

TEST REPORT

Report Number: 105890996DAL-001
Project Numbers: G105890996
Report Issue Date: August 26, 2024
Report Revision Date: September 18, 2024
Testing performed on
AccelStim
Models Tested: 4301

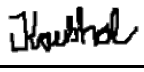
FCC ID: 2AHVN-OFIX-4301-001
IC ID: 21309-4301OFIX001
to
FCC Part 15 Subpart C (15.247)
ISED RSS-247 Issue 3
FCC Part 15, Subpart B, Class B
Industry Canada ICES-003, Class B

For

ORTHOFIX US LLC

Test Performed by:
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Plano, TX 75074
USA

Test Authorized by:
ORTHOFIX US LLC
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Prepared by: 

Kaushal Patel

Date: August 26, 2024

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Anderson Soungpanya

Date: August 26, 2024

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Report No. 105890996DAL-001	
Equipment Under Test:	Accelstim
Model Numbers:	4301
Applicant:	Orthofix US LLC
Contact:	Daniela Behzad
Address:	3451 Plano Parkway Lewisville, TX 75056-9453
Country:	USA
Email:	danielabehzad@orthofix.com
Applicable Regulation:	FCC Part 15 Subpart C (15.247) ISED RSS-247 Issue 3
Date of Test:	July 24, 2024, to August 05, 2024

We attest to the accuracy of this report:



Kaushal Patel
Compliance Investigator



Anderson Soungpanya
EMC Team Leader

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1.0 Summary of Tests

Test	Reference FCC	Reference Industry Canada	Result
RF Output Power	15.247(b)(3)	RSS-247, 5.4.d)	Complies
6 dB Bandwidth	15.247(a)(2)	RSS-247, 5.2.a)	Complies
Power Density	15.247(e)	RSS-247, 5.2.b)	Complies
Out of Band Antenna Conducted Emission	15.247(d)	RSS-247, 5.5	Complies
Transmitter Radiated Emissions	15.247(d), 15.209, 15.205	RSS-247, 5.5	Complies
AC Line Conducted Emission	15.207	RSS-GEN	Complies
Antenna Requirement	15.203	RSS-GEN	Complies (Internal Antenna)

EUT receive date: July 18, 2024

EUT receive condition: The production version of the EUT was received in good condition with no apparent damage.

Test start date: July 24, 2024

Test completion date: August 05, 2024

The test results in this report pertain only to the item tested.

2.0 General Information

2.1 Product Description

Orthofix US LLC. supplied the following description of the EUT:

Model # 4301 is a medical device that applies ultrasound to the treated area to accelerate the osteogenic process, thereby reducing healing times. The AccelStim device generates a low-intensity pulsed ultrasound (LIPUS) signal as a prescribed, nonsurgical treatment for nonunion fractures or fresh fractures (closed, posteriorly displaced distal radius fractures, or closed or Grade I open tibial diaphysis fractures)

For more information, refer to the manufacturer user manual.

The following product specification, declared by the manufacturer.

Information about the 2.4 GHz BLE radio is presented below:

Applicant	Othofix US LLC
Model No.	4301
FCC Identifier	2AHVN-OFIX-4301-001
IC Identifier	21309-4301OFIX001
Type of transmission	Digital Transmission System (DTS)
Rated RF Output	-5.29 dBm (0.296 mW)
Antenna(s) & Gain	Internal Antenna, Gain: -3.86 dBi
Frequency Range	2402 – 2480 MHz
Type of modulation/data rate	GFSK / 1Mbit/s
Number of Channel(s)	40 Channels
Test Channels	2402 MHz, 2442 MHz, 2480 MHz
Applicant Name & Address	Othofix US LLC 3451 Plano Parkway Lewisville, TX 75056-9453 USA

*: Antenna gain was provided by Orthofix US LLC. Intertek takes no responsibility for the accuracy of the antenna gain.

*: This test report covers the BLE transmitter only.

2.2 Related Submittal(s) Grants

None.

2.3 Test Facility

The test site used to collect the radiated data is site 1 (3-m semi-anechoic chamber). This test facility and site measurement data have been fully placed on file with the FCC, IC and A2LA accredited.

2.4 Test Methodology

Antenna conducted measurements were performed according to the FCC documents “Guidance for Performing Compliance Measurement on Digital Transmission Systems (DTS) Operating under §15.247” (KDB 558074 D01 DTS Meas Guidance v05r02).

Radiated emissions and AC mains conducted emissions measurements were performed according to the procedures in ANSI C63.10: 2013. Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the “Data Sheet” of this report.

2.5 Measurement Uncertainty

Compliance with the limits was based on the results of the measurements and doesn’t take into account the measurement uncertainty.

Estimated Measurement Uncertainty

Measurement	Expanded Uncertainty (k=2)		
	0.15 MHz – 1 GHz	1 GHz – 2.5 GHz	> 2.5 GHz
RF Power and Power Density – antenna conducted	-	0.7 dB	-
Unwanted emissions – antenna conducted	1.1 dB	1.3 dB	1.9 dB
Bandwidth – antenna conducted	-	30 Hz	-

Measurement	Expanded Uncertainty (k=2)			
	0.15 MHz – 30MHz	30 – 200 MHz	200 MHz – 1 GHz	1 GHz – 18 GHz
Radiated emissions	-	3.5	3.5	3.5 dB
AC mains conducted emissions	2.1 dB	-	-	-

3.0 System Test Configuration

3.1 Support Equipment

Equipment Under Test				
Description	Manufacturer	Type	Model	Serial Number
Radiated Sample	Othofix US LLC	Accelstim	4301	EE10000006
Conducted Sample	Othofix US LLC	Accelstim	4301	EE10000007

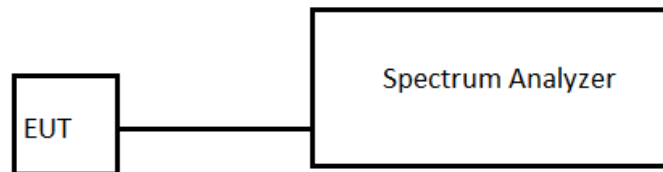
Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of phases
3.7 Vdc – Internal Battery	N/A	N/A	N/A

Note: Battery was charged full before each test.

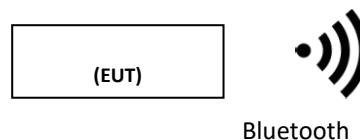
Support Equipment			
Description	Manufacturer	Model	Serial Number
None	None	None	None

3.2 Block Diagram of Test Setup

Conducted Measurements SETUP



Radiated Measurements SETUP



S = Shielded	F = With Ferrite
U = Unshielded	m = Length in Meters

3.3 Justification

For radiated emission measurements the EUT is placed on a non-conductive table. Different orientations of the EUT were tested and only the worse-case emissions were reported.

3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was provided by Orthofix US LLC

3.5 Mode of Operation during Test

During transmitter testing, the transmitter was setup to transmit at maximum RF power on low, middle and high channel.

EUT was placed into transmit mode at the lowest (2402MHz) middle (2442MHz), and highest (2480MHz) channels.

Channels	Freq. MHz	EUT Setting
Low	2402	SN 1041028035
Mid	2442	SN 1041428035
High	2480	SN 1041808035

The Duty Cycle for the BLE Transmitter is >98 % for the testing.

3.6 Modifications Required for Compliance

No modifications were made by the manufacturer or Intertek to the EUT in order to bring the EUT into compliance.

3.7 Additions, Deviations and Exclusions from Standards

No additions, deviations or exclusions from the standard were made.

4.0 Measurement Results

4.1 6-dB Bandwidth and 99% Occupied Bandwidth FCC Rule: 15.247(a)(2); RSS-247, 5.2.a) and RSS-GEN;

4.1.1 Requirement

The minimum 6-dB bandwidth shall be at least 500 kHz

4.1.2 Procedure

A spectrum analyzer was connected to the antenna port of the transmitter.

For FCC 6dB Channel Bandwidth the Procedure described in the FCC Publication KDB 558074 D01 Meas Guidance v05r02 was used to determine the DTS occupied bandwidth. Section 11.8.1 Option 1 of ANSI 63.10 was used.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

For 99% power bandwidth measurement, the bandwidth was determined by using the built-in 99% occupied bandwidth function of the spectrum analyzer. The resolution bandwidth is set to 1% of the selected span as is without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.

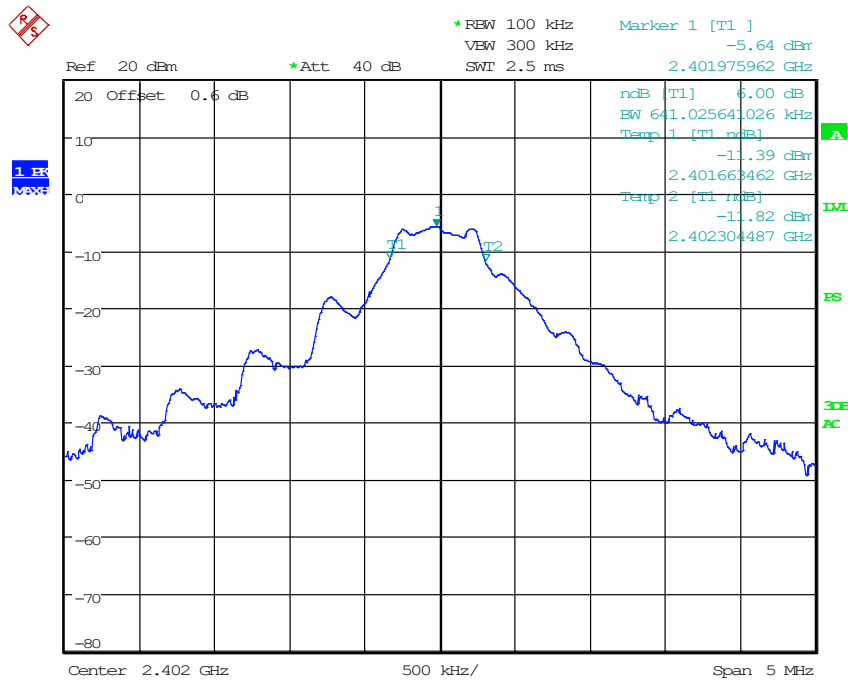
4.1.3 Test Result

Model 4301

Frequency (MHz)	6-dB bandwidth FCC 15.247 & RSS-GEN, kHz	Occupied bandwidth, RSS-GEN, MHz	Plot
2402	641.02	--	1.1
	--	1.30	1.4
2442	721.15	--	1.2
	--	1.41	1.5
2480	616.98	--	1.3
	--	0.987	1.6

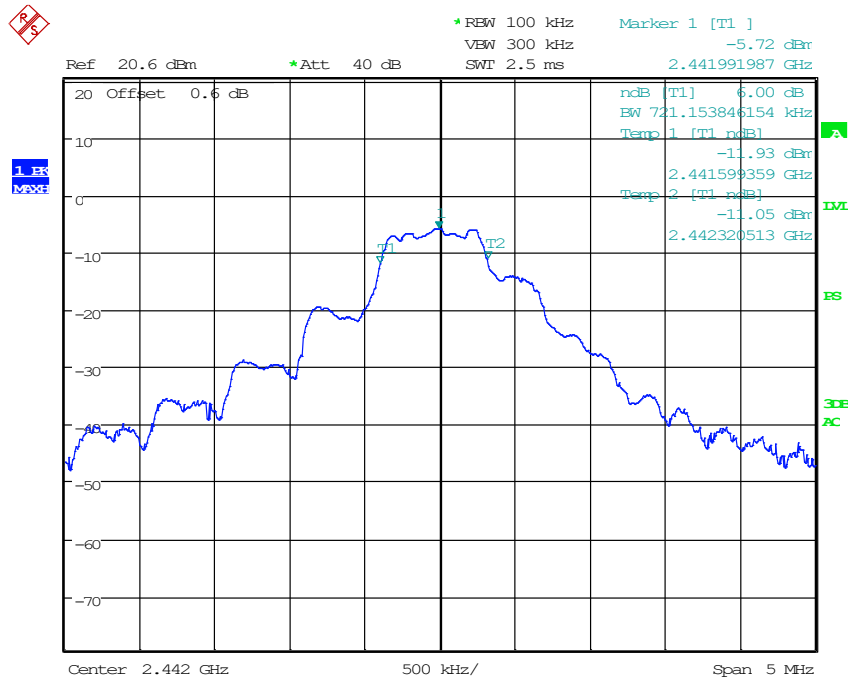
Tested By	Test Date	Results
Kaushal Patel	July 24, 2024 & August 05, 2024	Complies

Plot 1.1



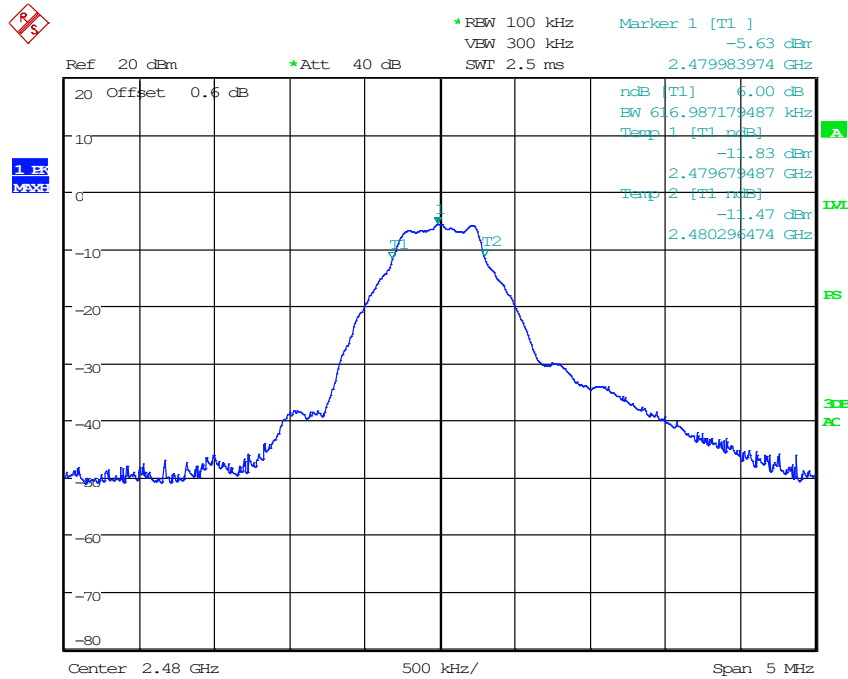
Date: 24.JUL.2024 11:37:32

Plot 1.2



Date: 24.JUL.2024 17:19:41

Plot 1.3



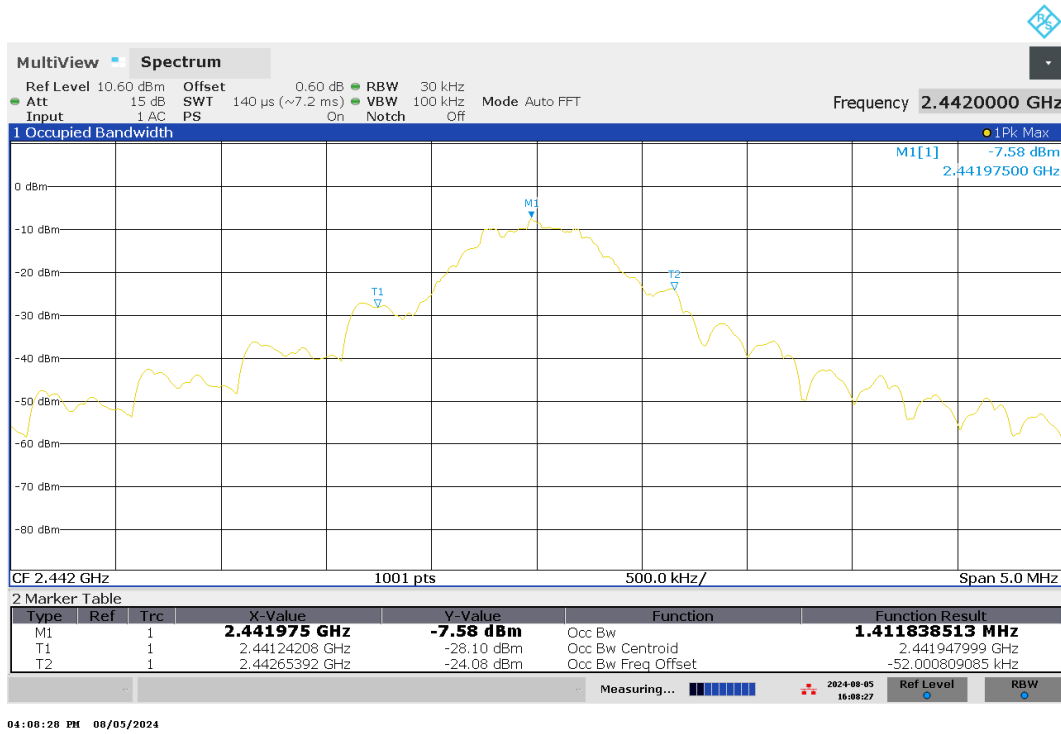
Date: 24.JUL.2024 11:19:04

Plot 1.4

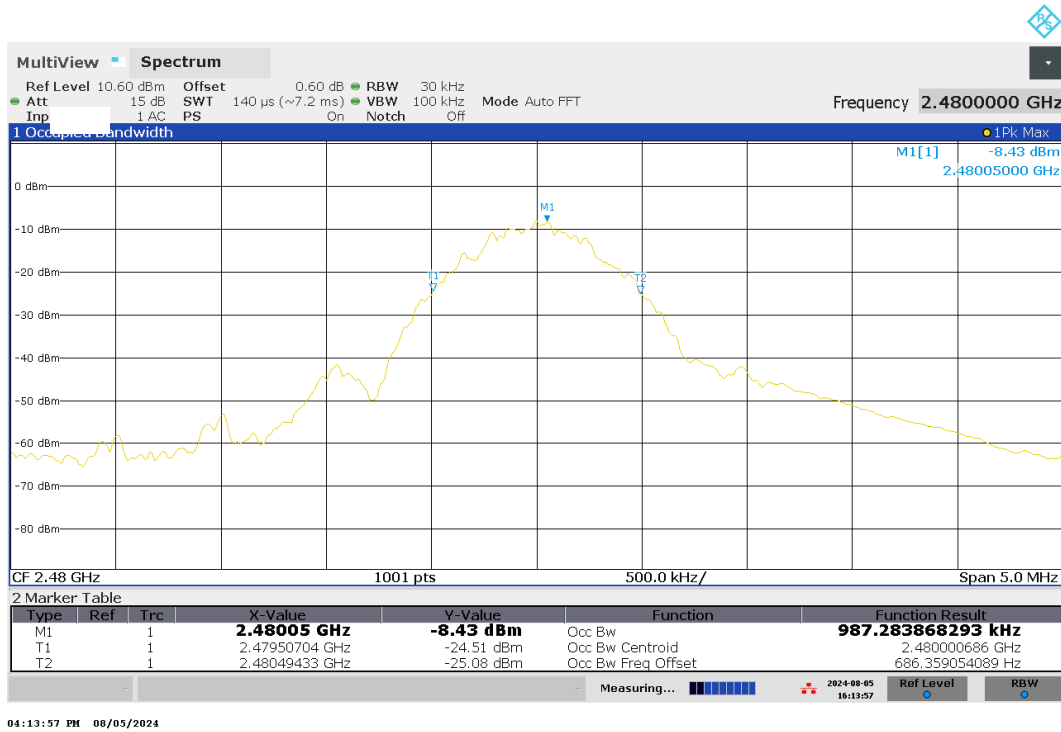


04:11:25 PM 08/05/2024

Plot 1.5



Plot 1.6



Results

Complies

4.2 Maximum Peak Conducted Output Power at Antenna Terminals FCC Rule: 15.247(b)(3); RSS-247, 5.4.d);

4.2.1 Requirement

For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt or 30 dBm. For antennas with gains greater than 6 dBi, transmitter output level must be decreased appropriately, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2.2 Procedure

The procedure described in FCC Publication KDB 558074 D01 Meas Guidance v05r02 was used. Specifically, section 11.9.1.1 RBW $\geq$ DTS bandwidth in ANSI 63.10.

1. Set the RBW $\geq$ DTS Bandwidth
2. Set the VBW $\geq 3 \times$ RBW
3. Set the span $\geq 3 \times$ RBW
4. Detector = Peak
5. Sweep time = Auto couple
6. Trace mode = Max Hold
7. Allow trace to fully stabilize
8. Use peak marker function to determine the peak amplitude level.

A spectrum analyzer was connected to the antenna port of the transmitter.

4.2.3 Test Result

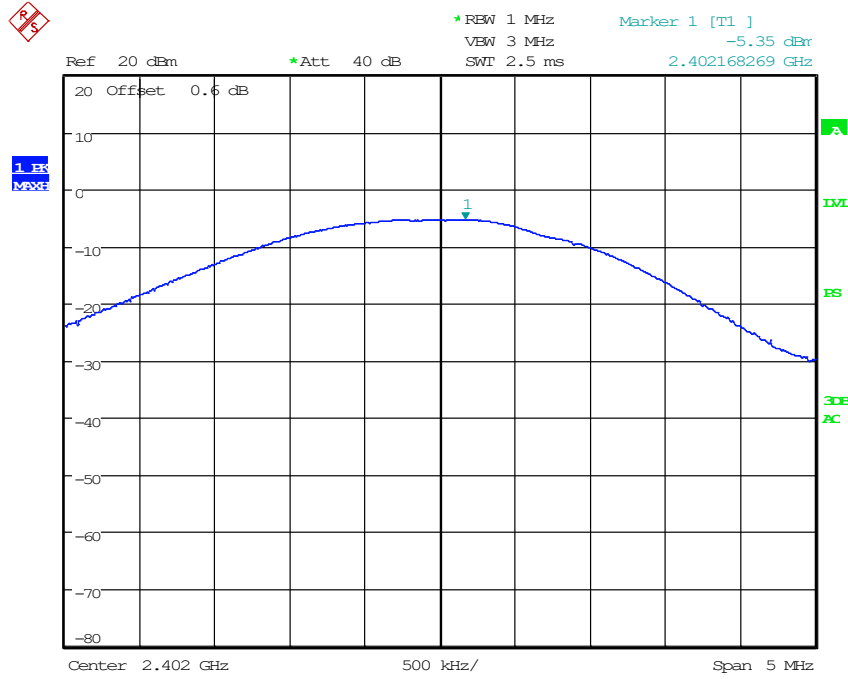
Refer to the following plots 2.1 – 2.3 for the test details.

Model 4301

Frequency	Conducted Power (peak)		Plot
MHz	dBm	mW	
2402	-5.35	0.292	2.1
2442	-5.44	0.286	2.2
2480	-5.29	0.296	2.3

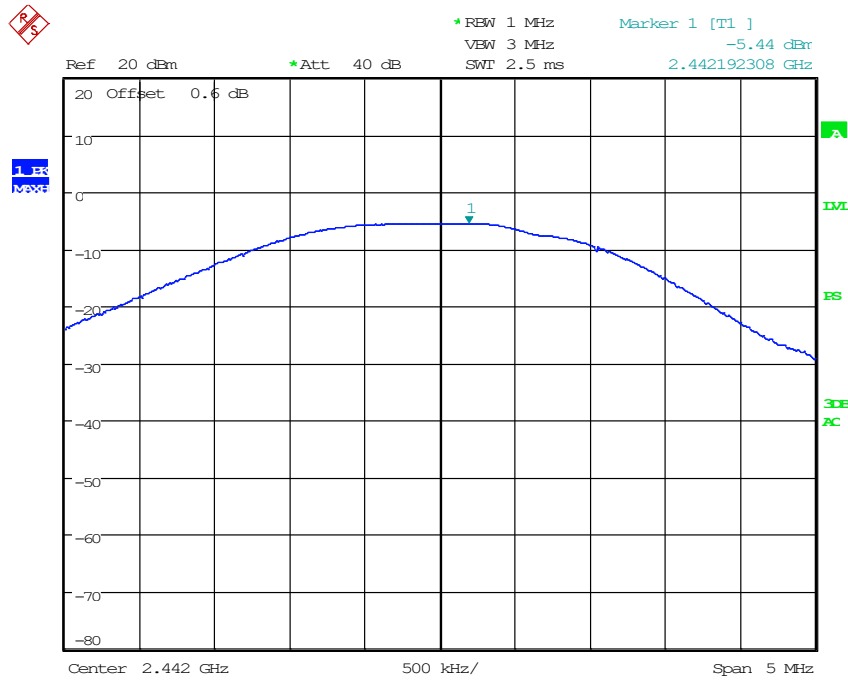
Tested By	Test Date	Results
Kaushal Patel	July 24, 2024	Complies

Plot 2.1



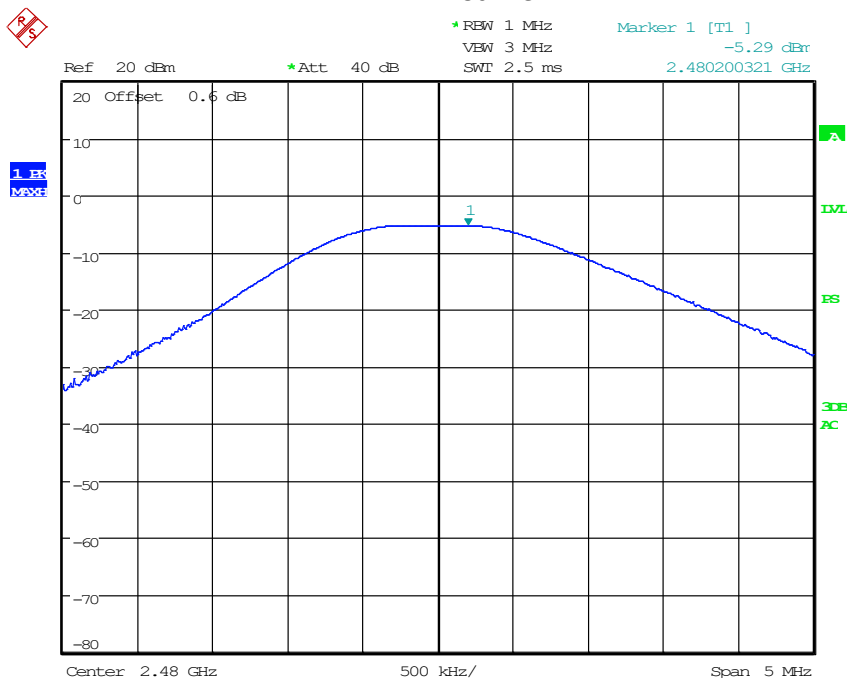
Date: 24.JUL.2024 11:36:38

Plot 2.2



Date: 24.JUL.2024 17:22:17

Plot 2.3



Date: 24.JUL.2024 11:20:58

Results

Complies

4.3 Maximum Power Spectral Density FCC: 15.247 (e); RSS-247, 5.2.b);

4.3.1 Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna should not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2 Procedure

A spectrum analyzer was connected to the antenna port of the transmitter.

The procedure described in FCC Publication KDB 558074 D01 Meas Guidance v05r02, specifically section 11.10.2 Method PKPSD (peak PSD) of ANSI 63.10.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the *DTS bandwidth*.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.3.3 Test Result

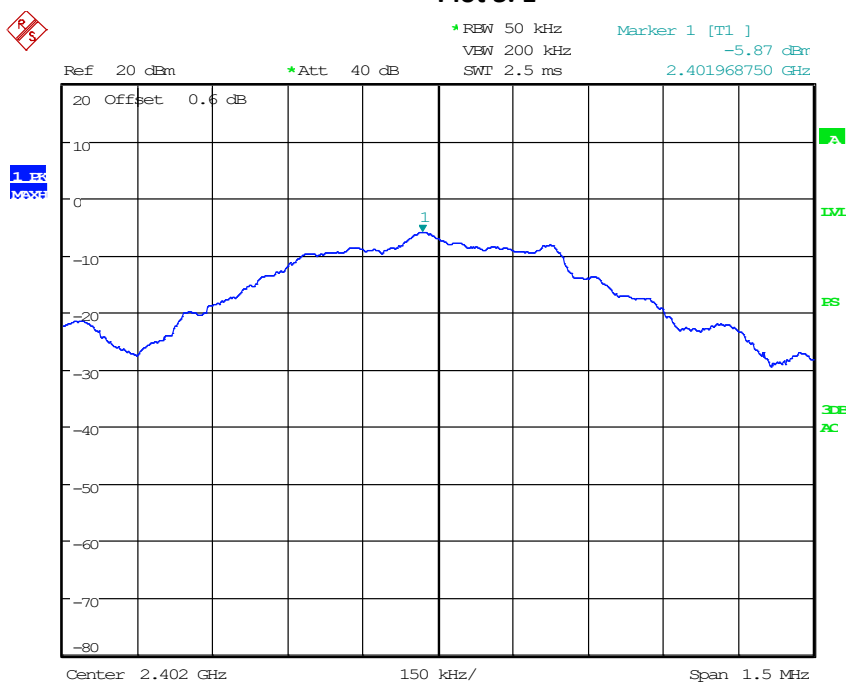
Refer to the following plots for the test result

Model 4301

Frequency, MHz	Maximum Power Spectral Density, dBm	Maximum Power Spectral Density Limit, dBm	Margin, dB	Plot
2402	-5.87	8.0	13.87	3.1
2442	-5.82	8.0	13.82	3.2
2480	-5.77	8.0	13.77	3.3

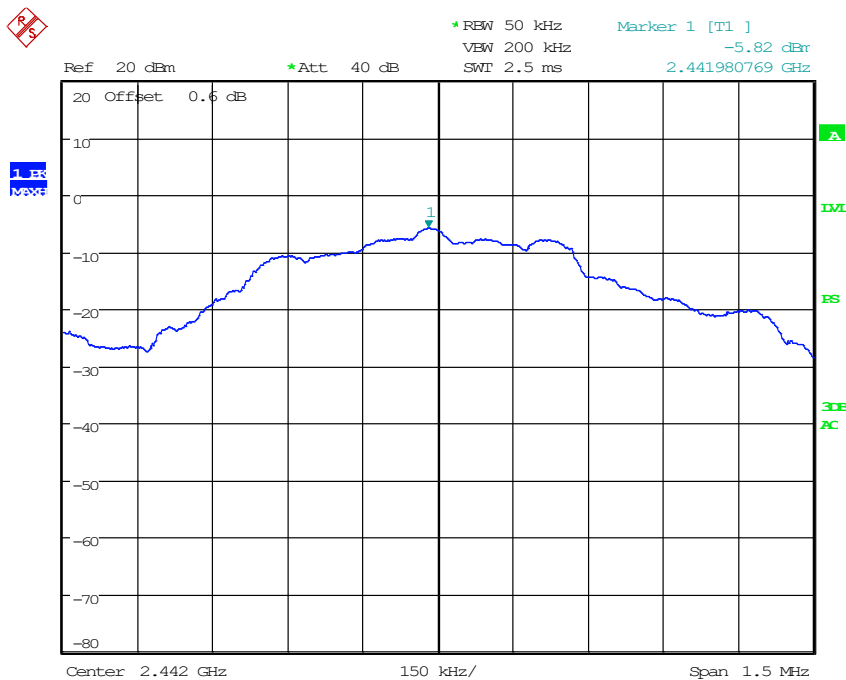
Tested By	Test Date	Results
Kaushal Patel	July 24, 2024	Complies

Plot 3. 1



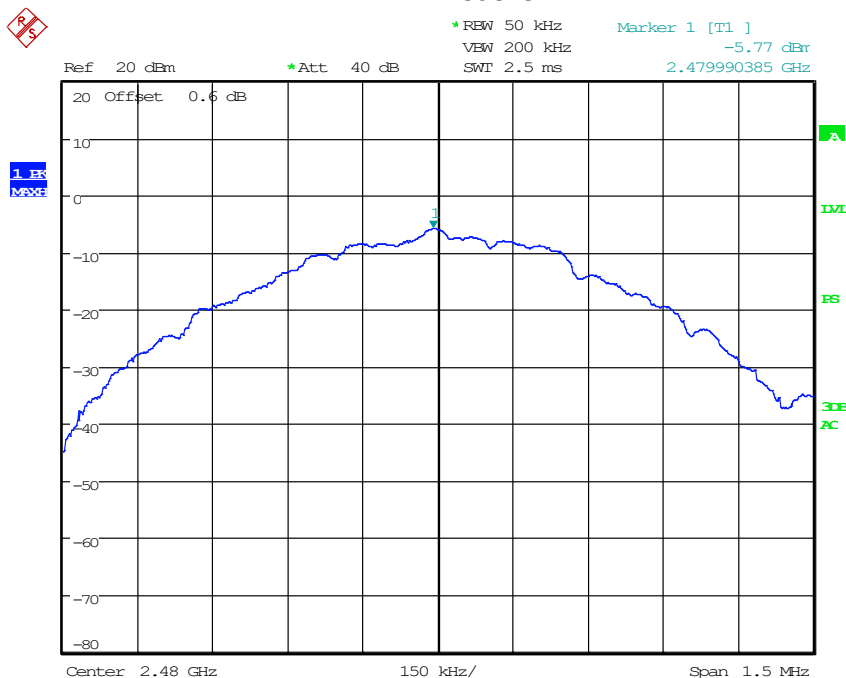
Date: 24.JUL.2024 11:35:43

Plot 3. 2



Date: 24.JUL.2024 17:21:06

Plot 3.3



Date: 24.JUL.2024 11:21:38

Results

Complies

4.4 Out of Band Antenna Conducted Emission FCC: 15.247(d); RSS-247, 5.5;

4.4.1 Requirement

In any 100 kHz bandwidth outside the EUT pass-band, the RF power shall be below the maximum in-band 100 kHz emissions by at least 20 dB (if peak power of in-band emission is measured) or 30 dB (if average power of in-band emission is measured).

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)

4.4.2 Procedure

The procedure described in FCC Publication KDB 558074 D01 Meas Guidance v05r02, specifically section 11.11 DTS Emissions in non-restricted frequency bands of ANSI 63.10.

A spectrum analyzer was connected to the antenna port of the transmitter.

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq 3 \times$ RBW.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

The unwanted emissions were measured from 30 MHz to 25 GHz. Plots below are corrected for cable loss and then compared to the limits.

4.4.3 Test Result

Refer to the following plots 4.3 – 4.5 and plots 4.2.3 – 4.2.5 for unwanted conducted emissions. The plot shows -20dB attenuation limit line.

