



TEST REPORT

Report Number. : 13714286-E2V2

Applicant : LEVITON MANUFACTURING CO., INC.
10385 SW AVERY
TUALATIN, OR 97062-2210
USA

Models : MSC-B9285

Brand : LEVITON

FCC ID : 2ASLN-ZL070

IC : 25037-ZL070

EUT Description : MSC Inline Logic Board B9285

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5 + A1

Date Of Issue:

January 25, 2022

Prepared by:

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	1/14/2022	Initial Issue	
V2	1/25/2022	Updated Section Cover 6.1,6.3 and 6.6	K.Kedida

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LEVITON MANUFACTURING CO., INC.
10385 SW AVERY
TUALATIN, OR 97062-2210
USA

EUT DESCRIPTION: MSC Inline Logic Board B9285

MODEL: MSC-B9285

BRAND: LEVITON

SERIAL NUMBER: 1MC (1MR), 1MC (1MRE) (Conducted)
1MR, 2MR, 3MR, 1MRE, 2MRE, 4MRE (Radiated)

DATE TESTED: MAY 20 – AUGUST 25, 2021

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 + A1	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
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2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Complies	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	Complies	None.
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	Complies	None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions	Complies	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Complies	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Complies	None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, certification #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	2324A	550739
☐	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	550739
☒	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	2324B	550739

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U _{Lab}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.84 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is an MSC Inline Logic Board B9285. It is a limited module and tested in number of host models with internal and external antenna.

Internal antenna models# 0-10V: ZLD70-B00, ZLD70-B20 and DALI: ZLDD0-B00 containing BG21 are identical in terms of enclosure and PCB board and their configurations to internal antenna model# 0-10V: ZL070-B00, ZL070-B20 and DALI: ZL0D0-B00 containing MG21; the only difference is these are BLE-only and had other proprietary protocol features disabled by silicon manufacturer.

External antenna models# 0-10V: ZLD70-B0A, ZLD70-B2A and DALI: ZLDD0-B0A containing BG21 are identical in terms of enclosure and PCB board and their configurations to external antenna model# 0-10V: ZL070-B0A, ZL070-B2A and DALI: ZL0D0-B0A containing MG21; the only difference is these are BLE-only and had other proprietary protocol features disabled by silicon manufacturer. External antenna variants uses an interposer board with antenna tuning components to connect to the main board

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

INTERNAL ANTENNA CONFIGURATION

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2405 - 2480	Zigbee	6.37	4.34

EXTERNAL ANTENNA CONFIGURATION

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2405 - 2480	Zigbee	2.85	1.93

Note: Conducted output power for Internal antenna configuration is measured before the antenna tuning components and for external antenna, it is measured after the antenna tuning components on the interposer board. The firmware setting (q settings) is almost equal but difference in measurement point. Only external antenna variants will be sold with this daughter tuning antenna component board and internal antenna variants will have main board only.

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna gain(s) and type, as provided by the manufacturer, are as follows:

Antenna	Type	Peak Gain dBi
Internal	Chip	1.50
External	Wire	0.8

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was SiLabs Railtest firmware version # 2.8.6
The EUT firmware installed during testing was SiLabs Railtest_efr32mg21_inline.s37
The test utility software used during testing was RealTerm version 2.0.0.70

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

A metal plate(for end product installation purposes) was attached to the host per applicant's request. The fundamental of the internal antenna EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

A metal plate(for end product installation purposes) was attached to the host per applicant's request. The fundamental of the external antenna EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

Internal Antenna: Part number ZLD70-B20 with both BLE/Zigbee protocol was set for full testing and spot check verification has been done on models ZLD70-B00 and DALI: ZLDD0-B00 for radiated harmonic spurious.

External Antenna: Part number ZLD70-B2A with both BLE/Zigbee protocol was set for full testing and spot check verification has been done on models ZLD70-B0A and DALI: ZLDD0-B0A for radiated harmonic spurious.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Asus	EeePC1101HAB	-	DoC
FTDI to USB Cable	-	-	-	-
LED Electronics Driver	Signify	XI040C110V054PST2	-	-
LED Electronics Driver	Signify	XI040C110V054VPT2	-	-
24V Power Supply	Mass Power	SHF2400125U1BA	-	-

INTERNAL ANTENNA CONFIGURATION

I/O CABLES (CONDUCTED EMISSIONS)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	DC	Unshielded	3	AC Main to EUT
2	FTDI	1	USB	Unshielded	1.8	EUT to Laptop (maintenance cable)
3	Antenna Port	1	SMA	Unshielded	0.2	EUT to Analyzer

