



F2 Labs
16740 Peters Road
Middlefield, Ohio 44062
United States of America
www.f2labs.com

CERTIFICATION TEST REPORT

Manufacturer: PetroPower, LLC
3003 East 37th Street North, Suite 100
Wichita, Kansas 67219 USA

Applicant: Same as Above

Product Name: Bluetooth Module

Product Description: Bluetooth module used in PetroPower, LLC Edge computer platform products.

Operating Voltage/Frequency: 5V USB

Model(s): BT840E

FCC ID: 2BGG6BT840F

Testing Commenced: 2024-06-10

Testing Ended: 2024-06-12

Summary of Test Results: In Compliance

The EUT complies with the EMC requirements when manufactured identically as the unit tested in this report, including any required modifications and/or manufacturer's statement. Any changes to the design or build of this unit subsequent to this testing may deem it non-compliant.

Rules:

- **FCC Part 15 Subpart C, Section 15.247**
- **ANSI C63.10:2020**



Evaluation Conducted by:

Erik Tobin, signing for
Julius Chiller, Senior Wireless Project Engineer

Report Reviewed by:

Ken Littell, Vice President of Operations

F2 Labs
26501 Ridge Road
Damascus, MD 20872
Ph 301.253.4500

F2 Labs
16740 Peters Road
Middlefield, OH 44062
Ph 440.632.5541

F2 Labs
8583 Zionsville Road
Indianapolis, IN 46268
Ph 317.610.0611

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1 ADMINISTRATIVE INFORMATION

1.1 Measurement Location:

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

1.2 Measurement Procedure:

All measurements were performed according ANSI C63.10 and recommended FCC procedure of measurement under Section 15.247 and in KDB558074. A list of the measurement equipment can be found in Section 6.

1.3 Uncertainty Budget:

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

The measurement uncertainty budgets detailed below are calculated from the test and calibration data and are expressed with a 95% confidence factor. Note: Only measurements listed below which relate to tests included in this Test Report are applicable to it.

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

This Uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.4 Document History

Document Number	Description	Issue Date	Approved By
F2P32071A-C1A-01E	First Issue	2026-02-23	K. Littell



2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
Radiated Spurious Emissions	CFR 47 Part 15.247(d) / Part 15.209 / KDB558074: • BLE Module with Molex 1461530050 Antenna • BLE Module with Laird CC24006G Antenna • BLE Module with Laird MD24-12 Antenna	Complies Complies Complies

Modifications Made to the Equipment
None



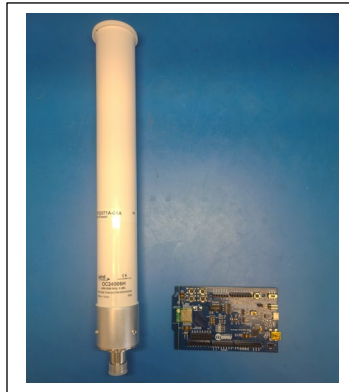
3 ENGINEERING STATEMENT

This report has been prepared on behalf of Petropower, LLC to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15.247 of the FCC Rules using ANSI C63.10 and KDB558074 standards. The test results found in this test report relate only to the items tested.



4 EUT INFORMATION AND DATA

- 4.1 Equipment Under Test:**
Product: Bluetooth Module
Model(s): BT840F
Serial No.: N/A
FCC ID: 2BGG6BT840F

MOLEX 1461530050**LAIRD CC24006H****LAIRD MD24-12**

- 4.2 Trade Name:**
Petropower, LLC
- 4.3 Power Supply:**
5V USB
- 4.4 Applicable Rules:**
CFR 47, Part 15.247, subpart C
- 4.5 Antennas:**

Device	Manufacturer	Model Number	Serial Number	Antenna Gain
Antenna Balanced	Molex	1461530050	None Specified	3.2dBi
Antenna Omni	Laird	CC24006H	None Specified	6dBi
Antenna Mini Directional	Laird	MD24-12	20230500090	11dBi

4.6 Accessories:

Device	Manufacturer	Model Number	Serial Number
Radio Module	Fanstel	BT840	E339347
Evaluation PCB	Fanstel	EV-BT840(832)-V4	None Specified
Accessory Software Version:		nRF Connect SDK v2.6.99	

**4.7 Cables:**

Cable Function	Length	Shielded (Yes/No)
Control/Power	<3m	No
RF Out	<3m	Yes

4.8 Test Item Condition:

The equipment to be tested was received in good condition.

4.9 Testing Algorithm:

Each antenna was tested for Spurious and Band Edge compliance. Radio module was set to provide a continuous modulated signal in the 2.4 GHz Bluetooth band. The BT radio operates at 1Mbps and 2Mbps modes. Testing was done at the 2Mbps mode which was deemed the worst-case for spurious and band edge compliance. The highest emissions were recorded in the data tables.

Client states the Zigbee mode will not be used.

**5 LIST OF MEASUREMENT INSTRUMENTATION**

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166	AlbatrossProjects	B83117-DF435-T261	US140023	2024-11-15
Receiver	CL151	Rohde & Schwarz	ESU40	100319	2025-04-09
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	2024-09-25
Horn Antenna	CL098	Emco	3115	9809-5580	2025-01-02
Pre-Amplifier	CL153	Agilent	83006-69007	MY57280115	2024-11-14
Pre-Amplifier	CL284	A.H. Systems, Inc.	PAM-1001	131	2025-04-10
Pre-Amplifier	CL250	Com-Power	PAM-118A	1804001	2024-06-15
18" Active Loop	CL194	A.H. Systems, Inc.	SAS-562B	281	2025-02-23
Horn Antenna 18-26.5 GHz	CL114	A.H. Systems, Inc.	SAS-572	237	2026-01-09
Software:	Tile Version 3.4.B.3.		Software Verified:		
Software:	EMC 32, Version 8.53.0		Software Verified: 2024-06-10 to 2024-06-12		
Temp/Hum Rec	CL293	Thermpro	TP50	1	2025-05-31



6 RADIATED SPURIOUS EMISSIONS

The EUT antenna port was fitted with the antenna being tested. Radiated emissions were measured in a Semi-Anechoic Chamber. All generated emissions that fall in the restricted bands per FCC Part 15.205 were examined.

6.1 Requirements:

All emissions that fall in the restricted bands defined in FCC Part 15.205 shall not exceed the maximum field strength listed in FCC Part 15.209(a).

Scans were performed from 9kHz to 26 GHz at the low and high channels and the low channel was determined to be the worst case based on total power output. Tables of measured results follow in the data presented and include measurements from all channels.



6.2 Radiated Spurious Emissions Test Data

Test Date(s):	2024-06-10	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.247(d) Part 15.209 / KDB558074	Air Temperature:	21.5°C
		Relative Humidity:	46%

Notes: Plots are peak, max hold prescan data included only to determine what frequencies to investigate and measure. The EUT was initially placed in a semi-anechoic chamber and rotated in all three orthogonal positions to maximize the emissions. Characterization measurements were then performed to determine at which frequencies significant emissions occurred. These graphs are shown below.

The equipment was fully exercised with all cabling attached to the EUT and was positioned on the Semi-Anechoic Chamber for maximum emissions. While the equipment was energized, the receiving antenna was scanned from 1.0 meter to 4.0 meters in both vertical and horizontal polarities while the turntable was adjusted 360 degrees to determine the maximum field strength. The tables of measured results can be found below.

The pre-scan plots are for reference only and the limit lines are not actual limit lines but merely a guide. Emissions to be found by the EUT were measured and listed in tables

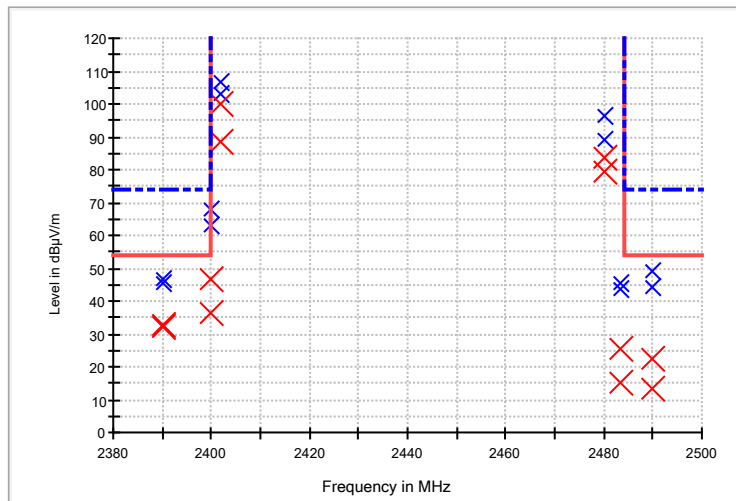
The Low channel (2402 MHz) has maximum power as was deemed worst-case.



Molex 1461530050

Measurements: Band Edges

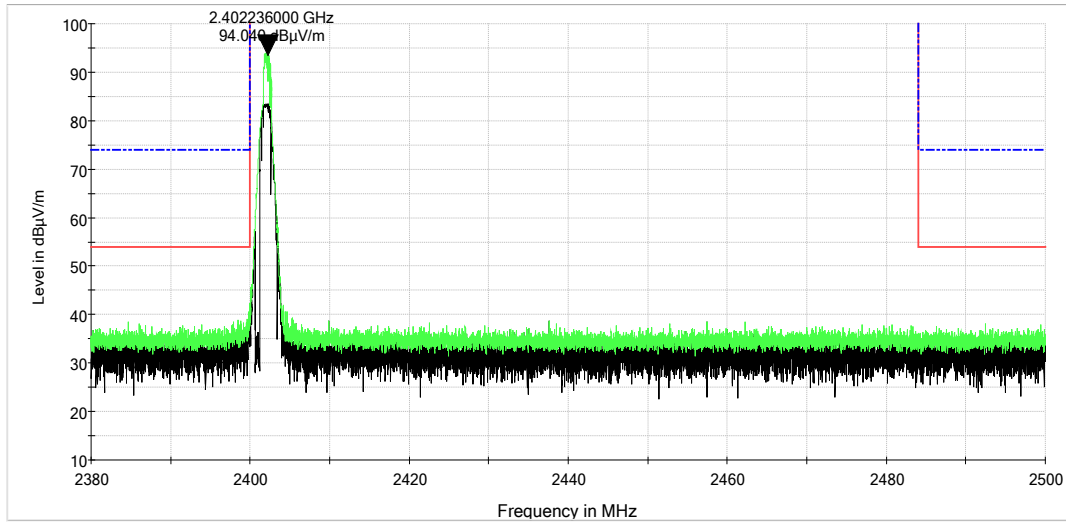
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2390.000000	46.7	32.9	1000.000	150.0	H	157.0	-10.8	21.1	54.0
2390.000000	45.6	32.2	1000.000	150.0	V	114.0	-10.8	21.8	54.0
2400.000000	62.7	36.4	1000.000	150.0	V	114.0	-10.8	17.6	54.0
2400.000000	67.9	46.6	1000.000	150.0	H	157.0	-10.8	7.4	54.0
2402.000000	106.4	99.8	1000.000	150.0	H	157.0	-10.8	-----	-----
2402.000000	103.3	88.5	1000.000	150.0	V	114.0	-10.8	-----	-----
2480.000000	96.4	83.5	1000.000	150.0	H	0.0	-11.0	-----	-----
2480.000000	89.3	79.2	1000.000	150.0	V	262.0	-11.0	-----	-----
2483.500000	45.7	25.8	1000.000	150.0	H	0.0	-11.0	28.2	54.0
2483.500000	43.5	15.0	1000.000	150.0	V	258.0	-11.0	39.0	54.0
2490.000000	49.1	22.2	1000.000	150.0	H	0.0	-10.9	31.8	54.0
2490.000000	44.4	13.4	1000.000	150.0	V	258.0	-10.9	40.6	54.0