Tested By	Test Date	Results
Kaushal Patel	July 24, 2024	Complies

Tx @ Low Channel, 2402 MHz Band Edge

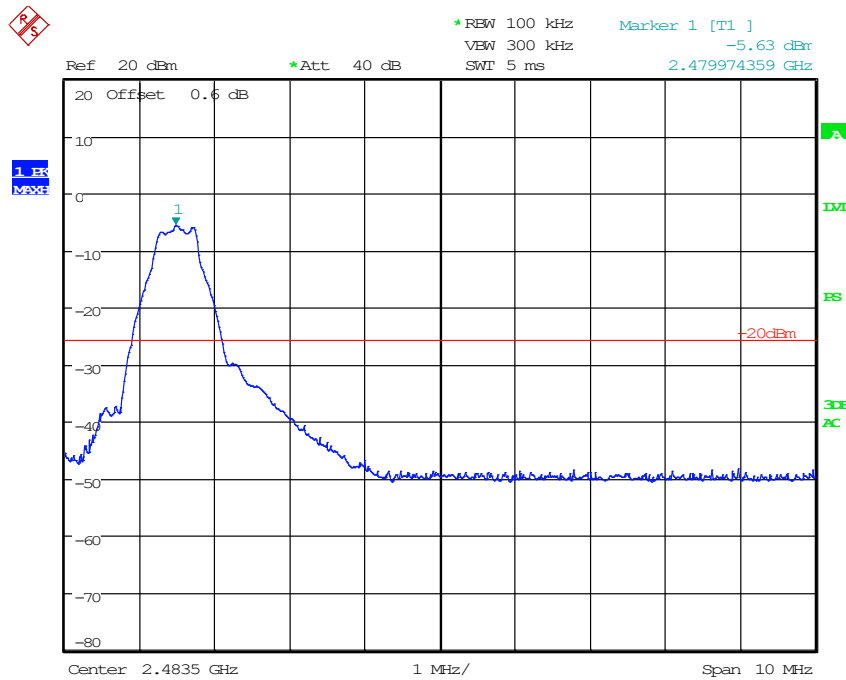
Plot 4.1



Date: 24.JUL.2024 11:41:15

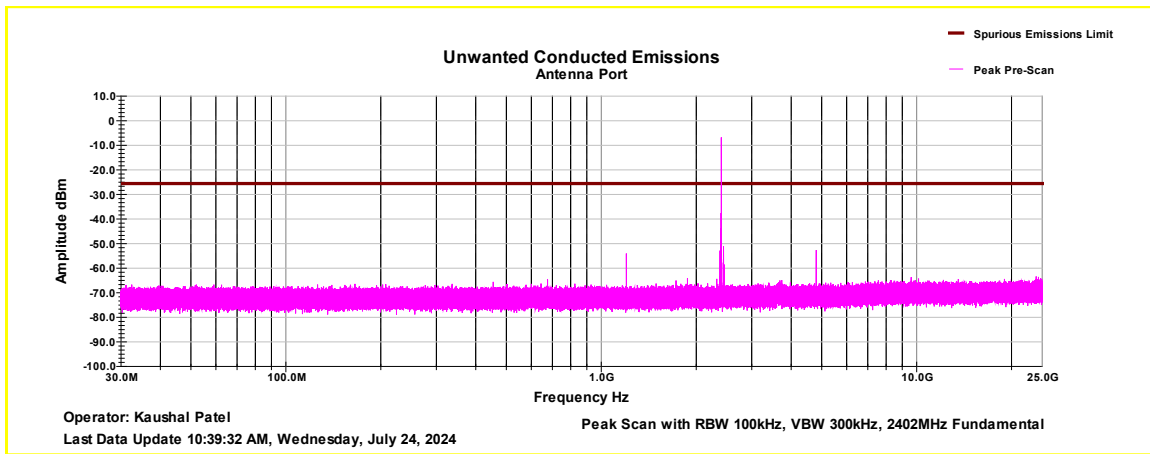
Tx @ High Channel, 2480 MHz Band Edge

Plot 4.2

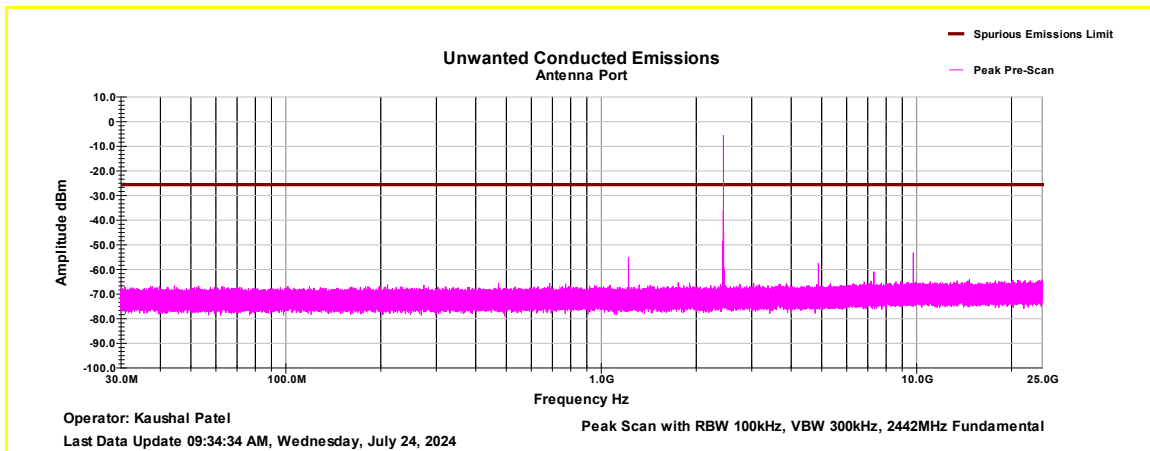


Date: 24.JUL.2024 11:16:10

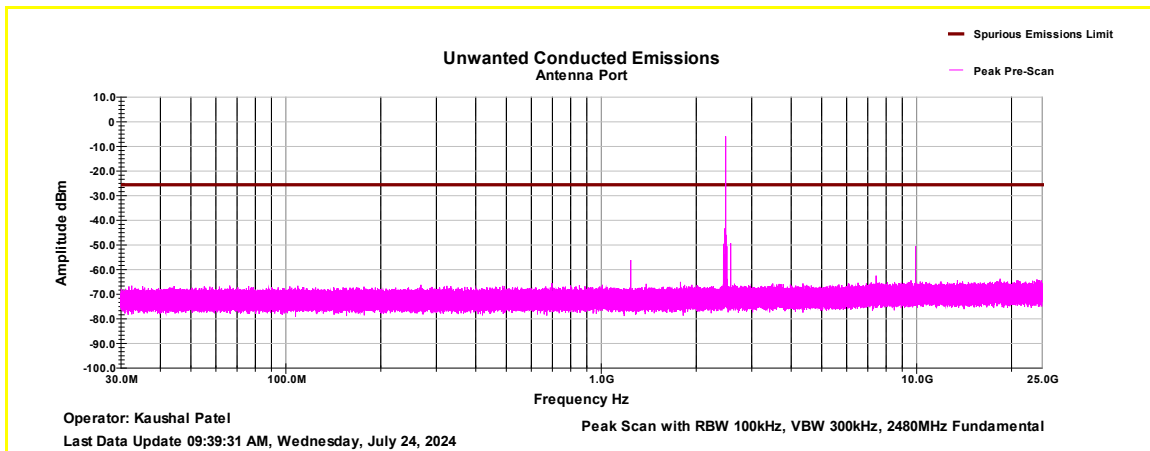
Tx @ Low Channel, 2402 MHz 30MHz -25GHz Conducted Spurious
Plot 4.3



Tx @ Mid Channel, 2440 MHz 30MHz -25GHz Conducted Spurious
Plot 4.4



Tx @ High Channel, 2480 MHz 30MHz -25GHz Conducted Spurious
Plot 4.5



Results

Complies

4.5 Transmitter Radiated Emissions FCC Rules: 15.247(d), 15.209, 15.205; RSS-247, 5.5;

4.5.1 Requirement

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

For out of band radiated emissions (except for frequencies in restricted bands), in any 100 kHz bandwidths outside the EUT pass-band, the RF power shall be at least 20dB (peak) or 30 dB (average) below that of the maximum in-band 100 kHz emissions.

4.5.2 Procedure

Radiated emission measurements were performed from 9 kHz to 26.5 GHz according to the procedure described in ANSI C63.10: 2013. Spectrum Analyzer Resolution Bandwidth is 200Hz or greater for frequencies 9kHz to 30MHz, 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz for frequencies above 1000 MHz. Above 1000 MHz Peak and Average measurements were performed.

The EUT is placed on a plastic turntable that is 80 cm in height for below 1000MHz and 1.5m in height for above 1GHz. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing, all cables were manipulated to produce worst-case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at 3 meters for frequencies above 1 GHz and at 3 meters for frequencies below 1 GHz.

Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place. A preamp was used from 9kHz to 26.5GHz.

All measurements were made with a Peak Detector and compared to QP limits for 30MHz – 1GHz and Average limits for 1GHz – 26.5GHz.

Data is presented with the X Axis, Y Axis & Z Axis configuration.

4.5.3 Field Strength Calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$FS = RA + AF + CF - AG$; if measurement is performed at a distance other than specified in the rule, a Distance Correction Factor (DCF) shall be added.

Where FS = Field Strength in dB(μ V/m)

RA = Receiver Amplitude (including preamplifier) in dB(μ V); AF = Antenna Factor in dB(1/m)

CF = Cable Attenuation Factor in dB; AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB(μ V) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μ V/m). This value in dB(μ V/m) was converted to its corresponding level in μ V/m.

RA = 52.0 dB(μ V)

AF = 7.4 dB(1/m)

CF = 1.6 dB

AG = 29.0 dB

$FS = 52.0 + 7.4 + 1.6 - 29.0 = 32 \text{ dB}(\mu\text{V/m})$.

Level in μ V/m = Common Antilogarithm $[(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$.

4.5.4 Test Results

All testing in this section were performed by radiated measurements.

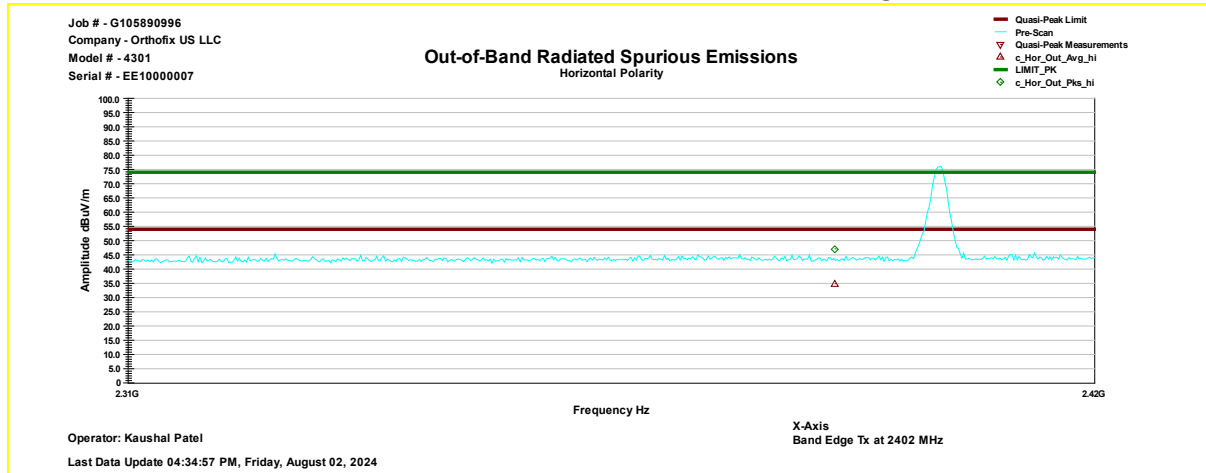
Tested By	Test Date	Results
Kaushal Patel	July 25, 2024, to August 05, 2024	Complies

Test Results: 15.209/15.205 Radiated Restricted Band Emissions

Model 4301

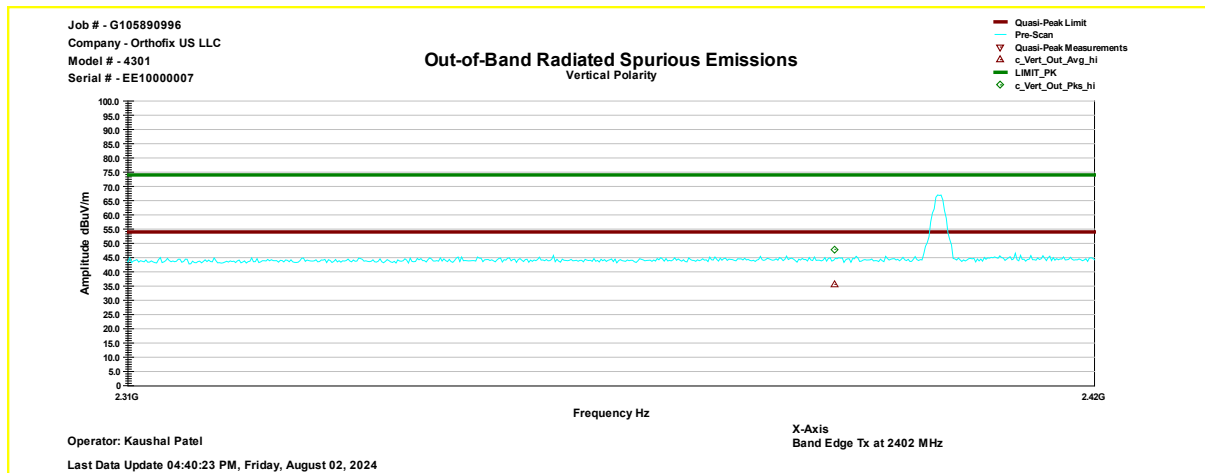
X-Axis

Out-of-Band Radiated spurious emissions at the Band-edge @3m distance 2310–2390 MHz, Peak Scan with Peak Limit & Average Limit



Freq. MHz	Pk@3m dB(μV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	47.1	74	-26.9	127	141	Horizontal	-0.7

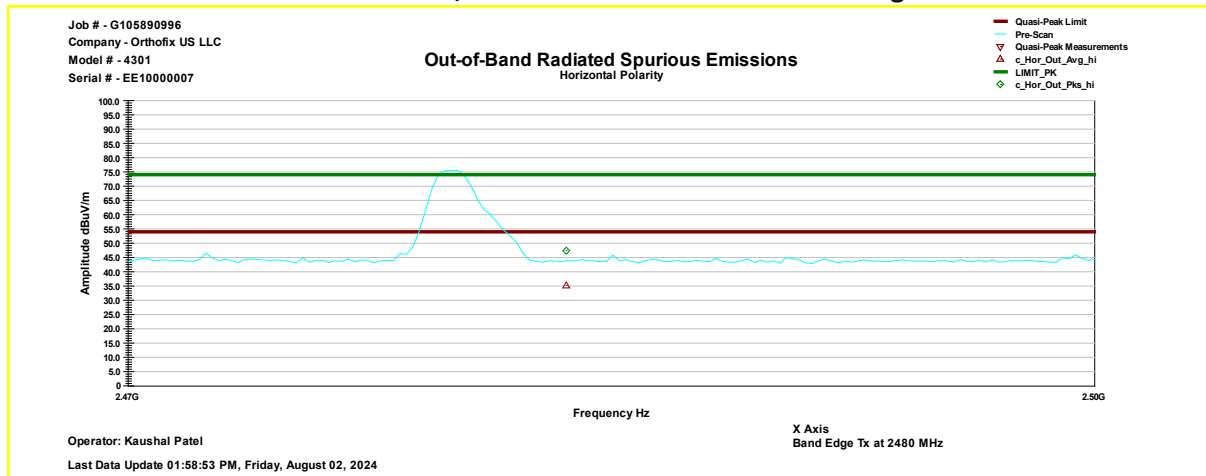
Freq. MHz	Avg@3m dB(μV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	34.8	54	-19.1	127	141	Horizontal	-0.7



Freq. MHz	Pk@3m dB(μV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	47.9	74	-26.1	186	37	Vertical	-0.77

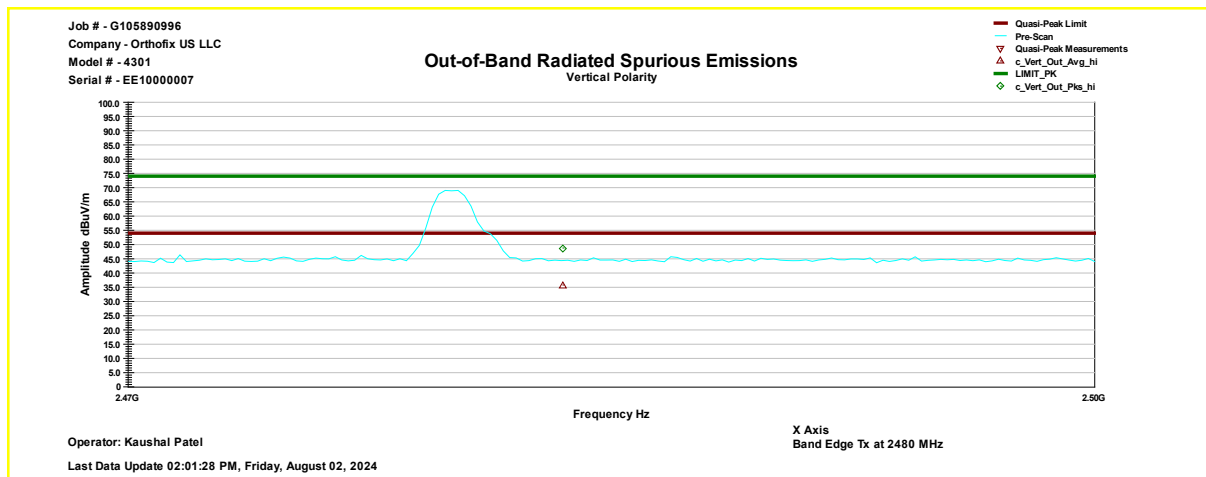
Freq. MHz	Avg@3m dB(μV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	35.6	54	-18.4	186	37	Vertical	-0.77

**Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2483.5–2500 MHz, Peak Scan with Peak Limit & Average Limit**



Freq. MHz	Pk@3m dB(uV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	47.5	74	-26.5	371	101	Horizontal	-0.1

Freq. MHz	Avg@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	35.1	54	-18.9	371	101	Horizontal	-0.1

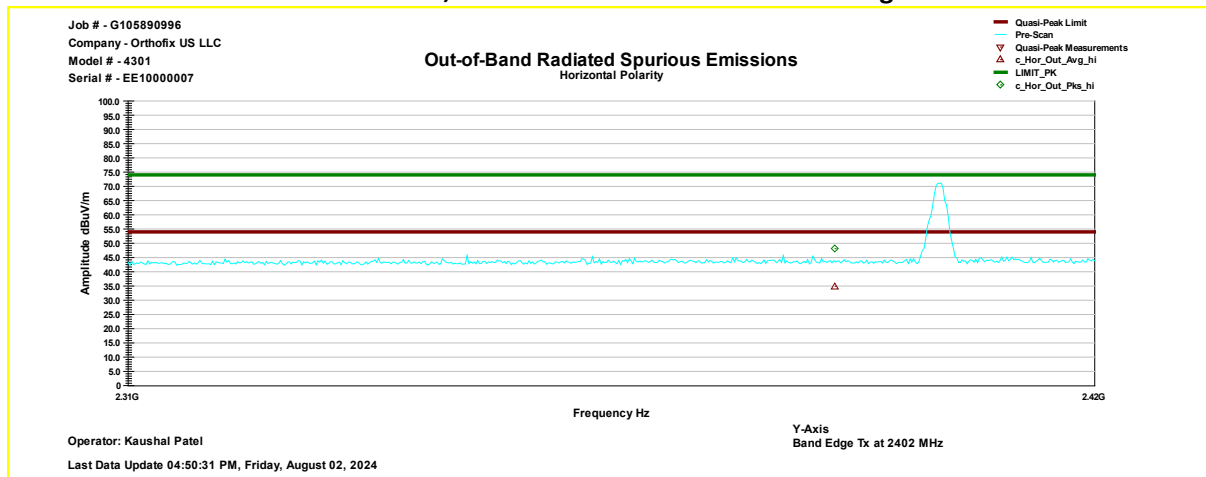


Freq. MHz	Pk@3m dB(uV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	48.8	74	-25.2	400	144	Vertical	-0.29

Freq. MHz	Avg@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	35.8	54	-18.2	400	144	Vertical	-0.29

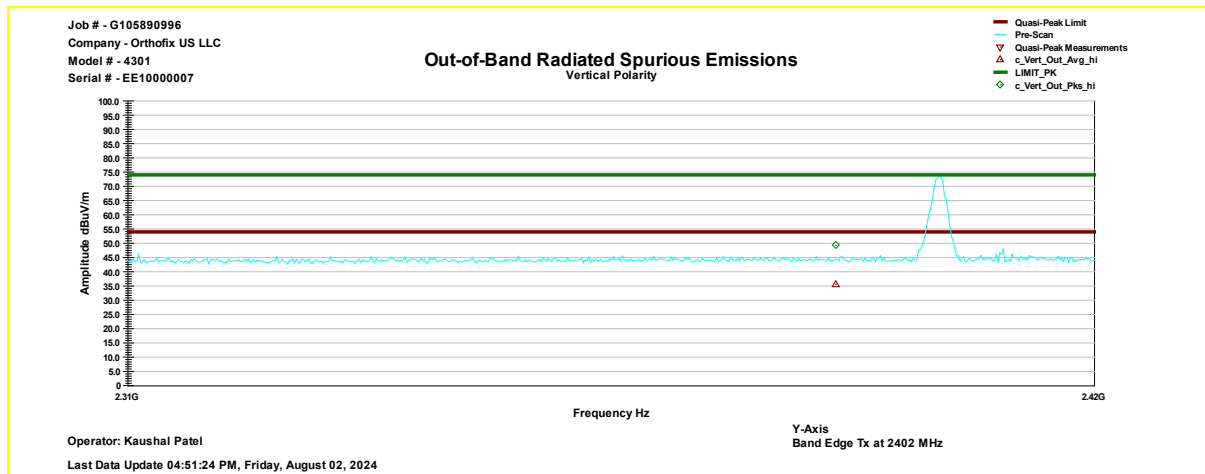
Y-Axis

Out-of-Band Radiated spurious emissions at the Band-edge @3m distance 2310–2390 MHz, Peak Scan with Peak Limit & Average Limit



Freq. MHz	Pk@3m dB(uV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	48.1	74	-25.9	250	328	Horizontal	-0.7

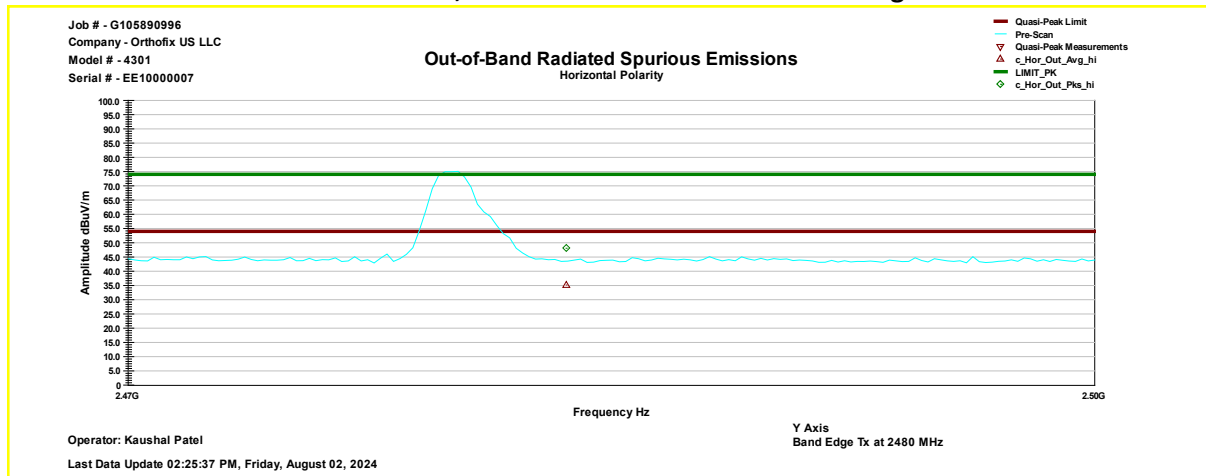
Freq. MHz	Avg@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	34.9	54	-19.1	250	328	Horizontal	-0.7



Freq. MHz	Pk@3m dB(uV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	49.2	74	-24.8	110	206	Vertical	-0.77

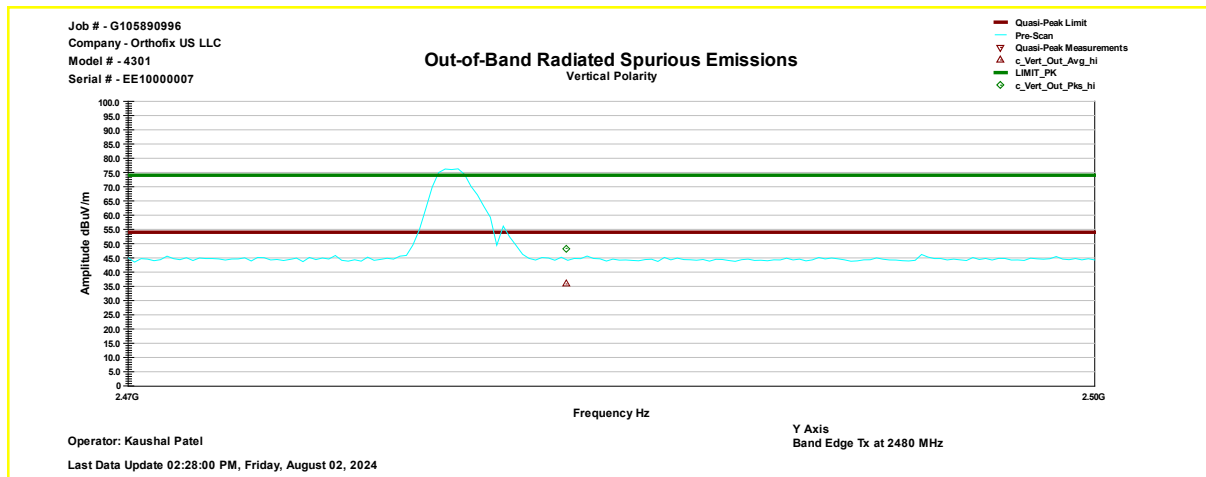
Freq. MHz	Avg@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	35.6	54	-18.4	110	206	Vertical	-0.77

**Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2483.5–2500 MHz, Peak Scan with Peak Limit & Average Limit**



Freq. MHz	Pk@3m dB(uV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	48.1	74	-25.9	399	348	Horizontal	-0.1

Freq. MHz	Avg@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	35.1	54	-18.9	399	348	Horizontal	-0.1

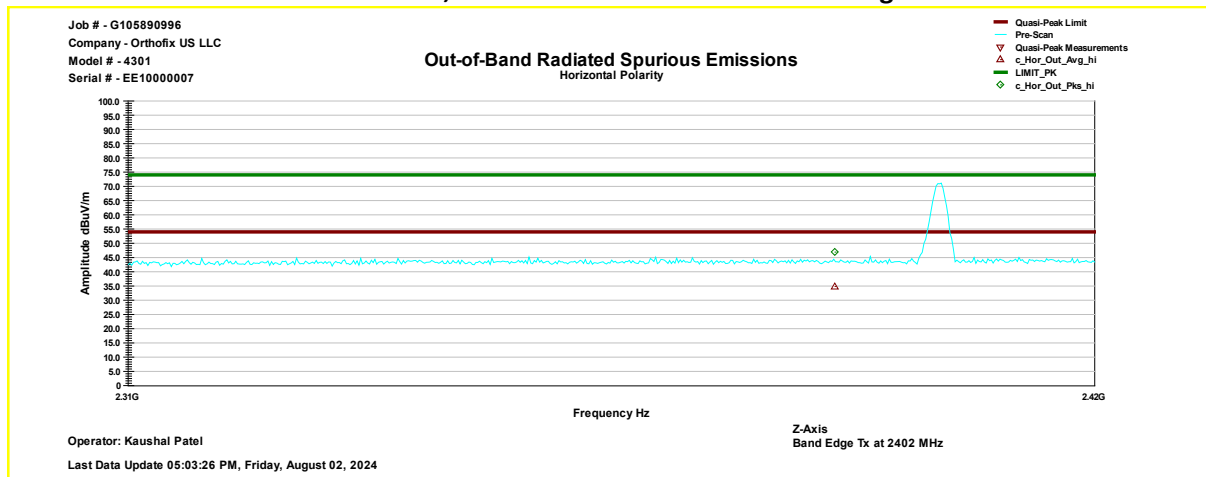


Freq. MHz	Pk@3m dB(uV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	48.3	74	-25.7	316	261	Vertical	-0.29

Freq. MHz	Avg@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	35.8	54	-18.2	316	261	Vertical	-0.29

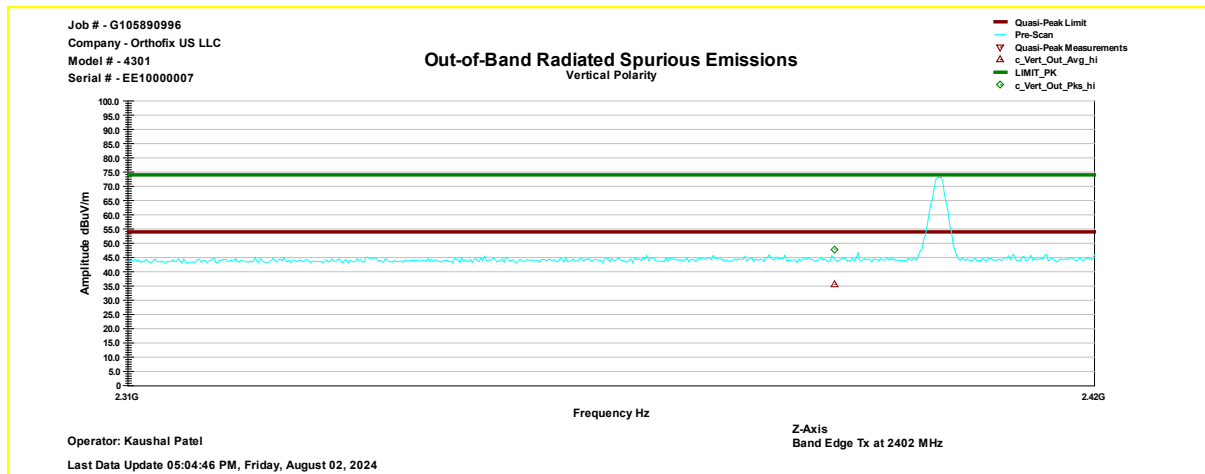
Z-Axis

Out-of-Band Radiated spurious emissions at the Band-edge @3m distance 2310–2390 MHz, Peak Scan with Peak Limit & Average Limit



Freq. MHz	Pk@3m dB(uV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	46.9	74	-27.1	250	18	Horizontal	-0.7

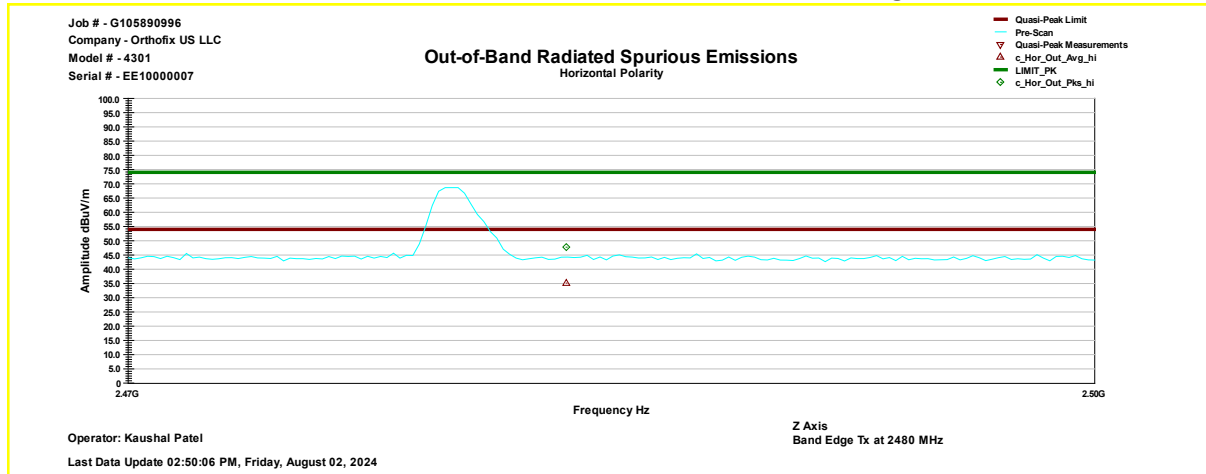
Freq. MHz	Avg@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	34.8	54	-19.1	250	18	Horizontal	-0.7



Freq. MHz	Pk@3m dB(uV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	48	74	-26	110	266	Vertical	-0.77

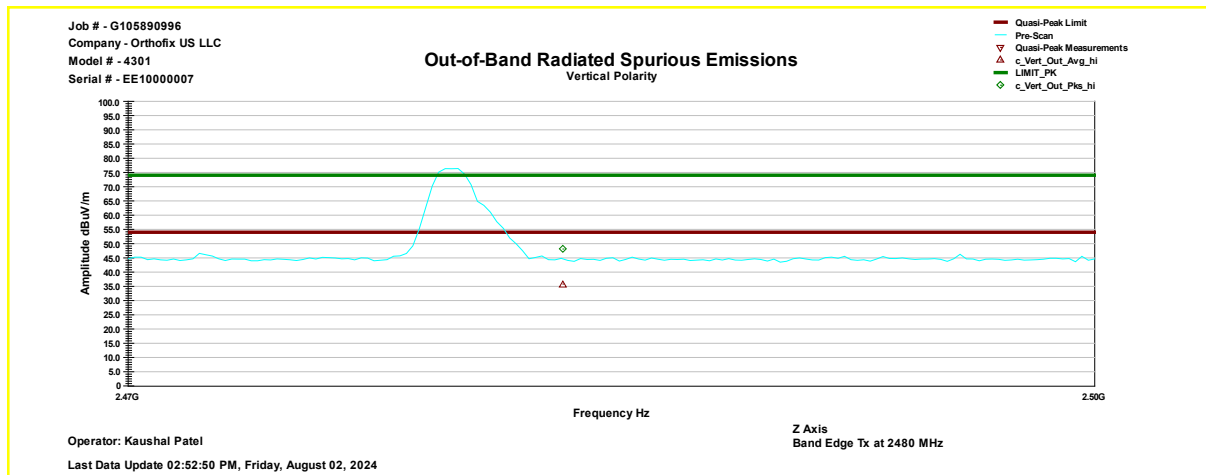
Freq. MHz	Avg@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2390.000	35.6	54	-18.4	110	266	Vertical	-0.77

**Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2483.5–2500 MHz, Peak Scan with Peak Limit & Average Limit**



Freq. MHz	Pk@3m dB(uV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	47.7	74	-26.3	399	269	Horizontal	-0.1

Freq. MHz	Avg@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	35.1	54	-18.9	399	269	Horizontal	-0.1



Freq. MHz	Pk@3m dB(uV/m)	Pk Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	48.1	74	-25.9	388	282	Vertical	-0.29

Freq. MHz	Avg@3m dB(uV/m)	Avg Limit dB(μV/m)	Margin dB	Height cm	Azimuth deg	Polarity	Correction dB
2483.50	35.8	54	-18.2	388	282	Vertical	-0.29

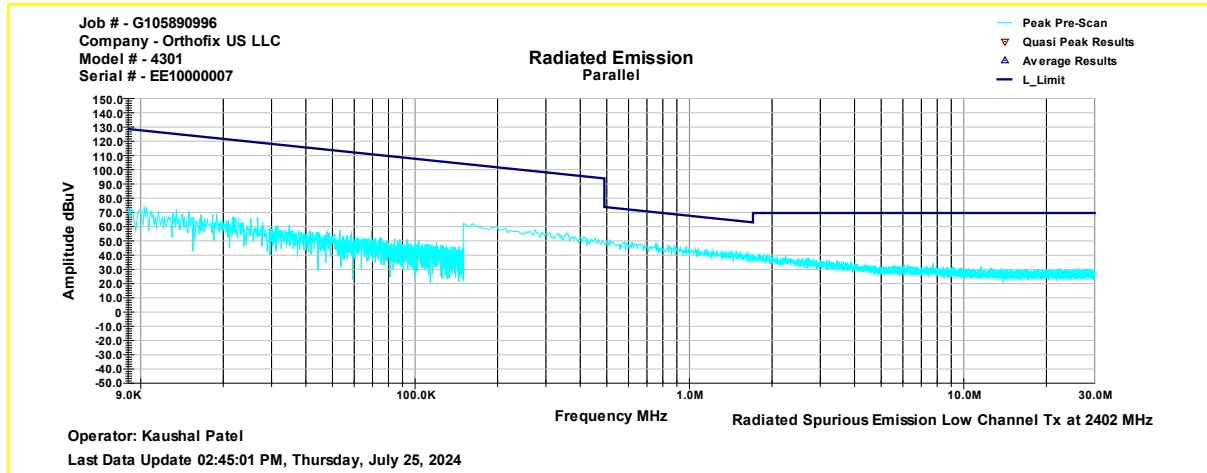
Results

Complies

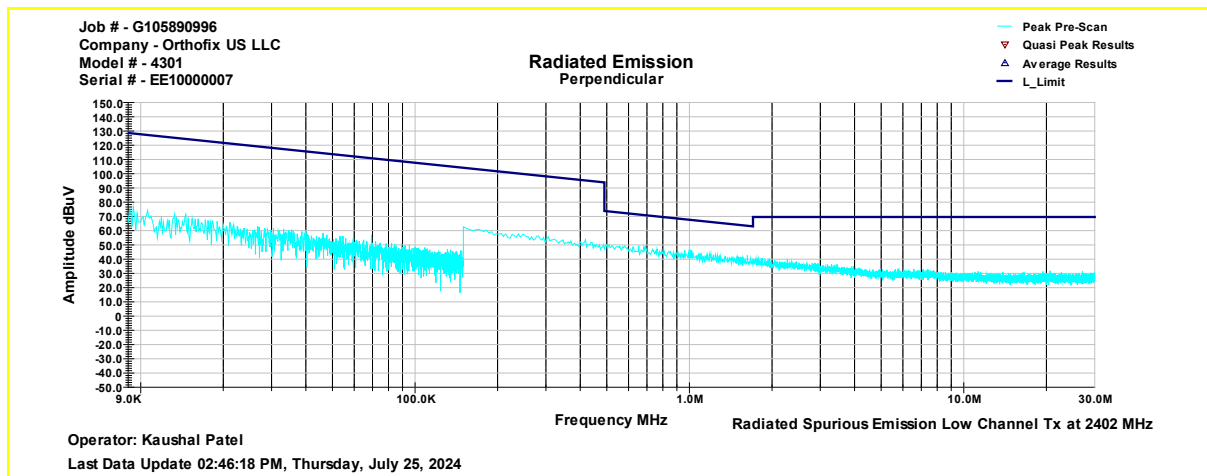
Model 4301

Test Results: 15.209 Radiated Spurious Emissions Low Channel, Tx at 2402MHz, X-Axis