I/O CABLES (RADIATED EMISSIONS 1 to 26GHz)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	3	AC Main to Driver
2	DC	1	DC	Unshielded	2.5	Driver to EUT
3	FTDI	1	USB	Unshielded	1.8	EUT to Laptop (maintenance cable)

I/O CABLES (RADIATED EMISSIONS 30MHz to 1GHz AND AC POWER LINE CONDUCTED EMISSIONS)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	DC	Unshielded	3	AC/DC Supply

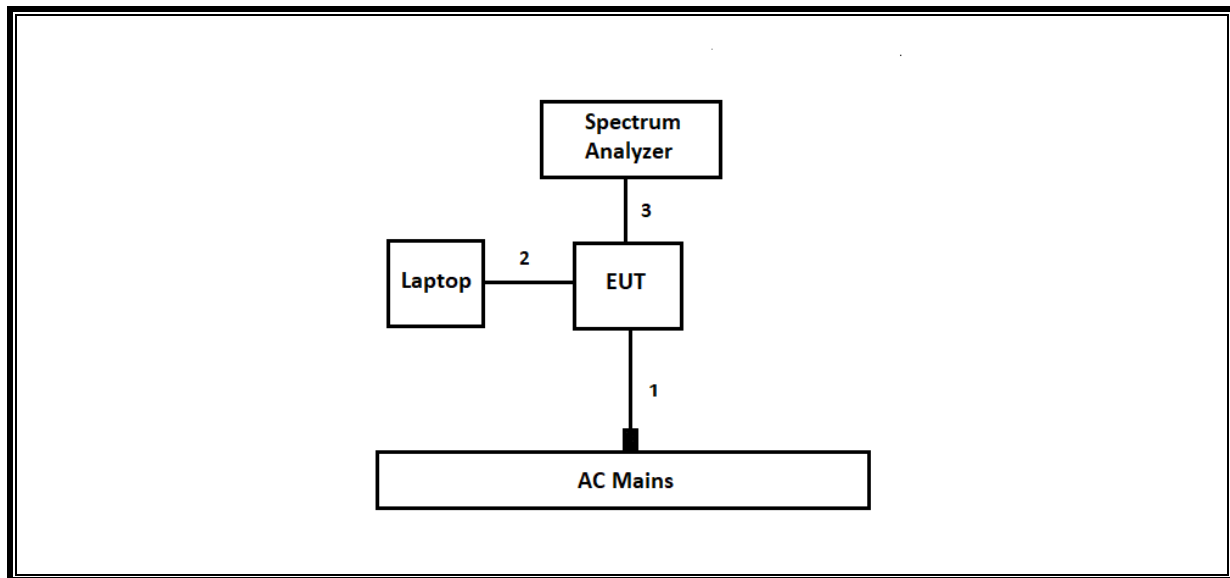
I/O CABLES (RADIATED EMISSIONS 9KHz to 30MHz)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	3	AC Main to Driver
2	DC	1	DC	Unshielded	2.5	Driver to EUT

SETUP DIAGRAM FOR CONDUCTED TESTS

TEST SETUP

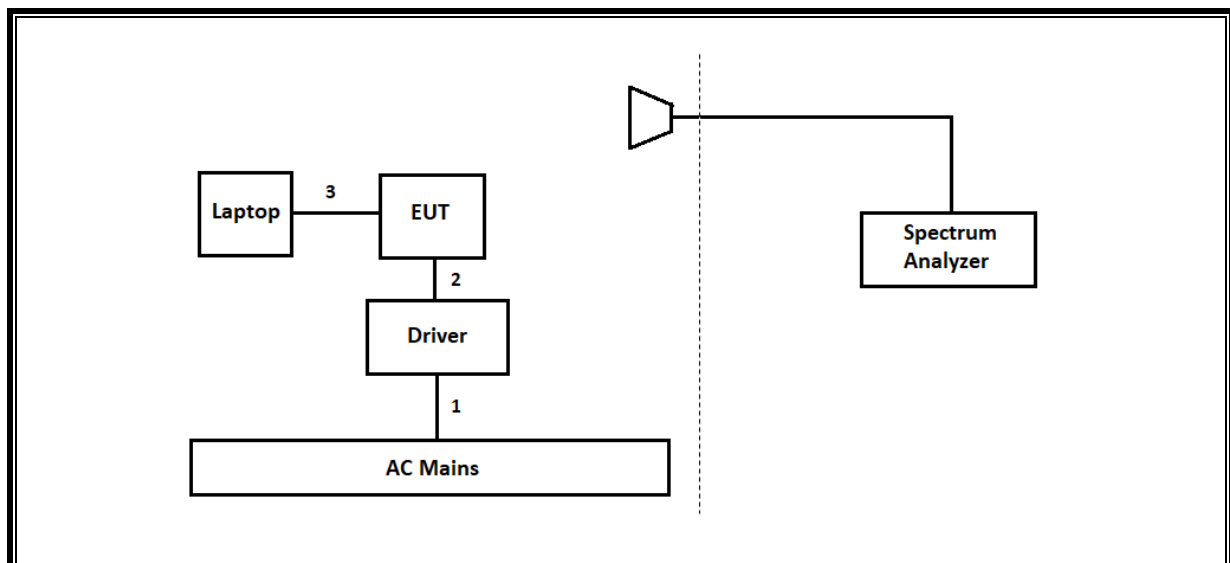
The EUT is powered by the AC/DC Adapter. Test software exercised the radio card.