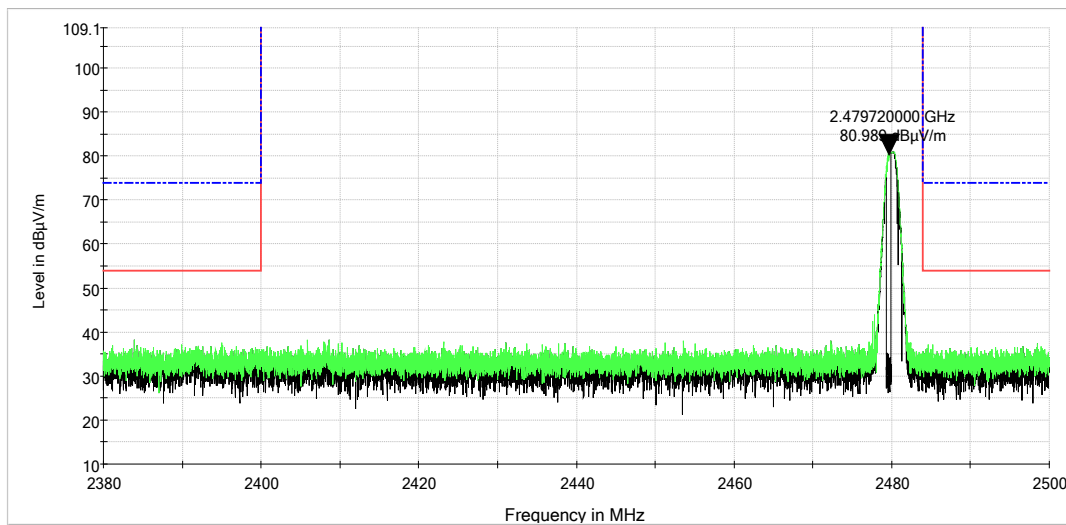


Molex 1461530050, cont'd

Lower Band Edge – Vertical



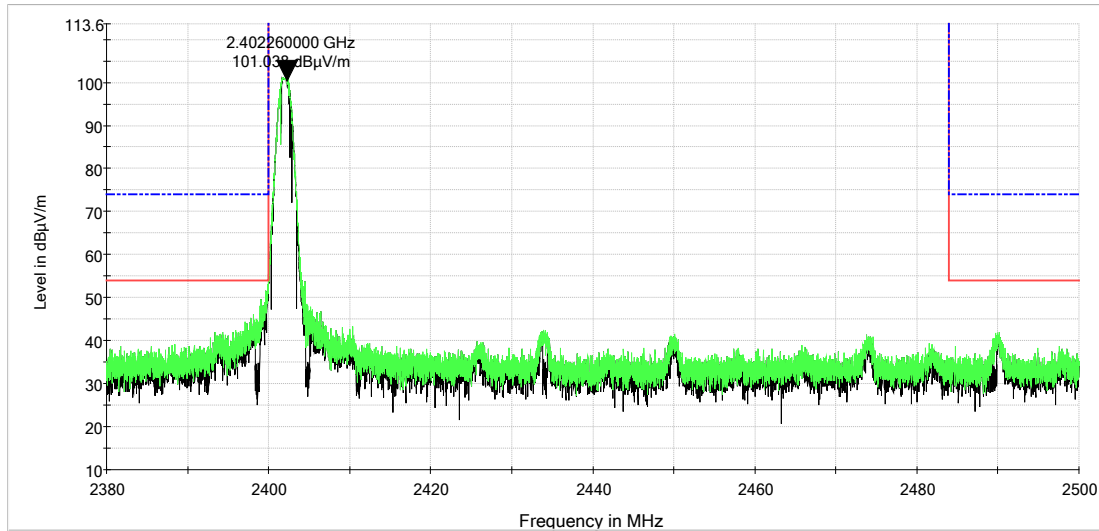
Upper Band Edge – Vertical



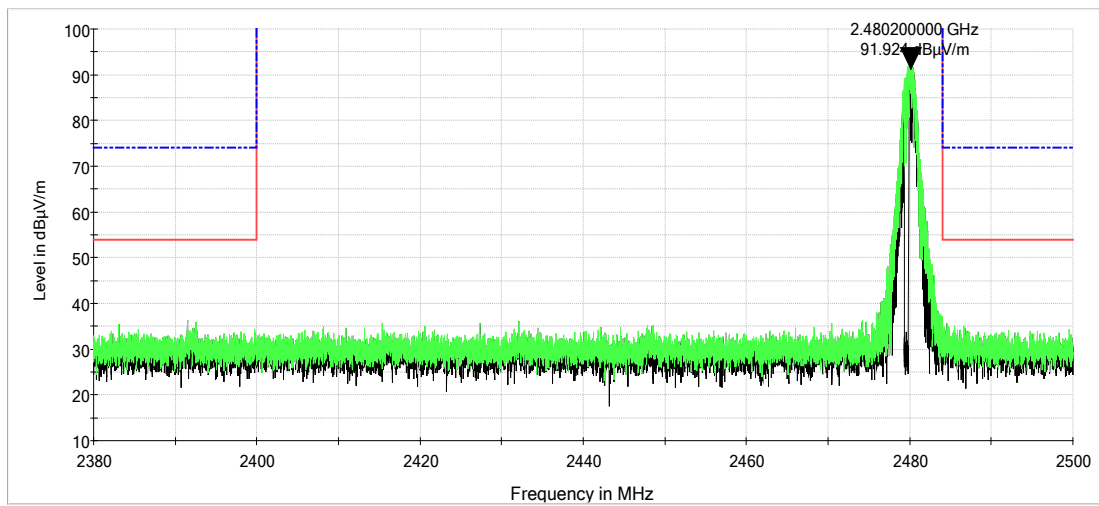


Molex 1461530050, cont'd

Lower Band Edge – Horizontal



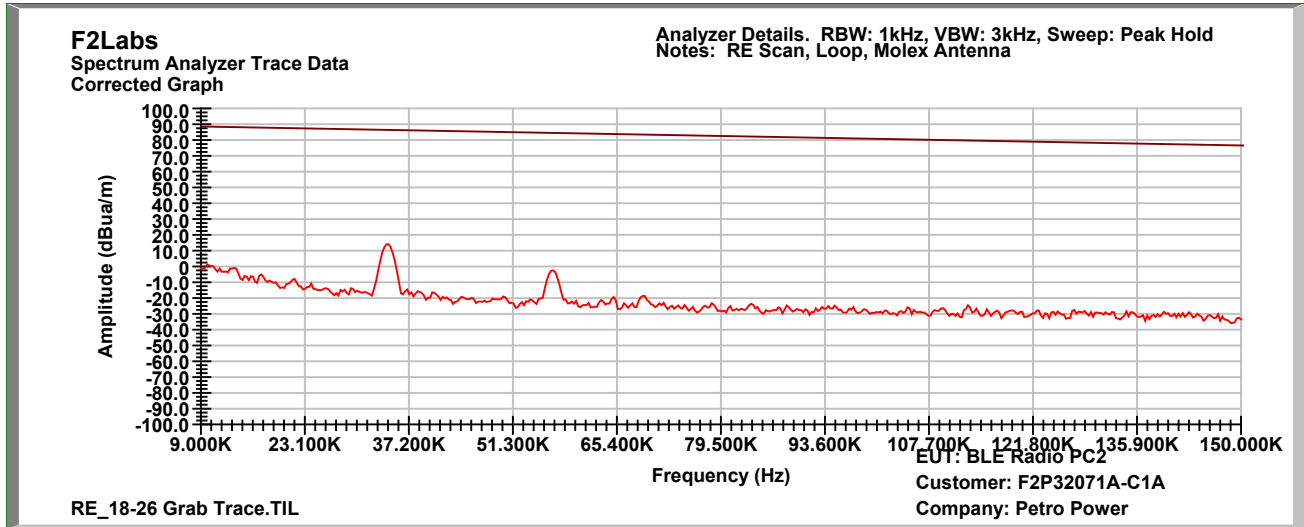
Upper Band Edge – Horizontal



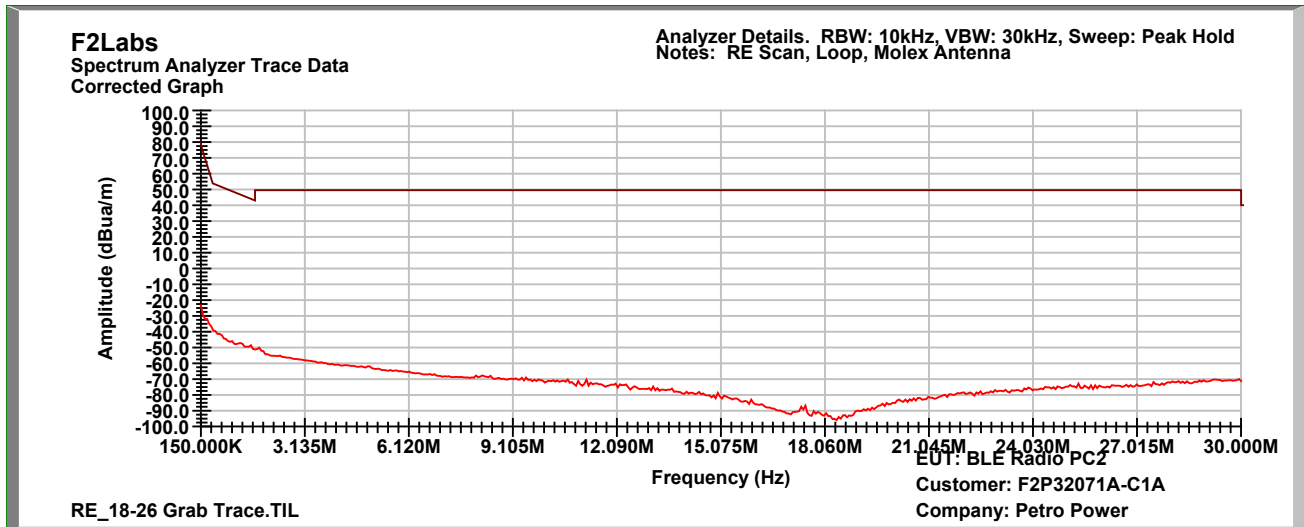


Molex 1461530050, cont'd

Radiated Spurious Emissions: 0.009 MHz to 0.15 MHz



Radiated Spurious Emissions: 0.15 MHz to 30 MHz

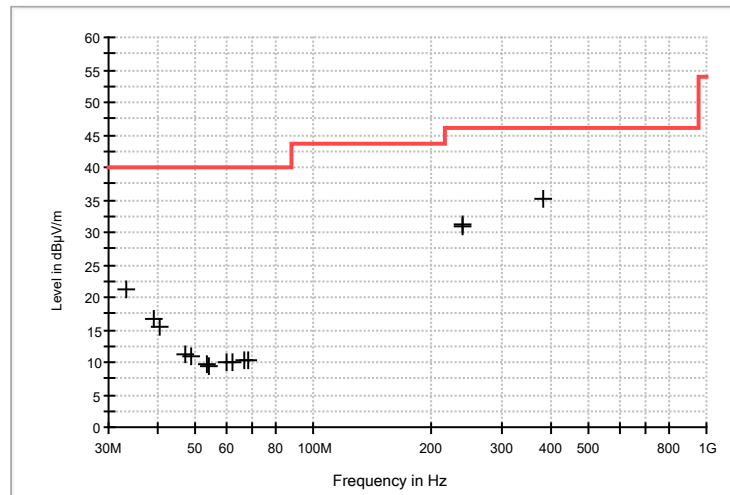




Molex 1461530050, cont'd

Measurements: 30 MHz to 1000 MHz

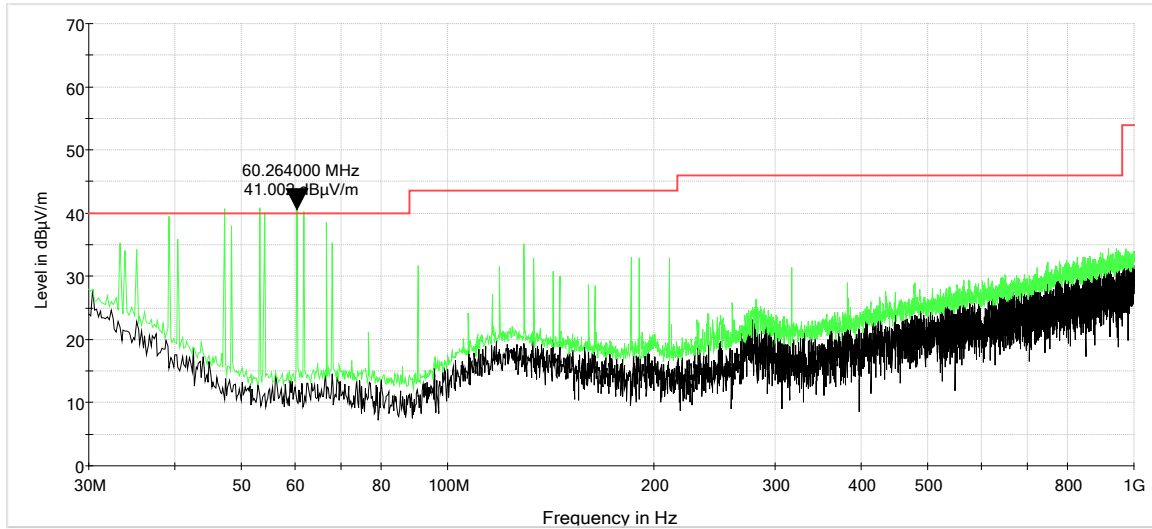
Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
33.300000	21.2	120.000	100.0	V	0.0	-21.5	18.8	40.0
39.310000	16.8	120.000	100.0	V	0.0	-26.0	23.2	40.0
40.480000	15.5	120.000	100.0	V	18.0	-26.9	24.5	40.0
47.270000	11.2	120.000	100.0	V	356.0	-31.0	28.8	40.0
48.430000	10.9	120.000	100.0	V	7.0	-31.4	29.1	40.0
53.280000	9.7	120.000	100.0	V	354.0	-32.5	30.3	40.0
54.060000	9.5	120.000	100.0	V	4.0	-32.6	30.5	40.0
60.260000	9.9	120.000	100.0	V	359.0	-32.3	30.1	40.0
61.820000	9.9	120.000	100.0	V	0.0	-32.3	30.1	40.0
66.670000	10.2	120.000	100.0	V	0.0	-31.7	29.8	40.0
67.830000	10.2	120.000	100.0	V	0.0	-31.7	29.8	40.0
239.330000	31.3	120.000	100.0	H	123.0	-26.8	14.7	46.0
239.910000	30.8	120.000	100.0	H	120.0	-26.8	15.2	46.0
382.890000	35.1	120.000	100.0	H	351.0	-23.3	10.9	46.0
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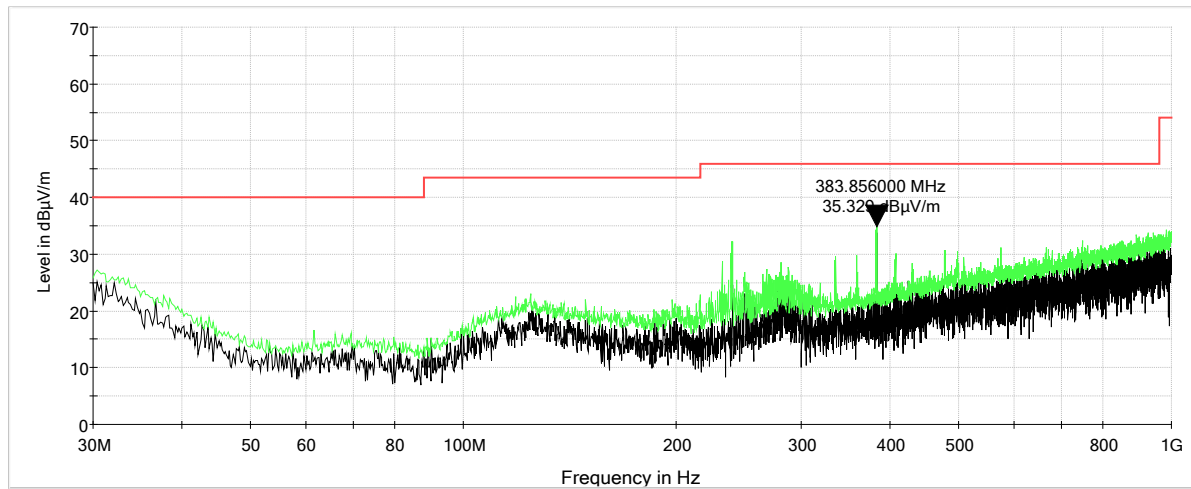