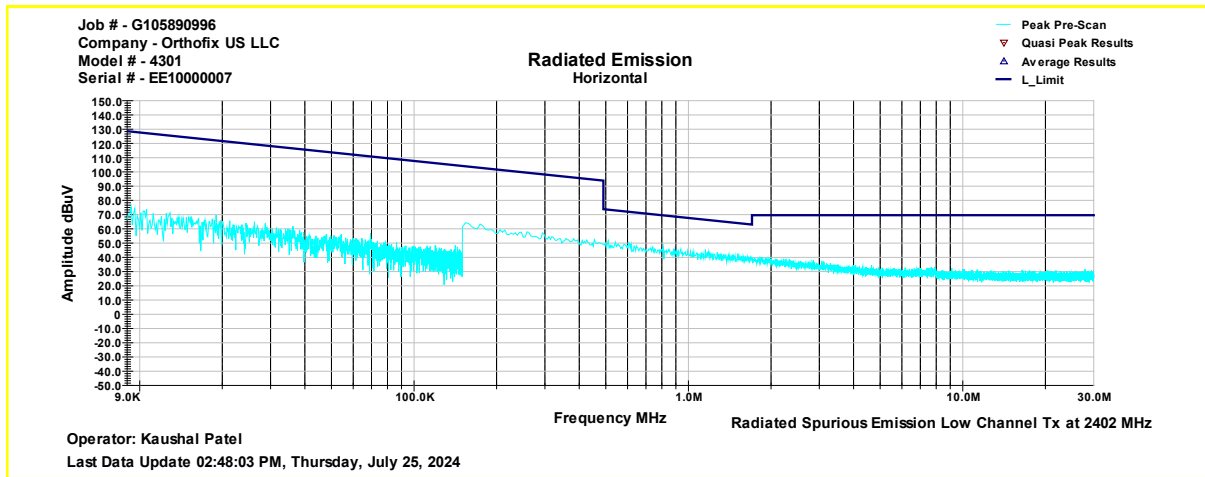
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



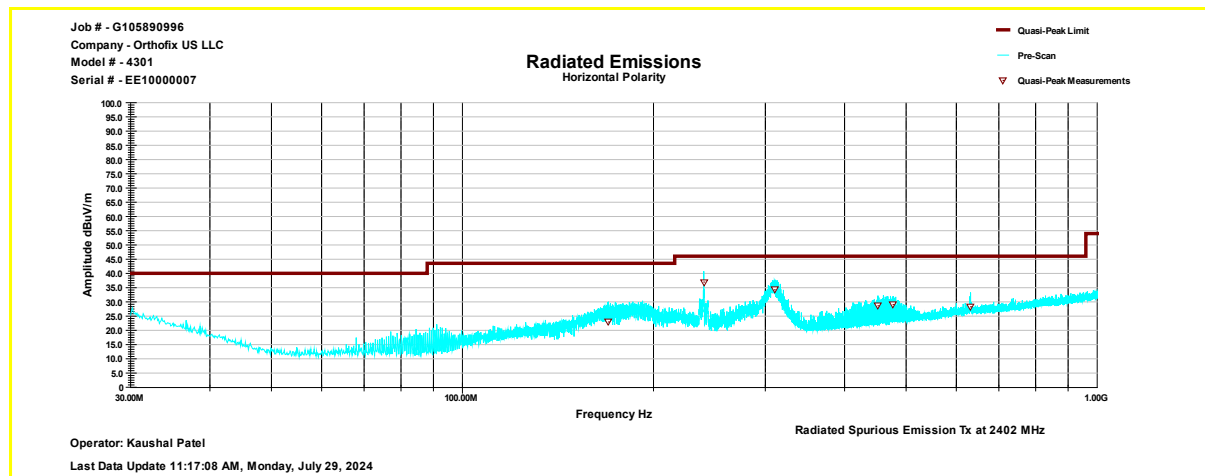
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



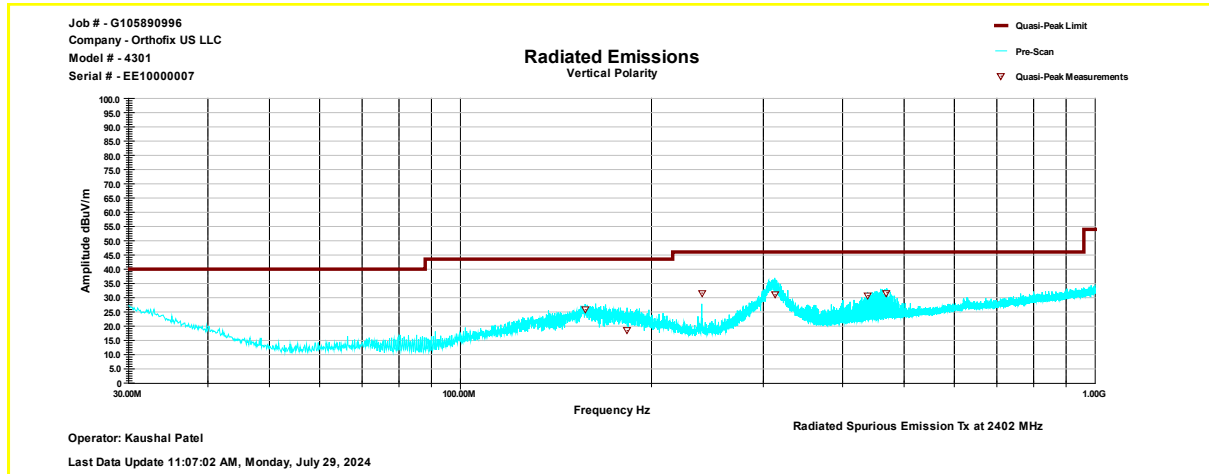
Radiated Spurious Emissions 30 MHz - 1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
169.85	22.9	43.5	-20.6	149	324	Horizontal	-17.6
240.01	37	46	-9.1	125	187	Horizontal	-17.2
310.05	34.2	46	-11.8	100	247	Horizontal	-14.7
451.45	28.6	46	-17.4	250	181	Horizontal	-11.1
476.95	29	46	-17	223	324	Horizontal	-10.4
631.75	28.2	46	-17.8	349	41	Horizontal	-7.4

Note: Correction = AF + CF - Preamp

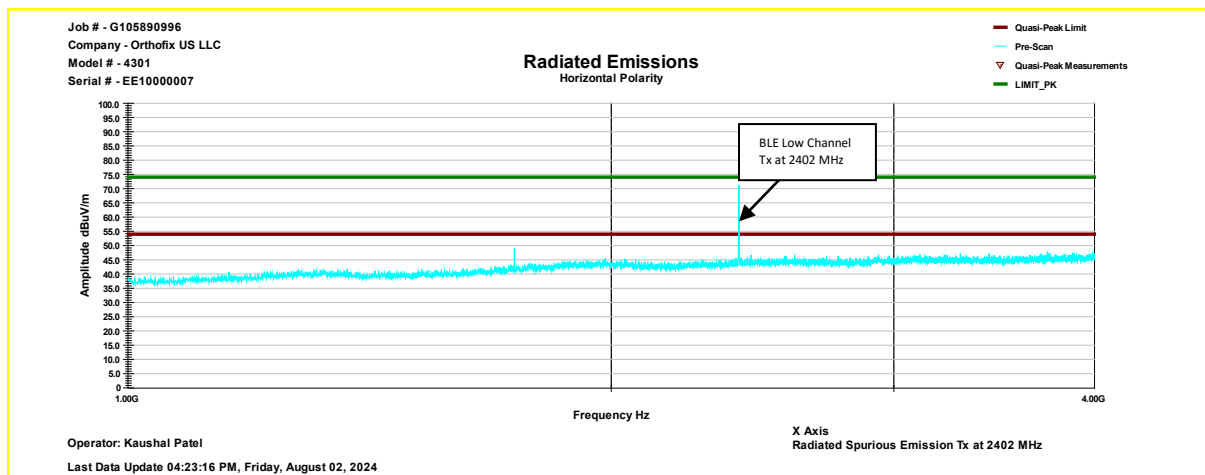
Radiated Spurious Emissions 30 MHz - 1000 MHz Vertical Antenna Polarization



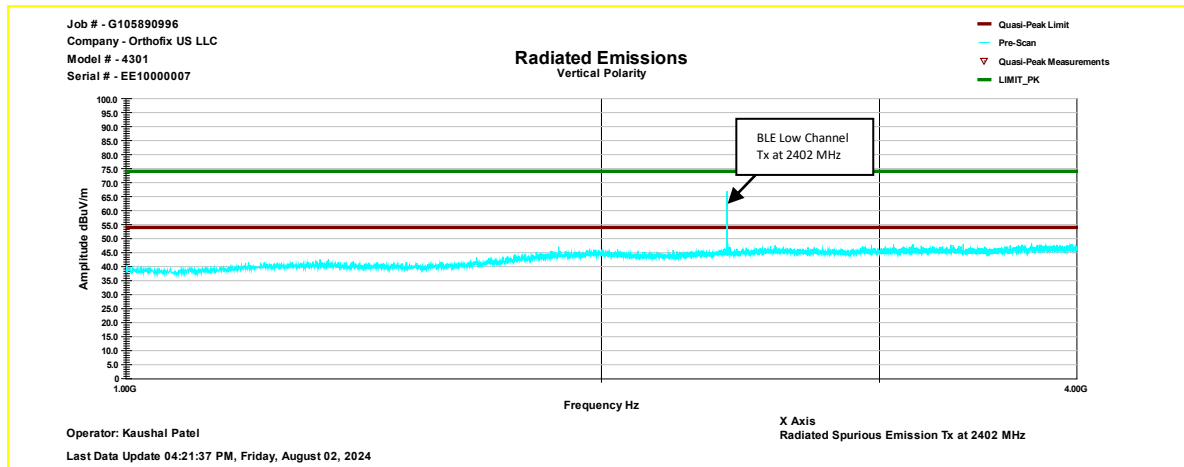
Frequency (MHz)	QPeak@ 3m (dBuV/m)	Lim. QPeak @3m (dBuV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
157.21	25.7	43.5	-17.8	100	256	Vertical	-16.9
183.02	18.4	43.5	-25.1	100	72	Vertical	-18.3
240	31.6	46	-14.4	100	105	Vertical	-17.2
312.7	31	46	-15.1	224	320	Vertical	-14.6
437.98	30.7	46	-15.3	109	76	Vertical	-11.3
469.49	31.7	46	-14.3	149	238	Vertical	-10.6

Note: Correction = AF + CF - Preamp

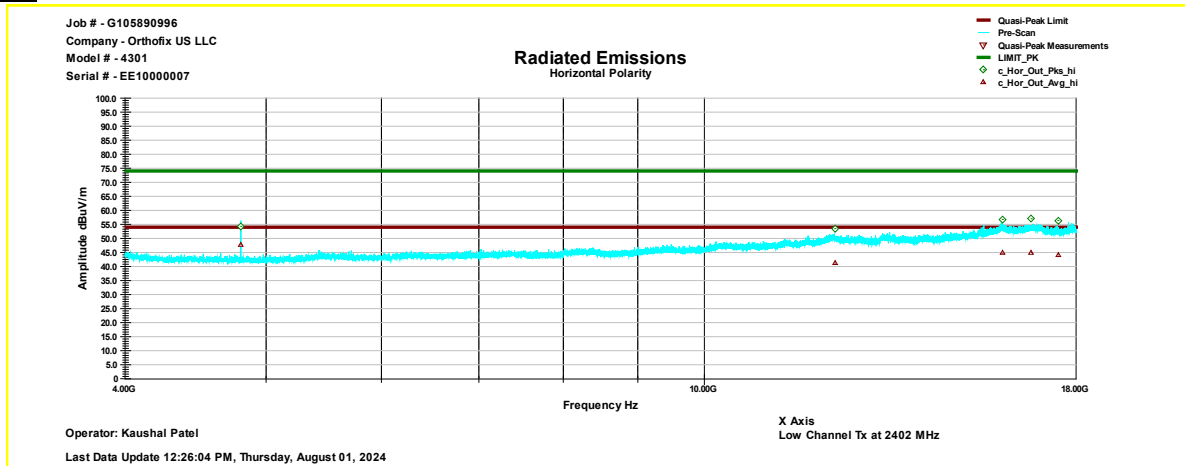
Radiated Spurious Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

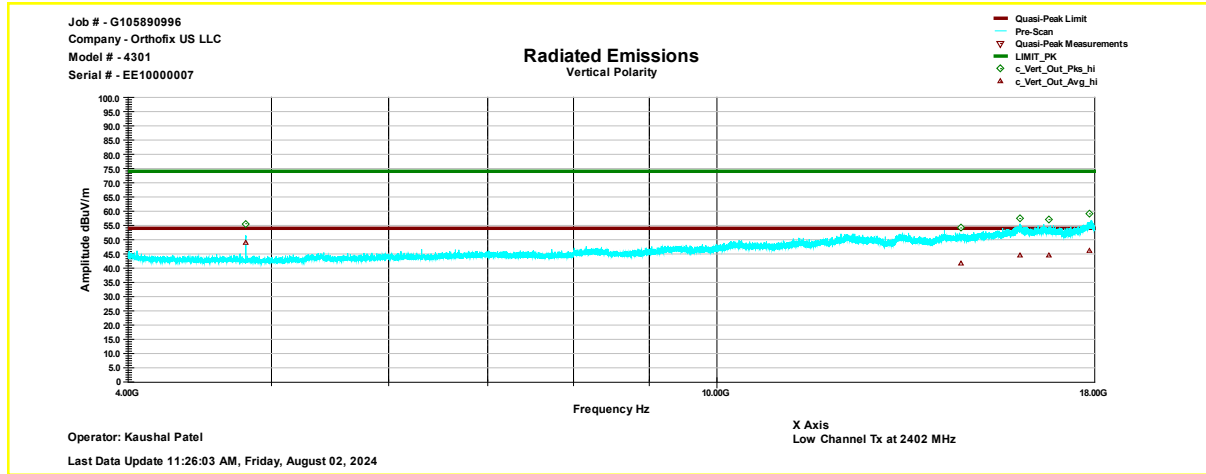
Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.55	54.3	74	-19.7	100	184	Horizontal	3.6
12290.55	53.5	74	-20.5	400	12	Horizontal	5.2
16017.55	56.7	74	-17.3	245	331	Horizontal	10.5
16765.55	57	74	-17	100	34	Horizontal	11.6
17491.45	56.4	74	-17.6	100	131	Horizontal	11.9

Note: Correction = AF + CF – Preamp

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.55	47.7	54	-6.3	100	184	Horizontal	3.6
12290.55	41.2	54	-12.8	400	12	Horizontal	5.2
16017.55	44.8	54	-9.2	245	331	Horizontal	10.5
16765.55	45	54	-9	100	34	Horizontal	11.6
17491.45	44.1	54	-9.9	100	131	Horizontal	11.9

Note: Correction = AF + CF – Preamp

Radiated Spurious Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization vs Avg Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.45	55.6	74	-18.4	321	177	Vertical	4.00
14613.55	54.1	74	-19.9	399	180	Vertical	7.00
16017.45	57.4	74	-16.6	398	310	Vertical	10.40
16765.55	57	74	-17	369	178	Vertical	11.10
17854.55	59	74	-15	172	232	Vertical	13.90

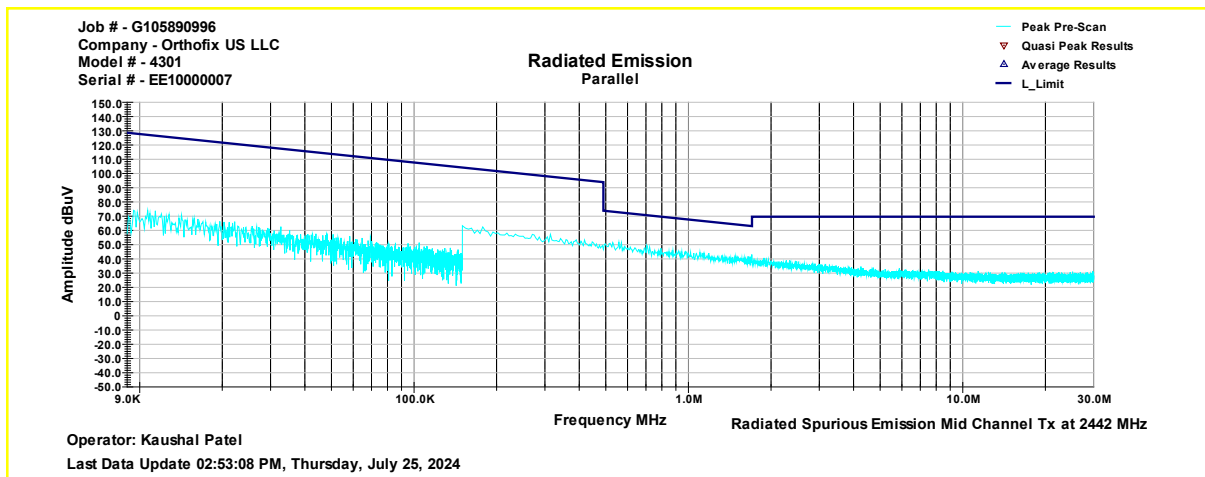
Note: Correction = AF + CF – Preamp

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.45	49.1	54	-4.9	321	177	Vertical	4.00
14613.55	41.9	54	-12.1	399	180	Vertical	7.00
16017.45	44.6	54	-9.4	398	310	Vertical	10.40
16765.55	44.5	54	-9.5	369	178	Vertical	11.10
17854.55	46.1	54	-7.9	172	232	Vertical	13.90

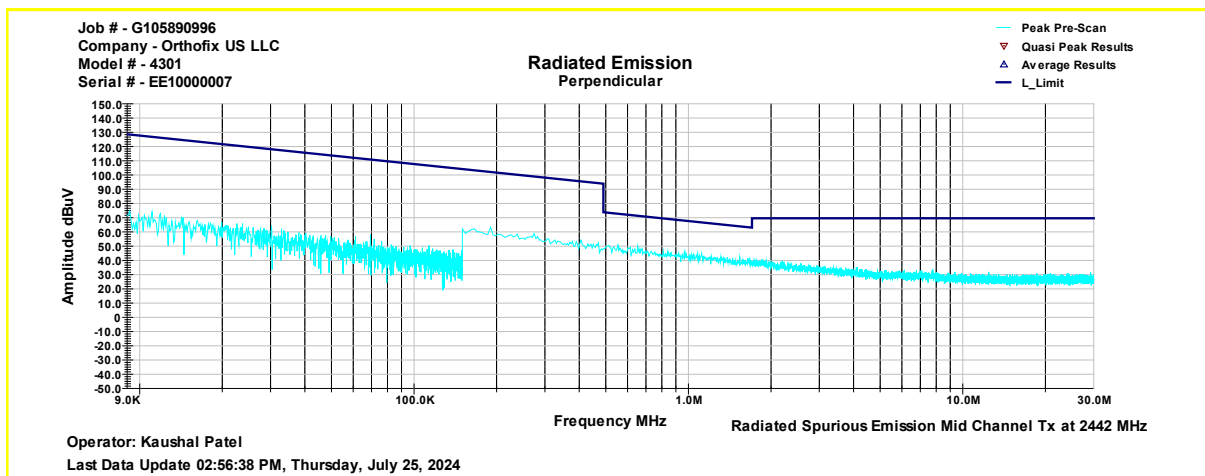
Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

Test Results: 15.209 Radiated Spurious Emissions Mid Channel, Tx at 2442MHz, X-Axis

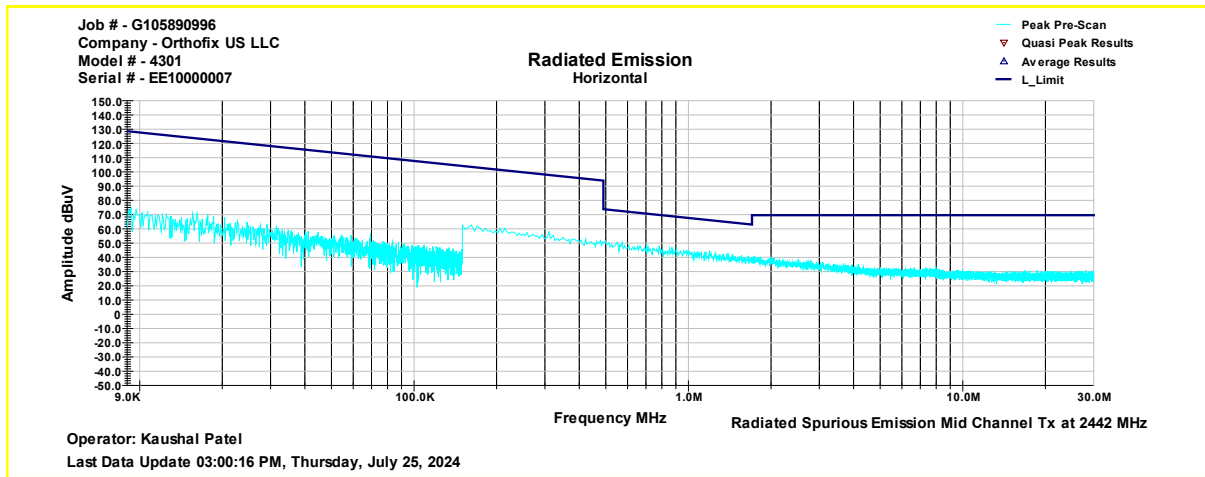
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



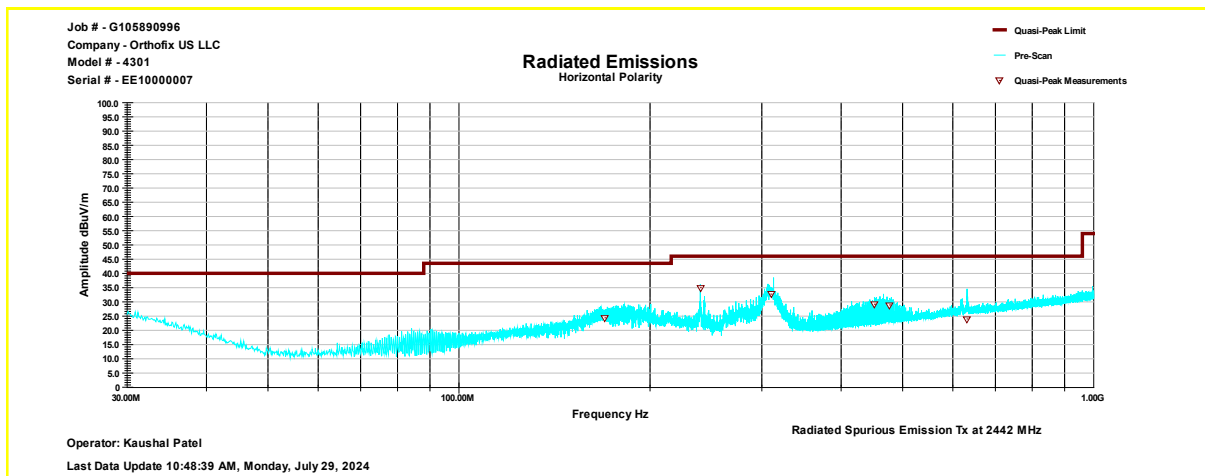
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



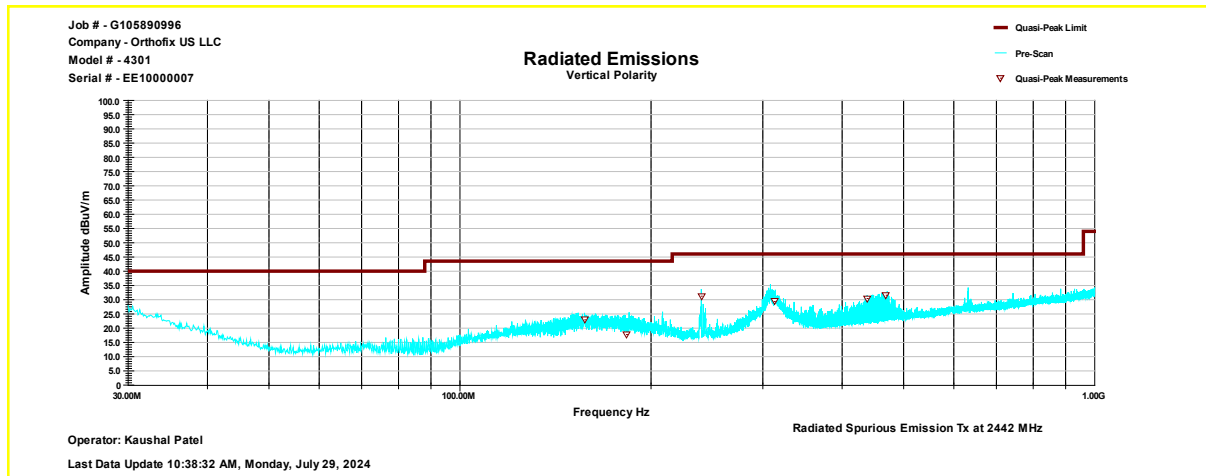
Radiated Spurious Emissions 30 MHz - 1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
169.85	24.4	43.5	-19.1	149	325	Horizontal	-17.6
240.05	35	46	-11	149	22	Horizontal	-17.2
310.01	32.7	46	-13.3	109	242	Horizontal	-14.7
451.51	29.1	46	-16.9	249	186	Horizontal	-11
477.01	28.9	46	-17.1	240	324	Horizontal	-10.4
631.75	24	46	-22.1	272	261	Horizontal	-7.4

Note: Correction = AF + CF - Preamp

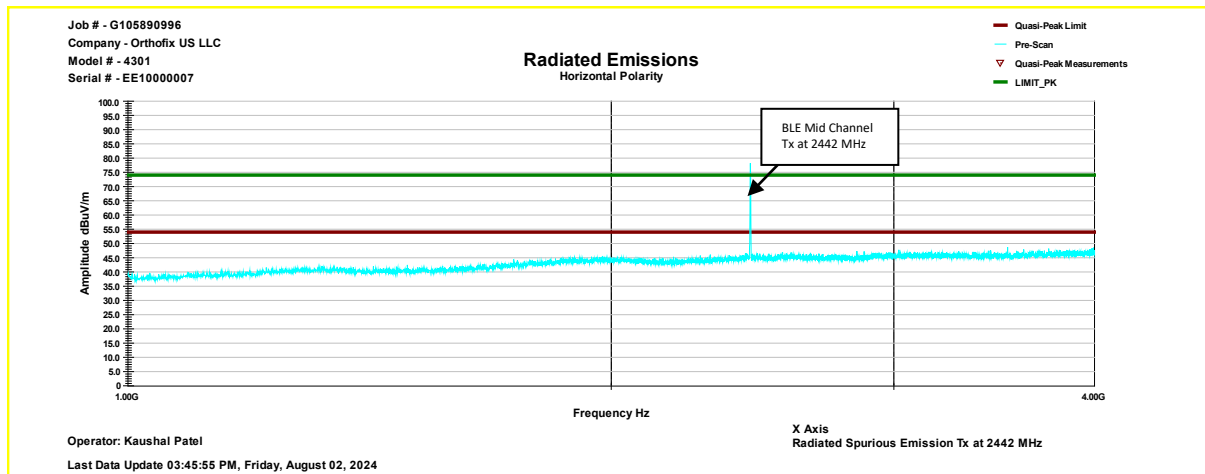
Radiated Spurious Emissions 30 MHz - 1000 MHz Vertical Antenna Polarization



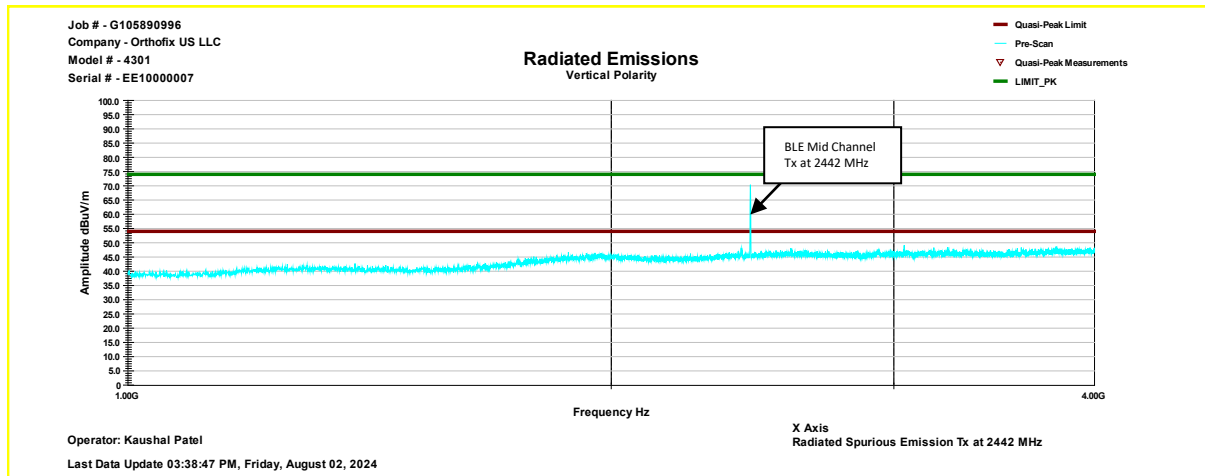
Frequency (MHz)	QPeak@ 3m (dBuV/m)	Lim. QPeak @3m (dBuV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
157.23	22.9	43.5	-20.6	125	72	Vertical	-16.9
182.95	17.7	43.5	-25.8	125	44	Vertical	-18.3
239.97	31.2	46	-14.8	324	49	Vertical	-17.2
312.71	29.3	46	-16.7	149	330	Vertical	-14.6
438	30.4	46	-15.6	109	73	Vertical	-11.3
469.48	31.5	46	-14.5	109	70	Vertical	-10.6

Note: Correction = AF + CF - Preamp

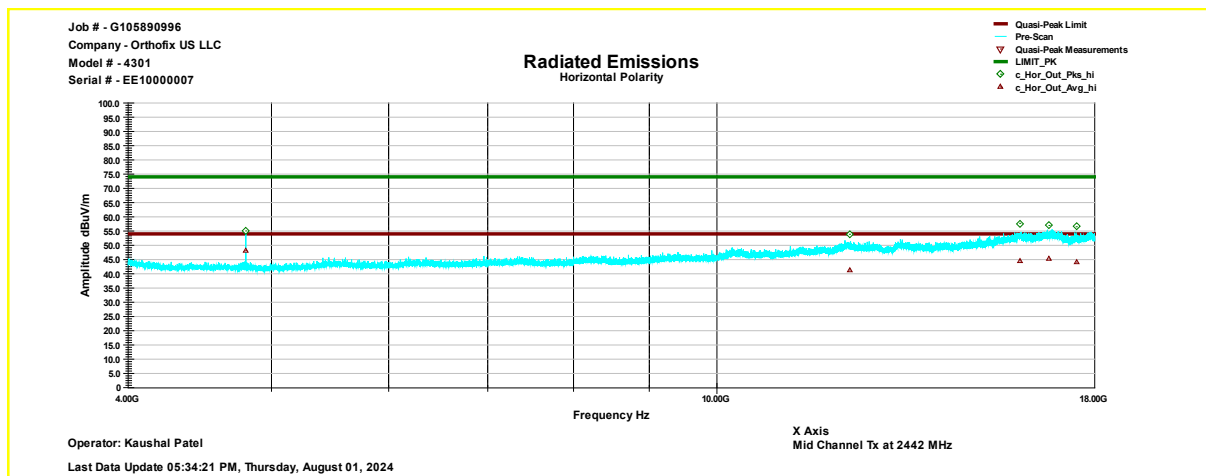
Radiated Spurious Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

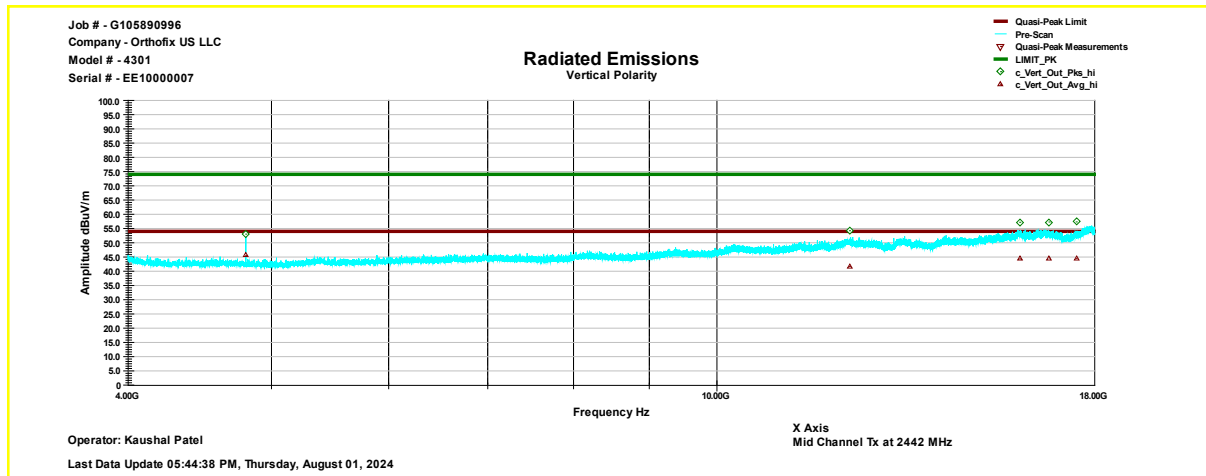
Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	55	74	-19	149	257	Horizontal	3.6
12290.55	53.8	74	-20.2	377	330	Horizontal	5.2
16017.55	57.7	74	-16.3	173	33	Horizontal	10.5
16765.55	56.9	74	-17.1	110	317	Horizontal	11.6
17491.45	56.5	74	-17.5	280	82	Horizontal	11.9

Note: Correction = AF + CF – Preamp

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	48.1	54	-5.9	149	257	Horizontal	3.6
12290.55	41.3	54	-12.7	377	330	Horizontal	5.2
16017.55	44.5	54	-9.5	173	33	Horizontal	10.5
16765.55	45.2	54	-8.8	110	317	Horizontal	11.6
17491.45	44.1	54	-9.9	280	82	Horizontal	11.9

Note: Correction = AF + CF – Preamp

Radiated Spurious Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	53	74	-21	250	247	Vertical	4.00
12290.55	54.2	74	-19.8	371	338	Vertical	5.60
16017.45	57.2	74	-16.8	299	58	Vertical	10.40
16765.55	57.3	74	-16.7	117	51	Vertical	11.10
17491.45	57.3	74	-16.7	378	265	Vertical	12.30

Note: Correction = AF + CF - Preamp

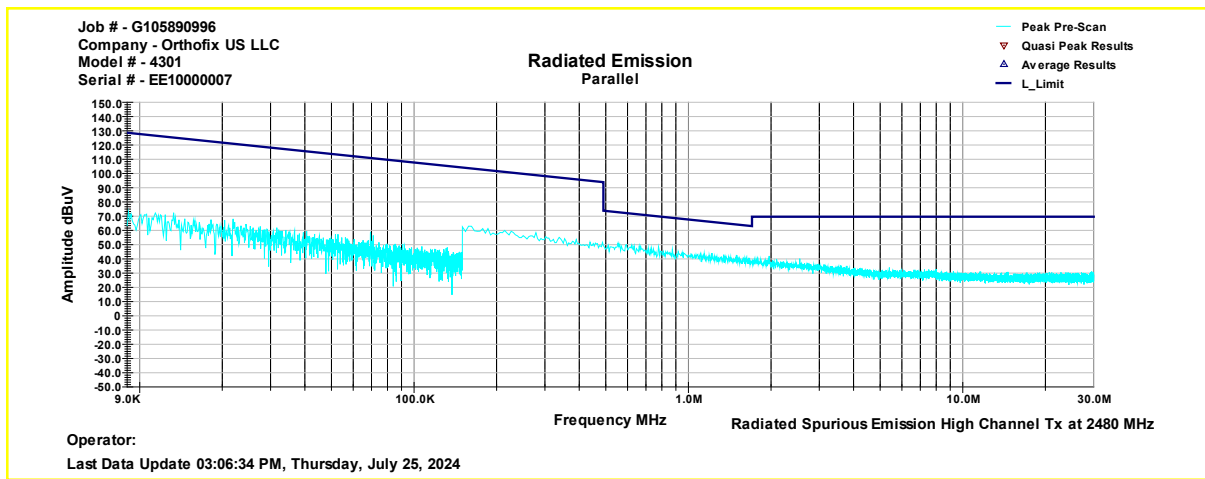
Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	45.5	54	-8.4	250	247	Vertical	4.00
12290.55	41.7	54	-12.3	371	338	Vertical	5.60
16017.45	44.3	54	-9.6	299	58	Vertical	10.40
16765.55	44.6	54	-9.4	117	51	Vertical	11.10
17491.45	44.5	54	-9.5	378	265	Vertical	12.30