SETUP DIAGRAM FOR RADIATED TESTS (1GHz to 26GHz)

TEST SETUP

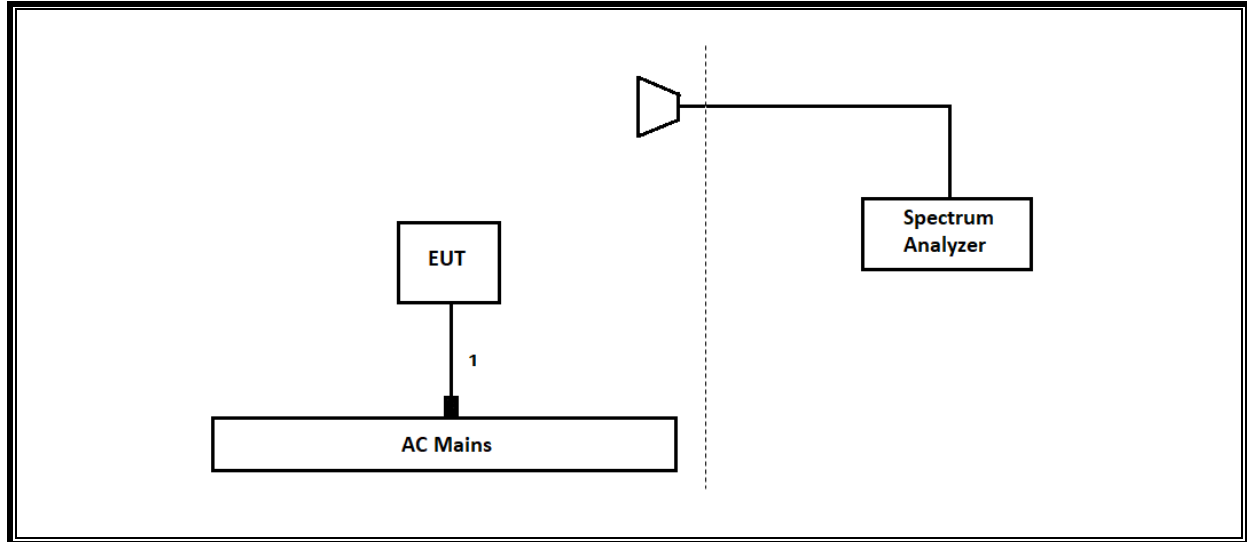
The EUT is powered by the Driver. Test software exercised the radio card.