Molex 1461530050, cont'd

Radiated Spurious Emissions: 30 MHz to 1000 MHz - Vertical



Radiated Spurious Emissions: 30 MHz to 1000 MHz - Horizontal



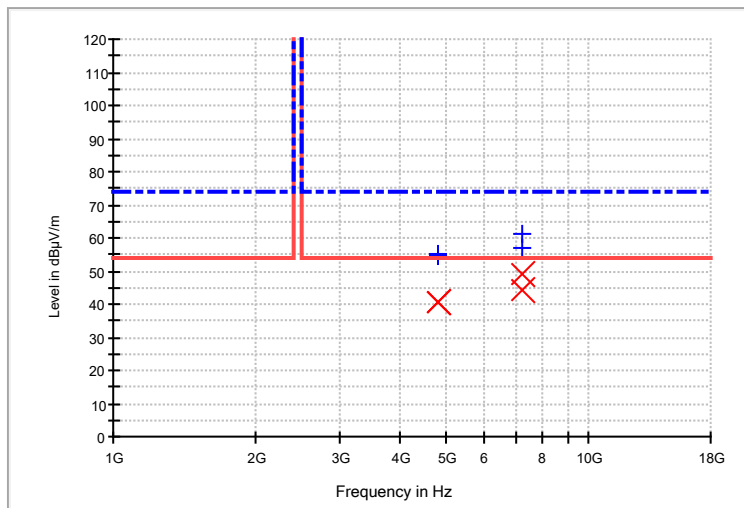


Molex 1461530050, cont'd

Measurements: 1 GHz to 18 GHz

Molex Dipole - Harmonics

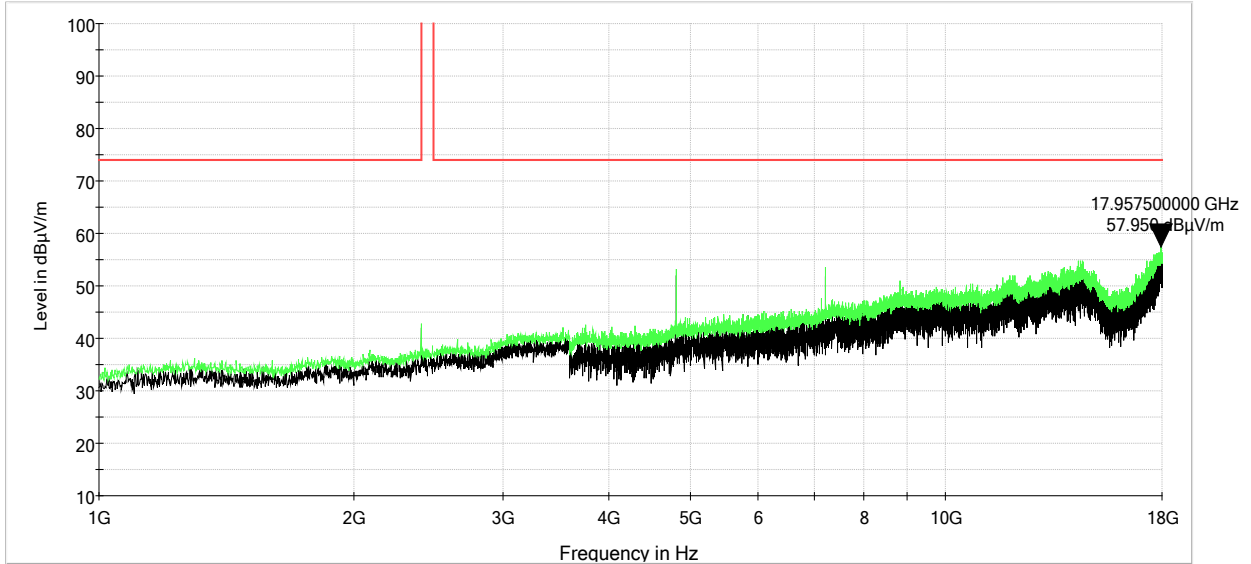
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
4804.000000	54.5	40.9	1000.000	150.0	V	0.0	-5.4	13.1	54.0
4804.000000	55.4	40.9	1000.000	150.0	H	0.0	-5.4	13.1	54.0
7206.000000	61.0	49.3	1000.000	173.0	H	317.0	-1.2	4.7	54.0
7206.000000	56.9	44.5	1000.000	150.0	V	0.0	-1.2	9.5	54.0



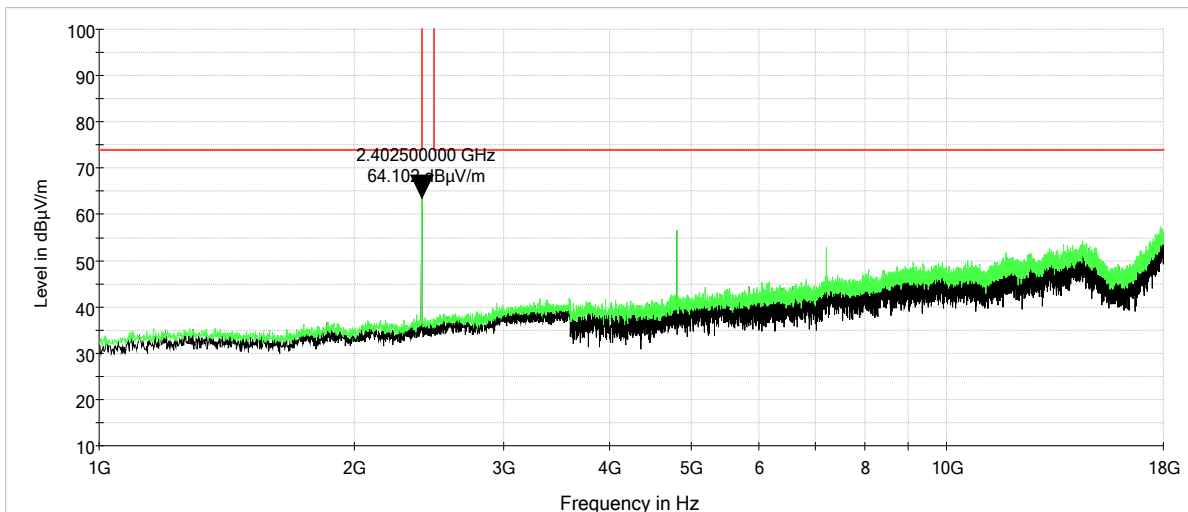


Molex 1461530050, cont'd

Radiated Spurious Emissions: 1 GHz to 18 GHz - Vertical



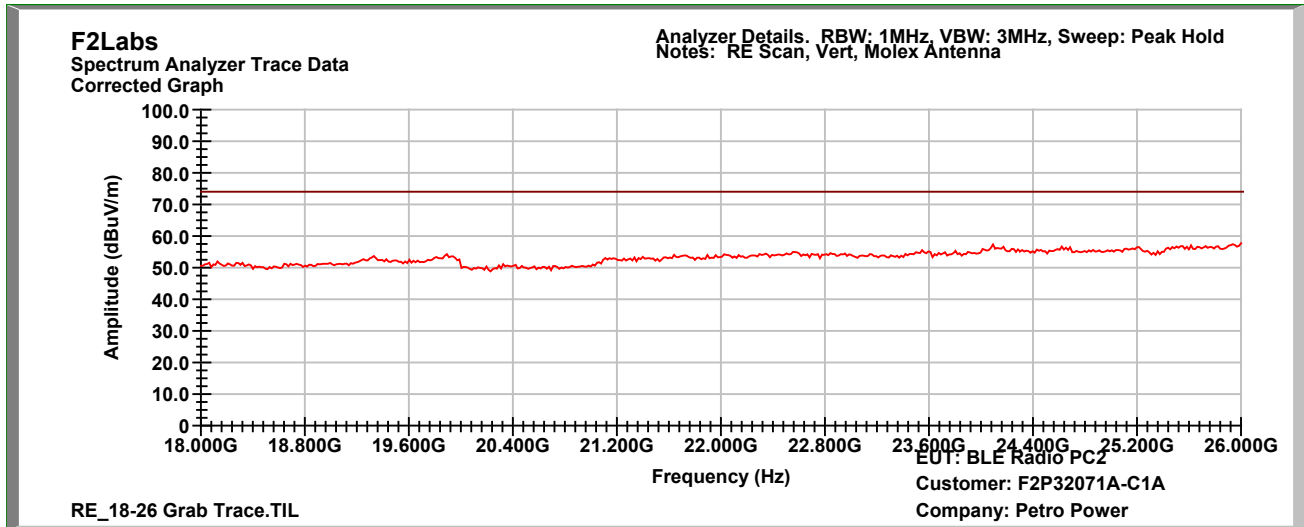
Radiated Spurious Emissions: 1 GHz to 18 GHz - Horizontal