Note: Correction = AF + CF - Preamp

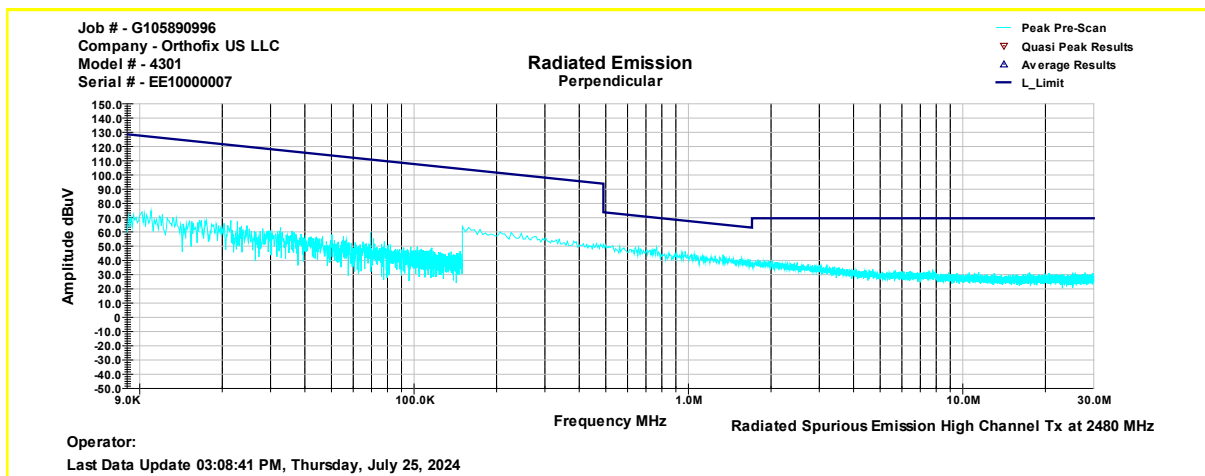
Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

Test Results: 15.209 Radiated Spurious Emissions High Channel, Tx at 2480MHz, X-Axis

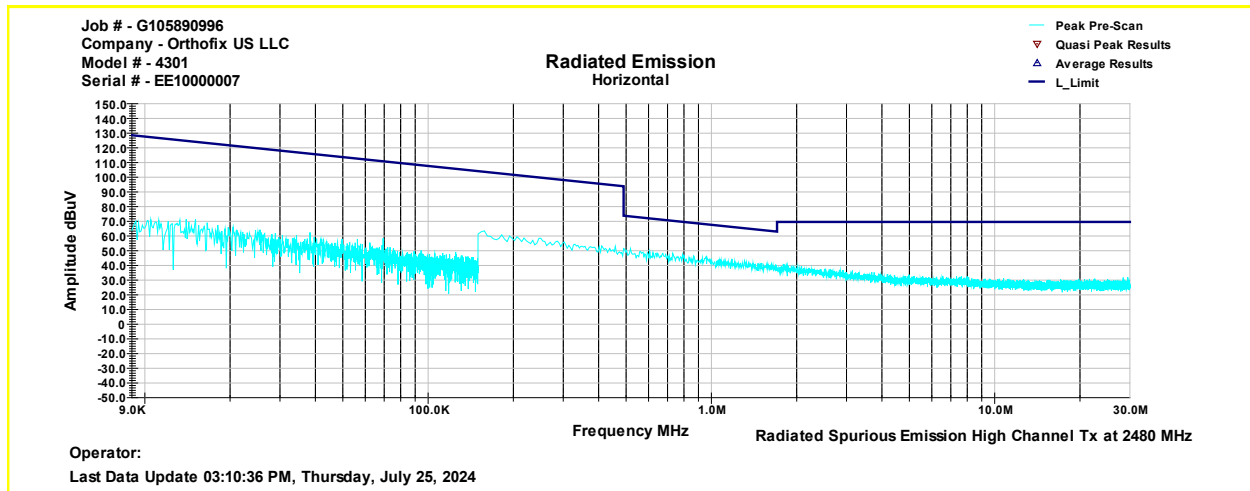
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



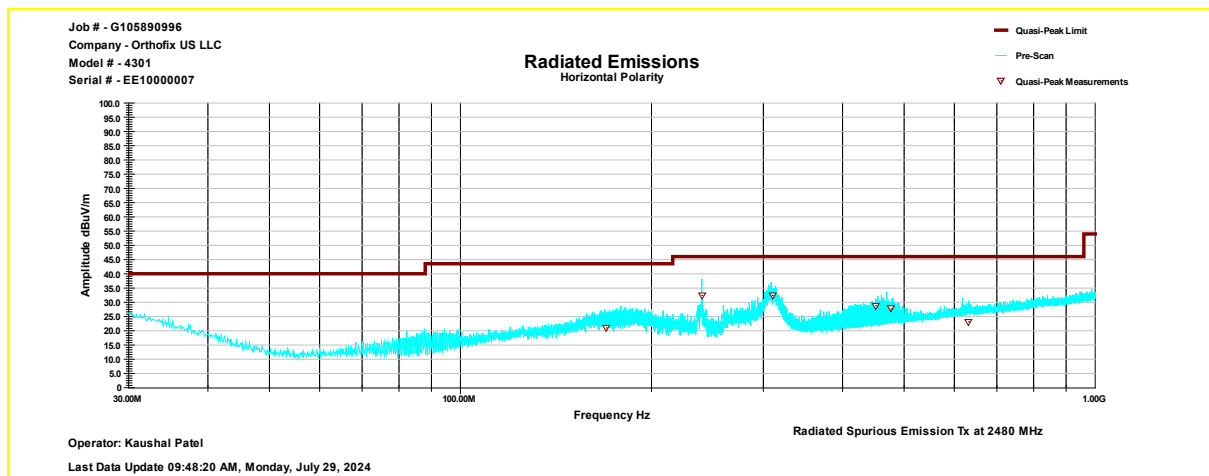
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



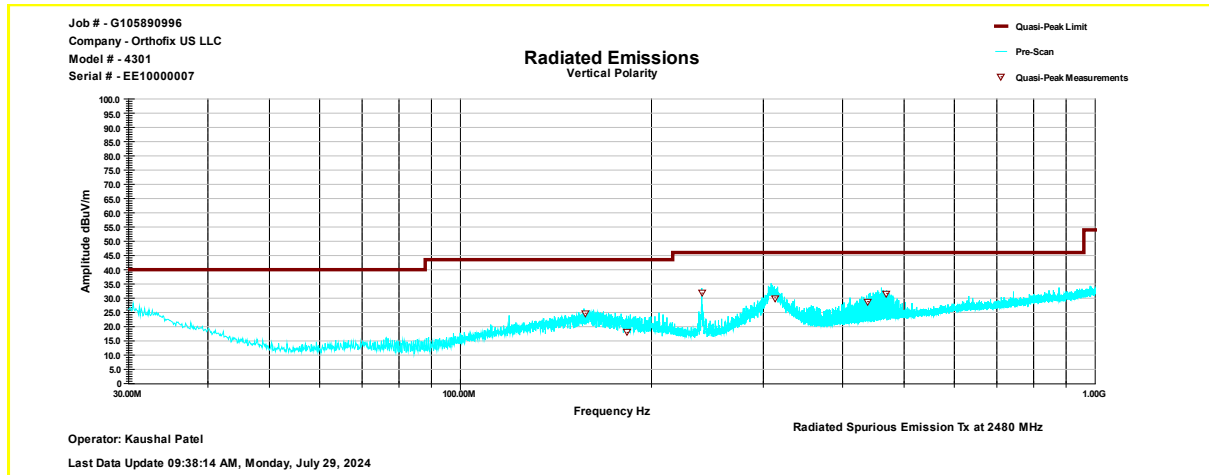
Radiated Spurious Emissions 30 MHz - 1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
169.81	21	43.5	-22.6	188	325	Horizontal	-17.6
240.01	32.4	46	-13.6	100	143	Horizontal	-17.2
310.05	32.4	46	-13.6	150	244	Horizontal	-14.7
451.51	28.8	46	-17.2	249	184	Horizontal	-11
477.01	27.7	46	-18.3	249	293	Horizontal	-10.4
631.65	23.1	46	-22.9	126	125	Horizontal	-7.4

Note: Correction = AF + CF - Preamp

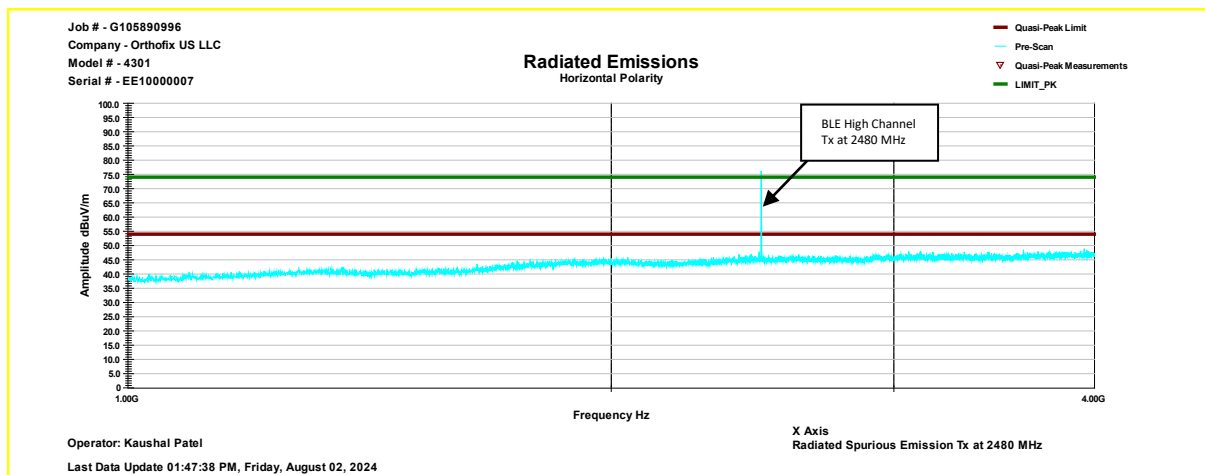
Radiated Spurious Emissions 30 MHz - 1000 MHz Vertical Antenna Polarization



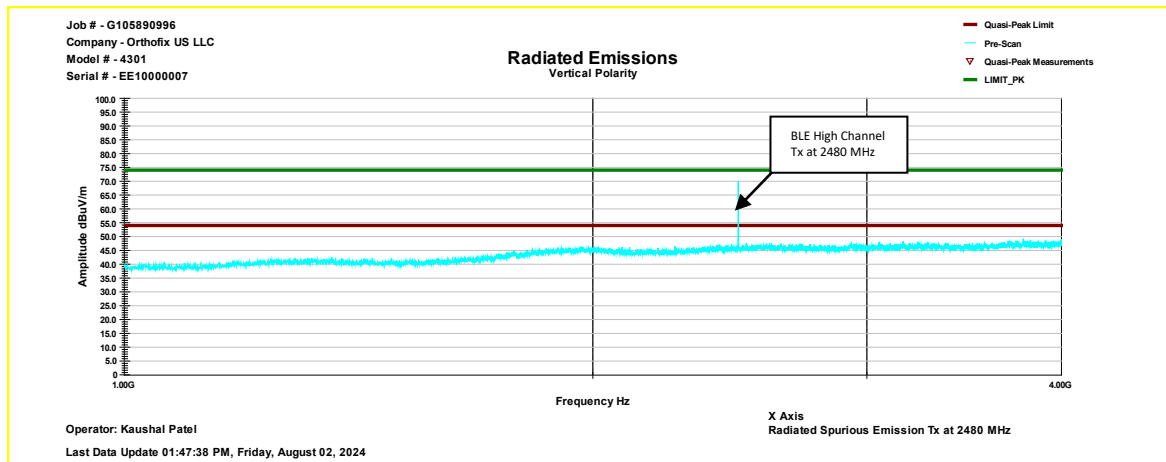
Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
157.19	24.7	43.5	-18.8	100	246	Vertical	-16.9
183.03	18	43.5	-25.6	100	68	Vertical	-18.3
239.99	31.8	46	-14.3	306	58	Vertical	-17.2
312.73	30.1	46	-15.9	223	299	Vertical	-14.6
437.99	28.8	46	-17.3	149	246	Vertical	-11.3
469.48	31.7	46	-14.3	149	214	Vertical	-10.6

Note: Correction = AF + CF - Preamp

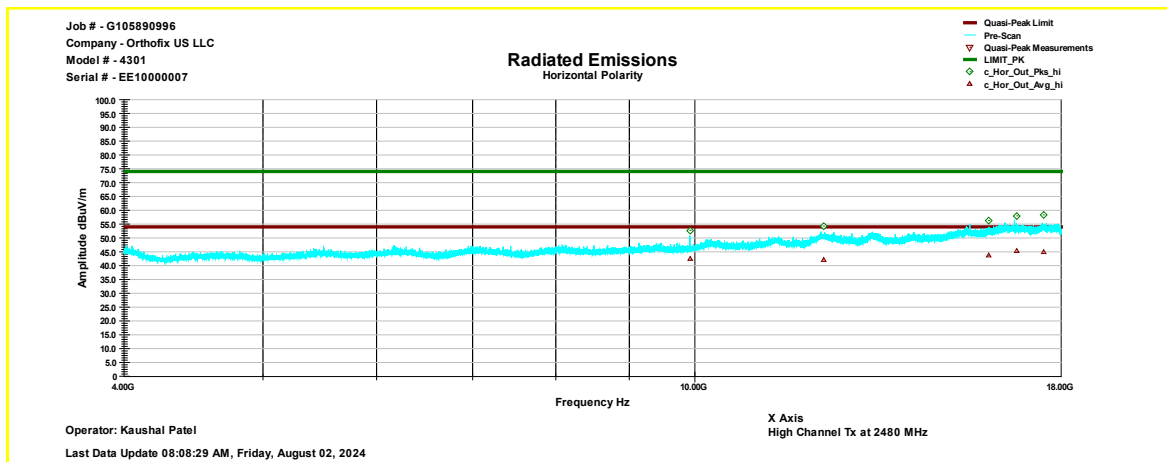
Radiated Spurious Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

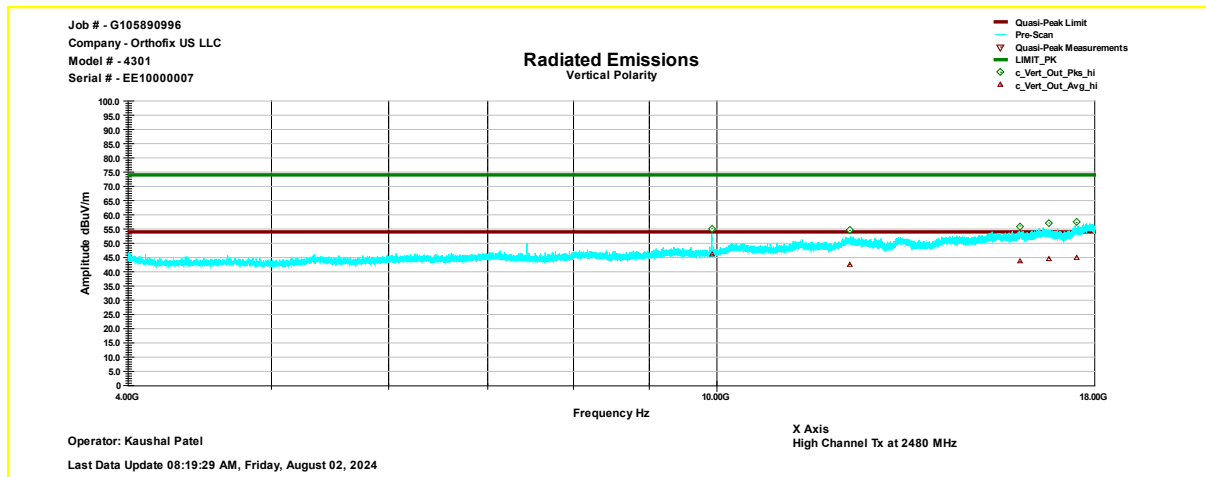
Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
9920.55	52.7	74	-21.3	208	194	Horizontal	1
12290.55	54.3	74	-19.7	163	120	Horizontal	5.2
16017.55	56.3	74	-17.7	199	213	Horizontal	10.5
16765.55	58	74	-16	344	80	Horizontal	11.6
17491.55	58.3	74	-15.7	118	302	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
9920.55	42.3	54	-11.6	208	194	Horizontal	1
12290.55	42.1	54	-11.9	163	120	Horizontal	5.2
16017.55	43.7	54	-10.3	199	213	Horizontal	10.5
16765.55	45.2	54	-8.8	344	80	Horizontal	11.6
17491.55	44.9	54	-9.1	118	302	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Radiated Spurious Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
9919.55	55.1	74	-18.9	100	26	Vertical	1.7
12290.55	54.5	74	-19.5	378	250	Vertical	5.6
16017.45	56.1	74	-17.9	353	269	Vertical	10.4
16765.55	57.1	74	-16.9	335	99	Vertical	11.1
17491.55	57.3	74	-16.7	100	133	Vertical	12.3

Note: Correction = AF + CF – Preamp

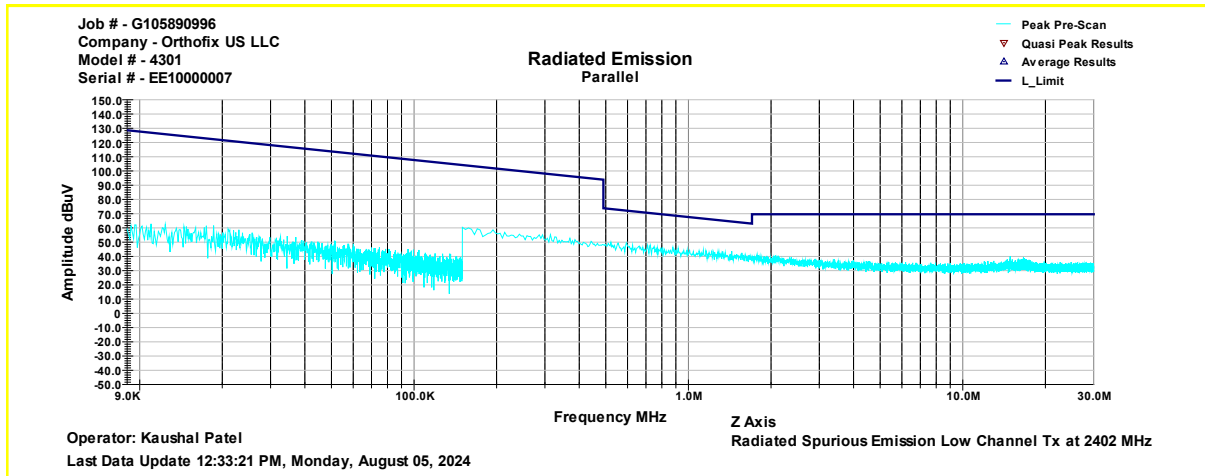
Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
9919.55	46	54	-8	100	26	Vertical	1.7
12290.55	42.6	54	-11.4	378	250	Vertical	5.6
16017.45	43.6	54	-10.4	353	269	Vertical	10.4
16765.55	44.7	54	-9.3	335	99	Vertical	11.1
17491.55	45.1	54	-8.9	100	133	Vertical	12.3

Note: Correction = AF + CF – Preamp

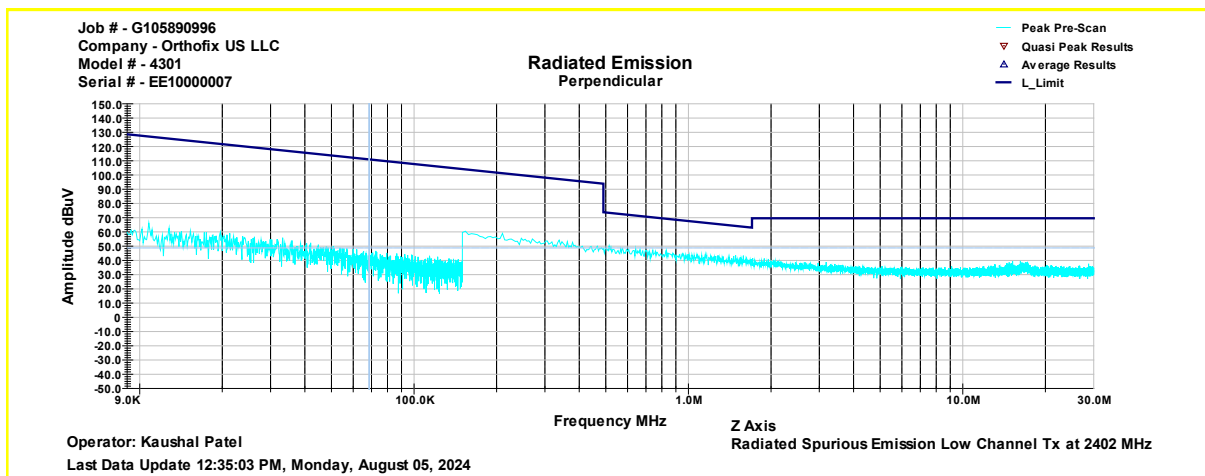
Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

Test Results: 15.209 Radiated Spurious Emissions Low Channel, Tx at 2402MHz, Y-Axis

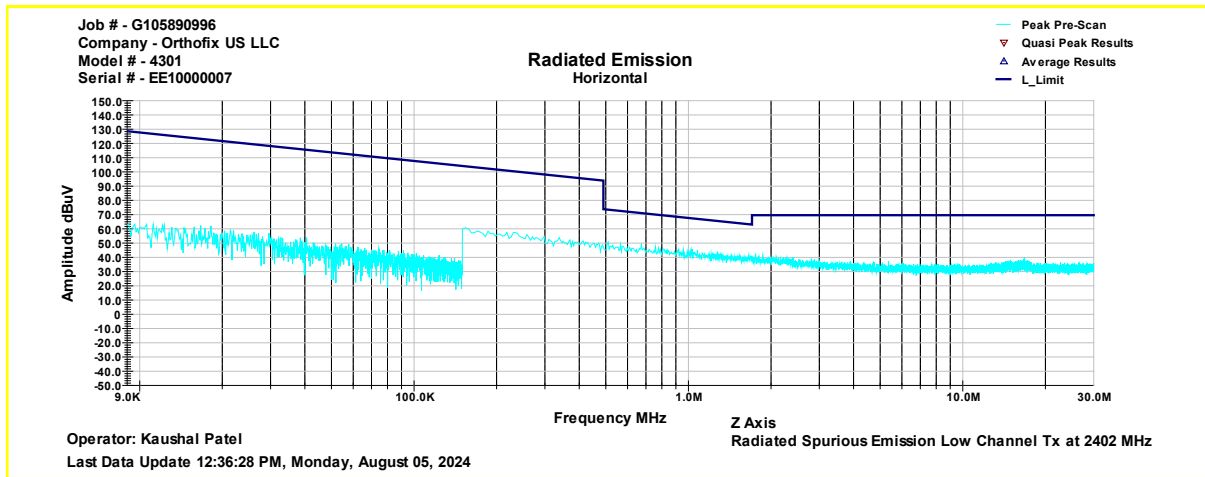
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



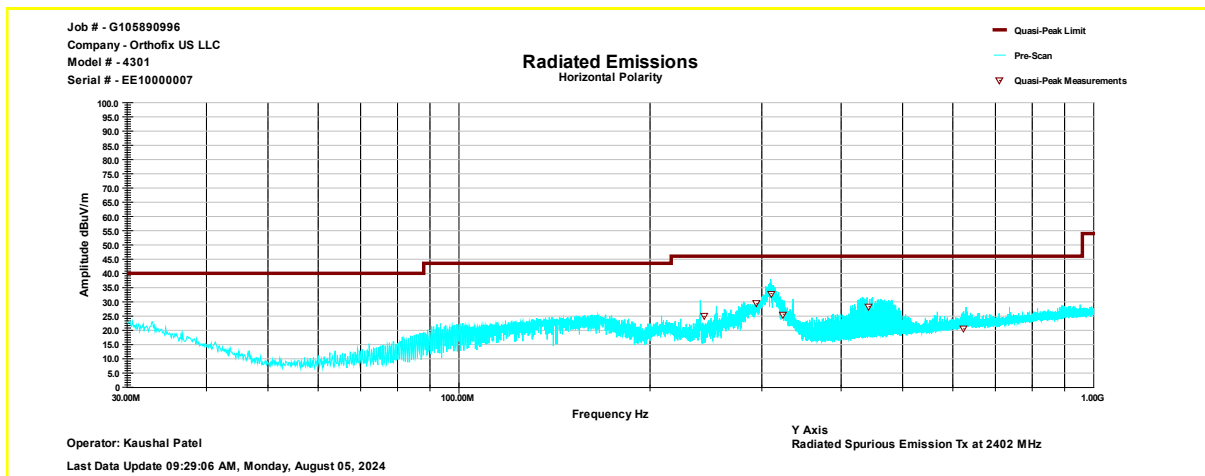
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



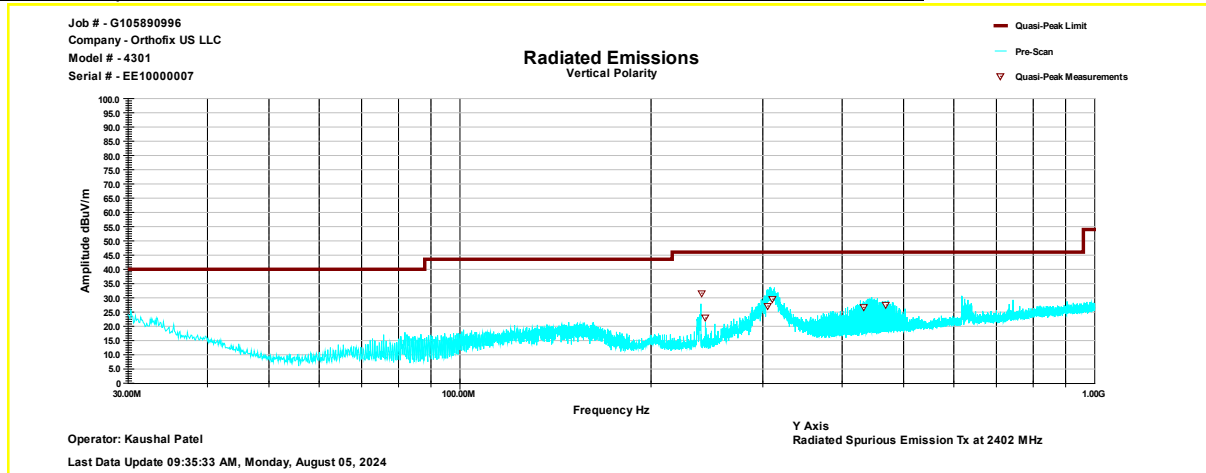
Radiated Spurious Emissions 30 MHz - 1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
242.95	24.9	46	-21.1	100	236	Horizontal	-17.2
294.45	29.3	46	-16.7	110	149	Horizontal	-15.1
310.15	32.9	46	-13.1	110	80	Horizontal	-14.7
324.21	25.7	46	-20.4	110	80	Horizontal	-14.4
442.51	28.3	46	-17.7	250	59	Horizontal	-11.2
623.35	20.5	46	-25.6	350	90	Horizontal	-7.6

Note: Correction = AF + CF - Preamp

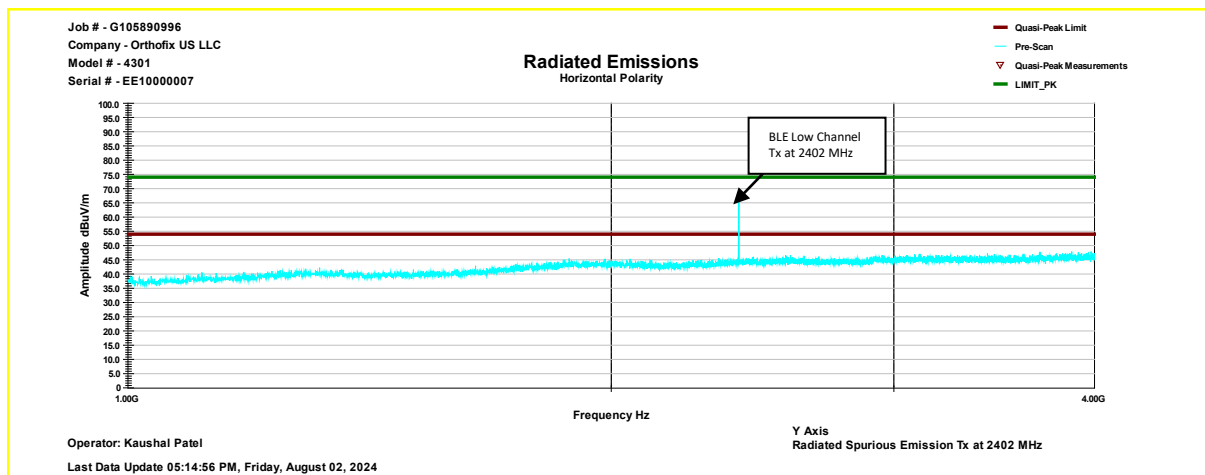
Radiated Spurious Emissions 30 MHz - 1000 MHz Vertical Antenna Polarization



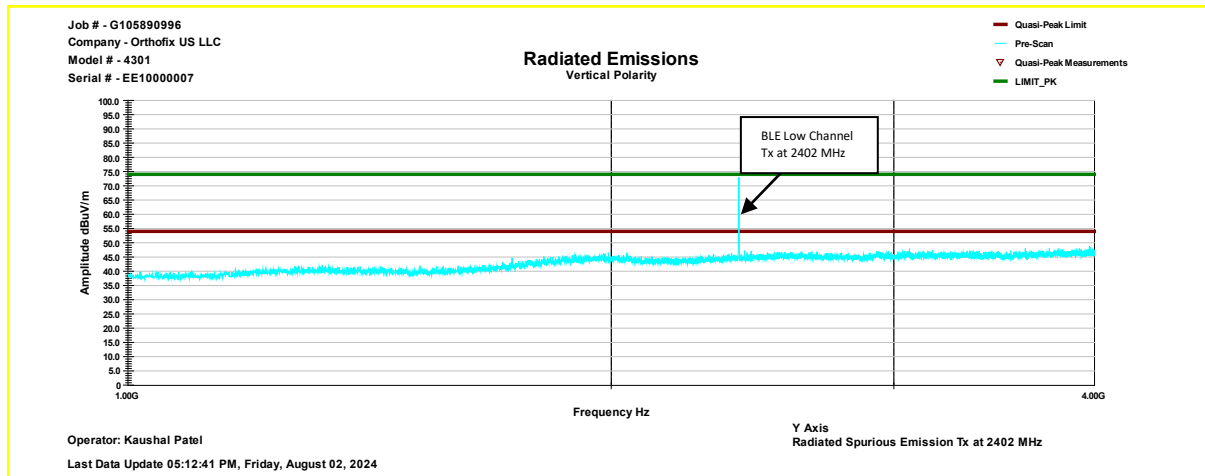
Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
239.99	31.6	46	-14.4	268	29	Vertical	-17.2
243.68	22.9	46	-23.1	285	40	Vertical	-17.2
305.38	27.1	46	-18.9	249	184	Vertical	-14.8
310.98	29.5	46	-16.5	267	80	Vertical	-14.7
431.96	26.7	46	-19.4	127	67	Vertical	-11.6
469.49	27.5	46	-18.6	149	55	Vertical	-10.6

Note: Correction = AF + CF - Preamp

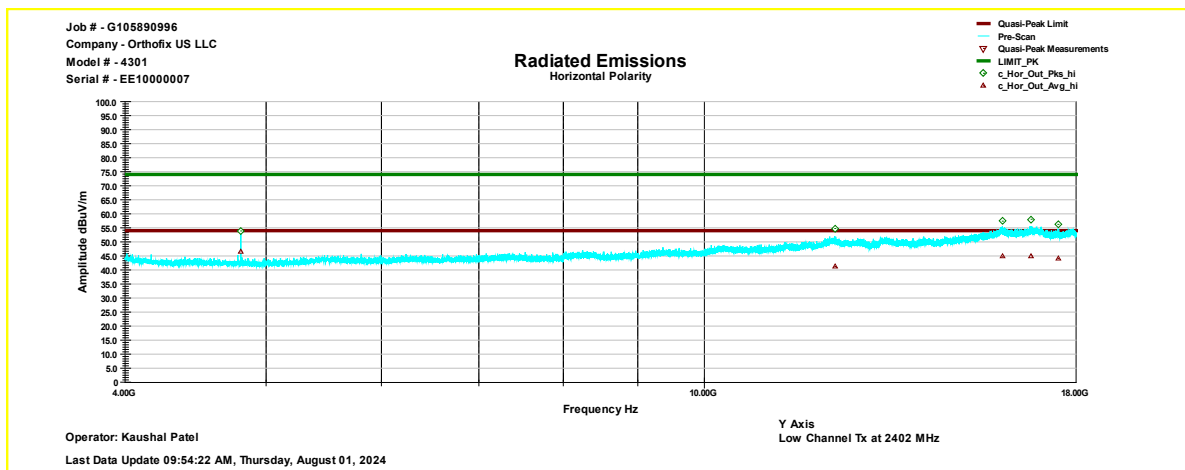
Radiated Spurious Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

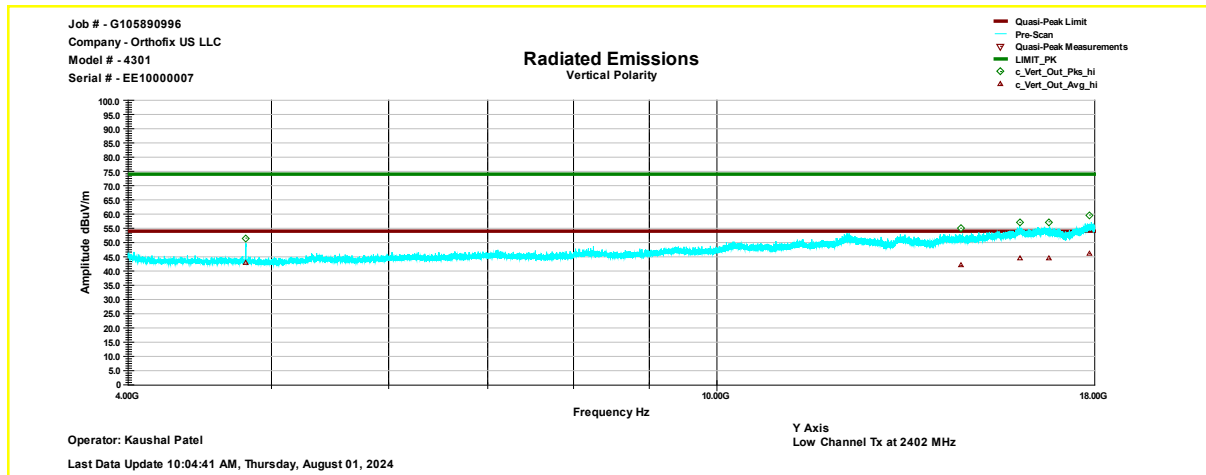
Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.45	53.9	74	-20.1	110	87	Horizontal	3.6
12290.45	54.8	74	-19.2	190	315	Horizontal	5.2
16017.55	57.3	74	-16.7	324	51	Horizontal	10.5
16765.55	58.1	74	-15.9	399	191	Horizontal	11.6
17491.45	56.2	74	-17.8	118	165	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.45	46.7	54	-7.3	110	87	Horizontal	3.6
12290.45	41.2	54	-12.8	190	315	Horizontal	5.2
16017.55	44.9	54	-9.1	324	51	Horizontal	10.5
16765.55	45	54	-9	399	191	Horizontal	11.6
17491.45	44.1	54	-9.9	118	165	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Radiated Spurious Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4804.45	51.5	74	-22.5	150	17	Vertical	4.00
14613.45	55	74	-19	180	200	Vertical	7.00
16017.55	57.1	74	-16.9	323	106	Vertical	10.40
16765.45	57.2	74	-16.8	280	190	Vertical	11.10
17854.45	59.6	74	-14.4	400	116	Vertical	13.90

Note: Correction = AF + CF - Preamp

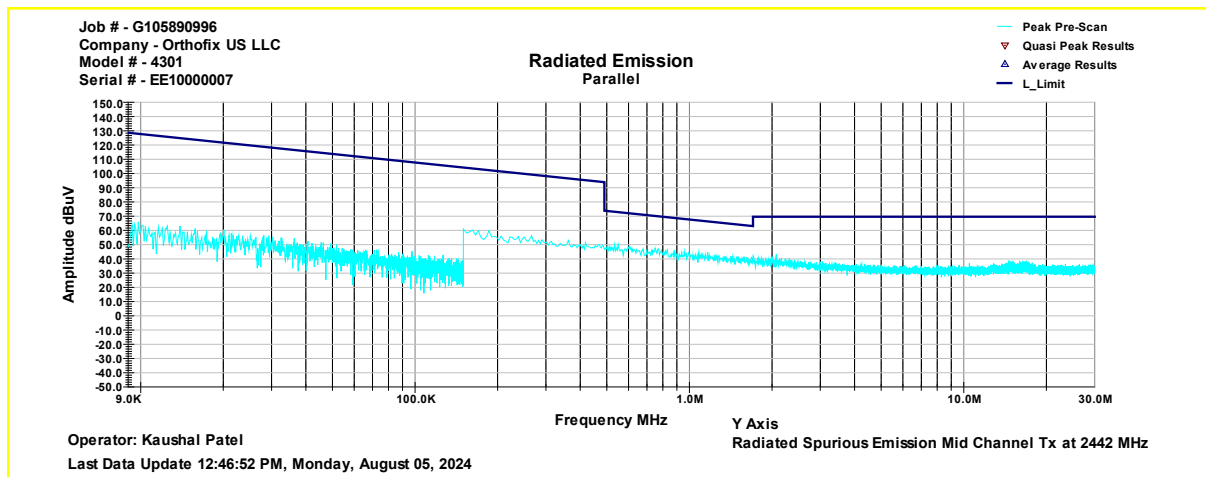
Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4804.45	42.8	54	-11.2	150	17	Vertical	4.00
14613.45	41.9	54	-12.1	180	200	Vertical	7.00
16017.55	44.7	54	-9.3	323	106	Vertical	10.40
16765.45	44.4	54	-9.5	280	190	Vertical	11.10
17854.45	46.1	54	-7.9	400	116	Vertical	13.90