SETUP DIAGRAM FOR RADIATED TESTS (30MHz to 1GHz) AND AC POWER LINE CONDUCTED EMISSIONS

TEST SETUP

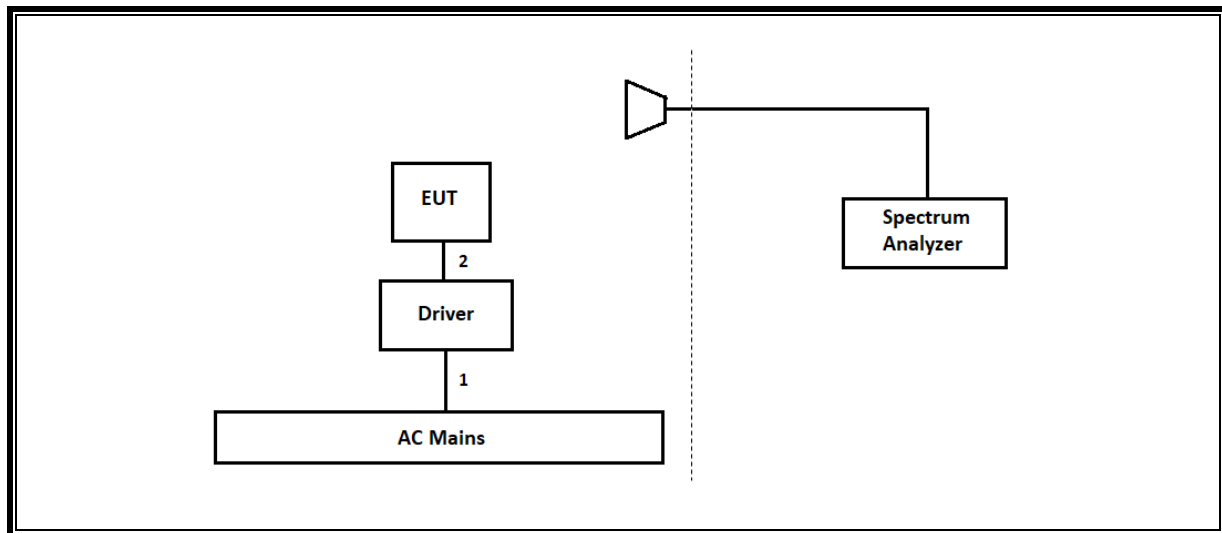
The EUT is powered by the AC/DC Adapter. Test software exercised the radio card. The laptop was used for setup and removed during testing.



SETUP DIAGRAM FOR RADIATED TESTS (9KHz to 30MHz)

TEST SETUP

The EUT is powered by the Driver. Test software exercised the radio card. The laptop was used for setup and removed during testing.



EXTERNAL ANTENNA CONFIGURATION

I/O CABLES (CONDUCTED EMISSIONS)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	DC	Unshielded	3	AC Main to EUT
2	FTDI	1	USB	Unshielded	1.8	EUT to Laptop (maintenance cable)
3	Antenna Port	1	SMA	Unshielded	0.2	EUT to Analyzer

I/O CABLES (RADIATED EMISSIONS 1 to 26GHz)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	DC	Unshielded	3	AC/DC Supply
2	FTDI	1	USB	Unshielded	1.8	EUT to Laptop (maintenance cable)

I/O CABLES (RADIATED EMISSIONS 9KHz to 30MHz, 30MHz to 1GHz AND AC POWER LINE CONDUCTED EMISSIONS)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	DC	Unshielded	3	AC/DC Supply

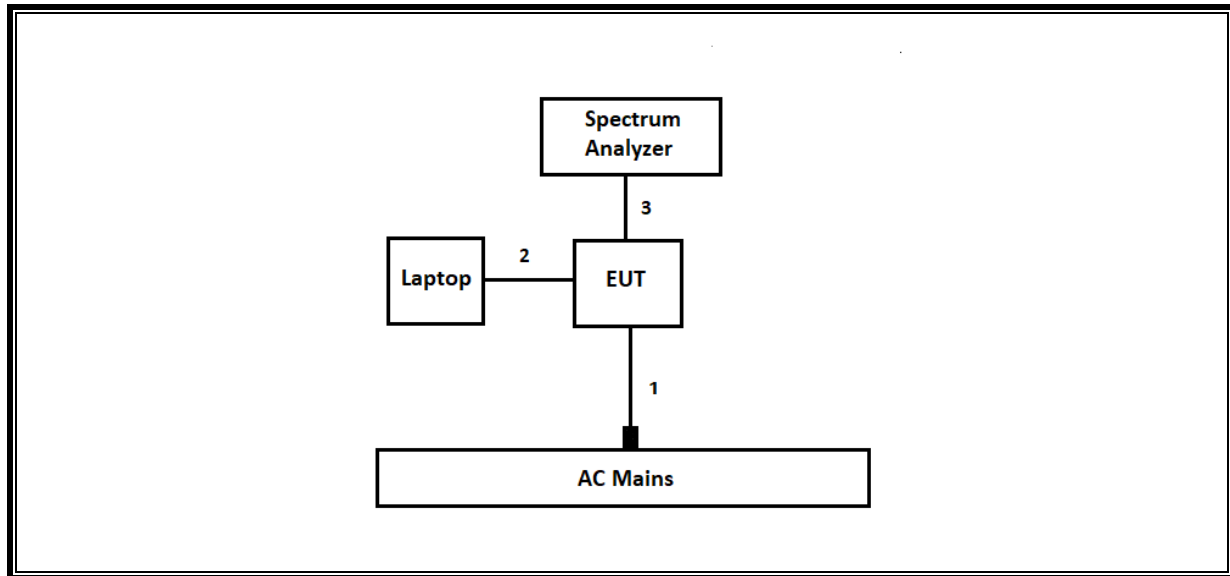
I/O CABLES (RADIATED EMISSIONS 9KHz to 30MHz)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	3	AC Main to Driver
2	DC	1	DC	Unshielded	2.5	Driver to EUT