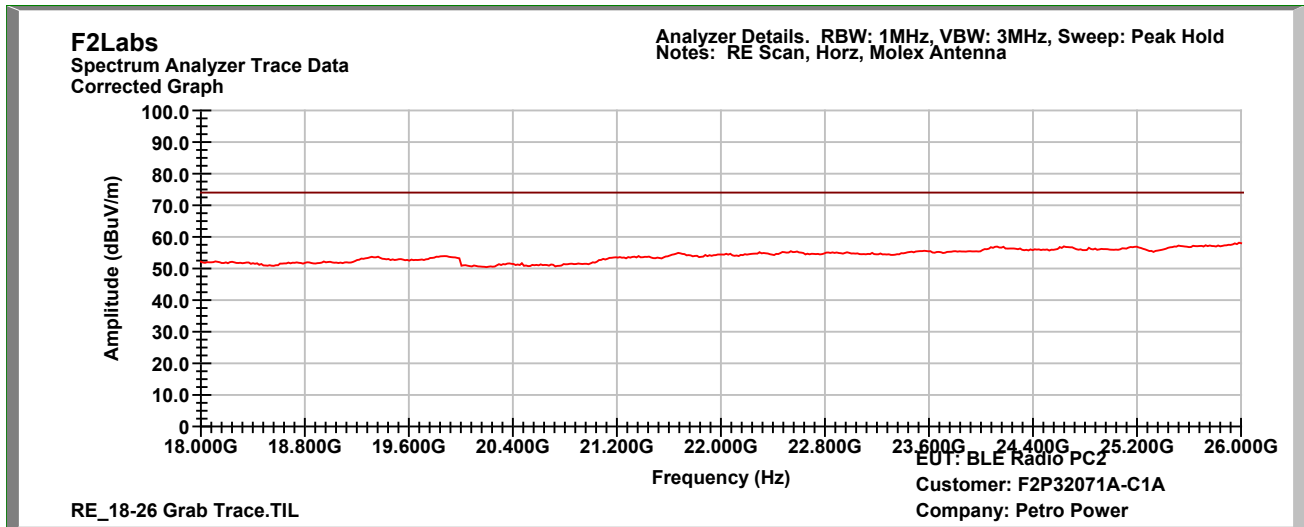


Molex 1461530050, cont'd

Radiated Spurious Emissions: 18 GHz to 26 GHz - Vertical



Radiated Spurious Emissions: 18 GHz to 26 GHz - Horizontal

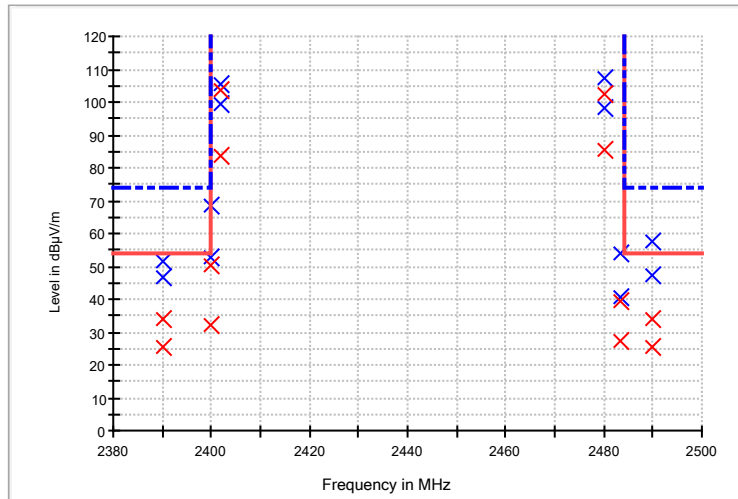




Laird CC24006H

Measurements: Band Edges

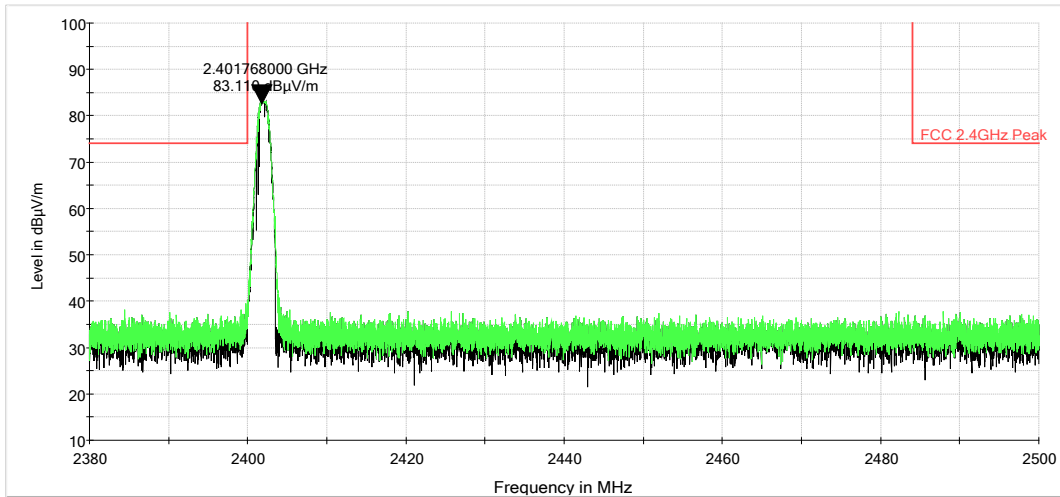
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2390.000000	46.8	33.8	1000.000	170.0	H	58.0	-10.8	20.2	54.0
2390.000000	51.4	25.4	1000.000	150.0	V	303.0	-10.8	28.6	54.0
2400.000000	52.6	31.9	1000.000	150.0	V	303.0	-10.8	22.1	54.0
2400.000000	68.4	50.5	1000.000	170.0	H	58.0	-10.8	3.5	54.0
2402.000000	105.7	103.7	1000.000	170.0	H	58.0	-10.8	-----	-----
2402.000000	99.4	83.8	1000.000	150.0	V	303.0	-10.8	-----	-----
2480.000000	107.0	102.7	1000.000	169.0	H	170.0	-11.0	-----	-----
2480.000000	98.4	85.6	1000.000	160.0	V	325.0	-11.0	-----	-----
2483.500000	54.1	39.6	1000.000	169.0	H	170.0	-11.0	14.4	54.0
2483.500000	40.7	27.1	1000.000	160.0	V	325.0	-11.0	26.9	54.0
2490.000000	57.7	33.9	1000.000	169.0	H	170.0	-10.9	20.1	54.0
2490.000000	47.0	25.6	1000.000	160.0	V	325.0	-10.9	28.4	54.0