Note: Correction = AF + CF - Preamp

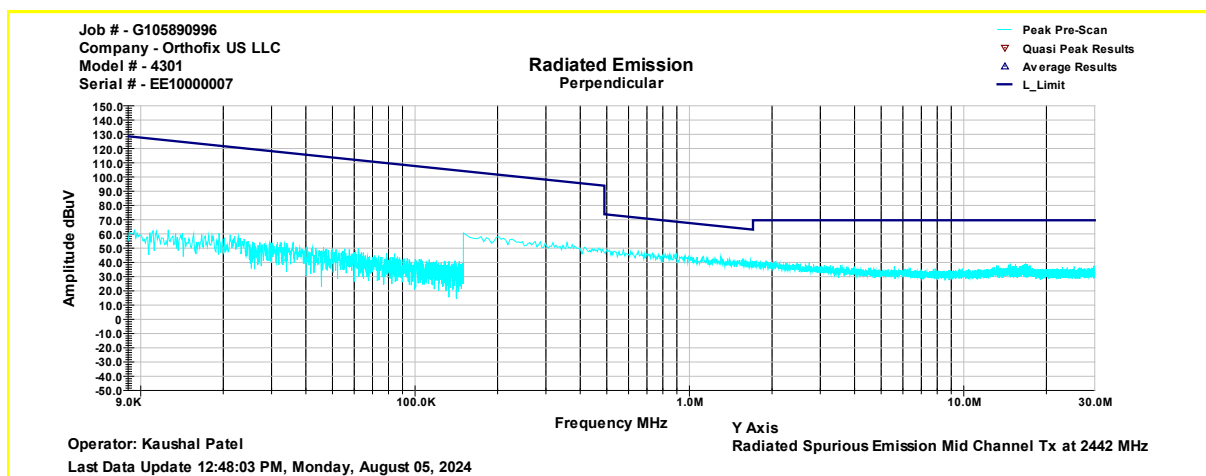
Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

Test Results: 15.209 Radiated Spurious Emissions Mid Channel, Tx at 2442MHz, Y-Axis

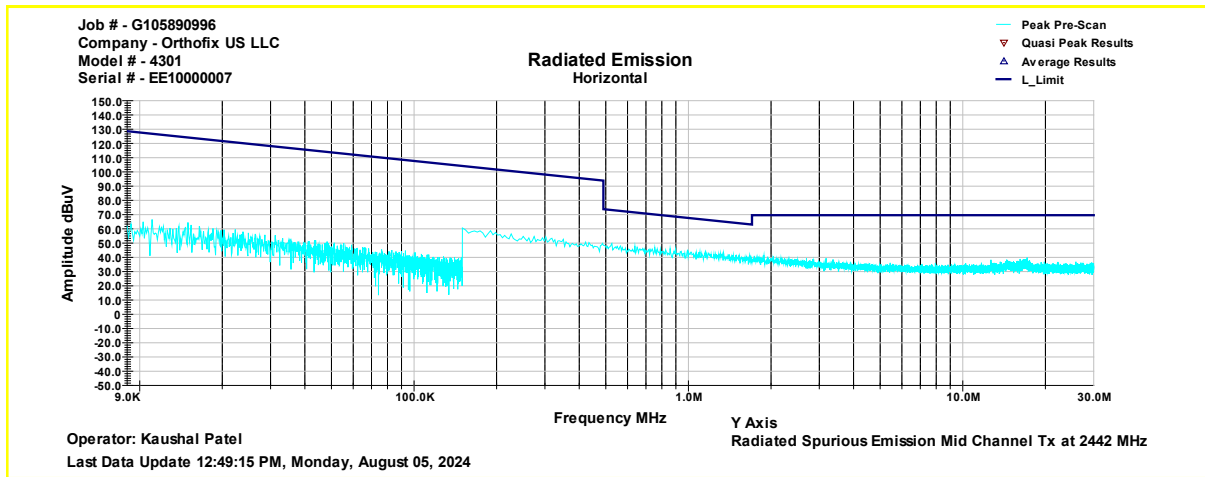
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



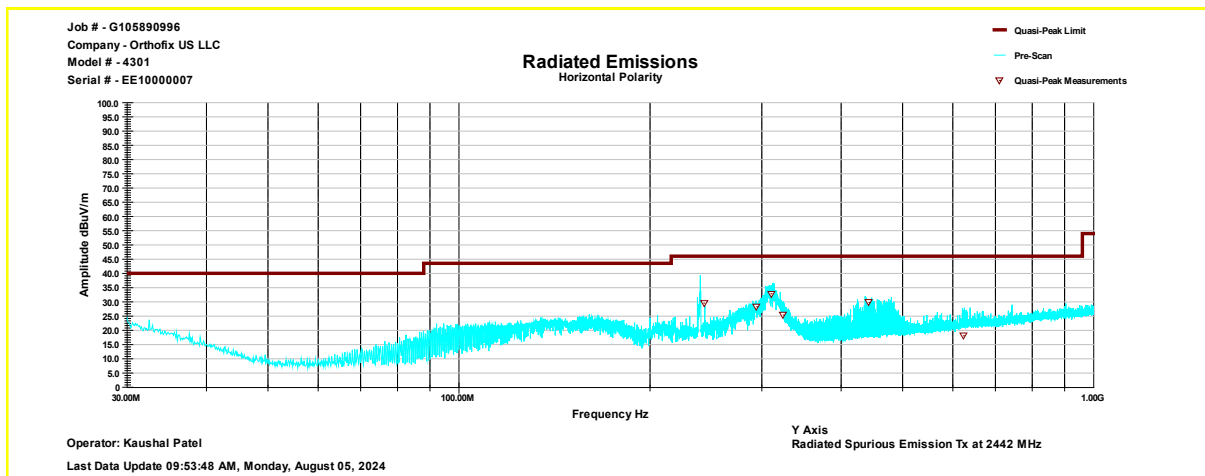
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



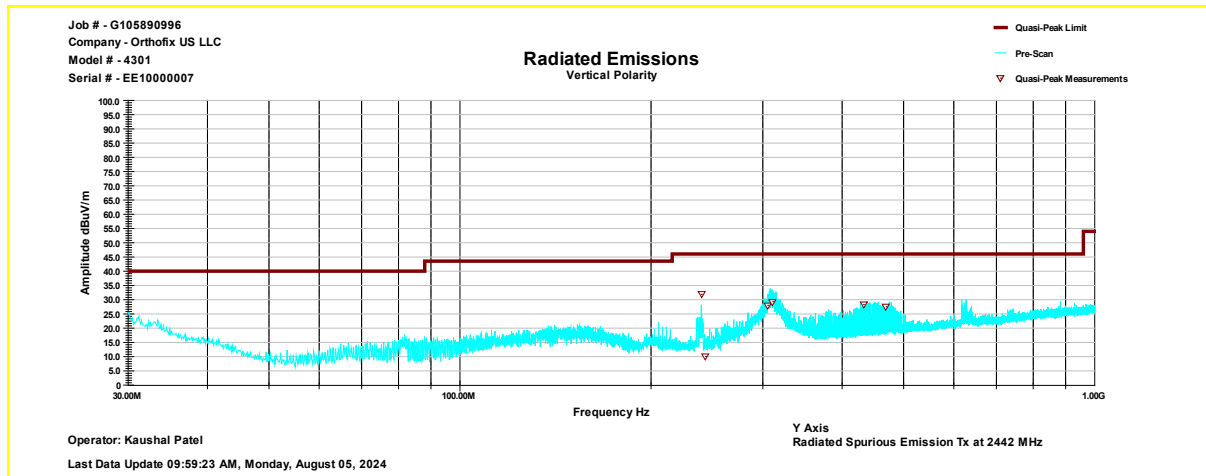
Radiated Spurious Emissions 30 MHz - 1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
243.01	29.6	46	-16.5	127	167	Horizontal	-17.2
294.51	28.2	46	-17.8	100	166	Horizontal	-15.1
310.11	32.8	46	-13.2	100	80	Horizontal	-14.7
324.25	25.4	46	-20.6	100	0	Horizontal	-14.4
442.51	29.8	46	-16.2	250	251	Horizontal	-11.2
623.41	18.1	46	-28	149	0	Horizontal	-7.6

Note: Correction = AF + CF - Preamp

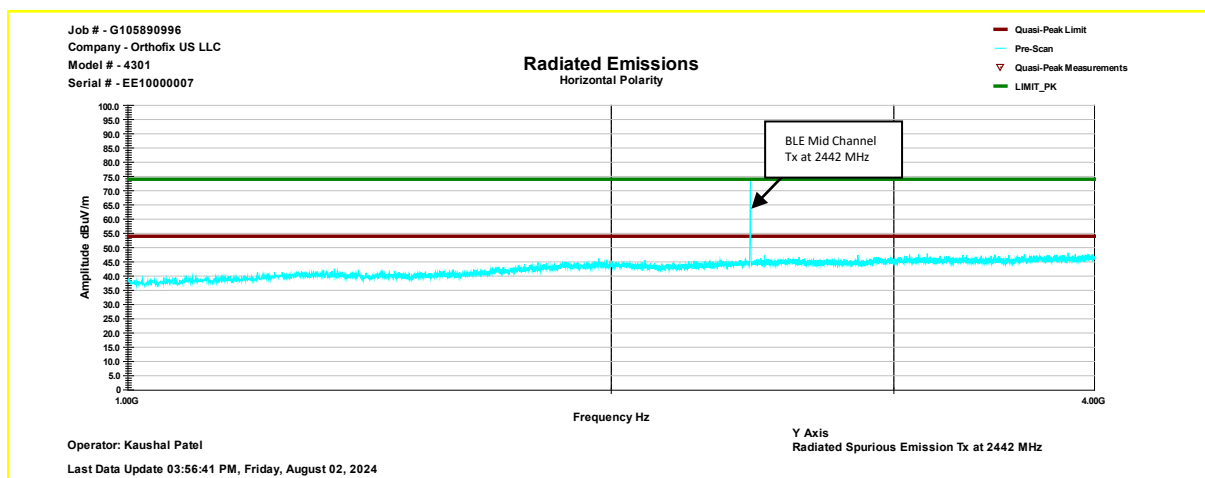
Radiated Spurious Emissions 30 MHz - 1000 MHz Vertical Antenna Polarization



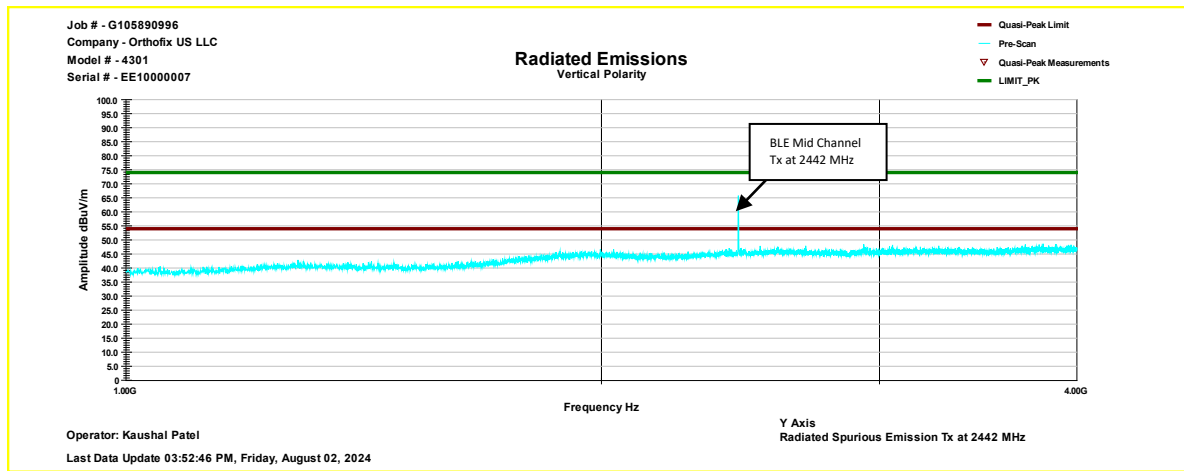
Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
239.99	31.8	46	-14.2	250	39	Vertical	-17.2
243.7	10.1	46	-36	100	23	Vertical	-17.2
305.44	28	46	-18	250	84	Vertical	-14.8
311.01	29.2	46	-16.8	239	65	Vertical	-14.7
431.98	28.3	46	-17.8	149	32	Vertical	-11.6
469.49	27.5	46	-18.5	149	23	Vertical	-10.6

Note: Correction = AF + CF - Preamp

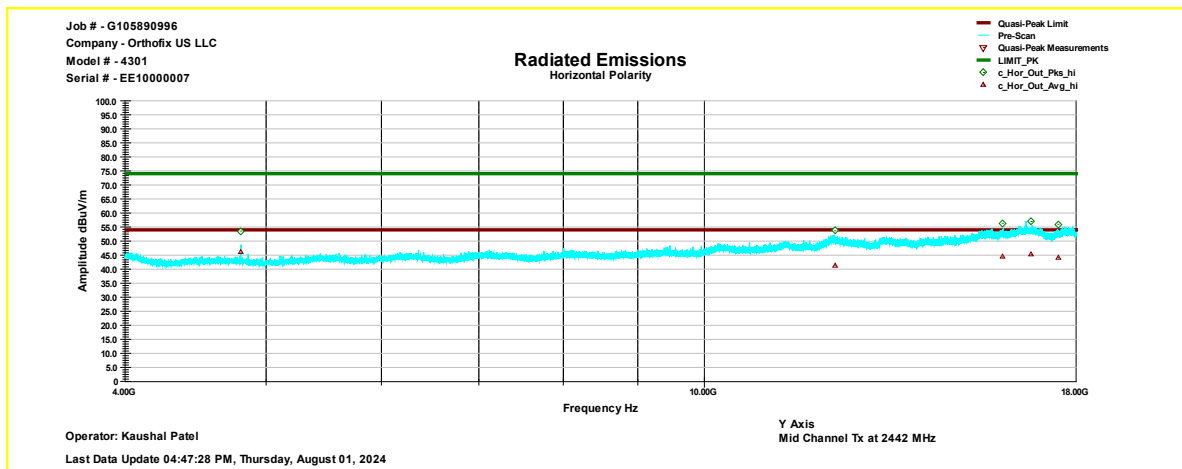
Radiated Spurious Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

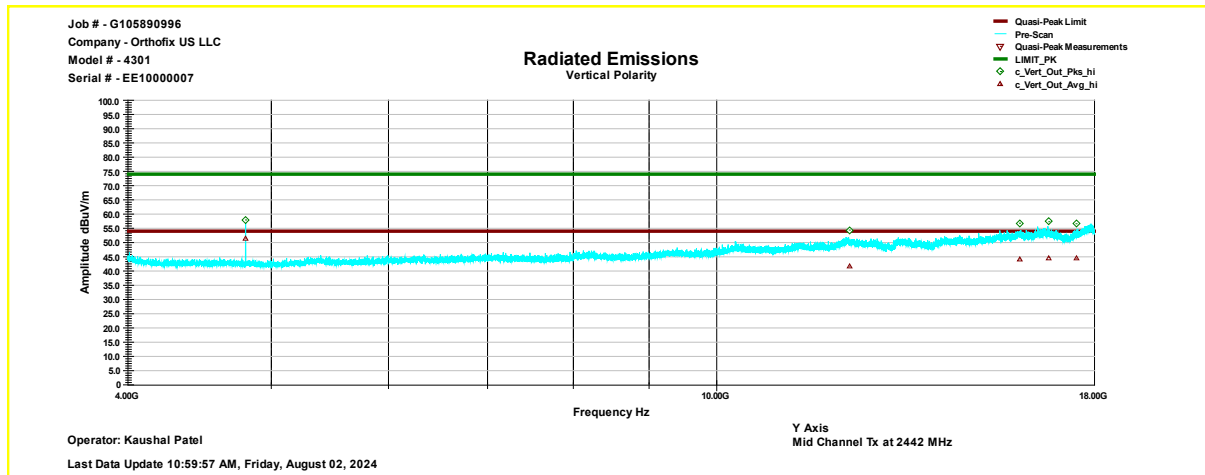
Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	53.5	74	-20.5	100	248	Horizontal	3.6
12290.45	53.6	74	-20.4	163	139	Horizontal	5.2
16017.45	56.3	74	-17.7	270	336	Horizontal	10.5
16765.45	56.9	74	-17.1	154	176	Horizontal	11.6
17491.55	55.9	74	-18.1	110	275	Horizontal	11.9

Note: Correction = AF + CF – Preamp

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	46.1	54	-7.9	100	248	Horizontal	3.6
12290.45	41.4	54	-12.6	163	139	Horizontal	5.2
16017.45	44.3	54	-9.7	270	336	Horizontal	10.5
16765.45	45.2	54	-8.8	154	176	Horizontal	11.6
17491.55	44.1	54	-9.9	110	275	Horizontal	11.9

Note: Correction = AF + CF – Preamp

Radiated Spurious Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	57.9	74	-16.1	100	4	Vertical	4.00
12290.45	54.4	74	-19.6	100	115	Vertical	5.60
16017.45	56.8	74	-17.2	252	348	Vertical	10.40
16765.55	57.3	74	-16.7	299	96	Vertical	11.10
17491.55	56.6	74	-17.4	137	71	Vertical	12.30

Note: Correction = AF + CF - Preamp

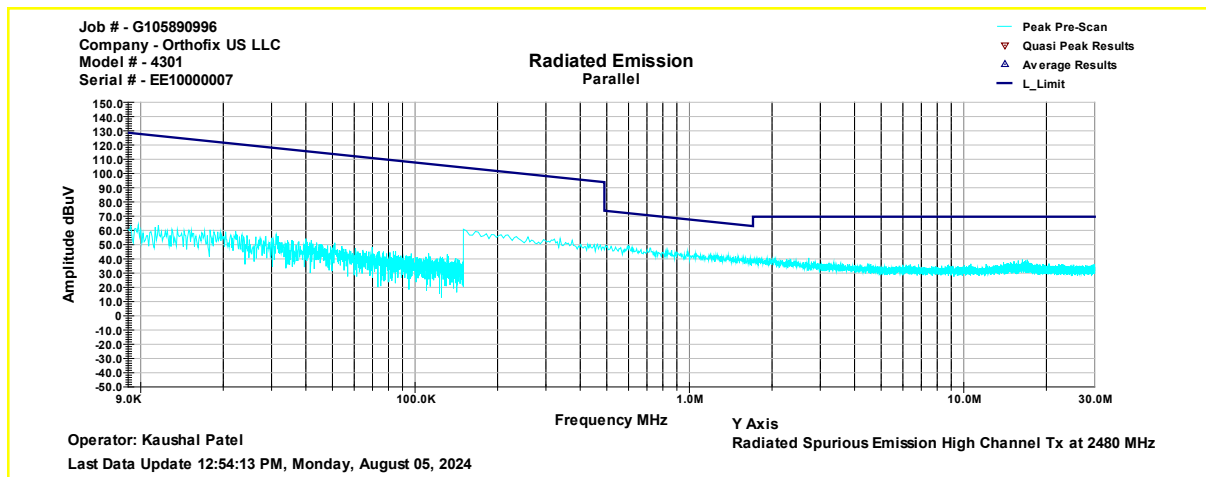
Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	51.5	54	-2.4	100	4	Vertical	4.00
12290.45	41.7	54	-12.3	100	115	Vertical	5.60
16017.45	44.3	54	-9.7	252	348	Vertical	10.40
16765.55	44.7	54	-9.3	299	96	Vertical	11.10
17491.55	44.5	54	-9.5	137	71	Vertical	12.30

Note: Correction = AF + CF - Preamp

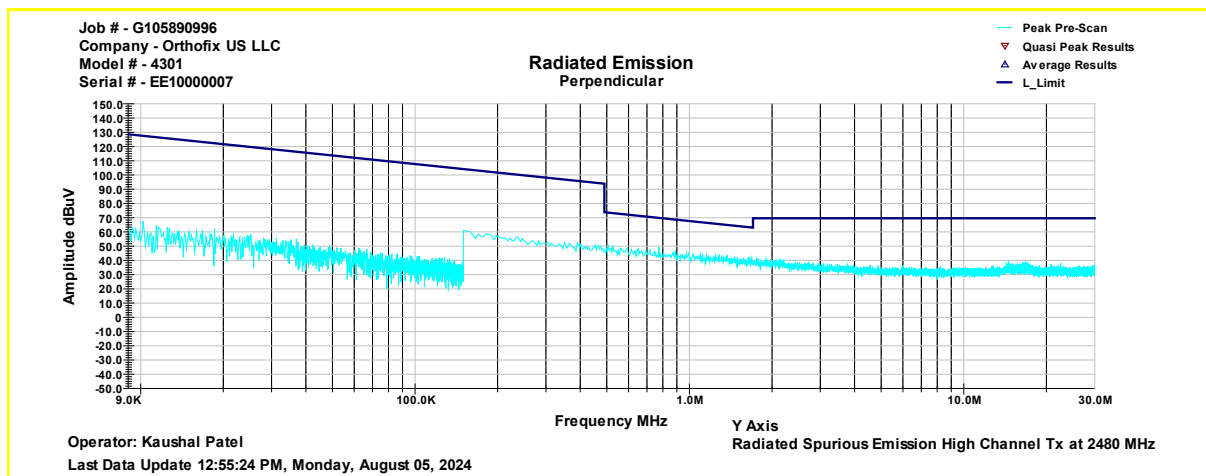
Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

Test Results: 15.209 Radiated Spurious Emissions High Channel, Tx at 2480MHz Y Axis

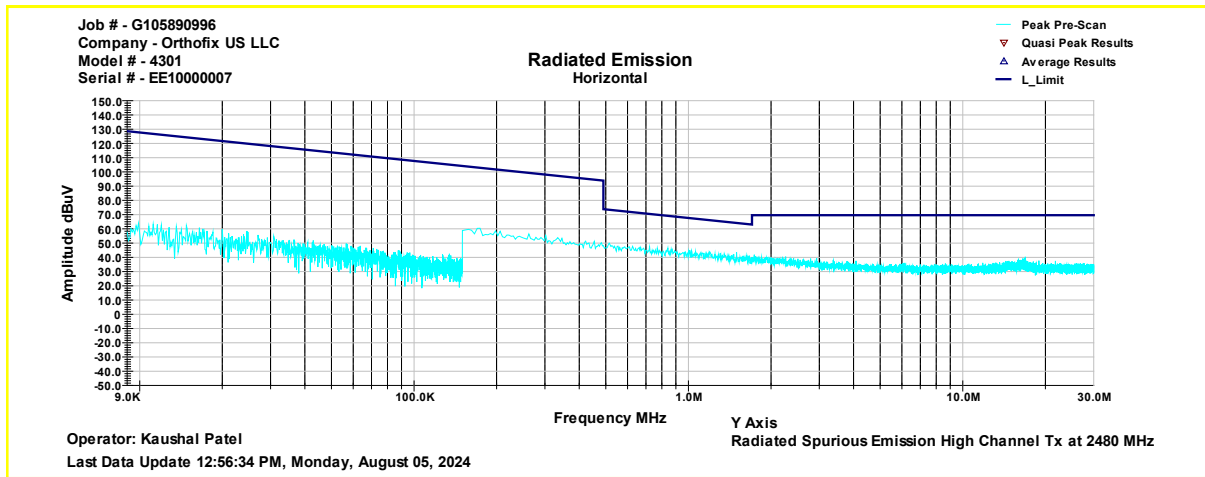
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



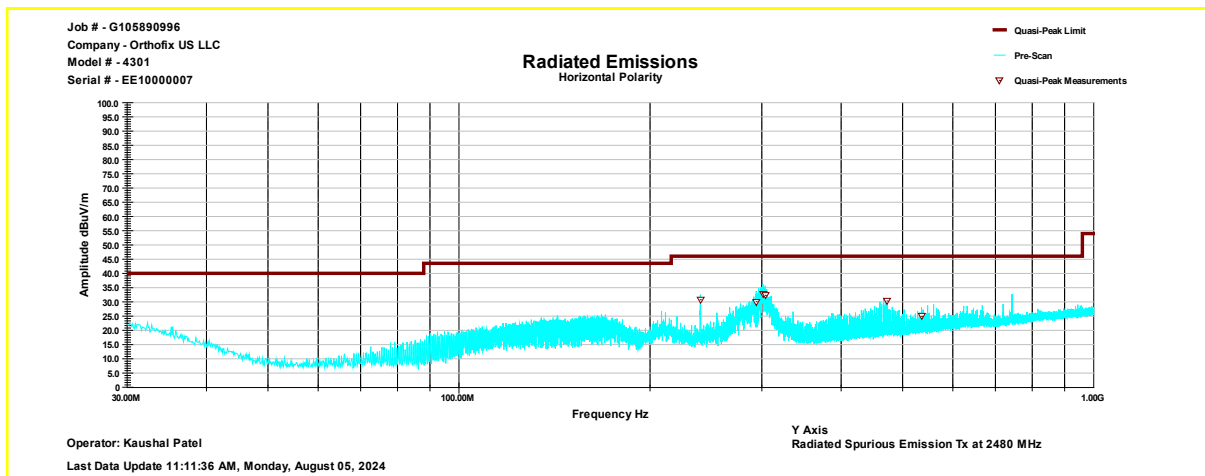
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



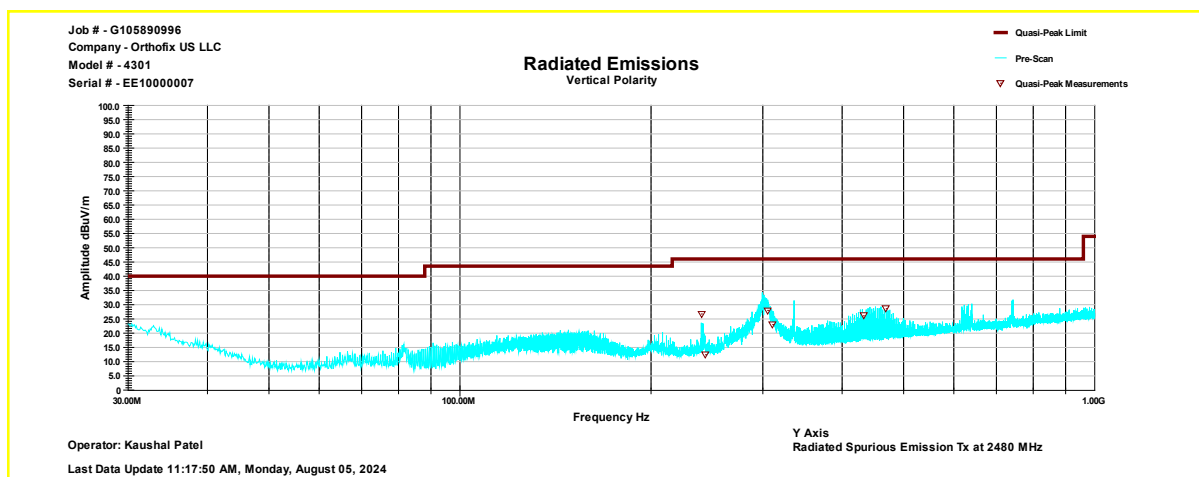
Radiated Spurious Emissions 30 MHz - 1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
239.95	30.7	46	-15.3	221	164	Horizontal	-17.2
293.95	30	46	-16	100	78	Horizontal	-15.1
301.25	32.8	46	-13.2	100	79	Horizontal	-14.9
303.91	32.3	46	-13.8	100	79	Horizontal	-14.8
472.51	30.3	46	-15.7	221	63	Horizontal	-10.5
535.51	24.9	46	-21.1	149	89	Horizontal	-9.2

Note: Correction = AF + CF - Preamp

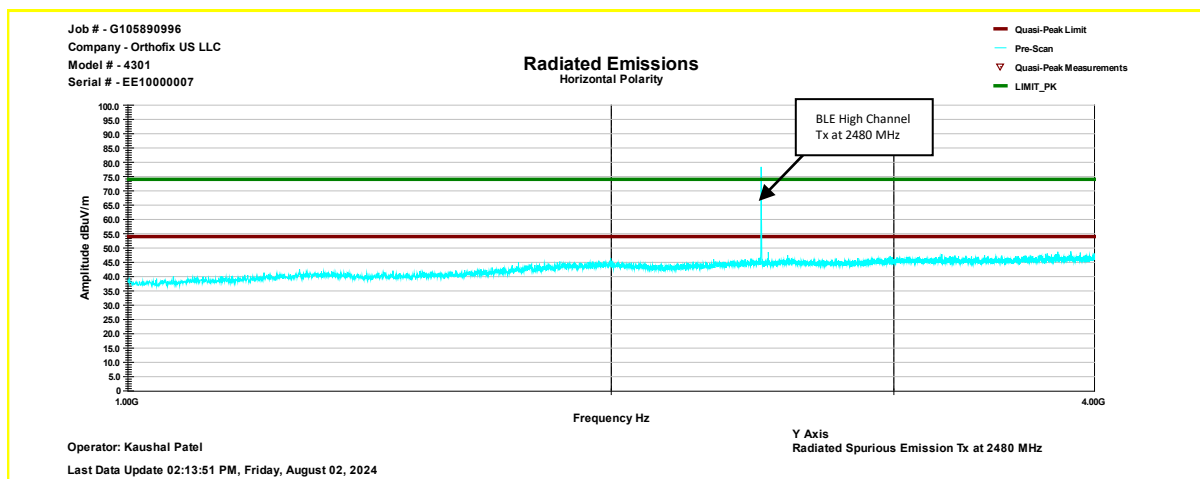
Radiated Spurious Emissions 30 MHz - 1000 MHz Vertical Antenna Polarization



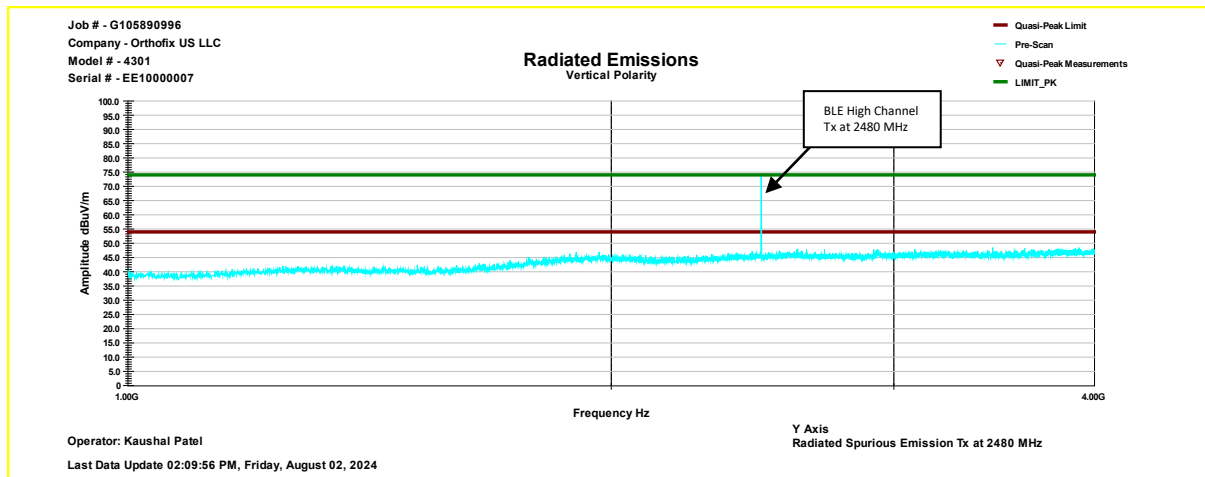
Frequency (MHz)	QPeak@ 3m (dBuV/m)	Lim. QPeak @3m (dBuV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
240	26.7	46	-19.3	149	215	Vertical	-17.2
243.67	12.4	46	-33.6	100	23	Vertical	-17.2
305.37	28	46	-18	250	53	Vertical	-14.8
311.01	23	46	-23	239	47	Vertical	-14.7
431.98	26.1	46	-20	149	23	Vertical	-11.6
469.49	28.6	46	-17.4	149	23	Vertical	-10.6

Note: Correction = AF + CF - Preamp

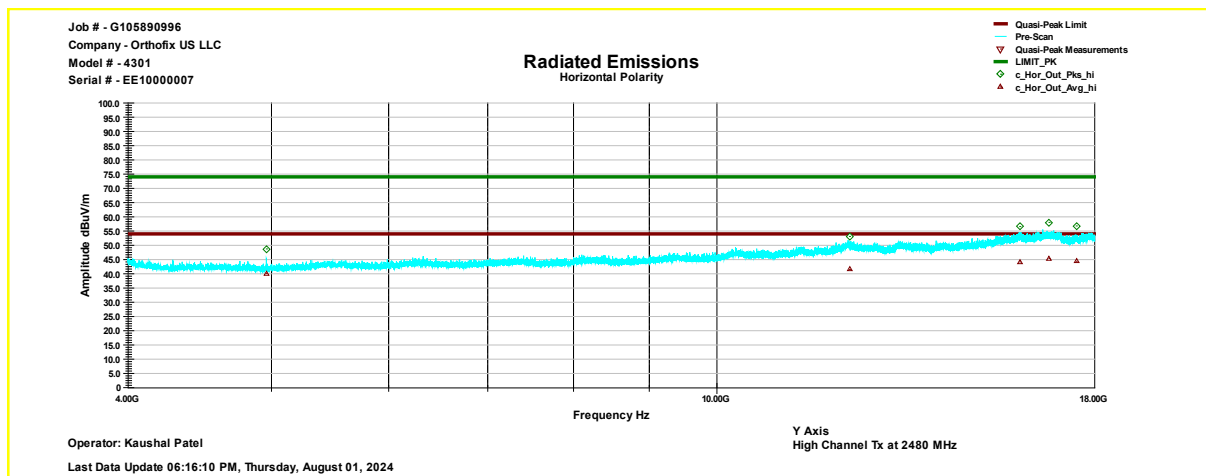
Radiated Spurious Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

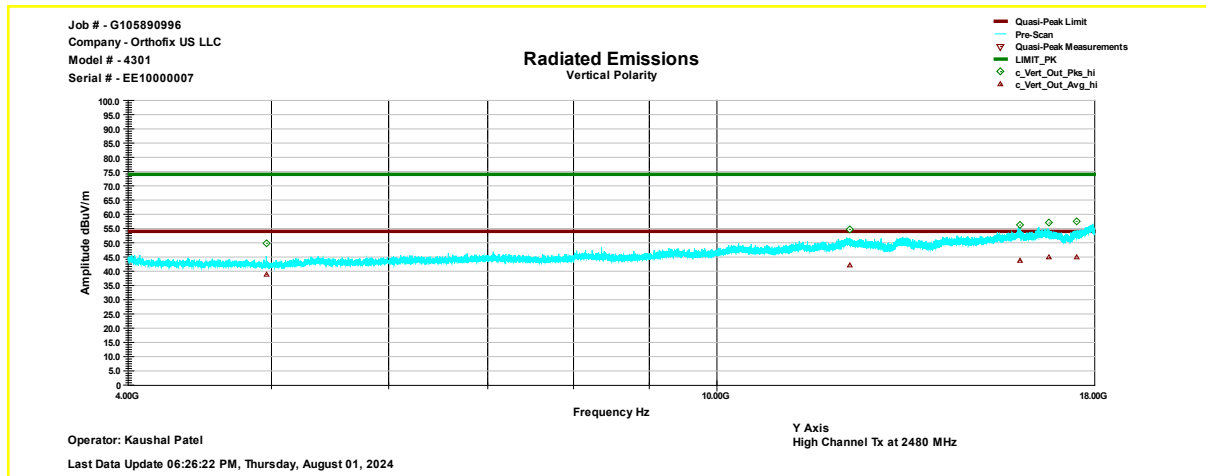
Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4959.95	48.7	74	-25.3	100	4	Horizontal	2.1
12290.55	53.1	74	-20.9	217	100	Horizontal	5.2
16017.55	56.5	74	-17.5	128	232	Horizontal	10.5
16765.55	58	74	-16	288	111	Horizontal	11.6
17491.45	56.8	74	-17.2	245	209	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4959.95	40	54	-13.9	100	4	Horizontal	2.1
12290.55	41.5	54	-12.5	217	100	Horizontal	5.2
16017.55	44.2	54	-9.8	128	232	Horizontal	10.5
16765.55	45.3	54	-8.6	288	111	Horizontal	11.6
17491.45	44.4	54	-9.6	245	209	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Radiated Spurious Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4960.45	49.8	74	-24.2	100	212	Vertical	4.00
12290.45	54.7	74	-19.3	323	107	Vertical	5.60
16017.45	56.2	74	-17.8	352	141	Vertical	10.40
16765.55	56.9	74	-17.1	154	155	Vertical	11.10
17491.55	57.5	74	-16.5	306	242	Vertical	12.30