SETUP DIAGRAM FOR CONDUCTED TESTS

TEST SETUP

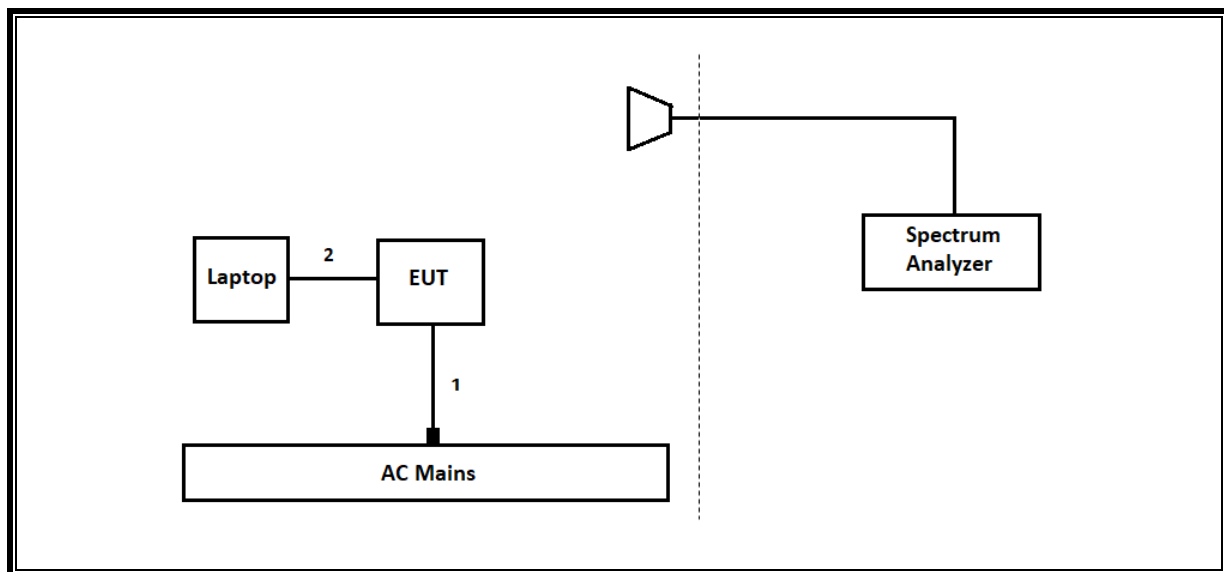
The EUT is powered by the AC/DC Adapter. Test software exercised the radio card.



SETUP DIAGRAM FOR RADIATED TESTS (1GHz to 26GHz)

TEST SETUP

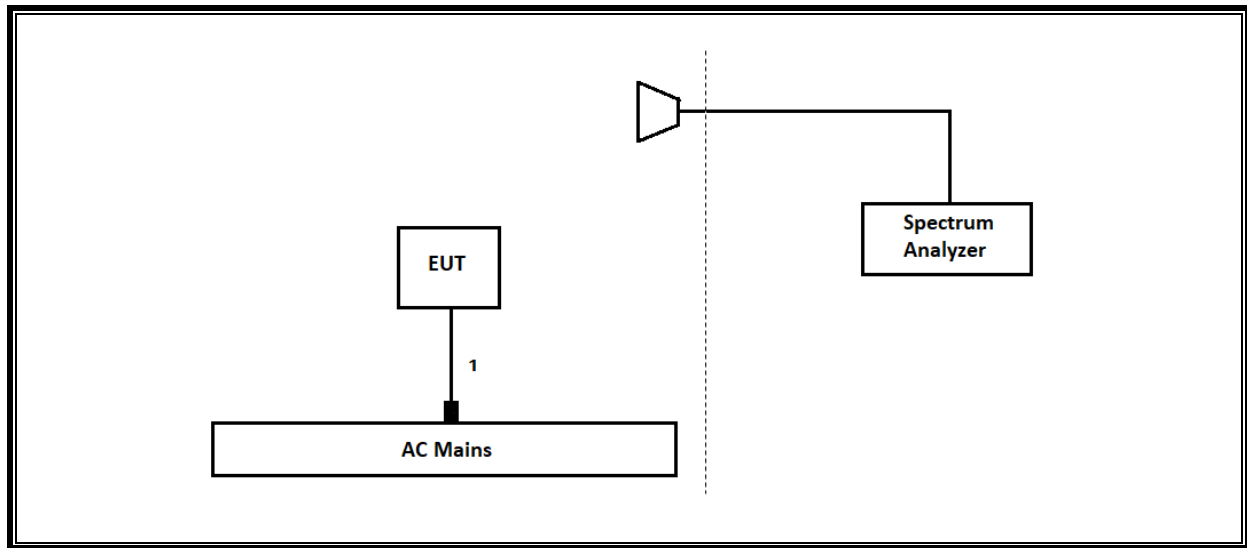
The EUT is powered by the AC/DC Adapter. Test software exercised the radio card.