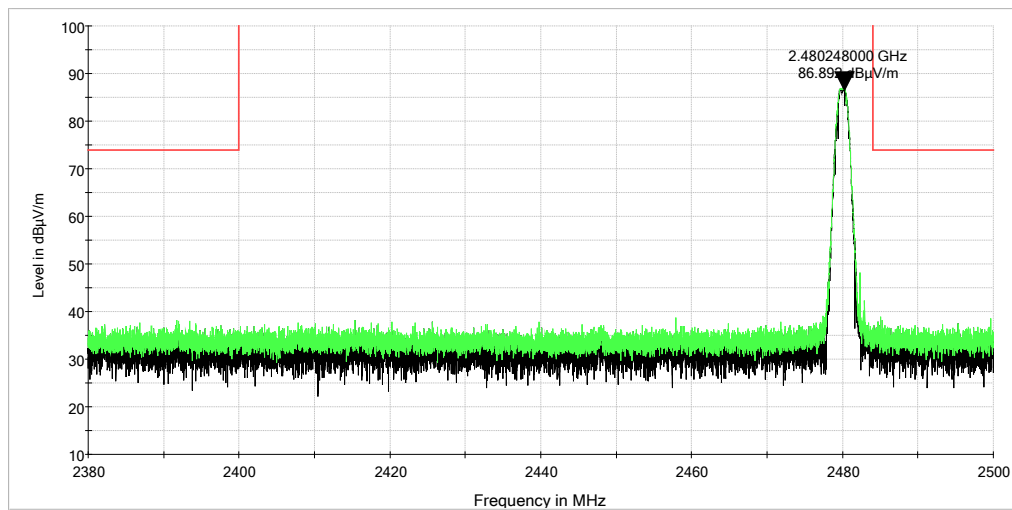


Laird CC24006H, cont'd

Lower Band Edge – Vertical



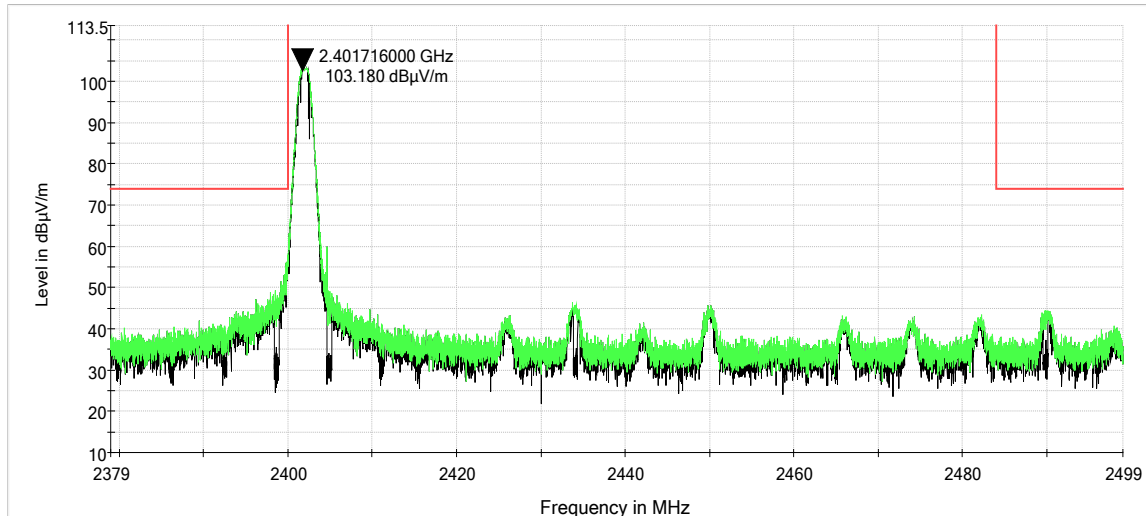
Upper Band Edge – Vertical



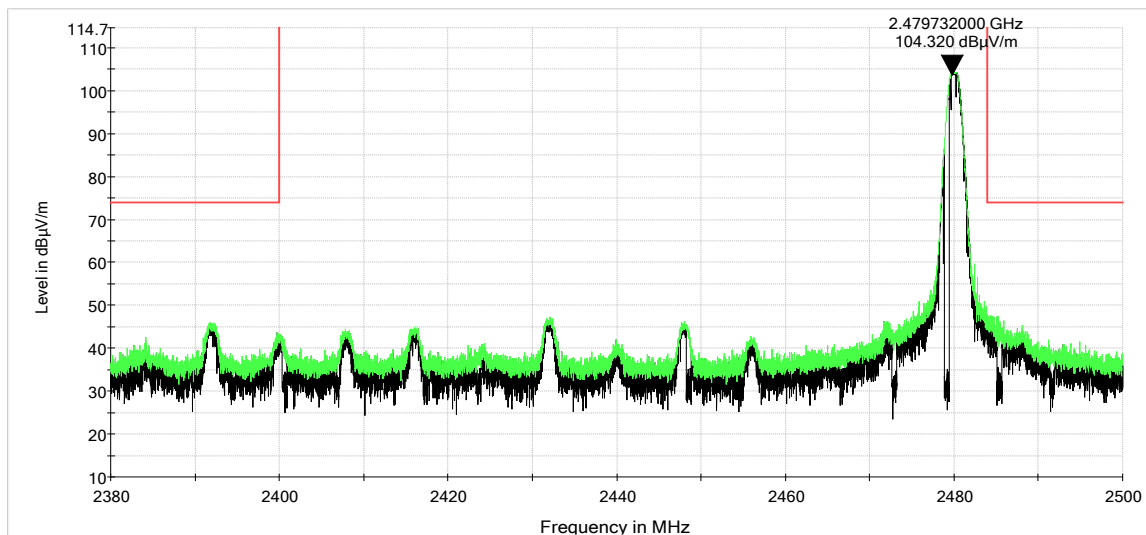


Laird CC24006H, cont'd

Lower Band Edge – Horizontal



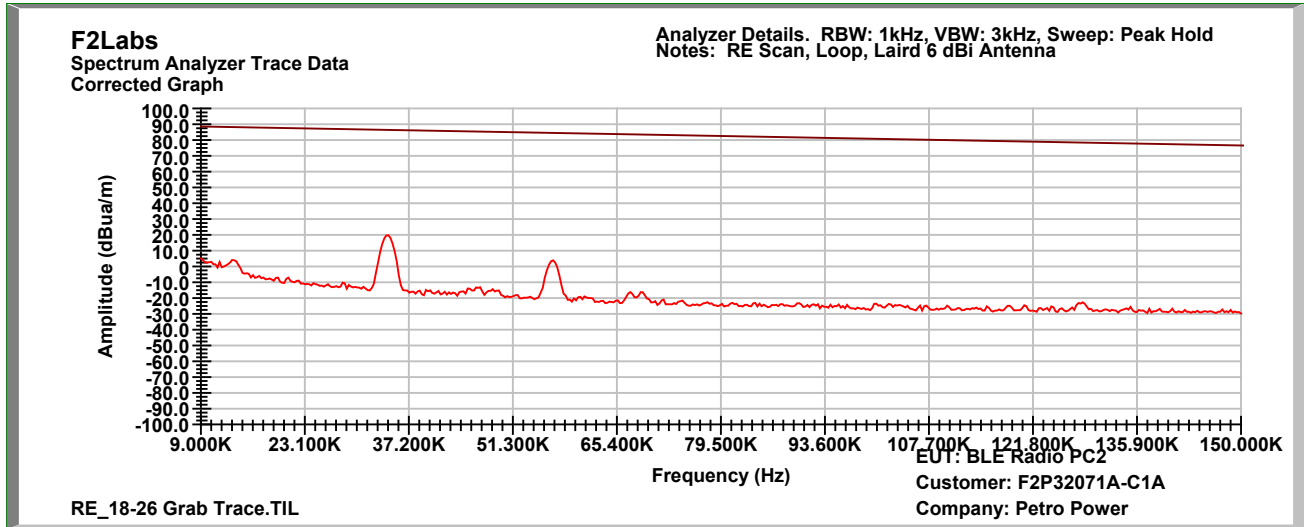
Upper Band Edge – Horizontal



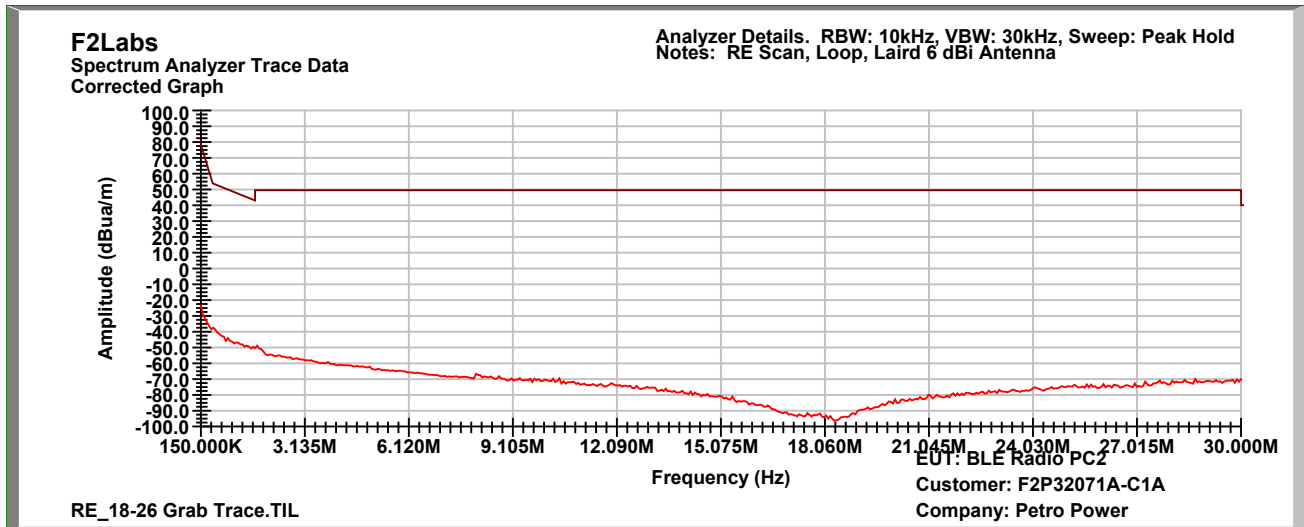


Laird CC24006H, cont'd

Radiated Spurious Emissions: 0.009 MHz to 0.15 MHz



Radiated Spurious Emissions: 0.15 MHz to 30 MHz

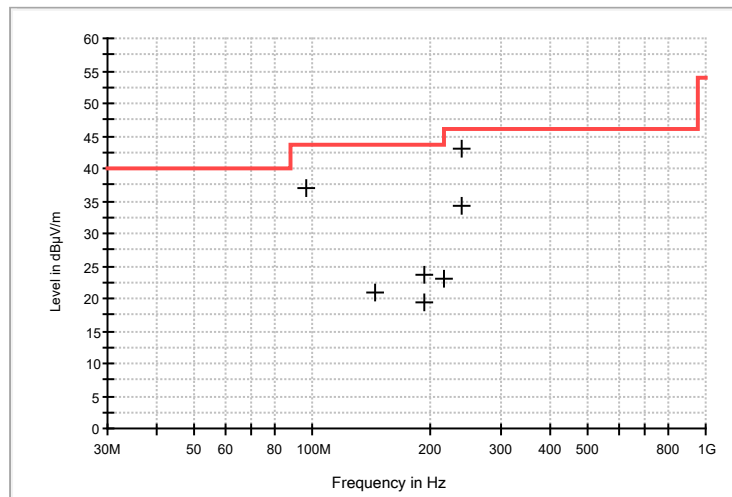




Laird CC24006H, cont'd

Measurements: 30 MHz to 1000 MHz

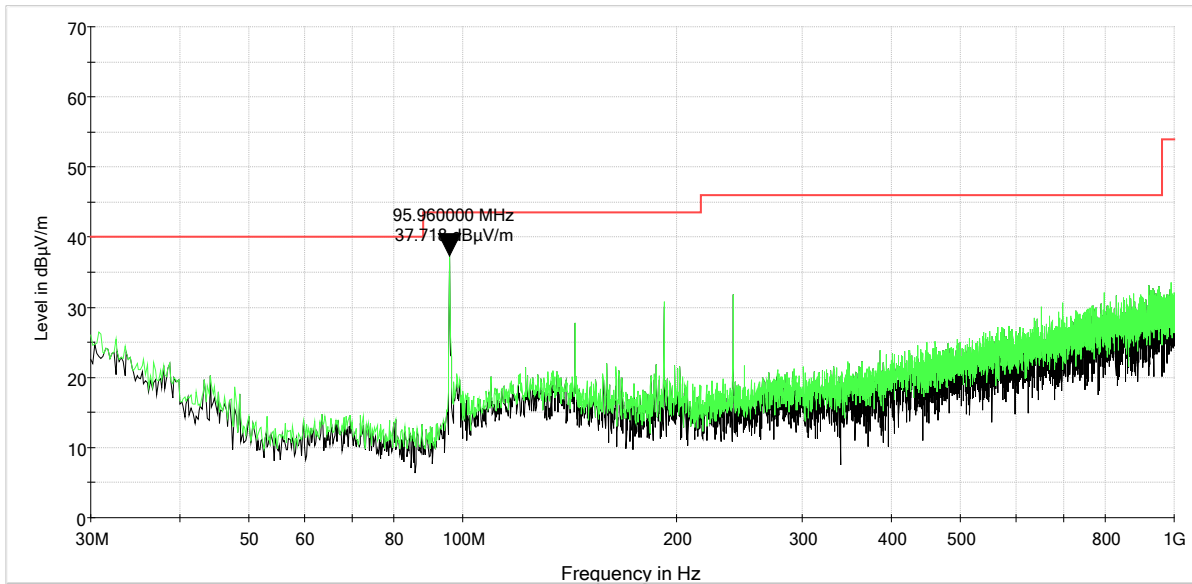
Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
95.960000	36.8	120.000	100.0	V	347.0	-30.8	6.7	43.5
143.880000	21.0	120.000	100.0	V	18.0	-26.6	22.5	43.5
191.800000	23.8	120.000	156.0	H	156.0	-27.4	19.7	43.5
191.800000	19.3	120.000	100.0	V	0.0	-27.4	24.2	43.5
215.850000	23.1	120.000	159.0	H	8.0	-28.0	20.4	43.5
239.910000	42.9	120.000	159.0	H	350.0	-26.8	3.1	46.0
239.910000	34.4	120.000	135.0	V	61.0	-26.8	11.6	46.0



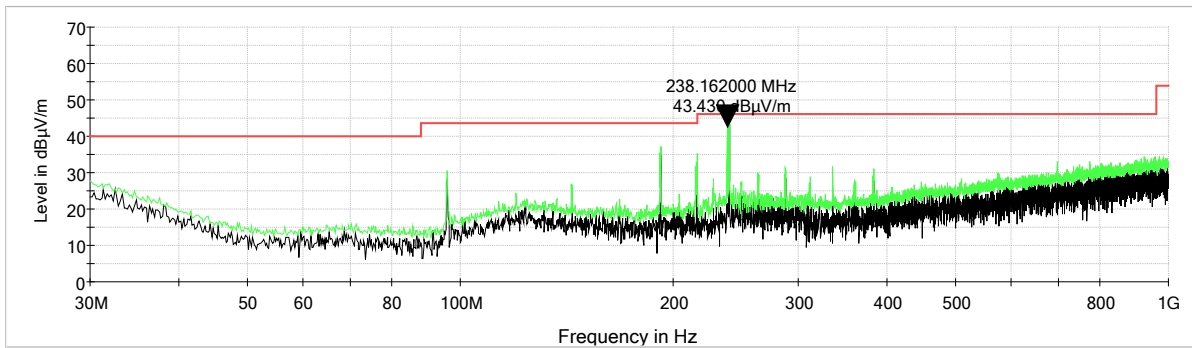


Laird CC24006H, cont'd

Radiated Spurious Emissions: 30 MHz to 1000 MHz - Vertical



Radiated Spurious Emissions: 30 MHz to 1000 MHz - Horizontal

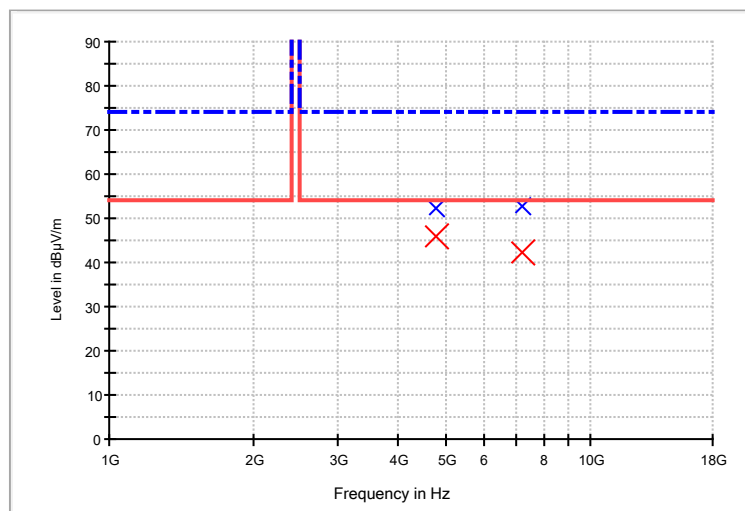




Laird CC24006H, cont'd

Measurements: 1 GHz to 18 GHz

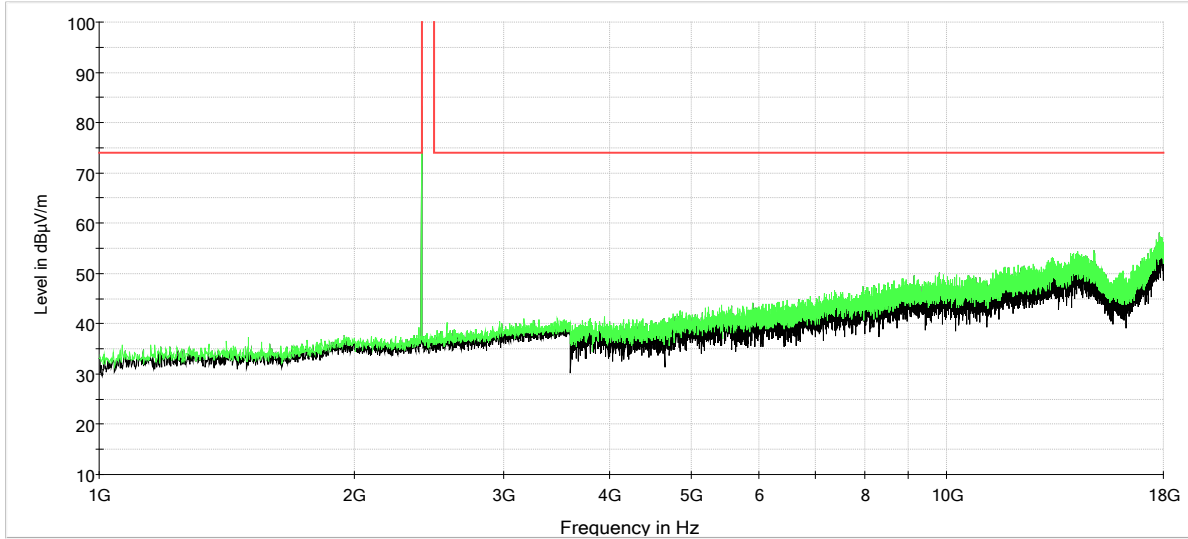
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)	Comment
4804.000000	52.3	45.8	1000.000	150.0	H	162.0	-5.4	8.2	54.0	
7206.000000	52.6	42.3	1000.000	170.0	H	114.0	-1.2	11.7	54.0	



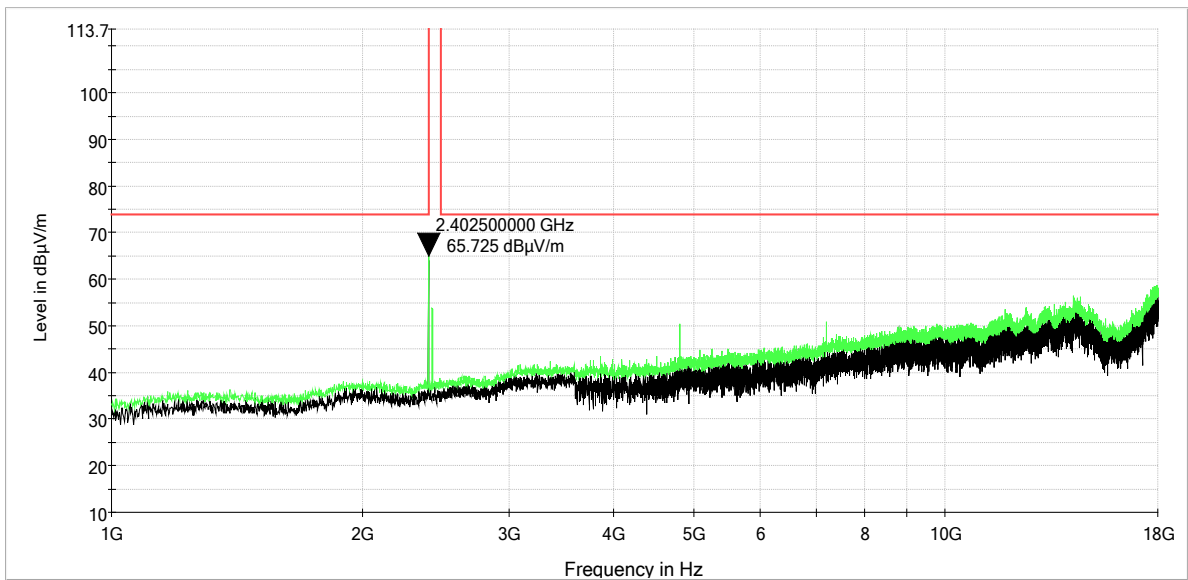


Laird CC24006H, cont'd

Radiated Spurious Emissions: 1 GHz to 18 GHz - Vertical



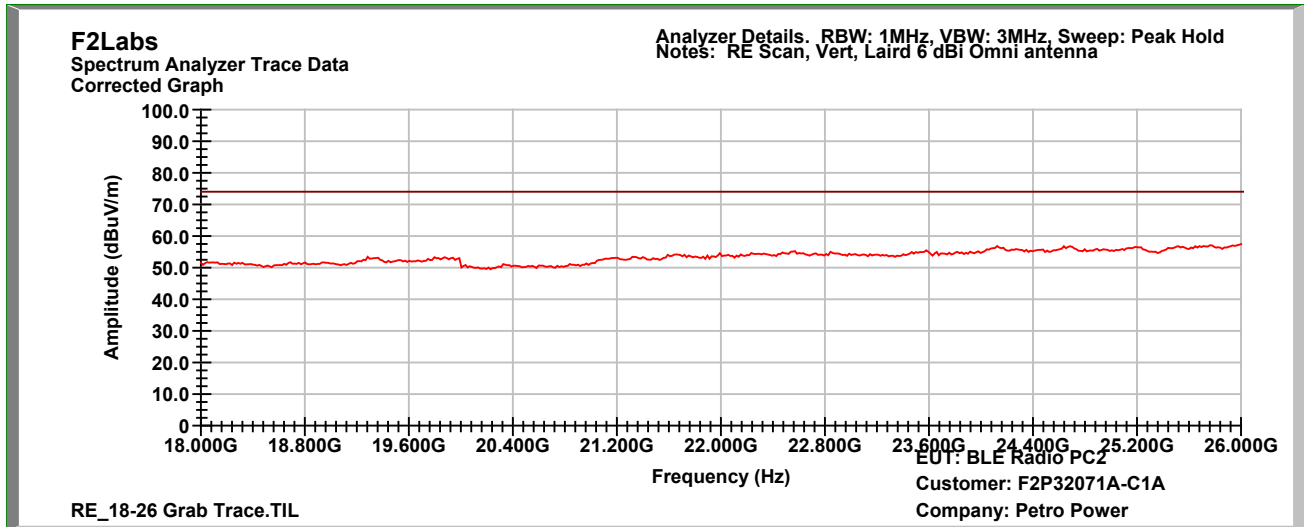
Radiated Spurious Emissions: 1 GHz to 18 GHz - Horizontal