Note: Correction = AF + CF – Preamp

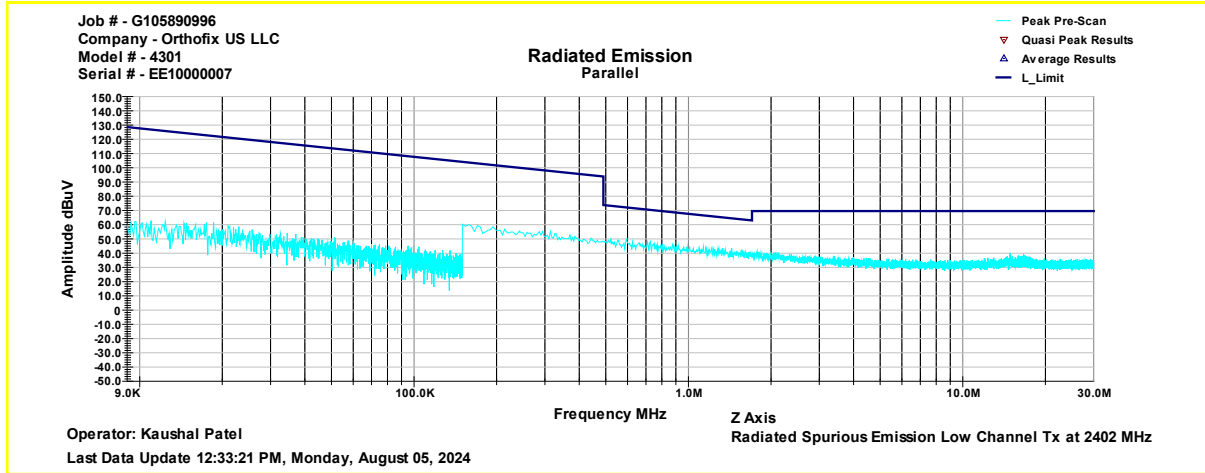
Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4960.45	38.9	54	-15.1	100	212	Vertical	4.00
12290.45	42.2	54	-11.8	323	107	Vertical	5.60
16017.45	43.7	54	-10.2	352	141	Vertical	10.40
16765.55	44.8	54	-9.2	154	155	Vertical	11.10
17491.55	45	54	-9	306	242	Vertical	12.30

Note: Correction = AF + CF – Preamp

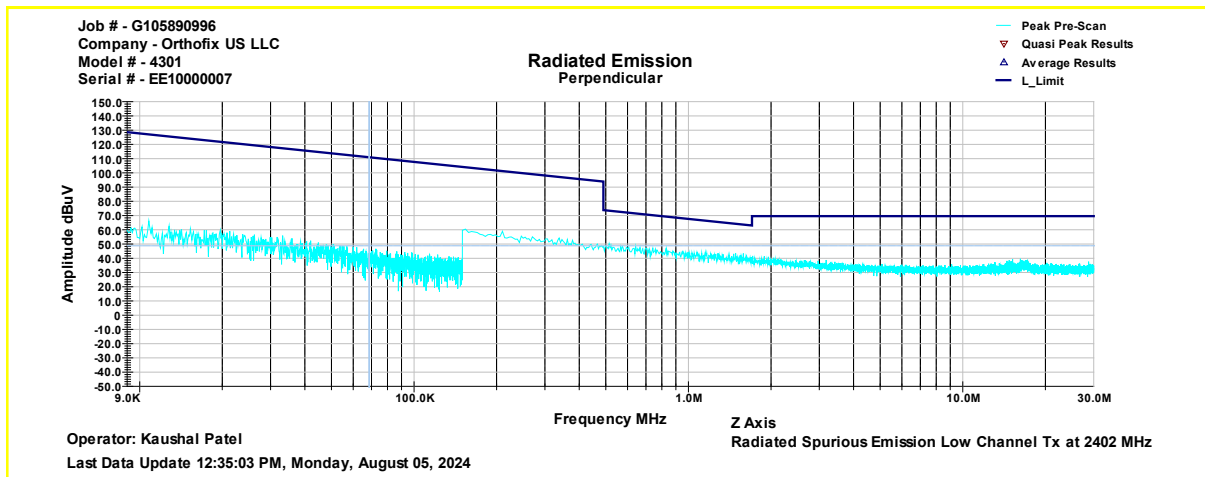
Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

Test Results: 15.209 Radiated Spurious Emissions Low Channel, Tx at 2402MHz, Z-Axis

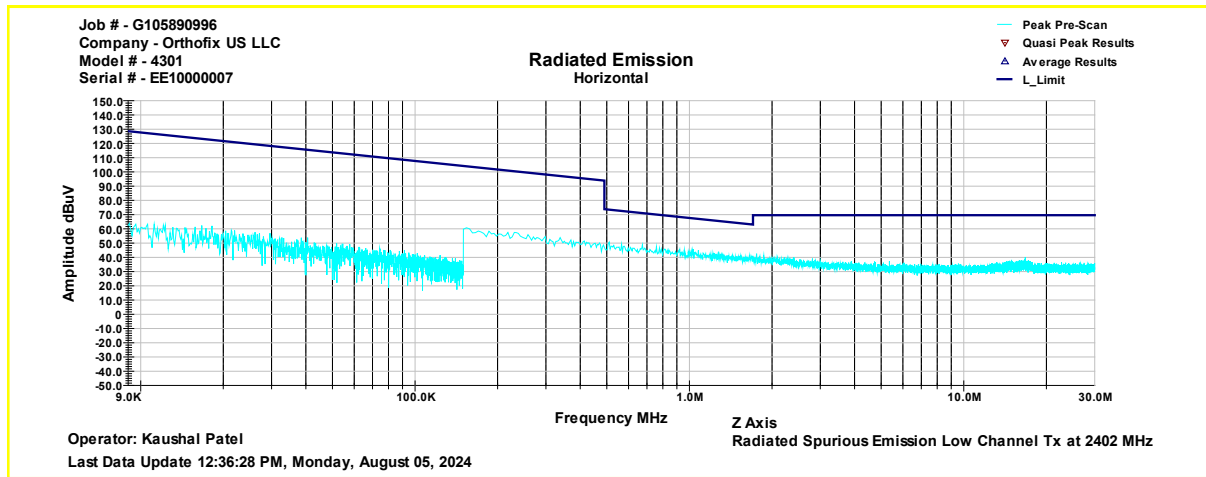
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



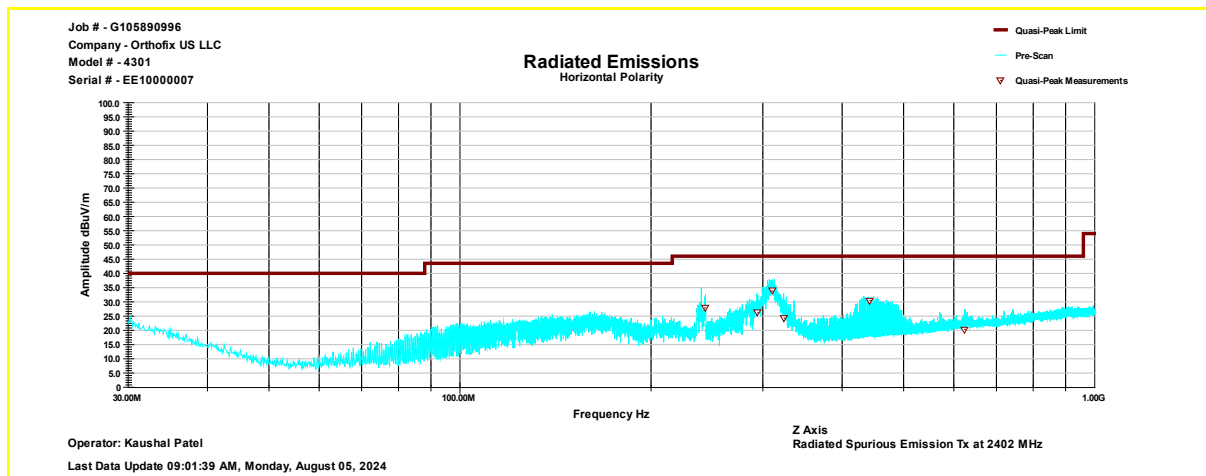
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



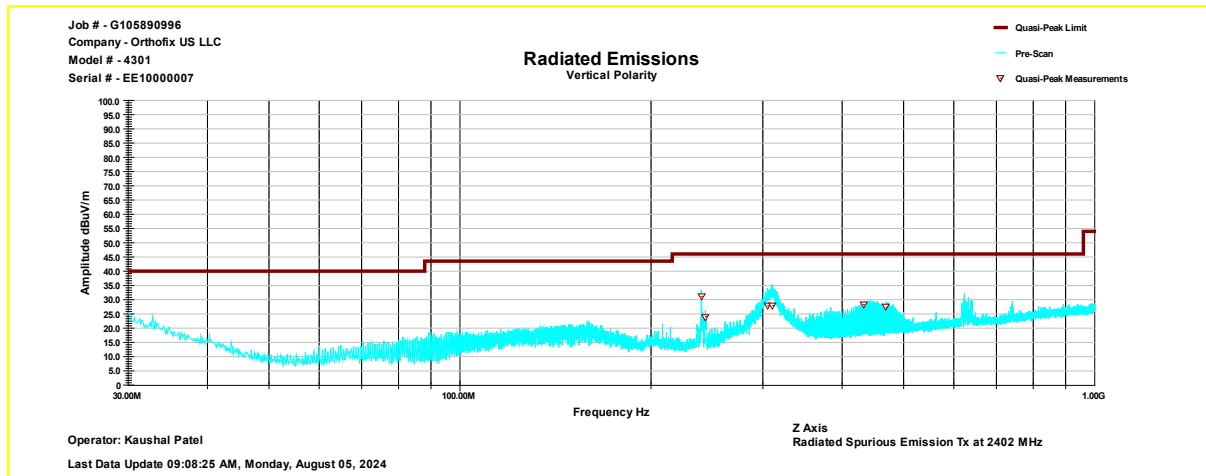
Radiated Spurious Emissions 30 MHz - 1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
242.95	27.9	46	-18.2	127	171	Horizontal	-17.2
294.45	26.1	46	-19.9	109	79	Horizontal	-15.1
310.11	33.8	46	-12.2	109	79	Horizontal	-14.7
324.15	24.2	46	-21.8	119	75	Horizontal	-14.4
442.51	30.4	46	-15.6	286	255	Horizontal	-11.2
623.35	20.3	46	-25.7	340	169	Horizontal	-7.6

Note: Correction = AF + CF - Preamp

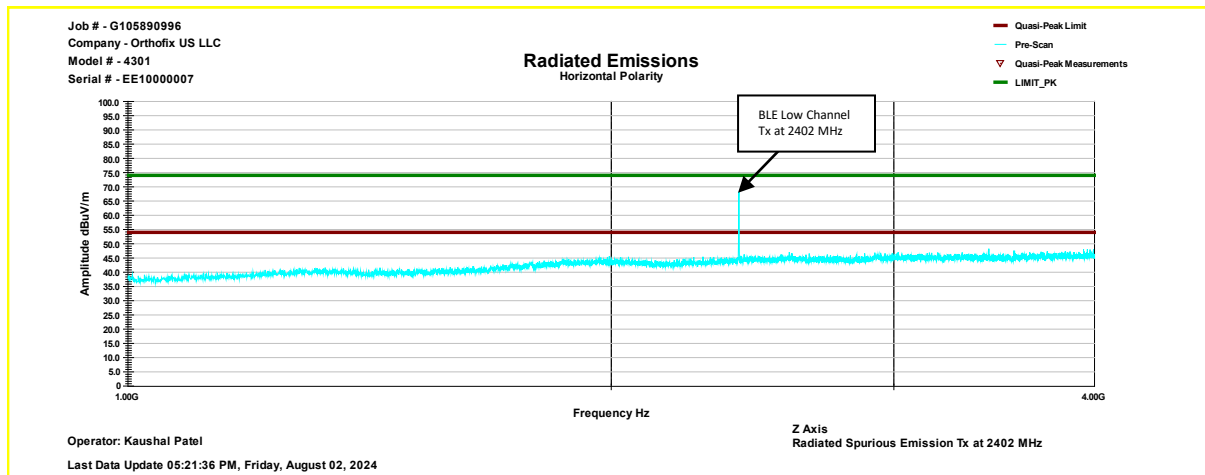
Radiated Spurious Emissions 30 MHz - 1000 MHz Vertical Antenna Polarization



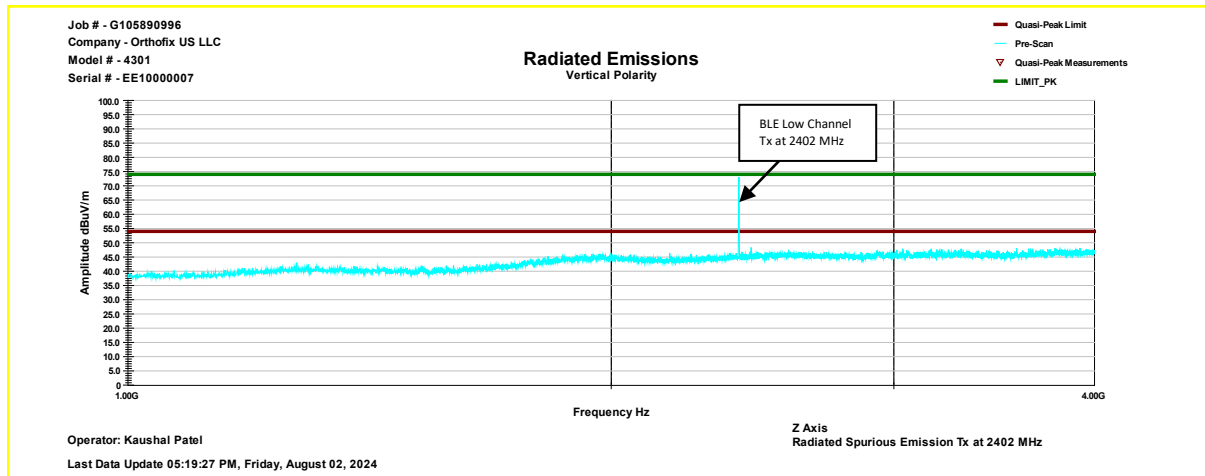
Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
239.99	31.1	46	-14.9	239	175	Vertical	-17.2
243.69	24	46	-22	285	23	Vertical	-17.2
305.41	27.9	46	-18.1	203	51	Vertical	-14.8
311.02	28	46	-18.1	222	23	Vertical	-14.7
431.98	28.3	46	-17.7	149	188	Vertical	-11.6
469.49	27.3	46	-18.7	203	23	Vertical	-10.6

Note: Correction = AF + CF - Preamp

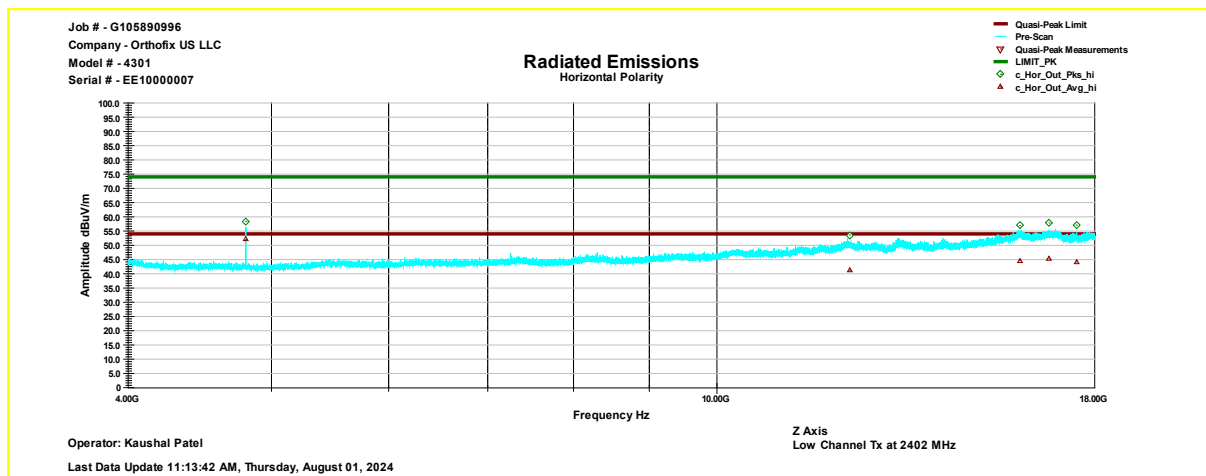
Radiated Spurious Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

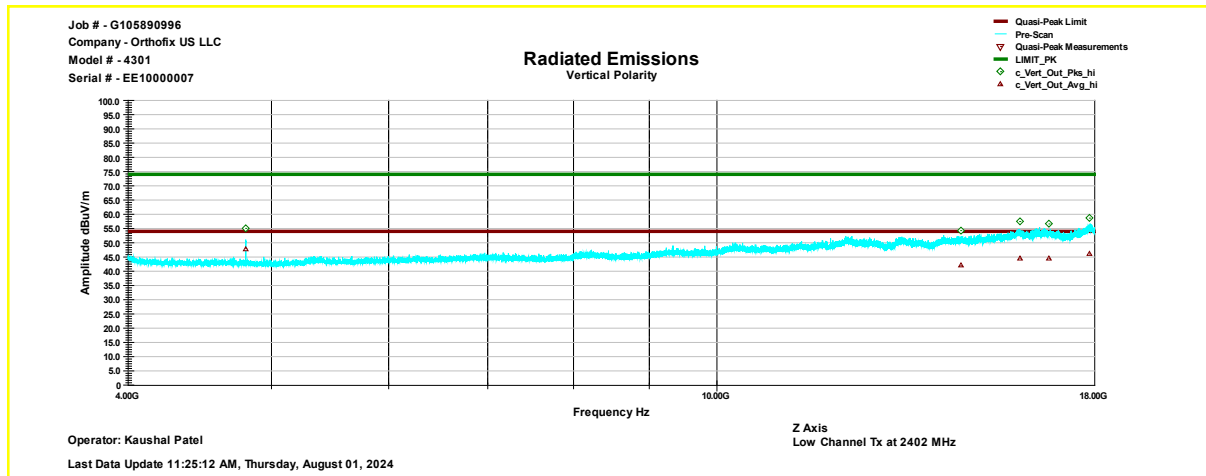
Frequency (MHz)	Avg@ 3m (dBuV/m)	Lim. Avg @3m (dBuV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.45	58.4	74	-15.6	149	195	Horizontal	3.6
12290.45	53.6	74	-20.4	305	15	Horizontal	5.2
16017.45	56.9	74	-17.1	372	101	Horizontal	10.5
16765.55	57.8	74	-16.2	245	79	Horizontal	11.6
17491.45	57.1	74	-16.9	252	314	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Frequency (MHz)	Avg@ 3m (dBuV/m)	Lim. Avg @3m (dBuV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.45	52	54	-1.9	149	195	Horizontal	3.6
12290.45	41.3	54	-12.7	305	15	Horizontal	5.2
16017.45	44.6	54	-9.4	372	101	Horizontal	10.5
16765.55	45.2	54	-8.8	245	79	Horizontal	11.6
17491.45	44.2	54	-9.8	252	314	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Radiated Spurious Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.55	55	74	-19	350	175	Vertical	4.00
14613.55	54.2	74	-19.8	400	169	Vertical	7.00
16017.45	57.4	74	-16.6	100	152	Vertical	10.40
16765.55	56.6	74	-17.4	252	77	Vertical	11.10
17854.55	58.6	74	-15.4	100	82	Vertical	13.90

Note: Correction = AF + CF - Preamp

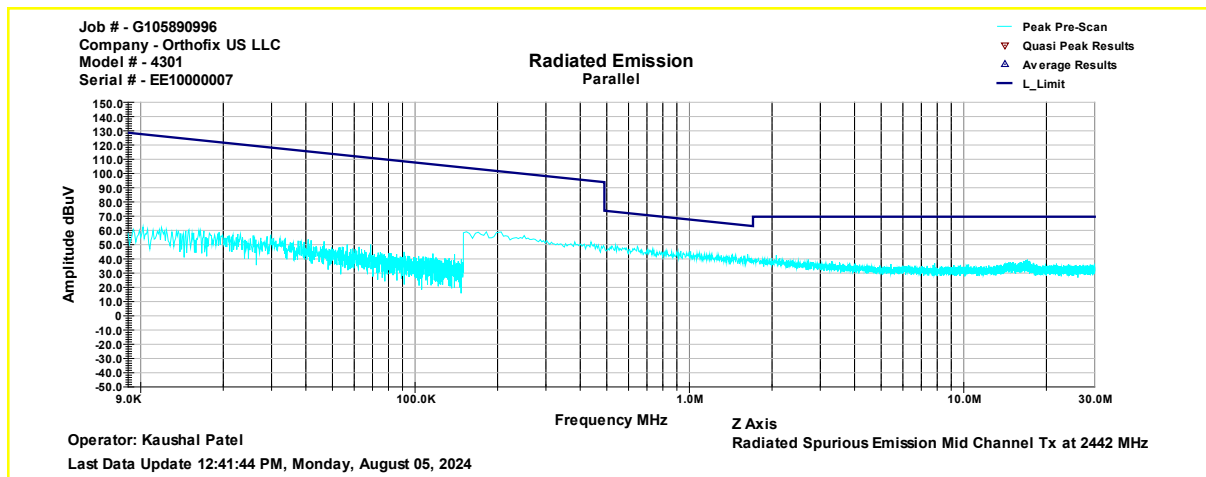
Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.55	47.9	54	-6.1	350	175	Vertical	4.00
14613.55	41.9	54	-12.1	400	169	Vertical	7.00
16017.45	44.6	54	-9.4	100	152	Vertical	10.40
16765.55	44.5	54	-9.5	252	77	Vertical	11.10
17854.55	46.1	54	-7.9	100	82	Vertical	13.90

Note: Correction = AF + CF - Preamp

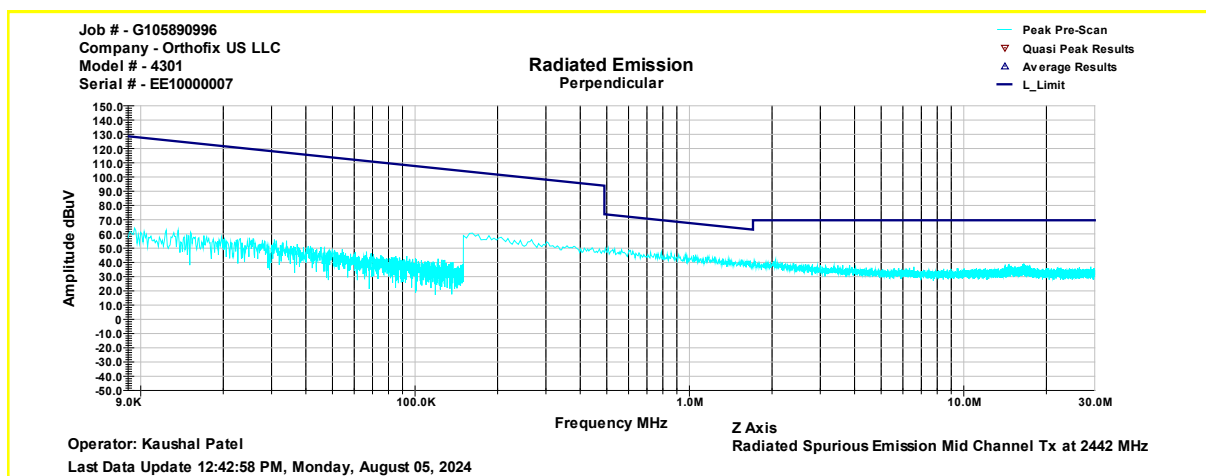
Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

Test Results: 15.209 Radiated Spurious Emissions Mid Channel, Tx at 2442MHz, Z-Axis

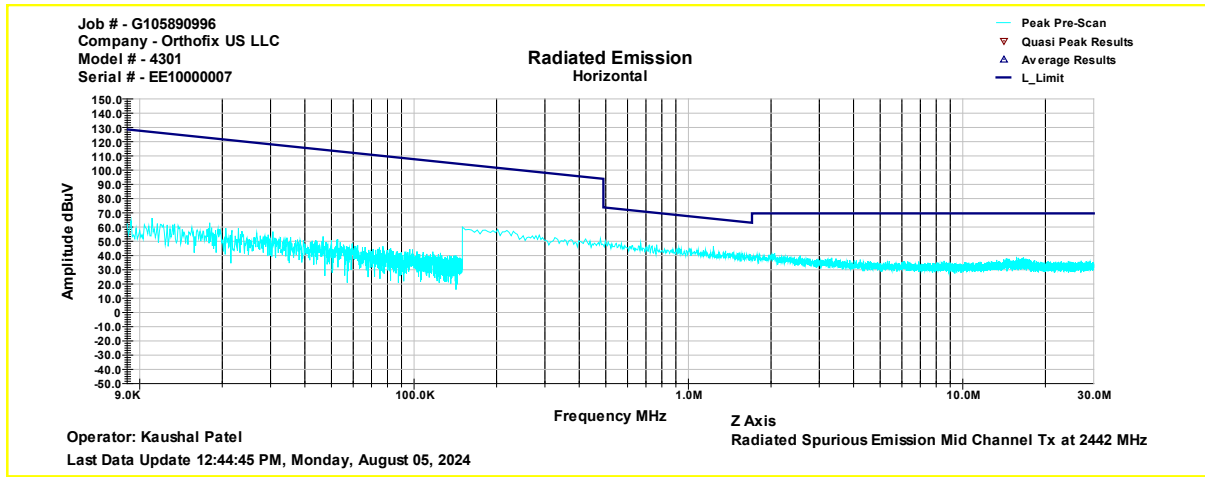
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



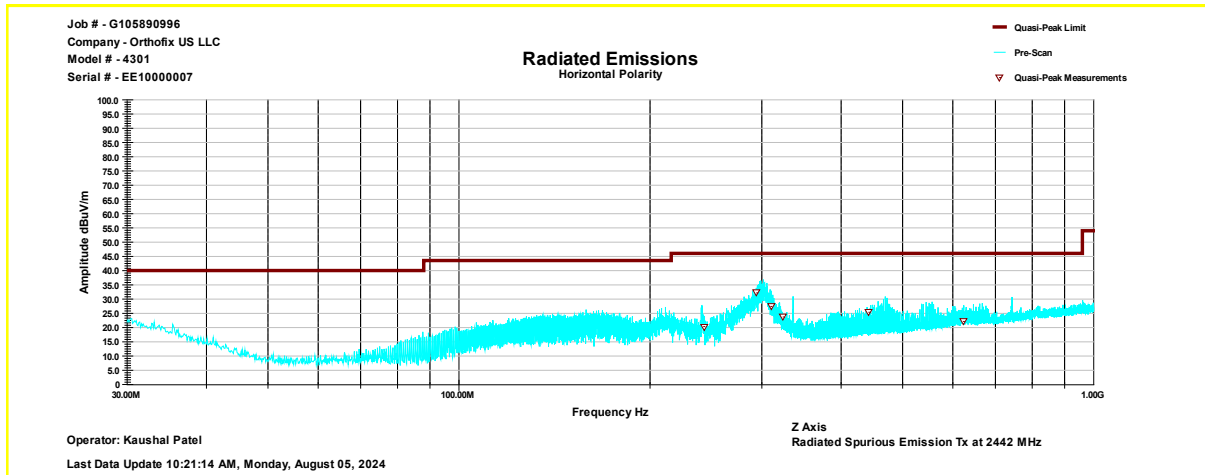
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



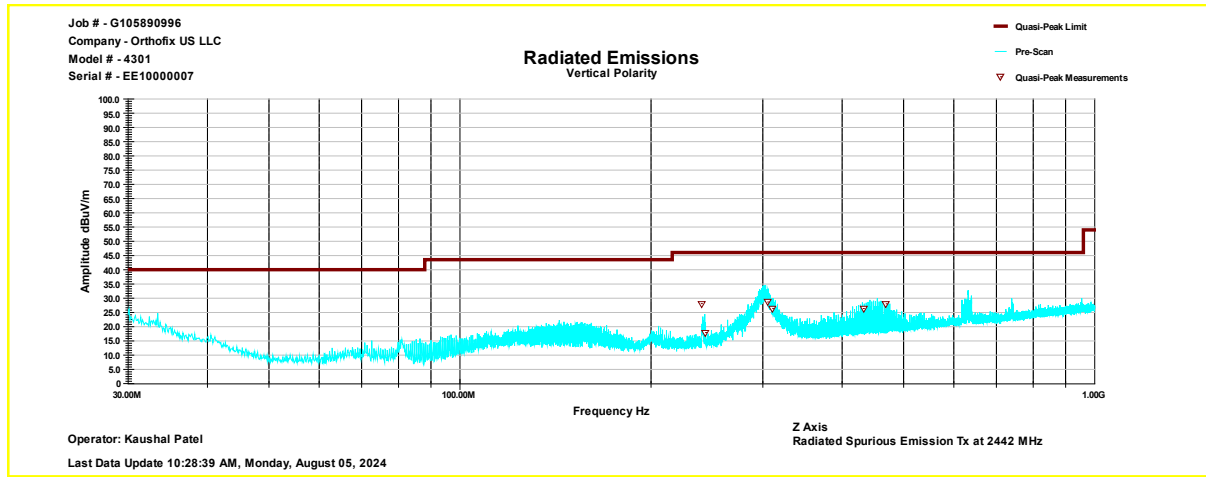
Radiated Spurious Emissions 30 MHz - 1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
243.05	20.3	46	-25.7	100	0	Horizontal	-17.2
294.55	32.2	46	-13.9	100	87	Horizontal	-15.1
310.05	27.4	46	-18.6	100	73	Horizontal	-14.7
324.21	23.7	46	-22.3	110	80	Horizontal	-14.4
442.51	25.4	46	-20.7	268	0	Horizontal	-11.2
623.41	22.1	46	-23.9	339	89	Horizontal	-7.6

Note: Correction = AF + CF - Preamp

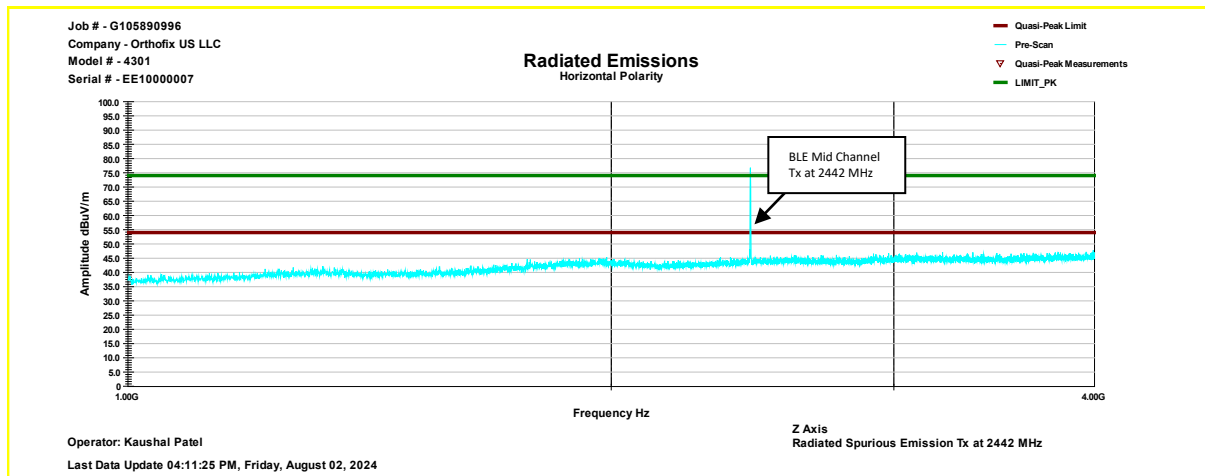
Radiated Spurious Emissions 30 MHz - 1000 MHz Vertical Antenna Polarization



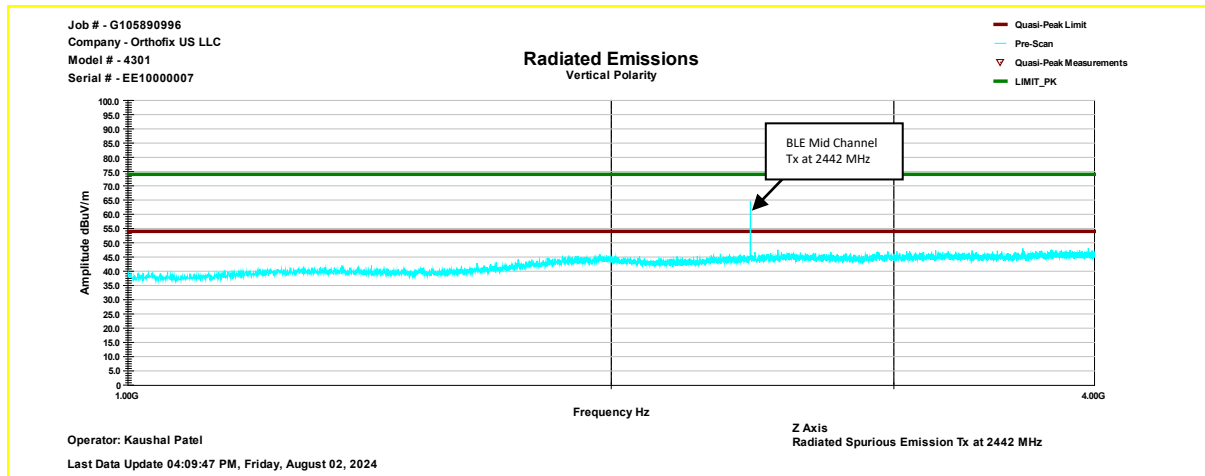
Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
240.01	28.1	46	-17.9	286	30	Vertical	-17.2
243.73	17.9	46	-28.1	267	185	Vertical	-17.2
305.44	28.6	46	-17.4	339	25	Vertical	-14.8
310.98	26.4	46	-19.6	250	72	Vertical	-14.7
432	26.4	46	-19.7	110	143	Vertical	-11.6
469.48	28	46	-18	149	25	Vertical	-10.6

Note: Correction = AF + CF – Preamp

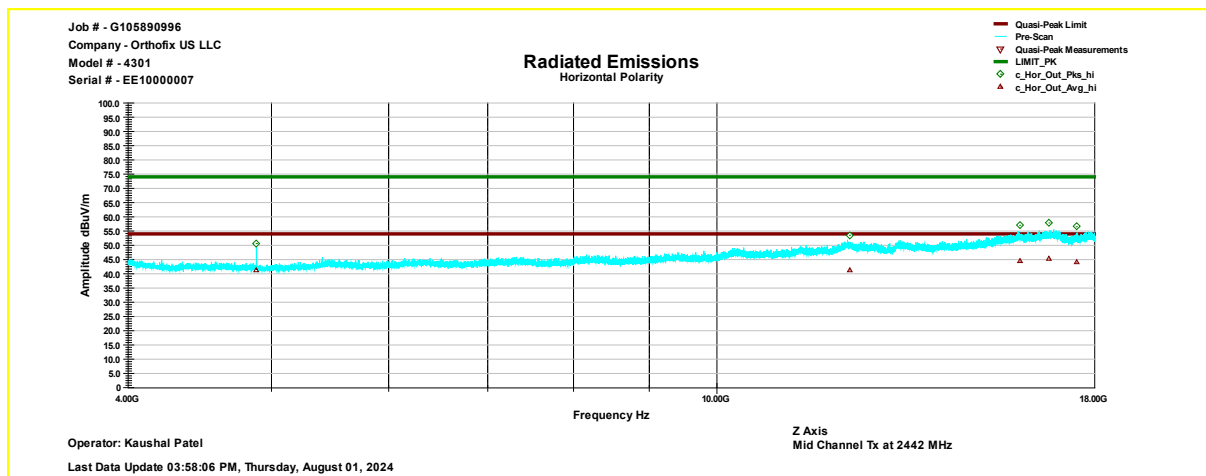
Radiated Spurious Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