**SETUP DIAGRAM FOR RADIATED TESTS (9KHz to 30MHz, 30MHz to 1GHz) AND AC POWER LINE
CONDUCTED EMISSIONS**

TEST SETUP

The EUT is powered by the AC/DC Adapter. Test software exercised the radio card. The laptop was used for setup and removed during testing.



7. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10 Section 11.6.

6 dB BW: ANSI C63.10 Section 11.8.1

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Output Power: ANSI C63.10 Section 11.9.1.3 Method PKPM1 Peak-reading power meter

Output Power: ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

PSD: ANSI C63.10 Section 11.10.2. Method PKPSD (peak PSD)

Radiated emissions non-restricted frequency bands: ANSI C63.10 Section -11.11

Radiated emissions restricted frequency bands: ANSI C63.10 Section -11.12.1 and KDB558074 Section 11, Question 3 (a)

Conducted emissions in restricted frequency bands: ANSI C63.10 Section -11.12.2

Band-edge: ANSI C63.10 Section 6.10

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179367	2/21/2022	2/21/2021
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179377	2/23/2022	2/23/2022
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	8/31/2021	8/31/2020
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	*5/26/2021	5/26/2020
Amplifier, 100MHz-18GHz	AMPLICAL	AMP0.1G18-47-20	PRE0197319	4/8/2022	4/8/2021
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25-S-42	T1568	4/9/2022	4/9/2021
Antenna, Broadband Hybrid, 30MHz to 3GHz	Sunol Sciences Corp.	JB3	T477 (81560)	9/24/2021	9/24/2020
Antenna, Broadband Hybrid, 30MHz to 3GHz	Sunol Sciences Corp.	JB3	174373	12/2/2021	12/2/2020
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	175953	1/21/2022	1/21/2021
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310N	T300	3/2/2022	3/2/2021
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	SC-8015	5/24/2022	5/24/2021
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	SC-8014	5/24/2022	5/24/2021
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	T340	1/28/2022	1/28/2021
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Keysight Technologies Inc	E4440A	T198	5/13/2022	5/13/2021
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	T1227	3/16/2022	3/16/2021
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	T1223	6/17/2022	6/17/2021
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	T1264	1/26/2022	1/26/2021
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	T447	9/24/2021	9/24/2020
Rf Amplifier, 18-26.5GHz, 60dB gain	AMPLICAL	AMP18G26.5-60	171590	5/21/2022	5/21/2021
AC Line					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
LISN	FCC INC.	FCC-LISN-50/250-25-2-01-480V	PRE0186446	1/20/2022	1/20/2021
EMI TEST RECEIVER	Rohde & Schwarz	ESR	T1436	2/19/2022	2/19/2021
Transient Limiter	COM-TE	TBFL1	207996	6/1/2022	6/1/2020
Thermometer	Control Company	14-650-118	175736	8/26/2021	6/26/2020
Test Software List					
Description	Manufacturer	Model	Version		
Radiated Software	UL	UL EMC	Rev 9.5, April 30, 2020 (below 30MHz, below 1G, 1-18G radiated emissions), Oct 21, 2019 (above 18G radiated emissions)		
Antenna Port Software	UL	UL RF	AP 2021.5.12 & AP 2021.7.13		
AC Line Conducted Software	UL	UL EMC	Rev 9.5, July 07, 2020		

NOTES:

1. * Testing is completed before equipment expiration date.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