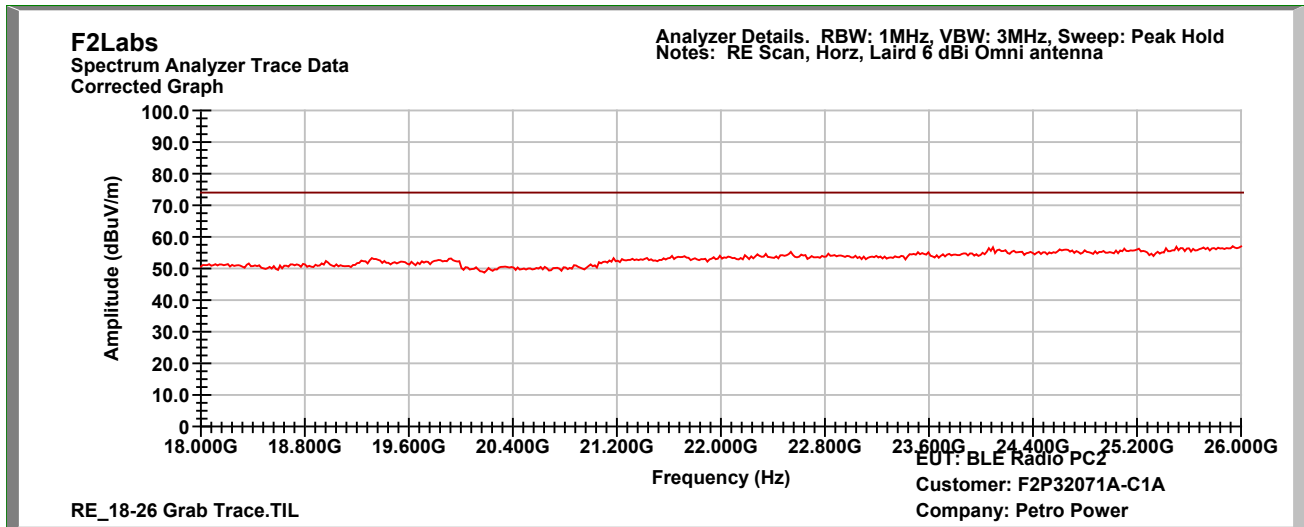


Laird CC24006H, cont'd

Radiated Spurious Emissions: 18 GHz to 26 GHz - Vertical



Radiated Spurious Emissions: 18 GHz to 26 GHz - Horizontal

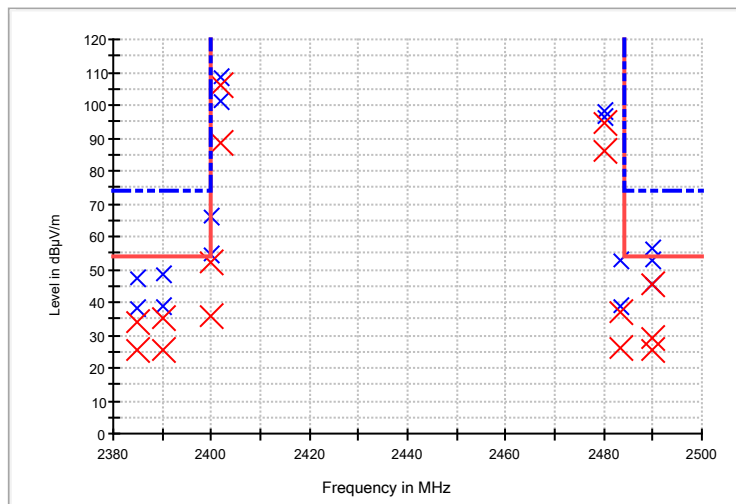




Laird MD24-12

Measurements: Band Edges

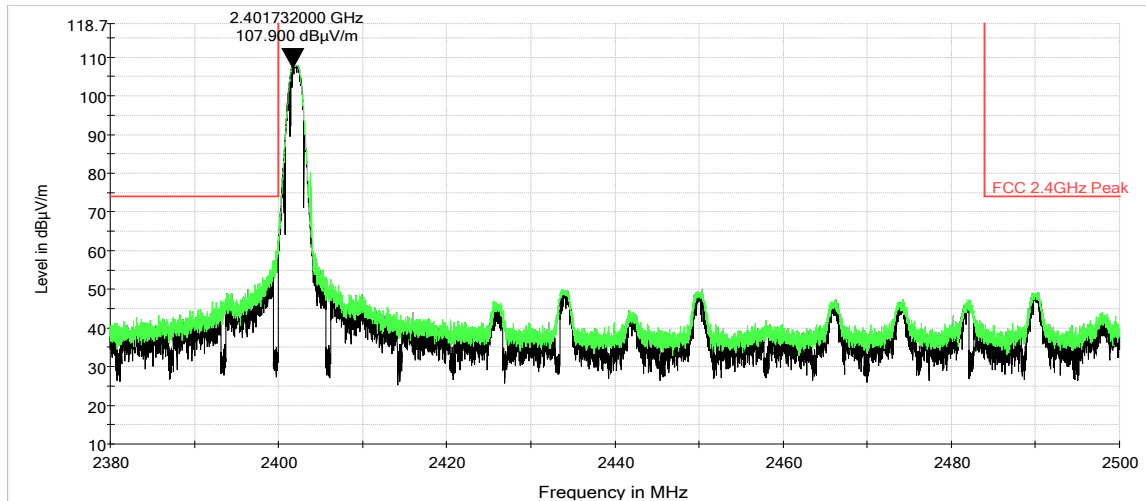
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
2385.000000	47.4	34.1	1000.000	170.0	V	0.0	-10.7	19.9	54.0
2385.000000	38.0	25.4	1000.000	150.0	H	334.0	-10.7	28.6	54.0
2391.500000	38.6	25.6	1000.000	150.0	H	334.0	-10.8	28.4	54.0
2391.500000	48.2	35.1	1000.000	170.0	V	0.0	-10.8	18.9	54.0
2400.000000	54.8	35.7	1000.000	150.0	H	334.0	-10.8	18.3	54.0
2400.000000	66.0	51.9	1000.000	170.0	V	0.0	-10.8	2.1	54.0
2402.000000	108.2	106.3	1000.000	170.0	V	0.0	-10.8	-----	-----
2402.000000	101.1	88.6	1000.000	150.0	H	334.0	-10.8	-----	-----
2480.000000	97.9	86.3	1000.000	150.0	H	34.0	-11.0	-----	-----
2480.000000	96.1	94.3	1000.000	170.0	V	51.0	-11.0	-----	-----
2483.500000	52.6	36.7	1000.000	170.0	V	51.0	-11.0	17.3	54.0
2483.500000	38.9	25.8	1000.000	150.0	H	34.0	-11.0	28.2	54.0
2490.000000	52.7	45.8	1000.000	170.0	V	0.0	-10.9	8.2	54.0
2490.000000	45.5	25.3	1000.000	150.0	H	34.0	-10.9	28.7	54.0