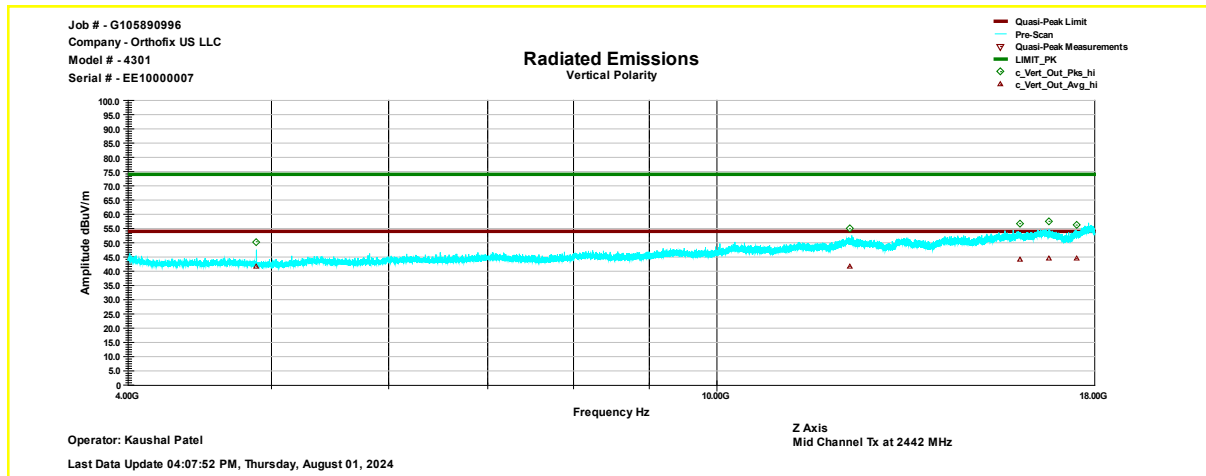
Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	50.6	74	-23.4	149	4	Horizontal	2.8
12290.45	53.5	74	-20.5	400	63	Horizontal	5.2
16017.45	57	74	-17	245	245	Horizontal	10.5
16765.55	57.8	74	-16.2	181	192	Horizontal	11.6
17491.55	56.5	74	-17.5	271	81	Horizontal	11.9

Note: Correction = AF + CF – Preamp

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	41.5	54	-12.5	149	4	Horizontal	2.8
12290.45	41.3	54	-12.7	400	63	Horizontal	5.2
16017.45	44.4	54	-9.5	245	245	Horizontal	10.5
16765.55	45.2	54	-8.8	181	192	Horizontal	11.6
17491.55	44.1	54	-9.9	271	81	Horizontal	11.9

Note: Correction = AF + CF – Preamp

Radiated Spurious Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	50.3	74	-23.7	212	14	Vertical	4.00
12290.45	54.9	74	-19.1	163	198	Vertical	7.00
16017.45	56.7	74	-17.3	323	241	Vertical	10.40
16765.55	57.5	74	-16.5	119	17	Vertical	11.10
17491.55	56.2	74	-17.8	216	156	Vertical	13.90

Note: Correction = AF + CF - Preamp

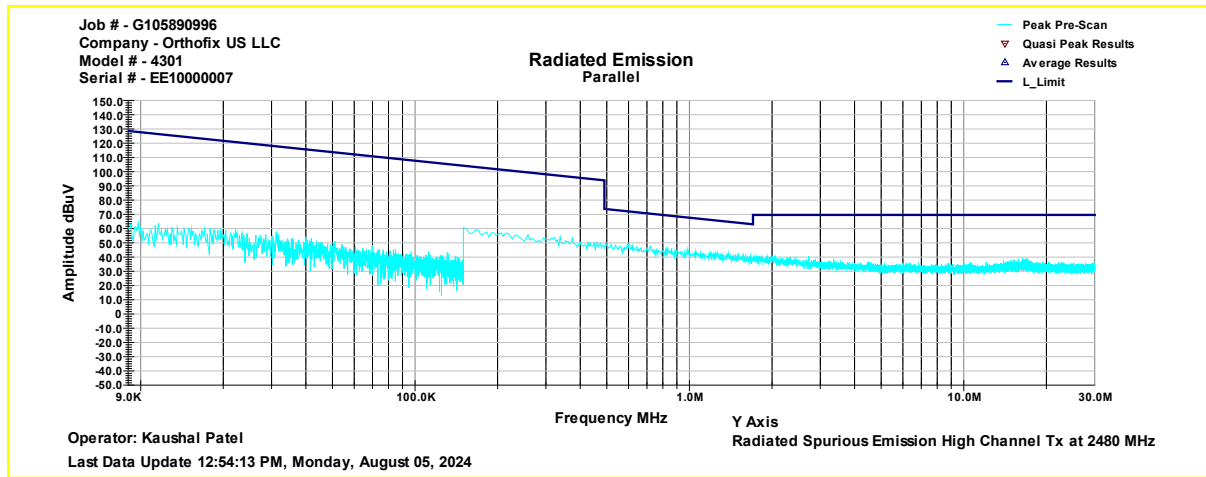
Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4883.45	41.7	54	-12.3	212	14	Vertical	4.00
12290.45	41.7	54	-12.3	163	198	Vertical	7.00
16017.45	44.3	54	-9.7	323	241	Vertical	10.40
16765.55	44.6	54	-9.3	119	17	Vertical	11.10
17491.55	44.5	54	-9.5	216	156	Vertical	13.90

Note: Correction = AF + CF - Preamp

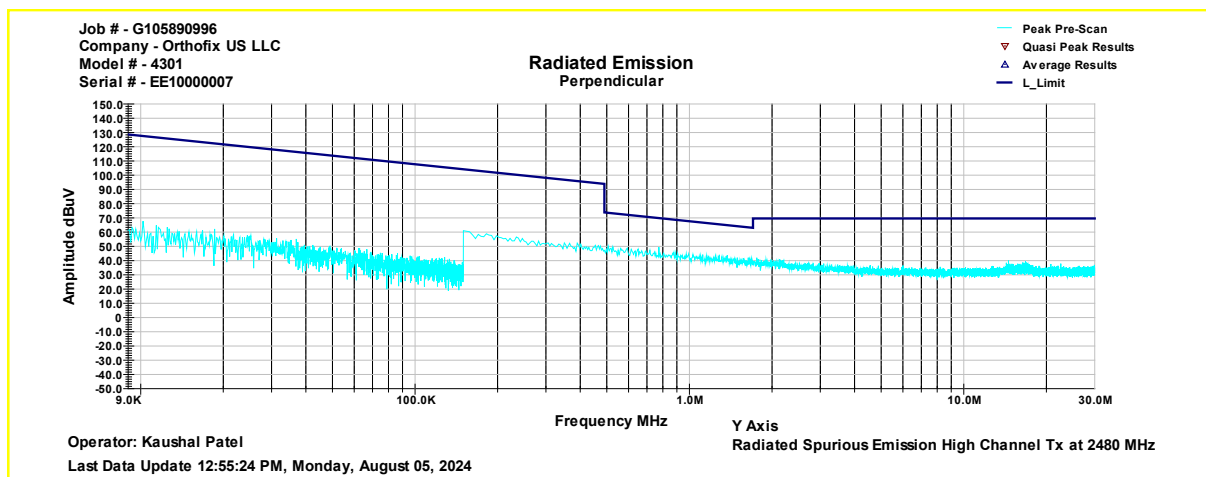
Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

Test Results: 15.209 Radiated Spurious Emissions High Channel, Tx at 2480MHz, Z-Axis

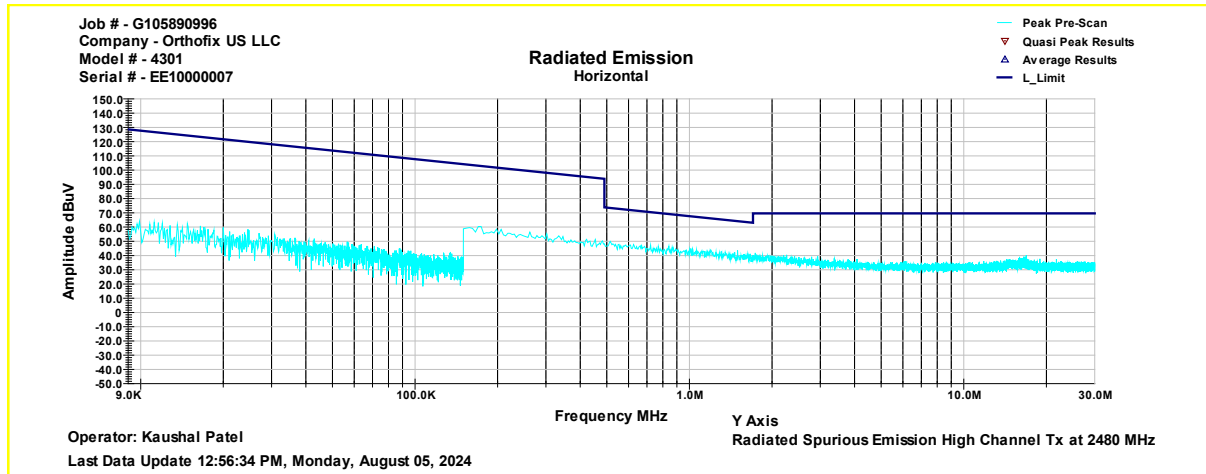
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



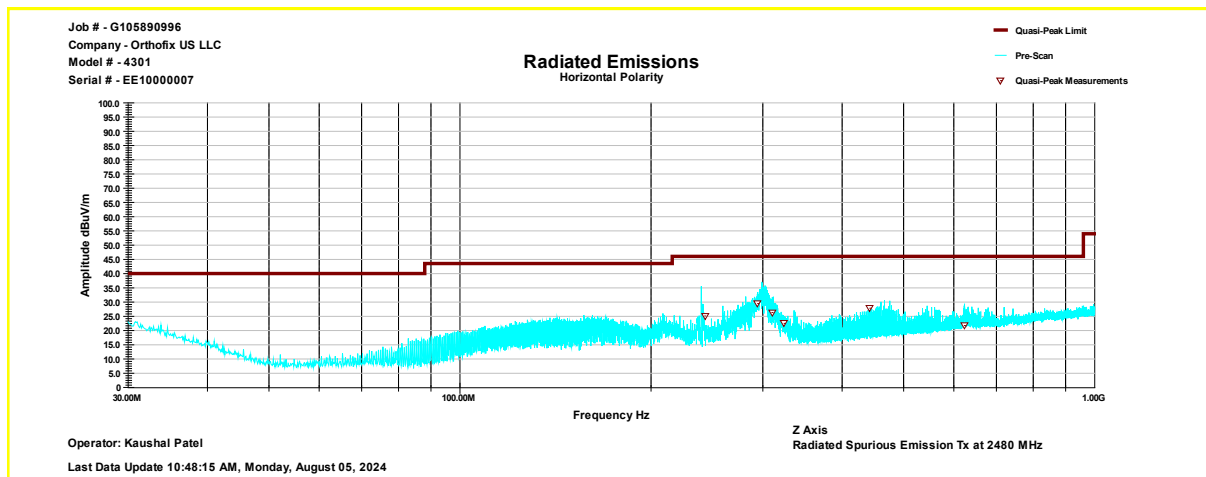
Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



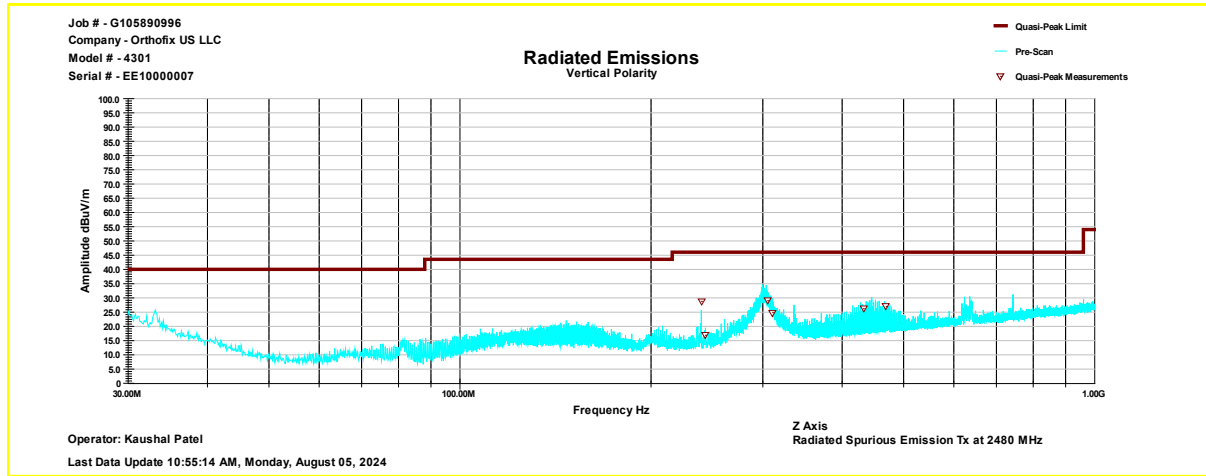
Radiated Spurious Emissions 30 MHz - 1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
243.01	25.1	46	-20.9	100	162	Horizontal	-17.2
294.51	29.5	46	-16.5	100	75	Horizontal	-15.1
310.15	26.3	46	-19.7	110	177	Horizontal	-14.7
324.21	22.5	46	-23.5	100	80	Horizontal	-14.4
442.45	27.8	46	-18.2	249	159	Horizontal	-11.2
623.41	21.7	46	-24.3	127	254	Horizontal	-7.6

Note: Correction = AF + CF - Preamp

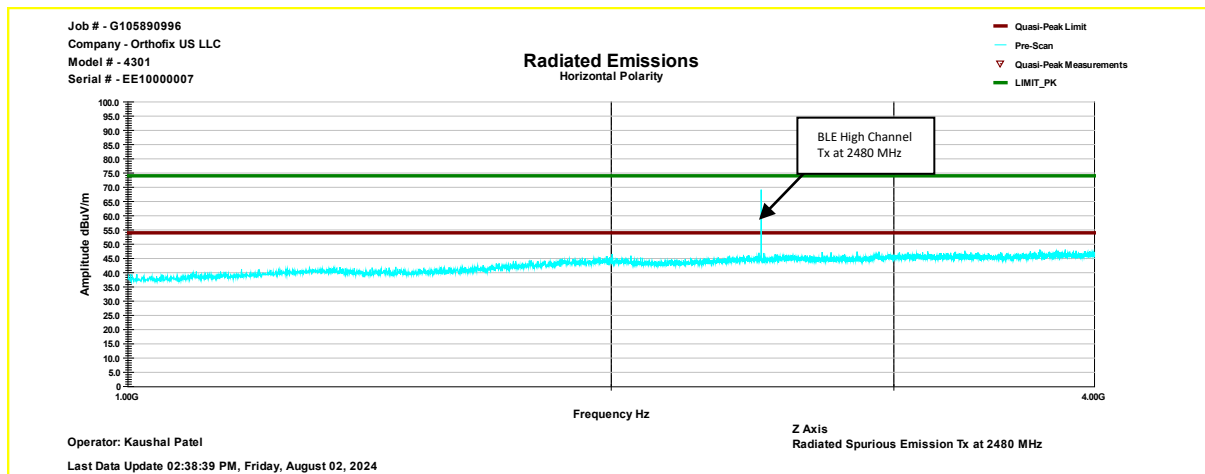
Radiated Spurious Emissions 30 MHz - 1000 MHz Vertical Antenna Polarization



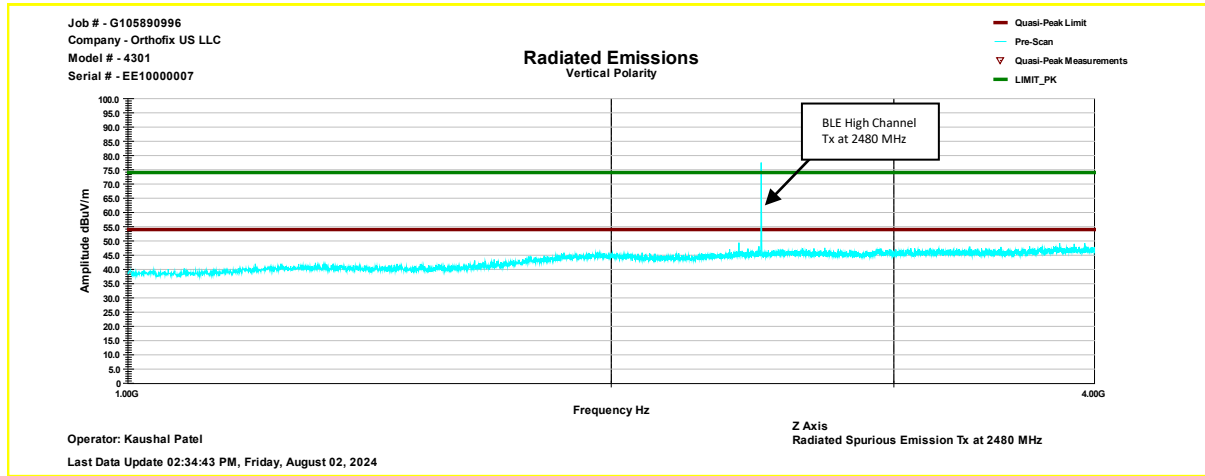
Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
239.98	28.8	46	-17.2	267	29	Vertical	-17.2
243.67	16.9	46	-29.2	203	42	Vertical	-17.2
305.41	29	46	-17	249	60	Vertical	-14.8
310.95	24.8	46	-21.2	303	25	Vertical	-14.7
431.97	26.2	46	-19.9	110	152	Vertical	-11.6
469.48	27	46	-19	149	211	Vertical	-10.6

Note: Correction = AF + CF - Preamp

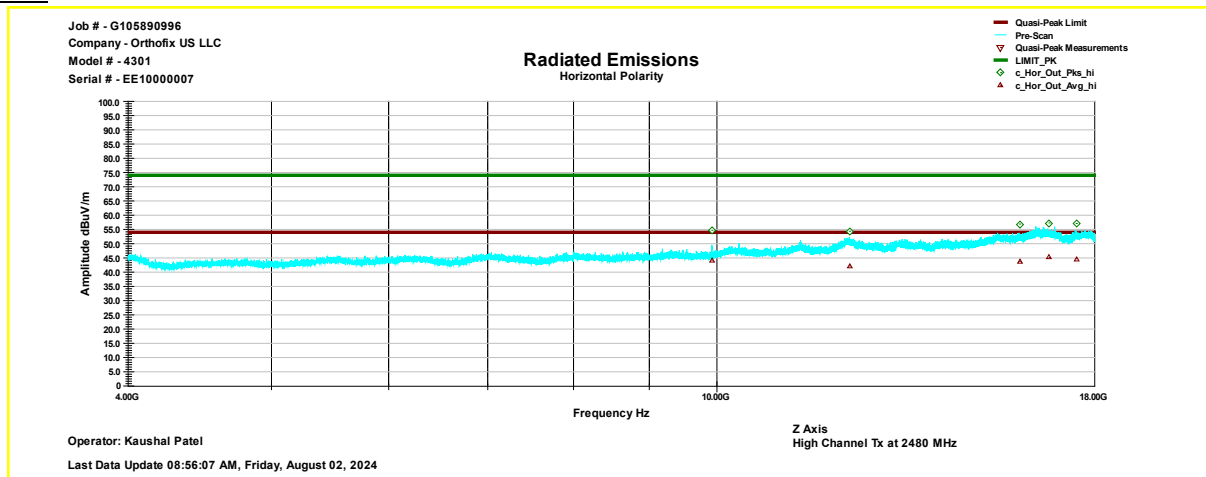
Radiated Spurious Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Radiated Spurious Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

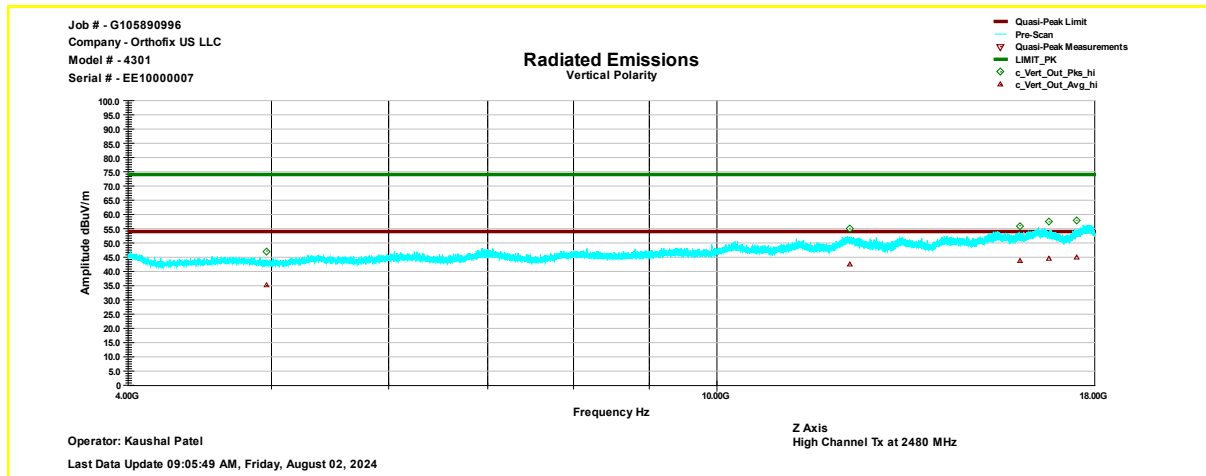
Frequency (MHz)	Pk@ 3m (dBμV/m)	Lim. Pk @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
9920.55	54.7	74	-19.3	181	209	Horizontal	1
12290.55	54.3	74	-19.7	270	289	Horizontal	5.2
16017.55	56.9	74	-17.1	335	338	Horizontal	10.5
16765.45	57.3	74	-16.7	208	334	Horizontal	11.6
17491.45	57.1	74	-16.9	109	240	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
9920.55	44.2	54	-9.8	181	209	Horizontal	1
12290.55	42.2	54	-11.8	270	289	Horizontal	5.2
16017.55	43.7	54	-10.2	335	338	Horizontal	10.5
16765.45	45.1	54	-8.8	208	334	Horizontal	11.6
17491.45	44.7	54	-9.3	109	240	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Radiated Spurious Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization vs Avg & Peak Limit



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4960.55	42.8	54	47.1	74	-26.9	Vertical	4.00
12290.55	45.5	54	54.9	74	-19.1	Vertical	7.00
16017.55	43.5	54	56	74	-18	Vertical	10.40
16765.55	45.4	54	57.4	74	-16.6	Vertical	11.10
17491.55	46.4	54	57.9	74	-16.1	Vertical	13.90

Note: Correction = AF + CF – Preamp

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4960.55	35	54	-18.9	321	198	Vertical	4.00
12290.55	42.6	54	-11.4	137	109	Vertical	7.00
16017.55	43.6	54	-10.4	234	225	Vertical	10.40
16765.55	44.7	54	-9.3	379	20	Vertical	11.10
17491.55	45.1	54	-8.9	263	109	Vertical	13.90

Note: Correction = AF + CF – Preamp

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

4.6 Radiated Emissions

FCC Ref: 15.109, ICES 003

4.6.1 Requirement

Limits for Electromagnetic Radiated Emissions FCC Section 15.109(b), ICES 003*, RSS GEN

Frequency (MHz)	Class A at 10m dB(μV/m)	Class B at 3m dB(μV/m)
30-88	39	40.0
88-216	43.5	43.5
216-960	46.4	46.0
Above 960	49.5	54.0

* According to FCC Part 15.109(g) an alternative to the radiated emission limits shown above, digital devices may be shown to comply with the limit of CISPR Pub. 22

4.6.2 Procedures

Measurements are conducted with a quasi-peak detector instrument in the frequency range of 30 MHz to 1000 MHz and with the average detector instrument in the frequency range above 1000 MHz. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole.

Measurements of the radiated field are made with the antenna located at a distance of 3 meters from the EUT. If the field-strength measurements at 3m cannot be made because of high ambient noise level or for other reasons, measurements of Class B equipment may be made at a closer distance, for example 1m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for a larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4. The Duty Cycle for the BLE Transmitter is >98 % for the testing.

Data is presented with the X Axis, Y Axis & Z Axis configuration.

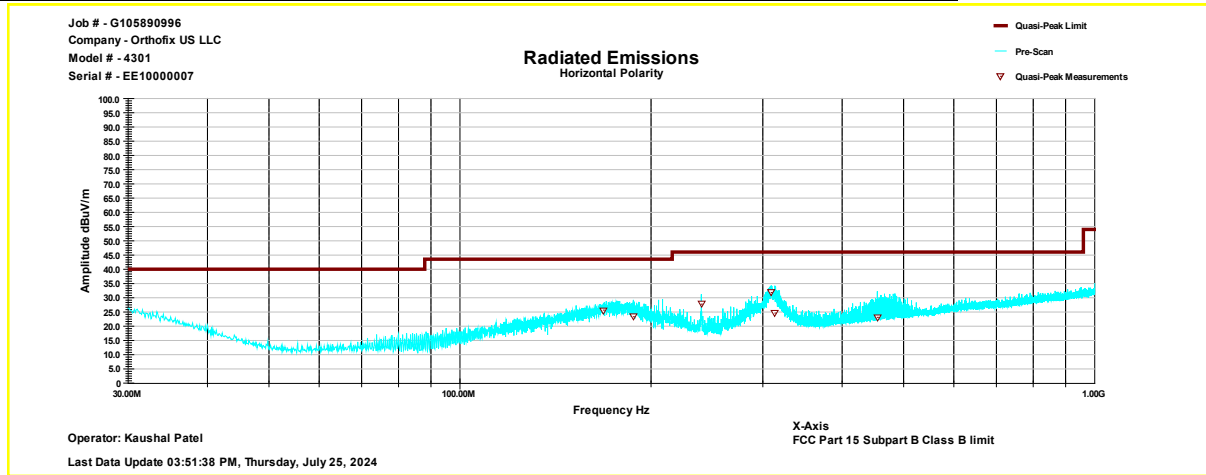
4.6.3 Test Results

Tested By	Test Date	Results
Kaushal Patel	July 15, 2024, to August 05, 2024	Complies

Model 4301

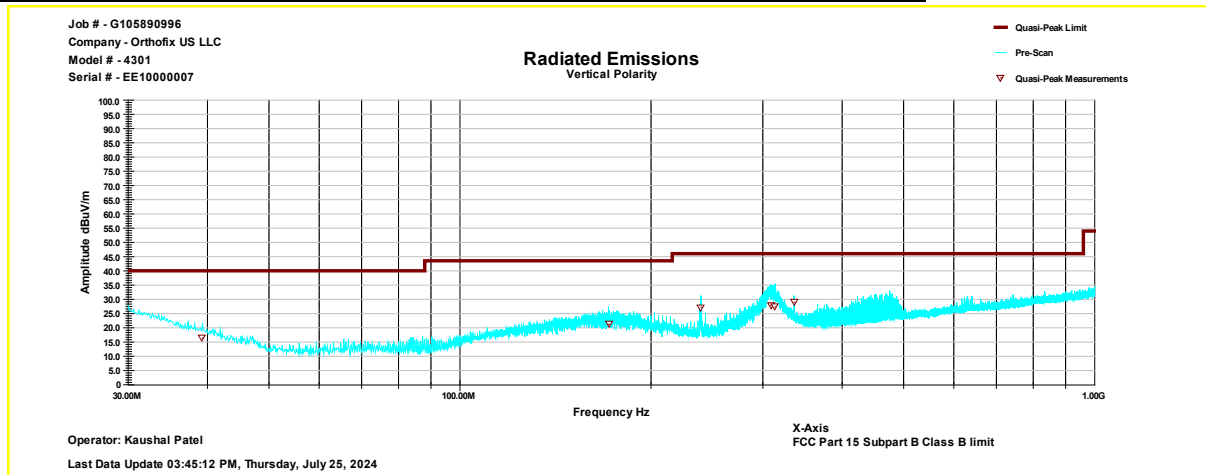
X-Axis

Test Result Radiated Emission 30 MHz-1000 MHz Horizontal Antenna Polarization



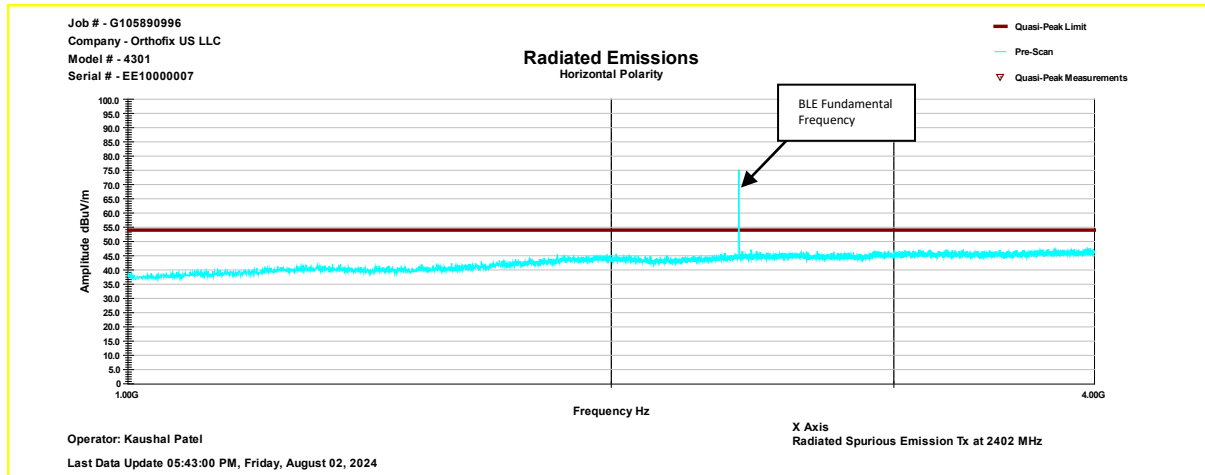
Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
168.25	25.7	43.5	-17.9	149.9	112	Horizontal	-17.4
187.61	23.3	43.5	-20.2	223	246	Horizontal	-18.3
240.01	27.7	46	-18.3	125	304	Horizontal	-17.2
309.31	31.8	46	-14.2	100	85	Horizontal	-14.7
313.45	24.6	46	-21.4	109	292	Horizontal	-14.6
454.51	23.1	46	-22.9	249	145	Horizontal	-11

Test Result Radiated Emission 30 MHz-1000 MHz Vertical Antenna Polarization

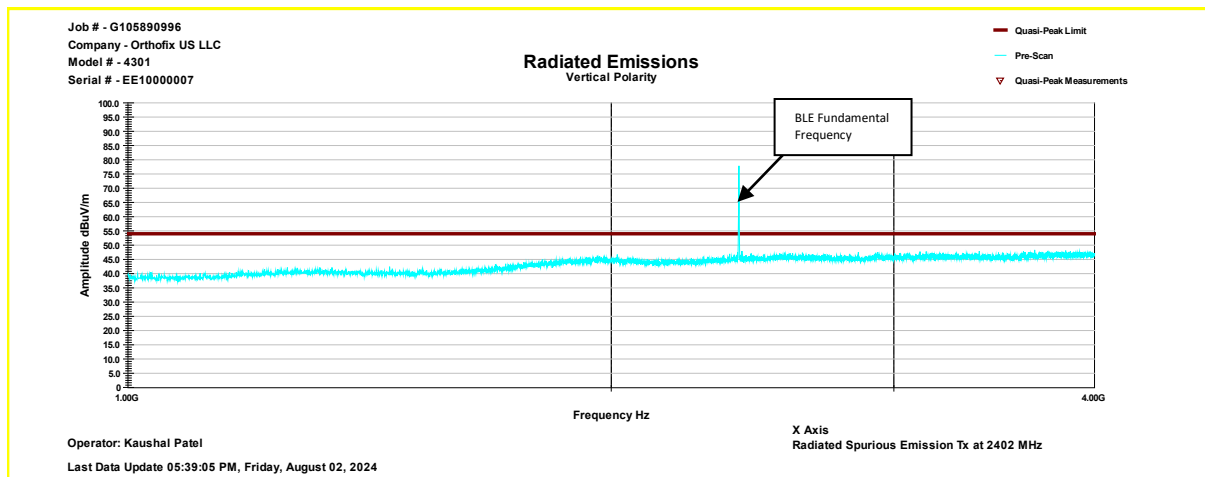


Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
39.26	16.4	40	-23.6	149	98	Vertical	-14.8
171.41	21.2	43.5	-22.3	100	25	Vertical	-17.7
239.69	27.2	46	-18.8	324	250	Vertical	-17.2
308.66	27.9	46	-18.1	188	238	Vertical	-14.7
313.62	27.3	46	-18.7	206	238	Vertical	-14.6
336	28.9	46	-17.1	149	222	Vertical	-14.2

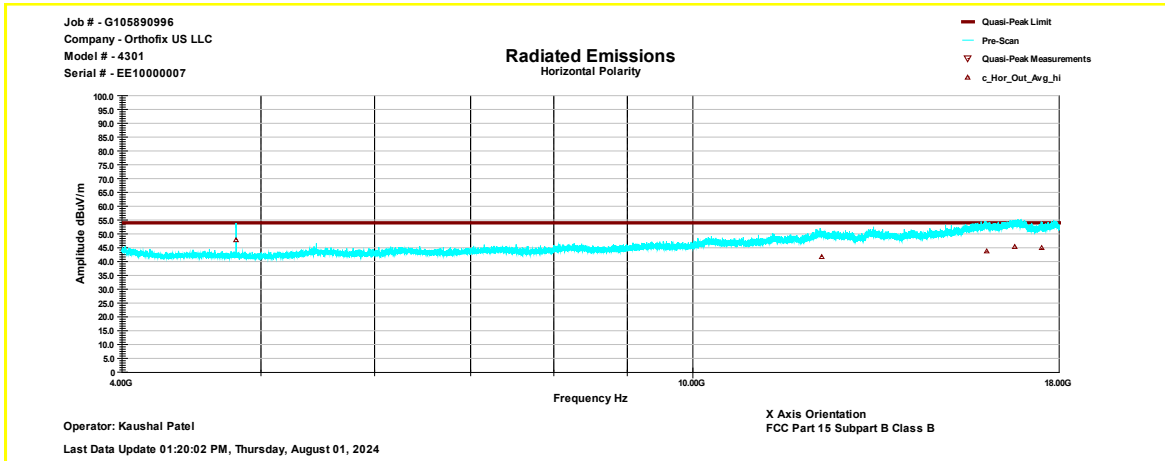
Radiated Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization



Radiated Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization



Radiated Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization

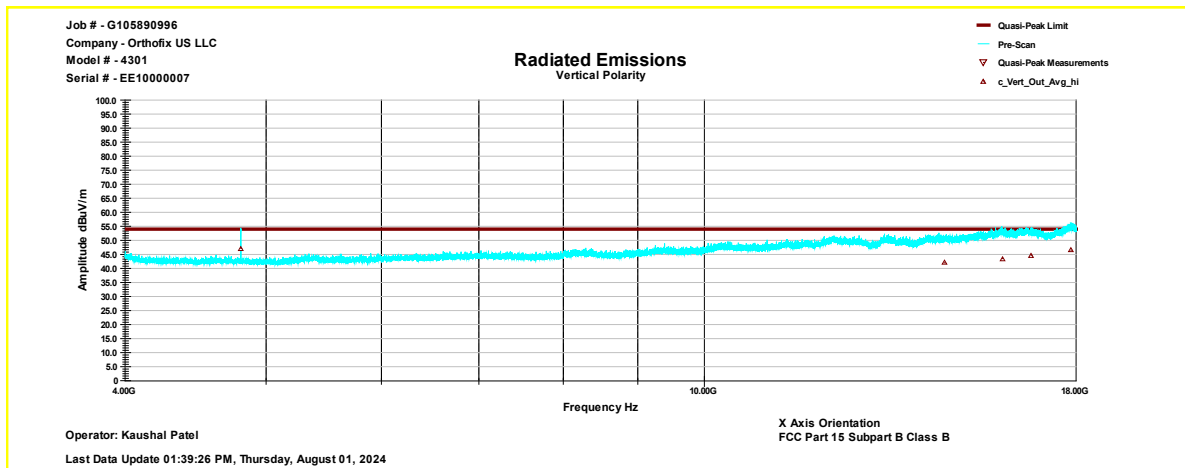


Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.55	48	54	-6	221	176	Horizontal	3.6
12290.45	41.8	54	-12.1	163	163	Horizontal	5.2
16017.55	43.7	54	-10.3	306	198	Horizontal	10.5
16765.55	45.2	54	-8.7	100	126	Horizontal	11.6
17491.55	44.7	54	-9.3	377	150	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Radiated Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization



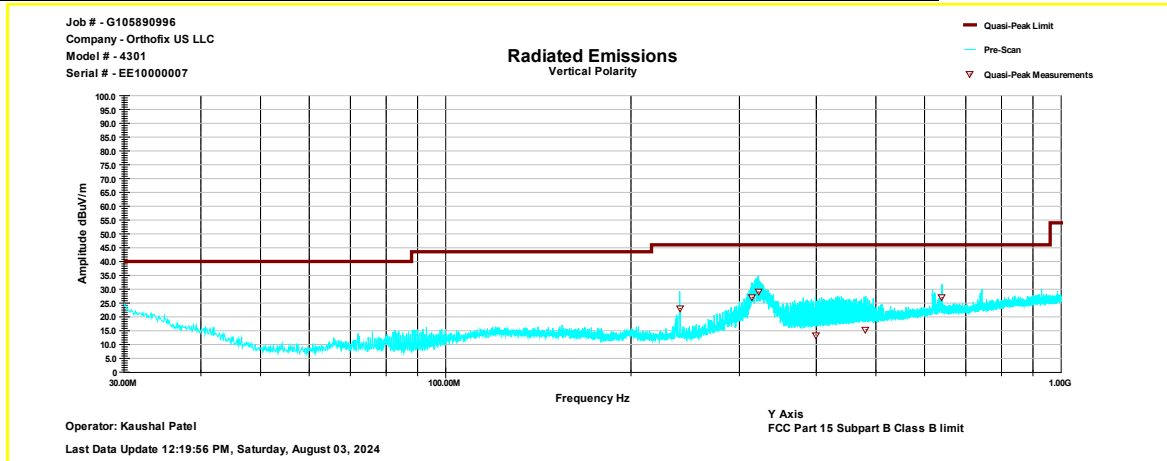
Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.55	47.1	54	-6.9	322	158	Vertical	4
14613.45	42	54	-12	389	63	Vertical	7
16017.45	43.5	54	-10.5	371	258	Vertical	10.4
16765.45	44.7	54	-9.3	173	234	Vertical	11.1
17854.45	46.5	54	-7.5	341	107	Vertical	13.9