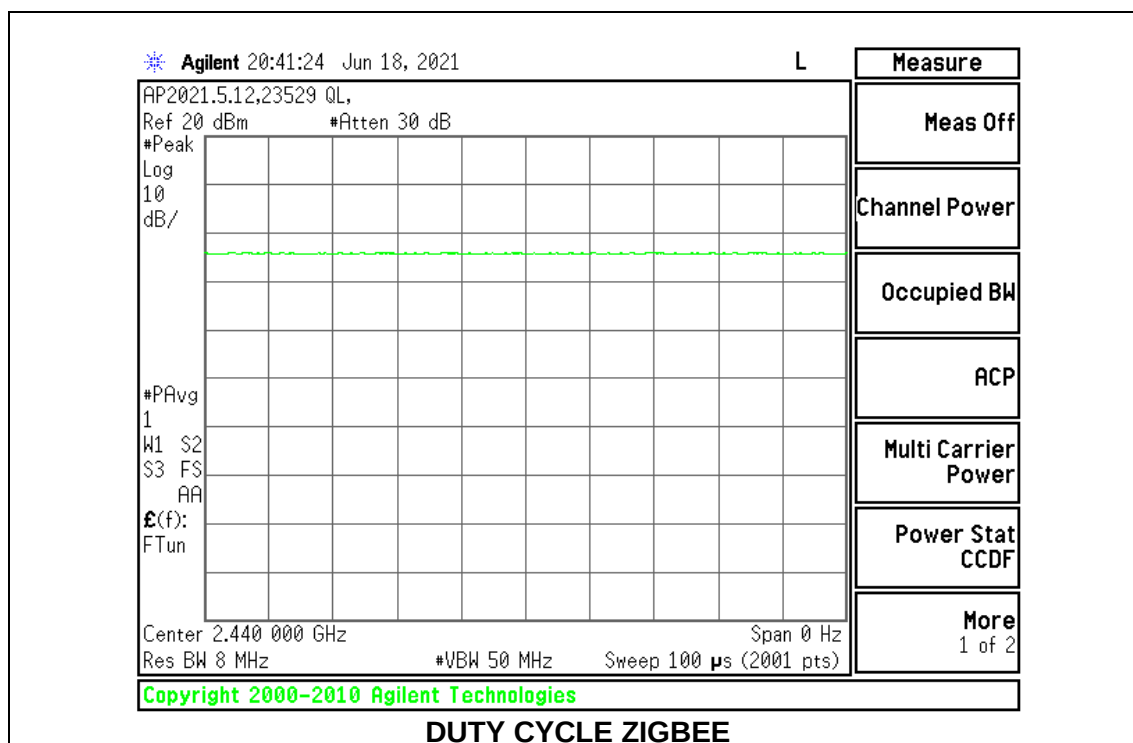
KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
Zigbee	0.100	0.100	1.000	100	0.00	0.010

Note: For testing purposes, the EUT is transmitting continuously
For DCCF used for radiated harmonic average measurements, DCCF is based on manufacturer's declared operational duty cycle of 66.06%
DCCF = $20 \cdot \log(0.6606) = -3.6 \text{ dB}$