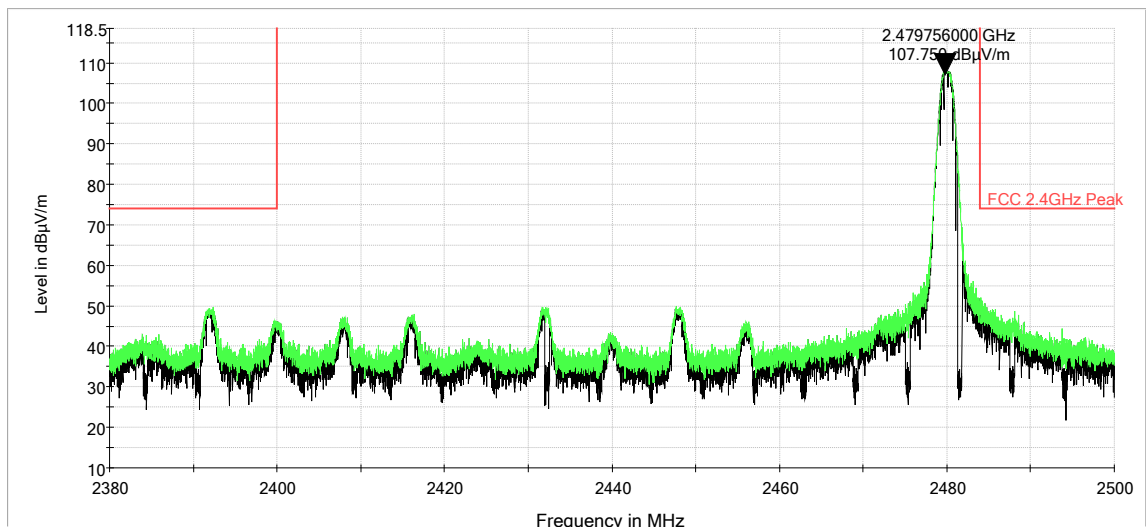


Laird MD24-12, cont'd

Lower Band Edge – Vertical

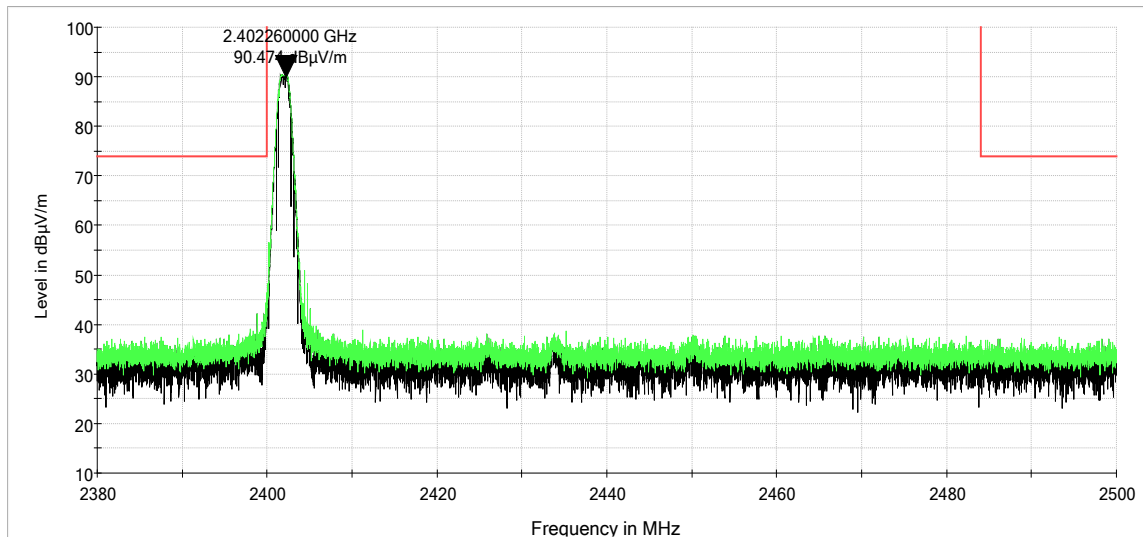


Upper Band Edge – Vertical

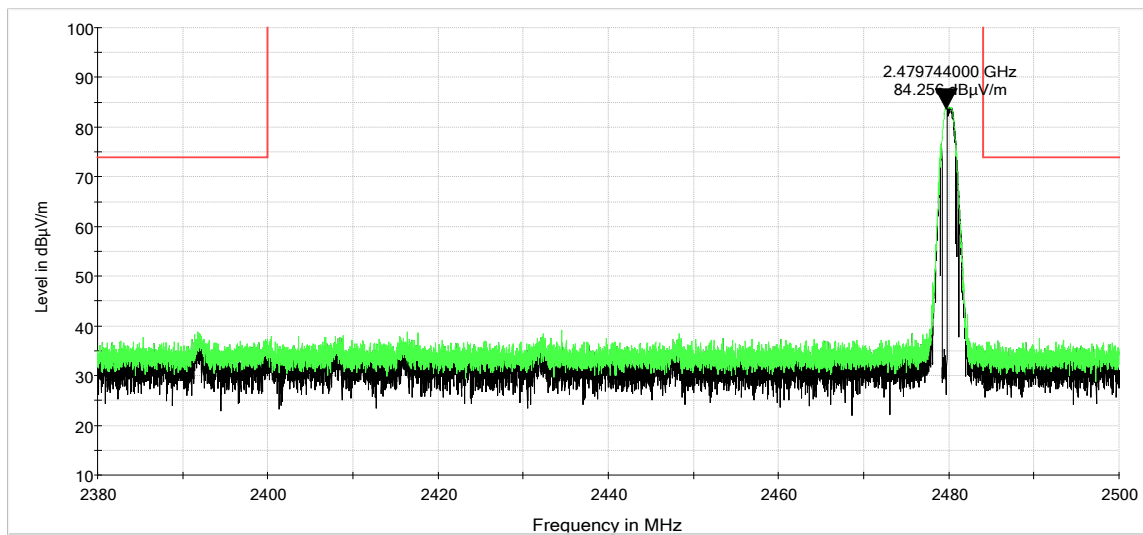




Laird MD24-12, cont'd
Lower Band Edge – Horizontal



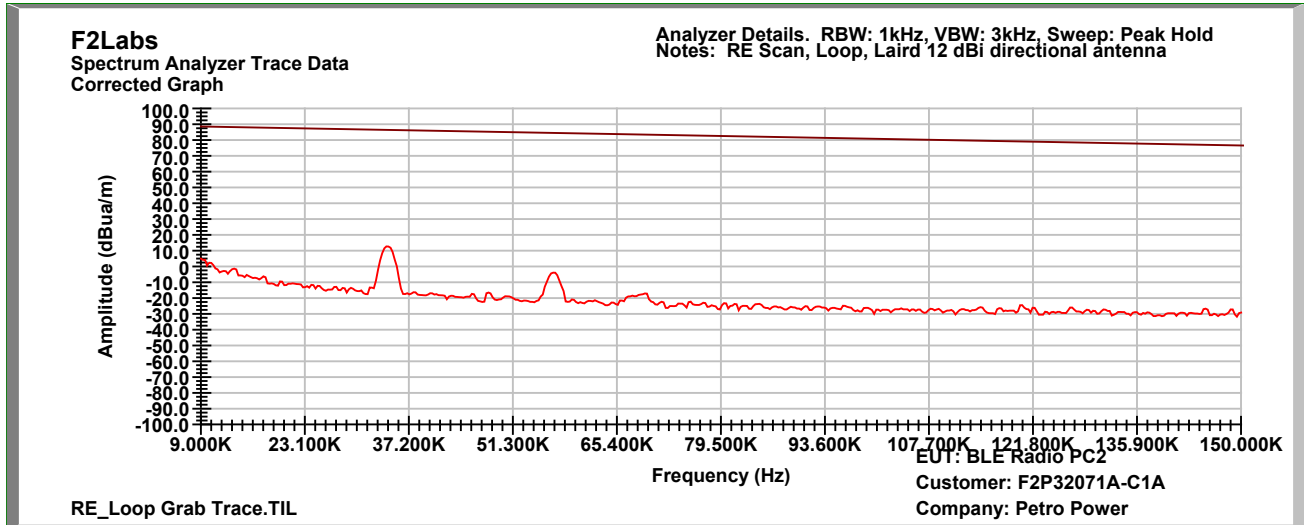
Upper Band Edge – Horizontal



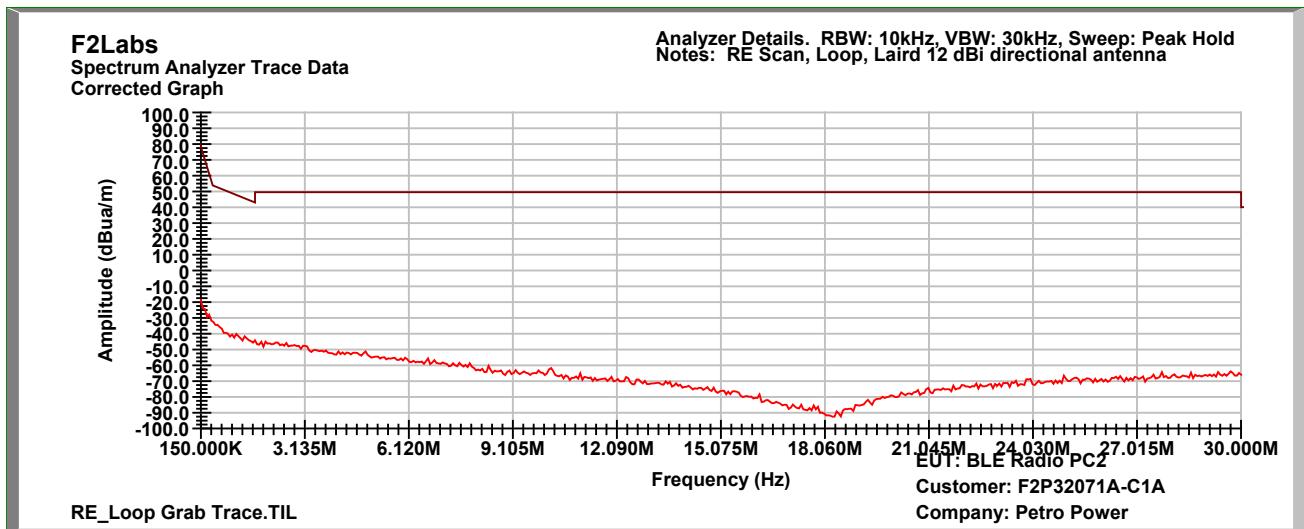


Laird MD24-12, cont'd

Radiated Spurious Emissions: 0.009 MHz to 0.15 MHz



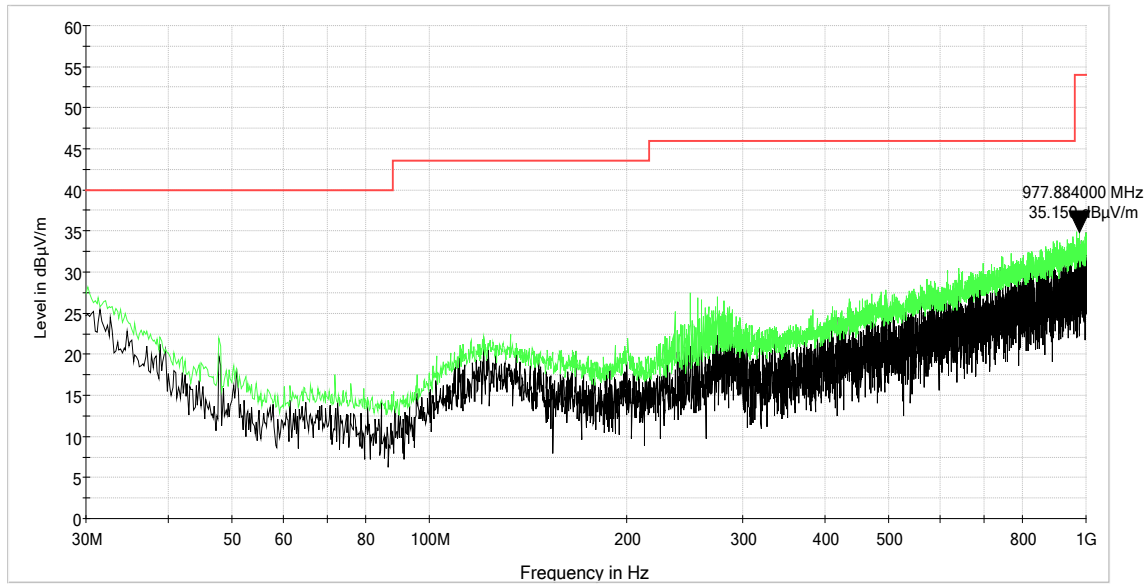
Radiated Spurious Emissions: 0.15 MHz to 30 MHz



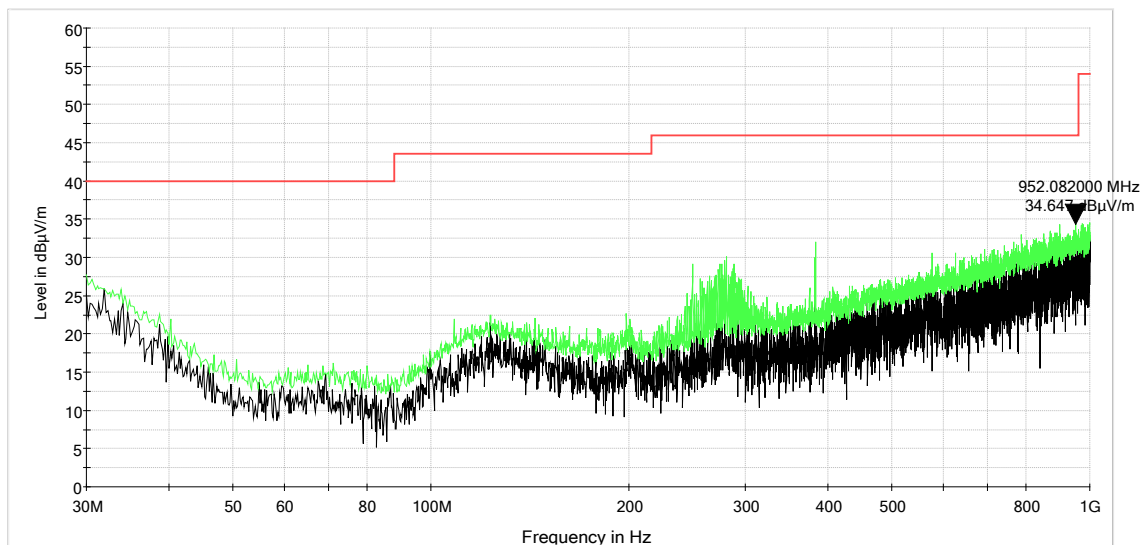


Laird MD24-12, cont'd

Radiated Spurious Emissions: 30 MHz to 1000 MHz - Vertical



Radiated Spurious Emissions: 30 MHz to 1000 MHz - Horizontal

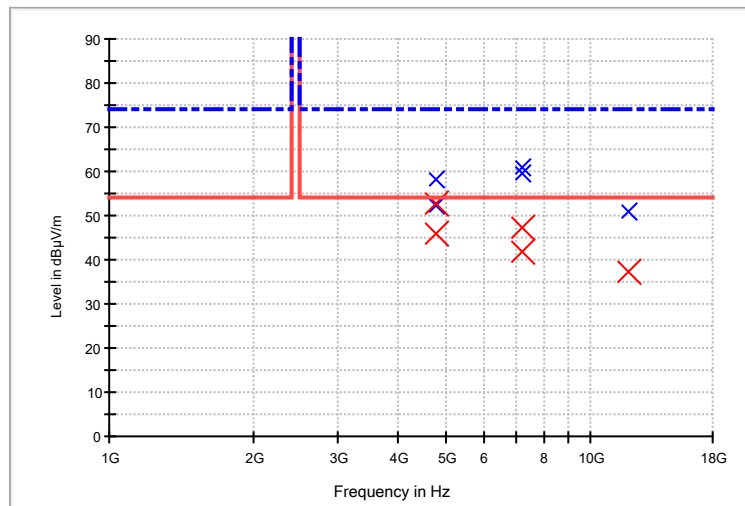




Laird MD24-12, cont'd

Measurements: 1 GHz to 18 GHz

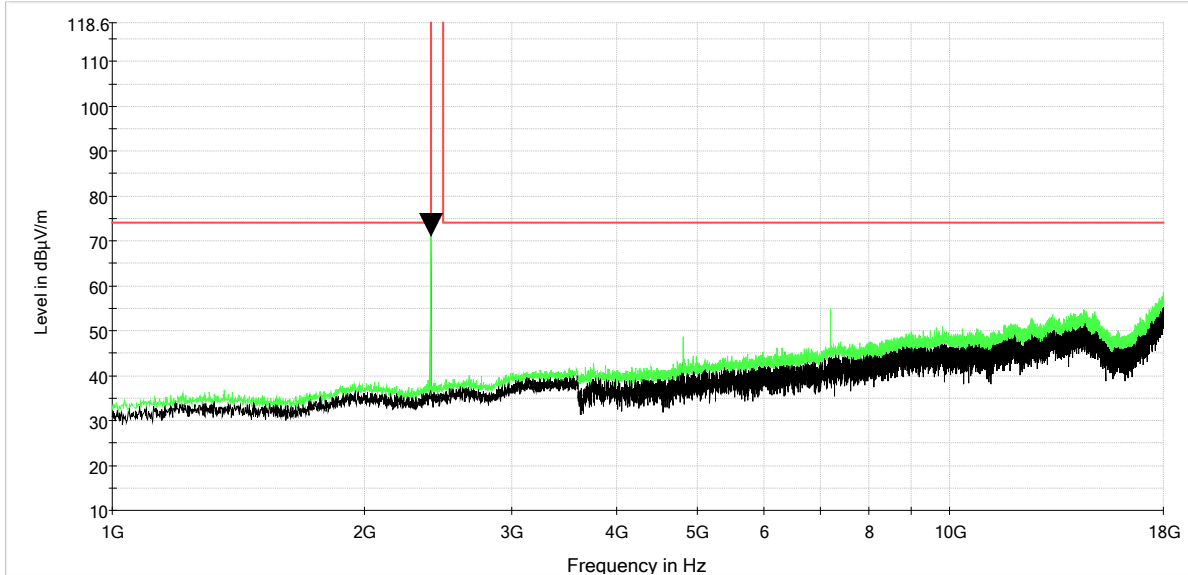
Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dB μ V/m)	Comment
4804.000000	58.2	52.9	1000.000	150.0	H	30.0	-5.4	1.1	54.0	
4804.000000	52.5	45.9	1000.000	170.0	V	5.0	-5.4	8.1	54.0	
7206.000000	60.8	42.0	1000.000	170.0	H	330.0	-1.2	12.0	54.0	
7206.000000	59.7	47.4	1000.000	160.0	V	178.0	-1.2	6.6	54.0	
12010.000000	50.9	37.3	1000.000	150.0	H	337.0	4.0	16.7	54.0	



