)
100
80
60
40
20
0
-20
-40
-60
-80
-100
-100
-80
-60
-40
-20
0
20
40
60
80
100


118-8087-B (204mm Antenna)
100
80
60
40
20
0
-20
-40
-60
-80
-100
-100
-80
-60
-40
-20
0
20
40
60
80
100


118-8087-A (394mm Antenna)
100
80
60
40
20
0
-20
-40
-60
-80
-100
-100
-80
-60
-40
-20
0
20
40
60
80
100

Test Data

Test Location: CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112
Customer: **The Toro Company**
Specification: **15.247(b) Power Output (902-928 MHz DTS)**
Work Order #: **107925** Date: 1/10/2023
Test Type: **Radiated Scan** Time: 13:10:12
Tested By: S. Yamamoto
Software: EMITest 5.03.20

Test Conditions / Notes:

The equipment under test (EUT) is the RF board. The LED power board is providing power to the EUT and a 12W LED light. The low voltage LED lighting transformer is providing 12Vac to the LED power board.
The EUT is powered on and transmitting continuously at its rated output power.
The nominal voltage to the EUT is 12.0VDC.
INSPIRA_TEST_CODE_File_1_-10.hex

The EUT center frequency is 914.04MHz.

Frequency range of data sheet is 914.04MHz.
RBW=1MHz VBW=3MHz

Test method ANSI C63.10 2013

The EUT was measured independently in each of the three axes with the following antennas attached.
Antenna is 128mm (118-8086-B).
Antenna is 165mm (118-8086-A).
Antenna is 204mm (118-8087-B).
Antenna is 394mm (118-8087-A).
The maximum amplitude was measured with the 394mm antenna.

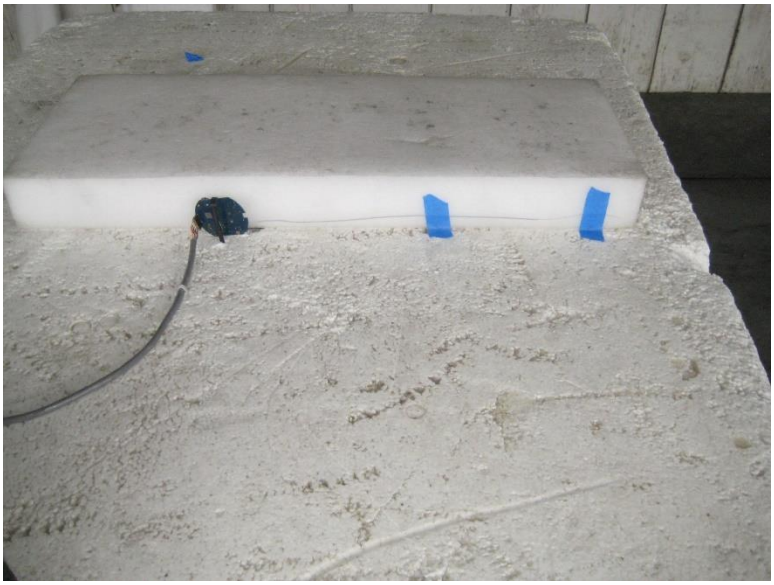
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03745	Spectrum Analyzer	E4443	7/13/2021	7/13/2023
T1	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/31/2022	12/31/2024
T2	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024

Measurement Data: Reading listed by order taken. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	914.040M	83.1	+5.9	+29.8			+0.0	118.8	131.2	-12.4	Horiz
									128mm antenna		
2	914.040M	79.9	+5.9	+29.8			+0.0	115.6	131.2	-15.6	Horiz
									165mm antenna		
3	914.040M	81.6	+5.9	+29.8			+0.0	117.3	131.2	-13.9	Horiz
									204mm antenna		
4	914.040M	83.5	+5.9	+29.8			+0.0	119.2	131.2	-12.0	Horiz
									394mm antenna		

Test Setup Photo(s)



SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

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.