Note: Correction = AF + CF - Preamp

Y-Axis

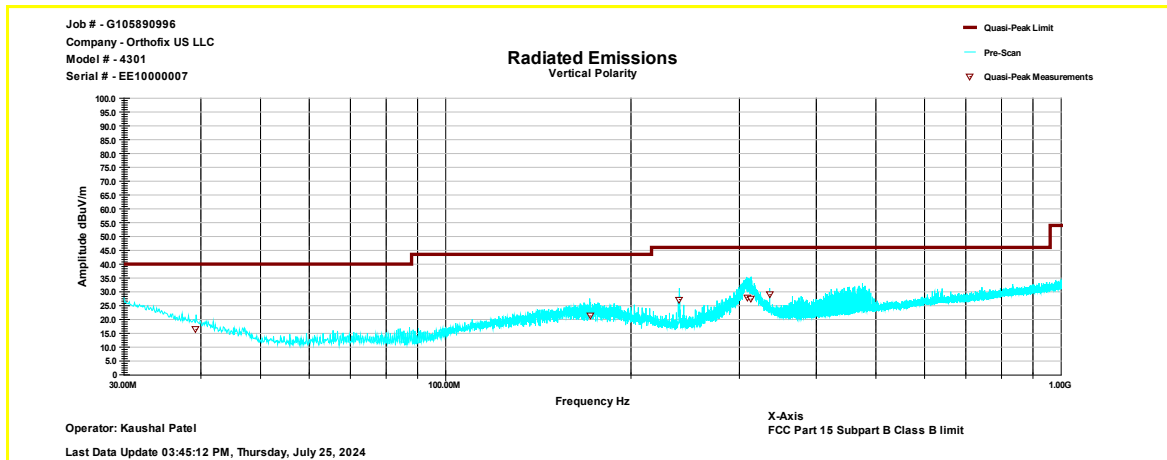
Test Result Radiated Emission 30 MHz-1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
205.51	21.8	43.5	-21.7	109	255	Horizontal	-17.9
281.45	23.8	46	-22.2	109	71	Horizontal	-15.4
311.95	32.9	46	-13.1	109	90	Horizontal	-14.7
320.31	38.1	46	-7.9	109	73	Horizontal	-14.5
339.15	28.8	46	-17.2	109	79	Horizontal	-14
469.51	30.5	46	-15.5	240	254	Horizontal	-10.6

Note: Correction = AF + CF - Preamp

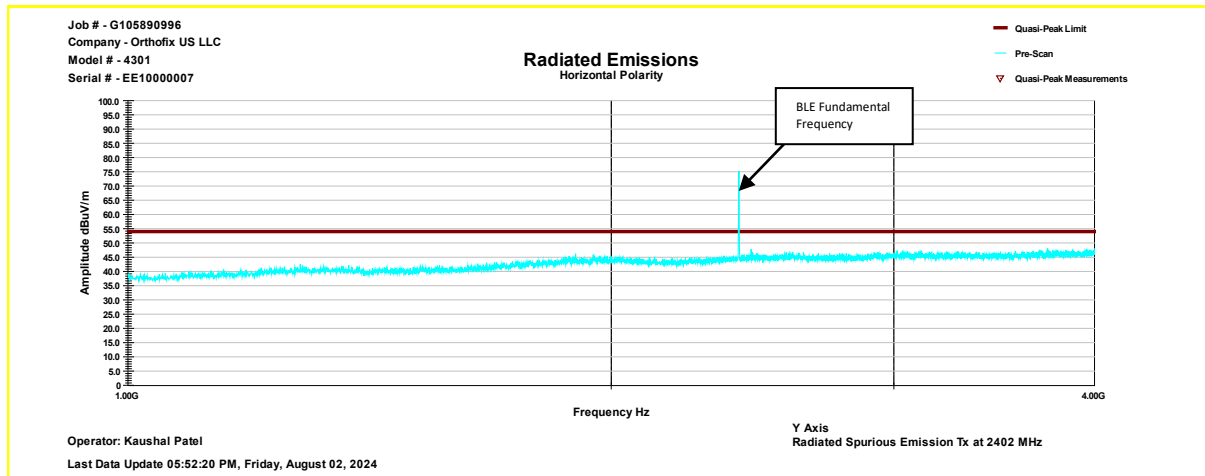
Test Result Radiated Emission 30 MHz-1000 MHz Vertical Antenna Polarization



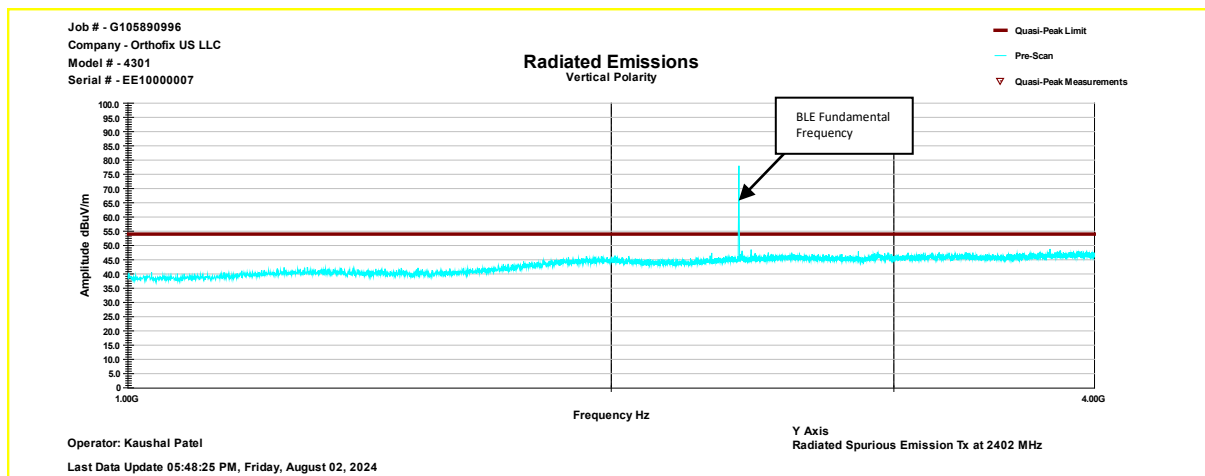
Frequency (MHz)	QPeak@ 3m (dBμV/m)	Lim. QPeak @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
240.01	23	46	-23.1	400	163	Vertical	-17.2
314.53	27	46	-19	349	136	Vertical	-14.6
321.84	28.9	46	-17.1	339	182	Vertical	-14.5
399.05	13.4	46	-32.6	250	68	Vertical	-12.4
481.55	15.3	46	-30.7	250	34	Vertical	-10.2
639.85	26.9	46	-19.2	100	235	Vertical	-7.1

Note: Correction = AF + CF - Preamp

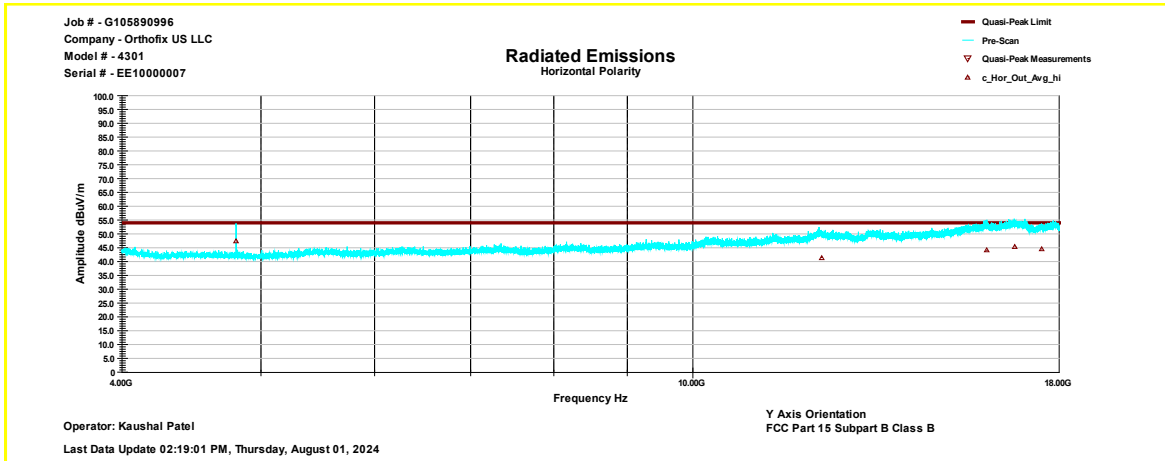
Radiated Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization



Radiated Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization



Radiated Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization

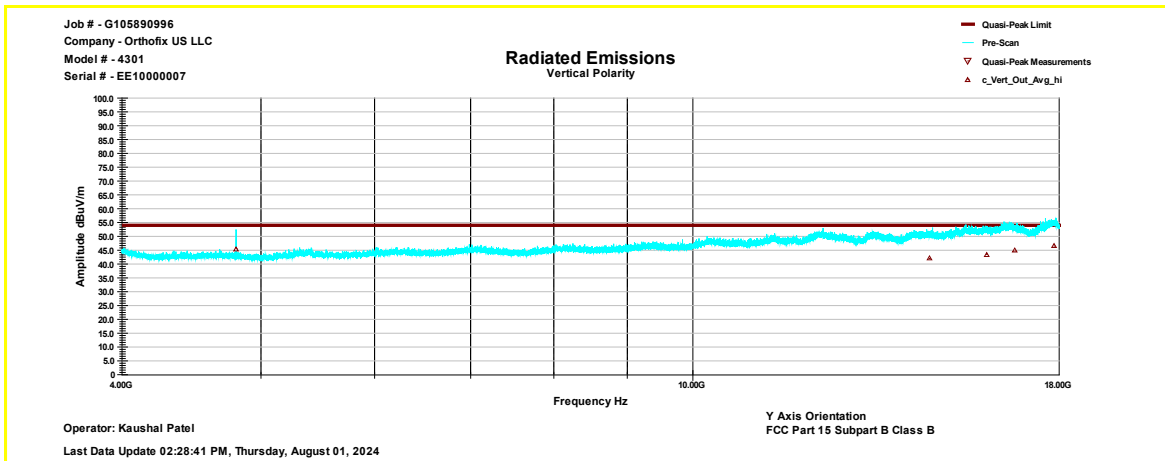


Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.55	47.4	54	-6.6	222	176	Horizontal	3.6
12290.55	41.4	54	-12.5	400	121	Horizontal	5.2
16017.55	44.1	54	-9.9	400	41	Horizontal	10.5
16765.45	45.3	54	-8.7	208	300	Horizontal	11.6
17491.55	44.5	54	-9.4	235	110	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Radiated Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization



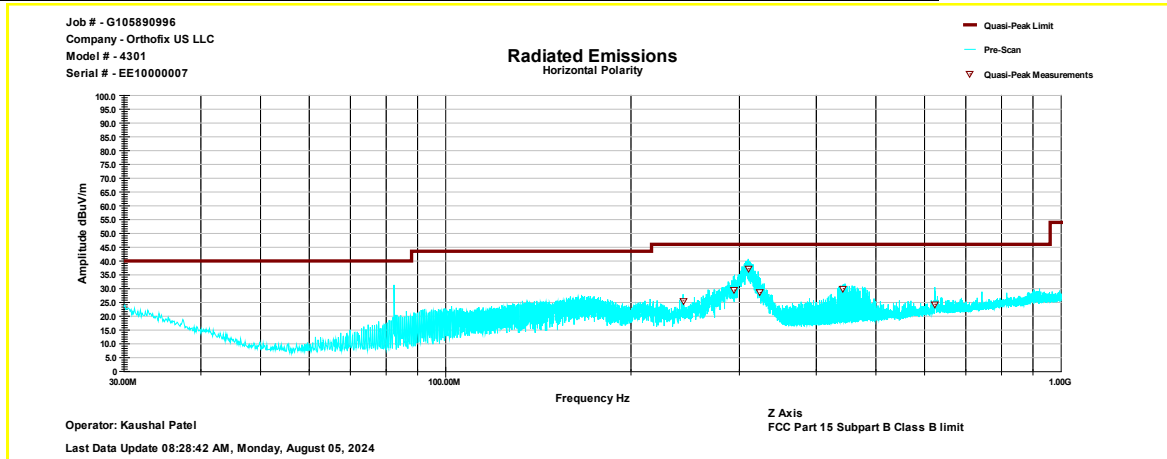
Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.55	45.5	54	-8.5	127	259	Vertical	4
14613.45	42	54	-12	216	30	Vertical	7
16017.45	43.5	54	-10.5	360	262	Vertical	10.4
16765.45	44.7	54	-9.3	118	244	Vertical	11.1
17854.45	46.5	54	-7.5	400	237	Vertical	13.9

Note: Correction = AF + CF - Preamp

Z-Axis

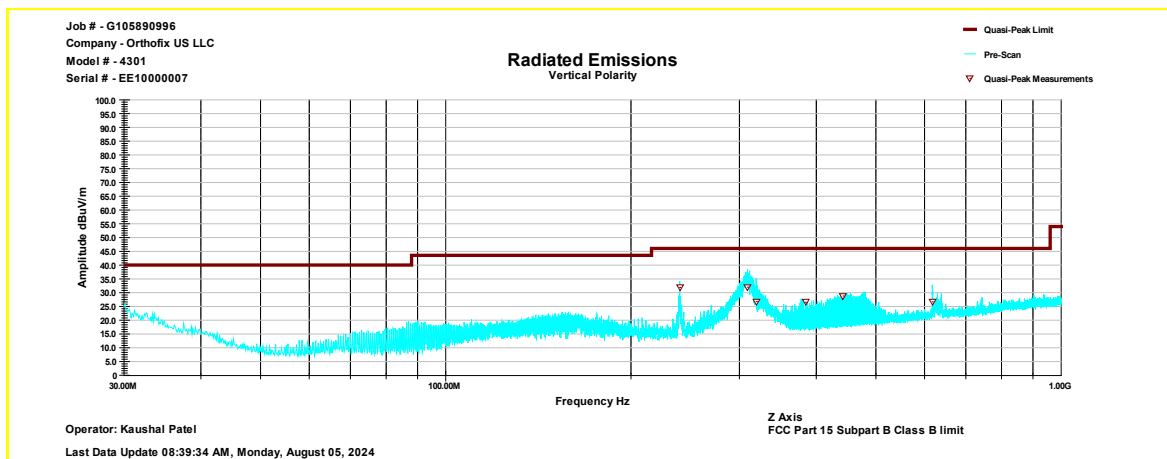
Test Result Radiated Emission 30 MHz-1000 MHz Horizontal Antenna Polarization



Frequency (MHz)	QPeak@ 3m (dBuV/m)	Lim. QPeak @3m (dBuV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
242.95	25.6	46	-20.4	203	159	Horizontal	-17.2
294.45	29.5	46	-16.6	100	79	Horizontal	-15.1
310.15	37.2	46	-8.8	100	80	Horizontal	-14.7
324.21	28.6	46	-17.4	100	79	Horizontal	-14.4
442.51	30	46	-16	250	254	Horizontal	-11.2
623.45	24.3	46	-21.7	339	149	Horizontal	-7.6

Note: Correction = AF + CF - Preamp

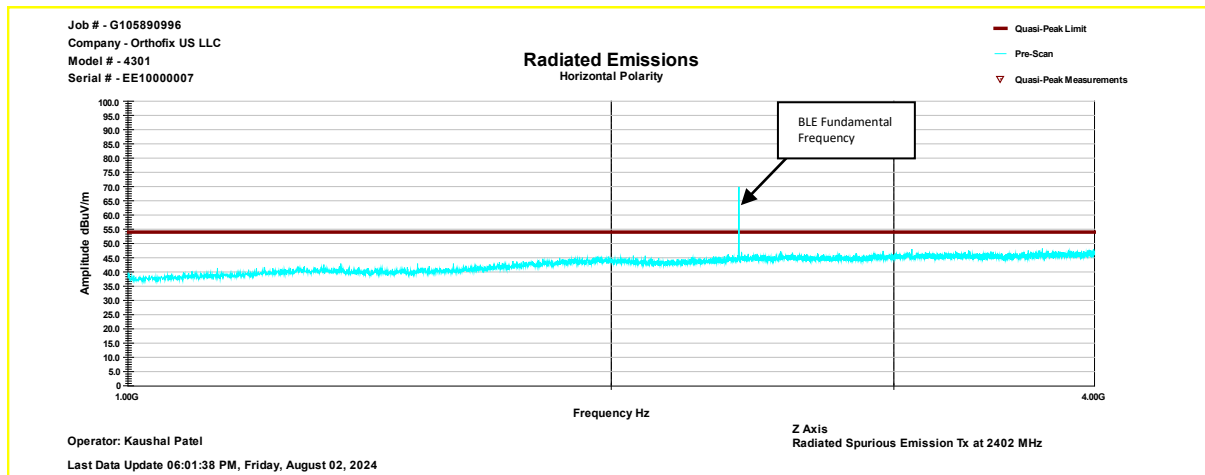
Test Result Radiated Emission 30 MHz-1000 MHz Vertical Antenna Polarization



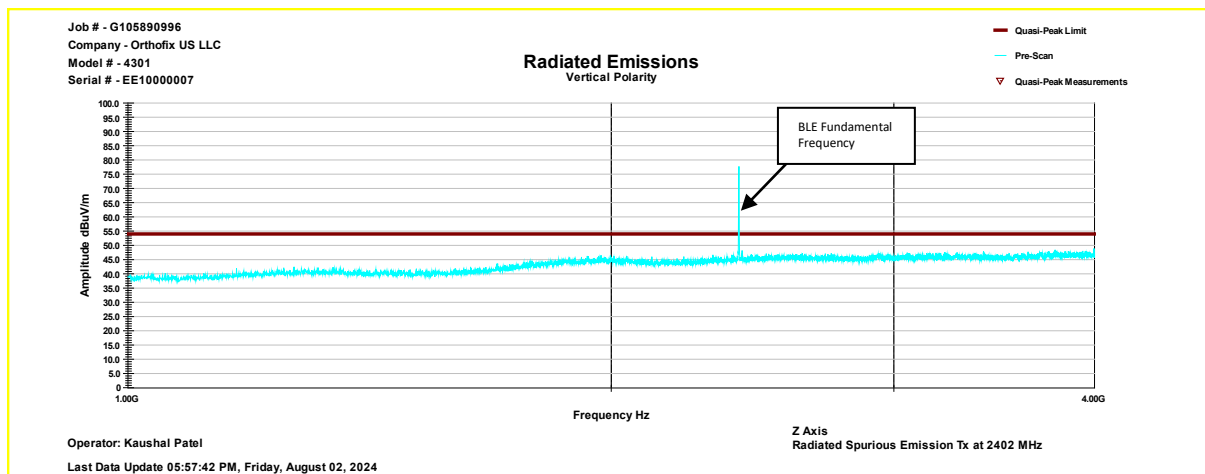
Frequency (MHz)	QPeak@ 3m (dBuV/m)	Lim. QPeak @3m (dBuV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
239.99	31.9	46	-14.1	250	23	Vertical	-17.2
309.35	32	46	-14	239	70	Vertical	-14.7
319.51	26.8	46	-19.2	221	41	Vertical	-14.5
383.99	26.5	46	-19.5	350	276	Vertical	-12.8
442.48	28.8	46	-17.3	150	23	Vertical	-11.2
617.56	26.6	46	-19.4	127	95	Vertical	-7.6

Note: Correction = AF + CF - Pream

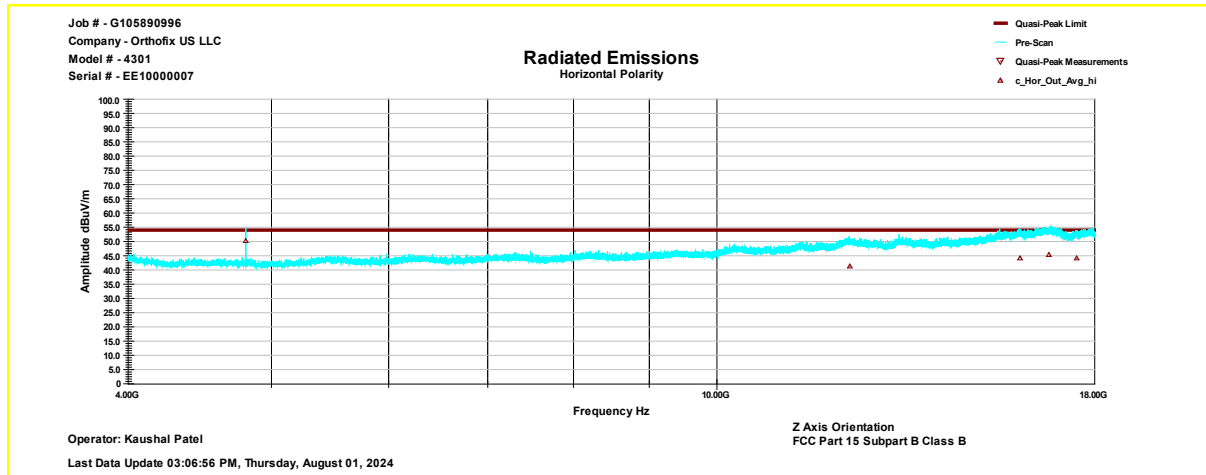
Radiated Emissions 1000 MHz - 4000 MHz Horizontal Antenna Polarization



Radiated Emissions 1000 MHz - 4000 MHz Vertical Antenna Polarization



Radiated Emissions 4000 MHz - 18000 MHz Horizontal Antenna Polarization

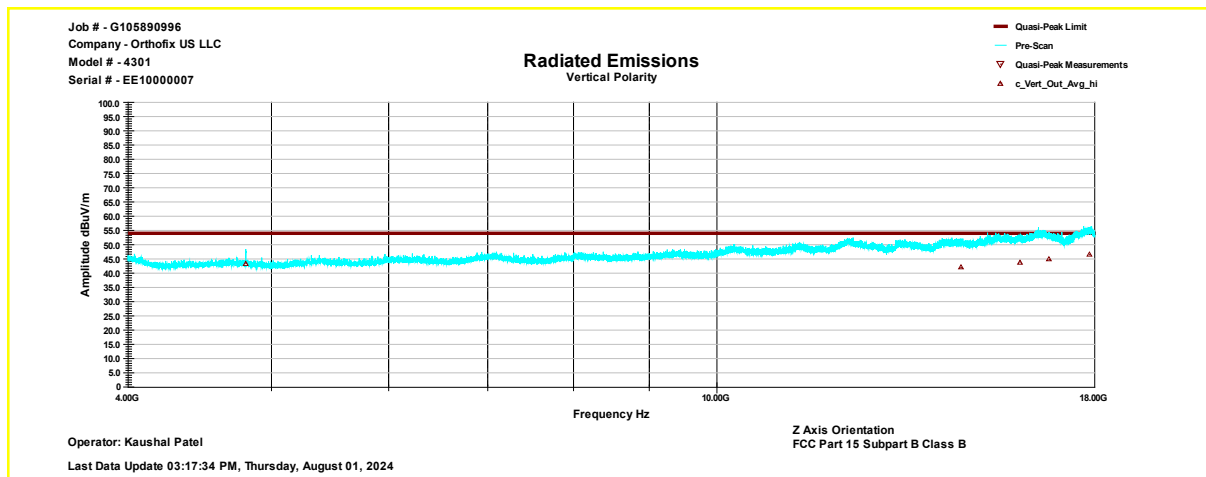


Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.55	50.2	54	-3.8	149	87	Horizontal	3.6
12290.45	41.4	54	-12.6	198	323	Horizontal	5.2
16017.55	44.3	54	-9.7	109	151	Horizontal	10.5
16765.55	45.2	54	-8.8	279	265	Horizontal	11.6
17491.55	44.1	54	-9.9	154	6	Horizontal	11.9

Note: Correction = AF + CF - Preamp

Radiated Emissions 4000 MHz - 18000 MHz Vertical Antenna Polarization



Note: Measurements made from 4 GHz to 18GHz had a 2.4-2.5GHz notch filter in place

Frequency (MHz)	Avg@ 3m (dBμV/m)	Lim. Avg @3m (dBμV/m)	Margin (dB)	Height (cm)	Angle (°)	Comment	Correction (dB)
4803.55	43.4	54	-10.5	150	78	Vertical	4
14613.45	41.9	54	-12.1	252	51	Vertical	7
16017.45	43.9	54	-10.1	209	45	Vertical	10.4
16765.45	44.8	54	-9.2	145	273	Vertical	11.1
17854.45	46.5	54	-7.5	377	299	Vertical	13.9

Note: Correction = AF + CF - Preamp

4.7 AC Line Conducted Emission FCC: 15.107, FCC: 15.207, ICES-003

4.7.1 Requirement

Frequency Band MHz	Class B Limit dB(μ V)		Class A Limit dB(μ V)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15-0.50	66 to 56 *	56 to 46 *	79	66
0.50-5.00	56	46	73	60
5.00-30.00	60	50	73	60

*Note: *Decreases linearly with the logarithm of the frequency. At the transition frequency the lower limit applies.*

4.7.2 Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m but may be extended for larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

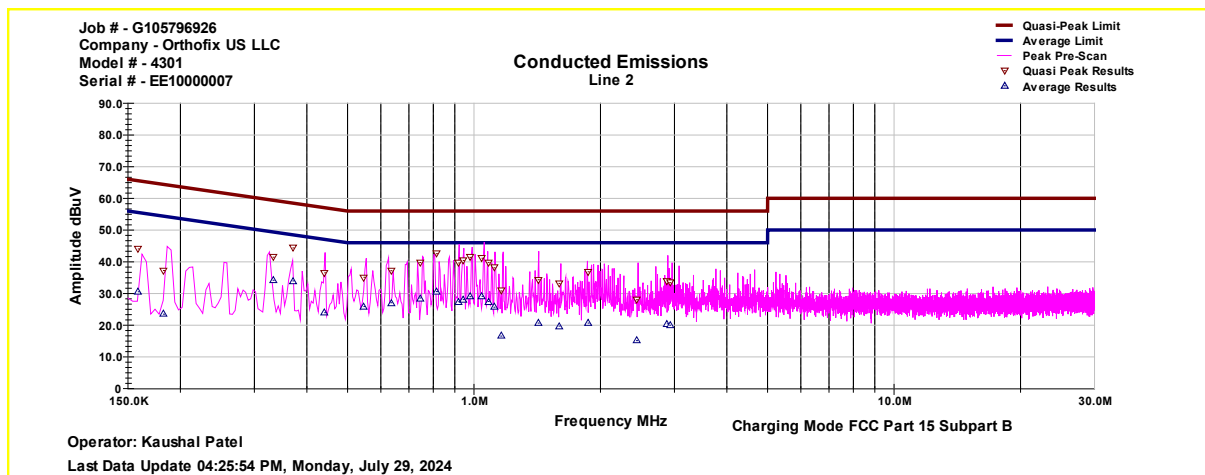
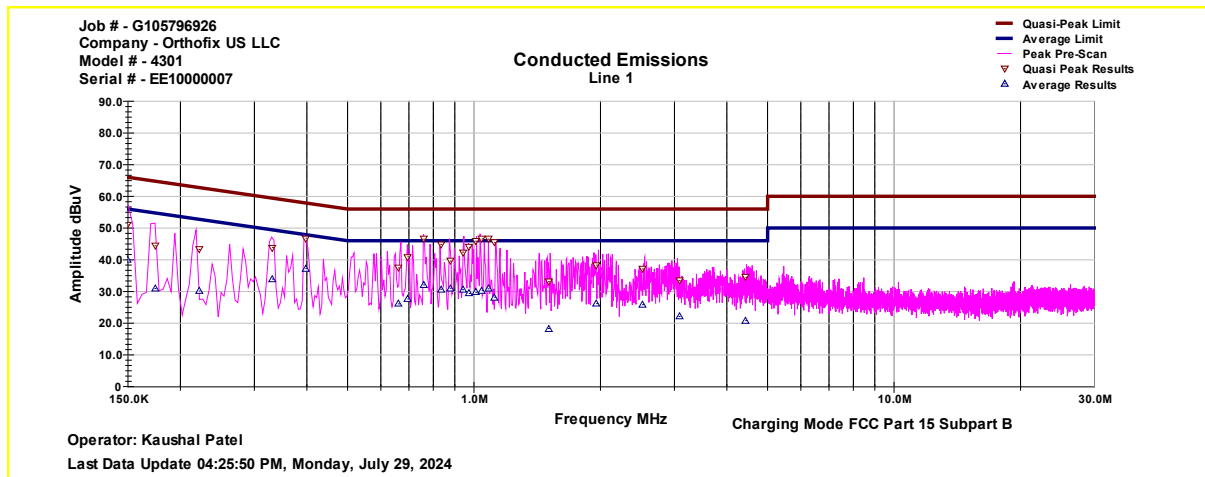
AC mains conducted emissions measurements were performed according to the procedures in ANSI C63.4.

Tested By	Test Date	Results
Kaushal Patel	July 29, 2024	Complies

4.7.3 Test Result

Model 4301

FCC Part 15.107 Conducted Disturbances, 120VAC 60 Hz



Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	Margin (dB)	Line	Corrector(dB)
0.15	50.966	66	-15.034	Line 1	10.247
0.17	44.422	64.768	-20.346	Line 1	10.231
0.22	43.198	62.758	-19.56	Line 1	10.209
0.33	43.884	59.416	-15.533	Line 1	10.187
0.4	46.786	57.896	-11.11	Line 1	10.182
0.66	37.413	56	-18.587	Line 1	10.172
0.7	40.924	56	-15.076	Line 1	10.171
0.76	46.48	56	-9.52	Line 1	10.17
0.83	44.838	56	-11.162	Line 1	10.17
0.88	39.571	56	-16.429	Line 1	10.169
0.94	42.4	56	-13.6	Line 1	10.168
0.97	43.942	56	-12.058	Line 1	10.167
1.01	45.843	56	-10.157	Line 1	10.167
1.05	46.575	56	-9.425	Line 1	10.168
1.08	46.455	56	-9.545	Line 1	10.168
1.12	45.388	56	-10.612	Line 1	10.169
1.5	33.063	56	-22.937	Line 1	10.172
1.96	38.289	56	-17.711	Line 1	10.175
2.52	37.1	56	-18.9	Line 1	10.175
3.08	33.419	56	-22.581	Line 1	10.174
4.44	34.492	56	-21.508	Line 1	10.173
0.16	44.043	65.53	-21.48	Line 2	10.196
0.18	37.219	64.38	-27.16	Line 2	10.185
0.33	41.426	59.39	-17.96	Line 2	10.159
0.37	44.349	58.49	-14.14	Line 2	10.158
0.44	36.496	57.04	-20.54	Line 2	10.147
0.55	35.083	56	-20.92	Line 2	10.145
0.63	37.176	56	-18.82	Line 2	10.144
0.74	39.762	56	-16.24	Line 2	10.143
0.81	42.529	56	-13.47	Line 2	10.142
0.92	39.607	56	-16.39	Line 2	10.141
0.94	40.401	56	-15.6	Line 2	10.141
0.98	41.357	56	-14.64	Line 2	10.14
1.04	41.115	56	-14.88	Line 2	10.14
1.08	39.79	56	-16.21	Line 2	10.14
1.12	38.093	56	-17.91	Line 2	10.14
1.16	30.79	56	-25.21	Line 2	10.14
1.42	34.323	56	-21.68	Line 2	10.15
1.59	33.172	56	-22.83	Line 2	10.15
1.87	36.826	56	-19.17	Line 2	10.15
2.44	28.001	56	-28	Line 2	10.14
2.88	33.866	56	-22.13	Line 2	10.14
2.92	33.39	56	-22.61	Line 2	10.14

Frequency (MHz)	Avg Level (dBμV)	Avg Limit (dBμV)	Margin (dB)	Line	Corrector(dB)
0.15	39.916	56	-16.084	Line 1	10.247
0.17	30.901	54.768	-23.867	Line 1	10.231
0.22	30.103	52.758	-22.655	Line 1	10.209
0.33	33.88	49.416	-15.536	Line 1	10.187
0.4	37.165	47.896	-10.731	Line 1	10.182
0.66	26.066	46	-19.934	Line 1	10.172
0.7	27.645	46	-18.355	Line 1	10.171
0.76	32.084	46	-13.916	Line 1	10.17
0.83	30.667	46	-15.333	Line 1	10.17
0.88	30.998	46	-15.002	Line 1	10.169
0.94	30.542	46	-15.458	Line 1	10.168
0.97	29.356	46	-16.644	Line 1	10.167
1.01	29.746	46	-16.254	Line 1	10.167
1.05	30.216	46	-15.784	Line 1	10.168
1.08	30.806	46	-15.194	Line 1	10.168
1.12	28.191	46	-17.809	Line 1	10.169
1.5	18.291	46	-27.709	Line 1	10.172
1.96	26.16	46	-19.84	Line 1	10.175
2.52	25.841	46	-20.159	Line 1	10.175
3.08	22.091	46	-23.909	Line 1	10.174
4.44	20.792	46	-25.208	Line 1	10.173
0.16	30.54	55.53	-24.99	Line 2	10.196
0.18	23.47	54.38	-30.91	Line 2	10.185
0.33	34.15	49.39	-15.23	Line 2	10.159
0.37	33.95	48.49	-14.54	Line 2	10.158
0.44	23.93	47.04	-23.11	Line 2	10.147
0.55	25.86	46	-20.14	Line 2	10.145
0.63	27.07	46	-18.93	Line 2	10.144
0.74	28.55	46	-17.45	Line 2	10.143
0.81	30.58	46	-15.42	Line 2	10.142
0.92	27.39	46	-18.61	Line 2	10.141
0.94	28.06	46	-17.94	Line 2	10.141
0.98	28.98	46	-17.02	Line 2	10.14
1.04	29.1	46	-16.9	Line 2	10.14
1.08	27.44	46	-18.56	Line 2	10.14
1.12	25.66	46	-20.34	Line 2	10.14
1.16	16.55	46	-29.45	Line 2	10.14
1.42	20.64	46	-25.36	Line 2	10.15
1.59	19.7	46	-26.3	Line 2	10.15
1.87	20.66	46	-25.34	Line 2	10.15
2.44	15.11	46	-30.89	Line 2	10.14
2.88	20.42	46	-25.58	Line 2	10.14
2.92	19.99	46	-26.01	Line 2	10.14

5.0 List of Test Equipment

Measurement equipment used for compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Asset #	Cal Int	Cal Due
EMI Test Receiver	Rohde & Schwarz	ESU26	3729	12	2/1/2025
EMI Test Receiver	Rohde & Schwarz	ESW26	5249	12	9/1/2024
9kHz-30MHz Loop Antenna (Passive)	EMCO	6512	ITS 01573	12	11/30/2024
30MHz-1GHz Bi-Log Antenna	Sunol Sciences Corp.	JB6	3556	12	8/7/2024
1-18GHz Double Ridge Horn Antenna	ETS Lindgren	3117	4387	12	2/5/2025
18 – 26 GHz Double Ridge Guide Antenna	ETS Lindgren	3116C	3696	12	8/3/2024
18-26 GHz Preamp	Miteq Inc.	AMF-6F1800265	967	12	4/16/2025
NOTCH FILTER	MICRO-TRONICS	BRC50702	5028	12	5/21/2025
30 MHz-1 GHz Preamp	Miteq Inc.	AM-3A-000110	3663	12	1/20/2025
1-4 GHz Preamp	Mini-Circuit Lab	ZHL-42	3619	12	8/4/2024
4-18 GHz Preamp	Narda	DBL-0618N615	3623	12	8/3/2024
18 GHz RF Cable	Maury Microwave	SF-N-MM-275-LP	5620	12	8/9/2024
18 GHz RF Cable	Maury Microwave	SF-N-MM-78-LP	5613	12	8/9/2024
40 GHz RF Cable	Megaphase	GC12-K1K1-236	5472	12	2/26/2025
LISN	Com-Power	LI-220A	5890	12	4/30/2025
Transient Limiter	Hewlett Packard	11947A	3542	12	2/28/2025

No Calibration required

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
TILE!	ETS Lindgren	7.5.5.6	Master Radiated Emissions
TILE!	ETS Lindgren	7.5.5.6	Master Band Edge Emissions
TILE!	ETS Lindgren	7.5.5.6	Master Unwanted Conducted Emissions
TILE!	ETS Lindgren	7.5.5.6	Master Conducted Emission

6.0 Document History

Revision/ Job Number	Writer Initials	Reviewers Initials	Date	Change
1.0/ G105890996	KP	AS	August 26, 2024	Original document
1.1/ G105890996	KP	AS	September 18, 2024	Test Setup Photos Removed from the Report Duty Cycle >98% added

END OF REPORT