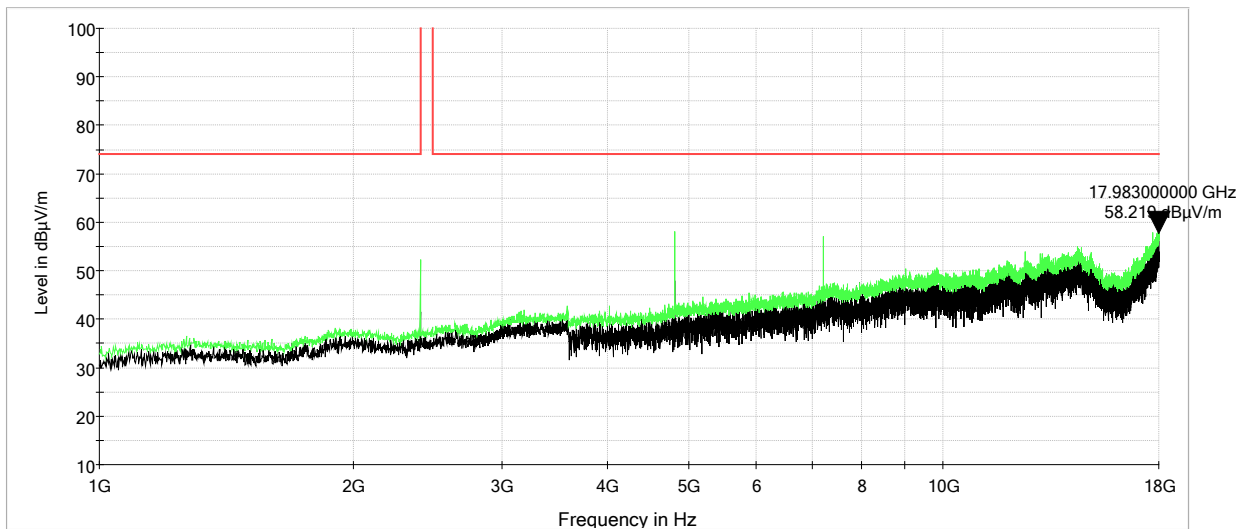


Laird MD24-12, cont'd

Radiated Spurious Emissions: 1 GHz to 18 GHz - Vertical



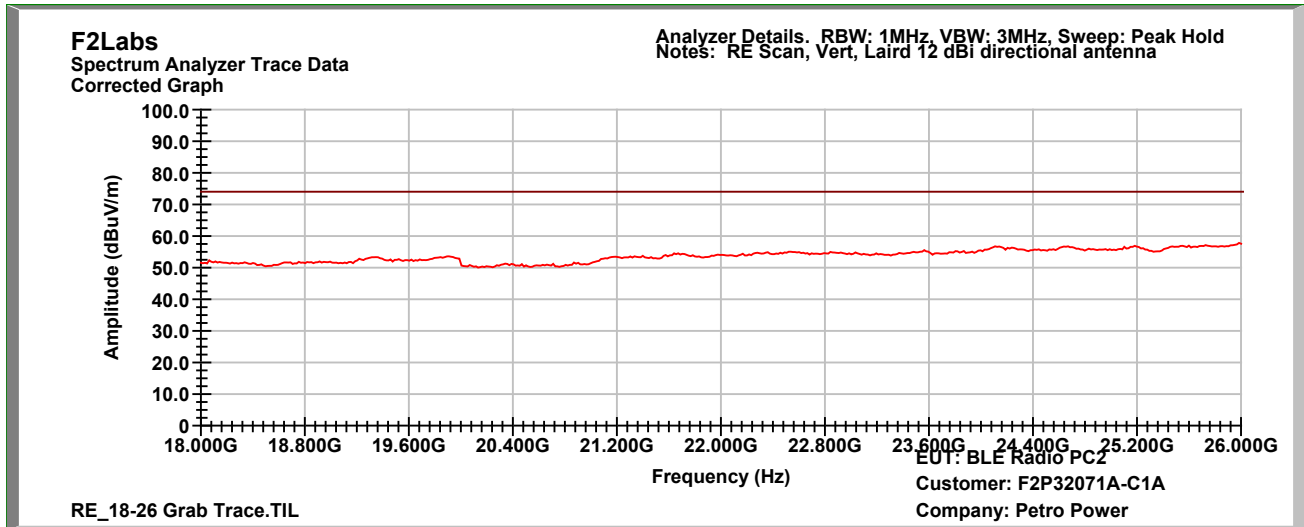
Radiated Spurious Emissions: 1 GHz to 18 GHz - Horizontal



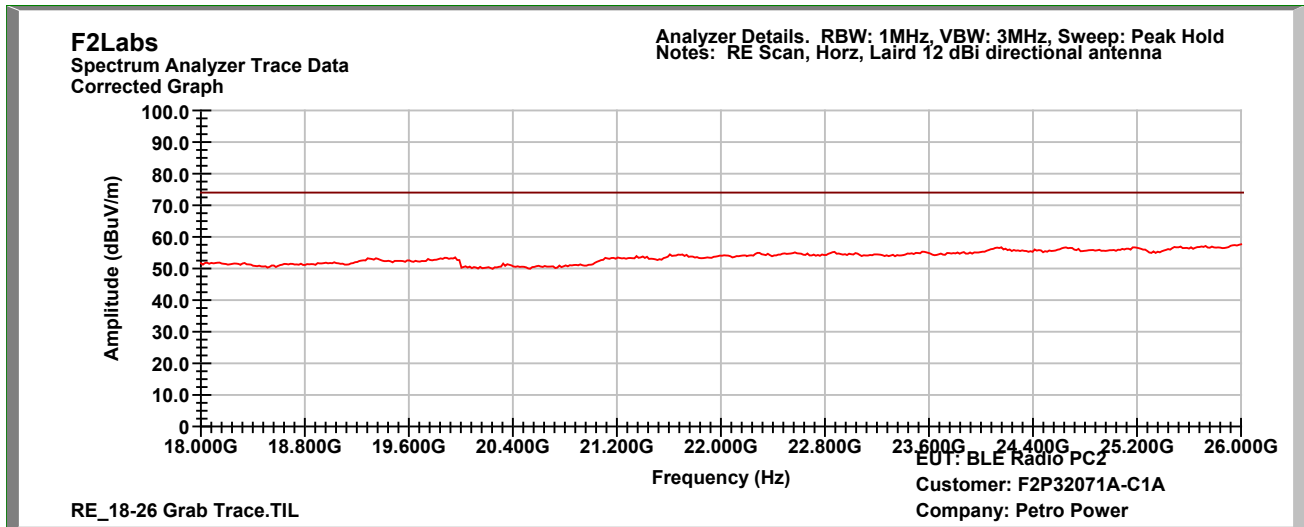


Laird MD24-12, cont'd

Radiated Spurious Emissions: 18 GHz to 26 GHz - Vertical



Radiated Spurious Emissions: 18 GHz to 26 GHz - Horizontal

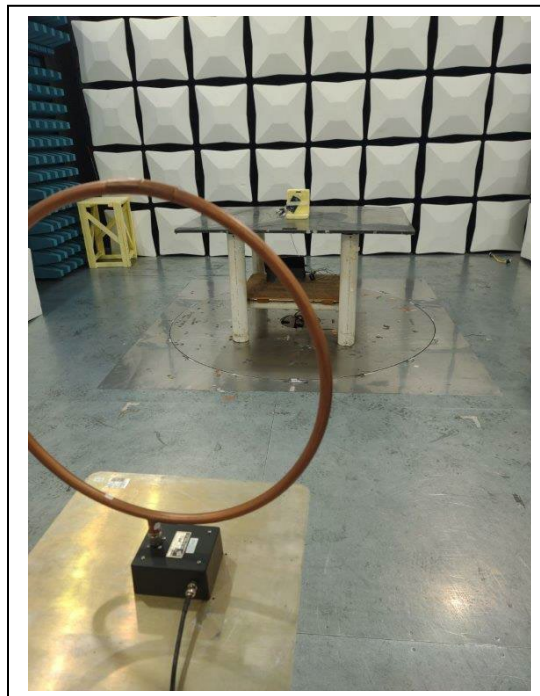


7 TEST SETUP PHOTOGRAPH(S)

Molex 1461530050: Radio Setup



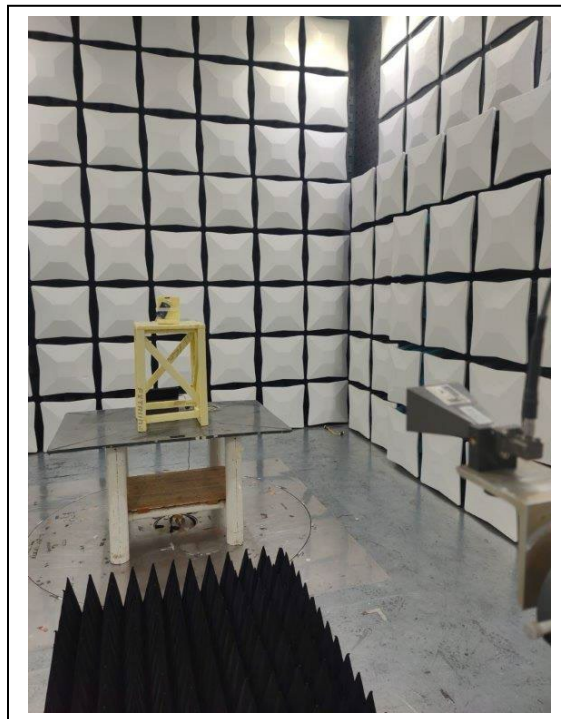
Molex 1461530050, Radiated Spurious Emission: 0.009 MHz to 30 MHz



Molex 1461530050, Radiated Spurious Emission: 30 MHz to 1000 MHz



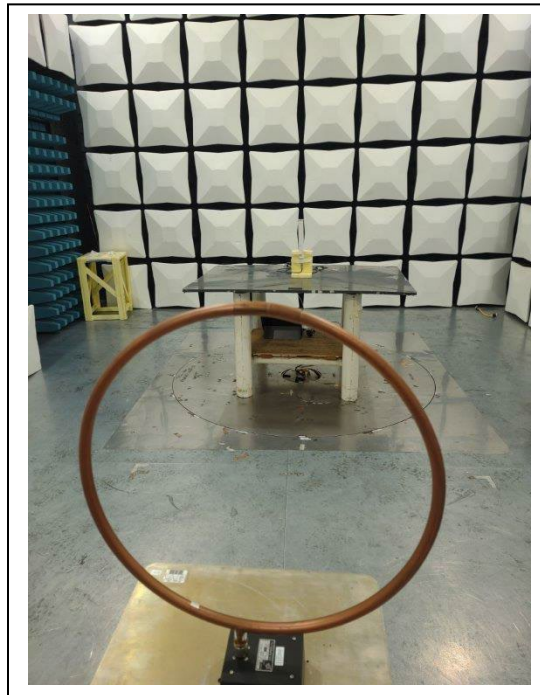
Molex 1461530050, Radiated Spurious Emission: Greater than 1 GHz



Laird CC24006H: Radio Setup



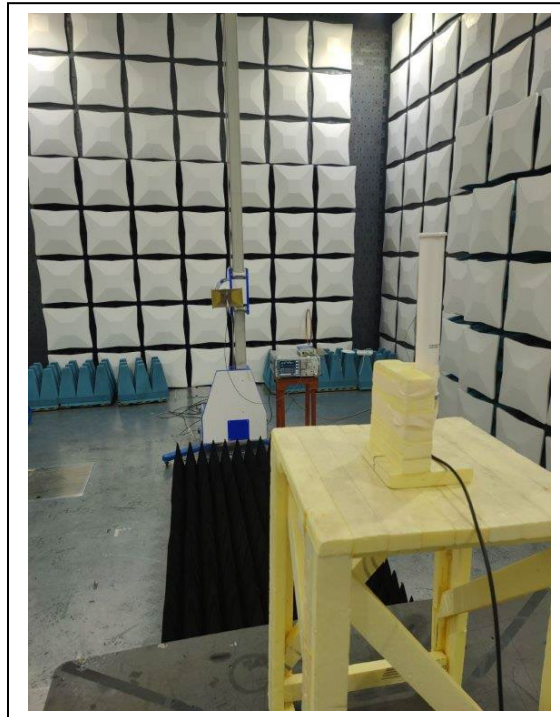
Laird CC24006H, Radiated Spurious Emission: 0.009 MHz to 30 MHz



Laird CC24006H, Radiated Spurious Emission: 30 MHz to 1000 MHz



Laird CC24006H, Radiated Spurious Emission: Greater than 1 GHz



Laird MD24-12, Radiated Spurious Emission: 0.009 MHz to 30 MHz**Laird MD24-12, Radiated Spurious Emission: 30 MHz to 1000 MHz**



Laird MD24-12, Radiated Spurious Emission: Greater than 1 GHz