DUTY CYCLE PLOTS



9.2. 99% BANDWIDTH

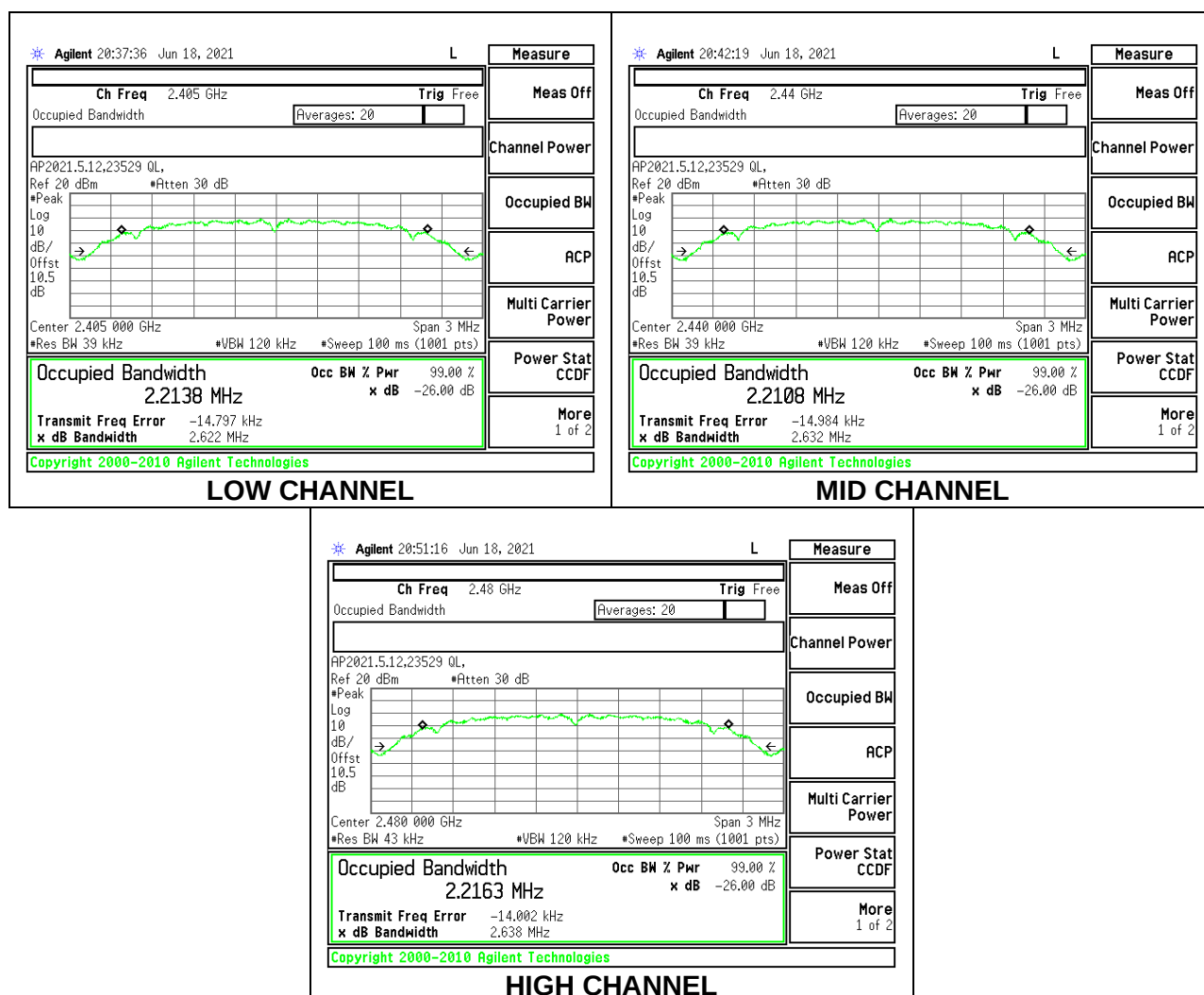
LIMITS

None; for reporting purposes only.

RESULTS

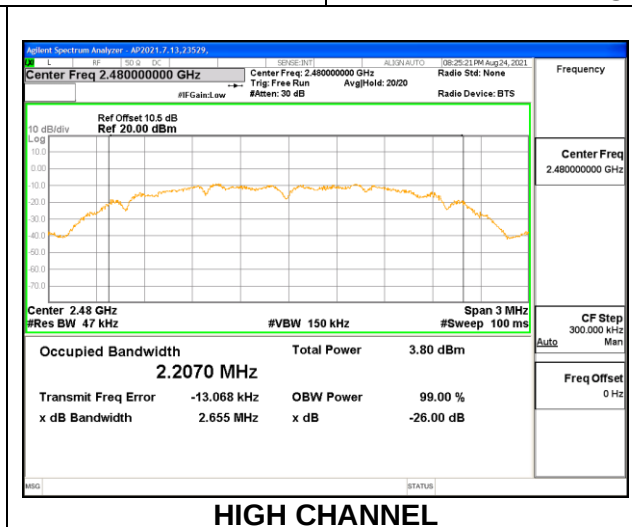
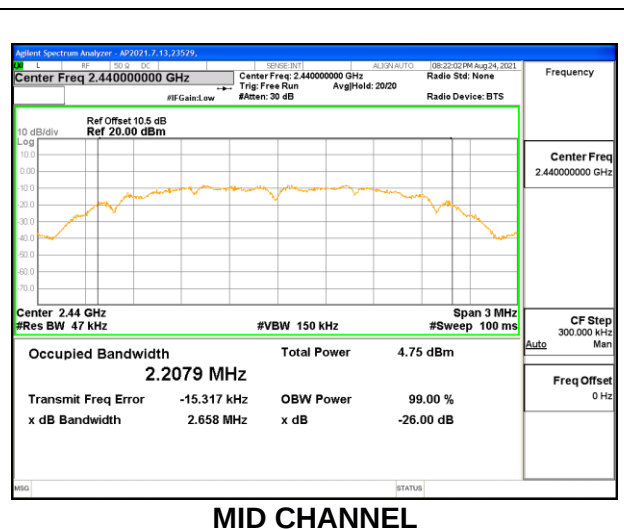
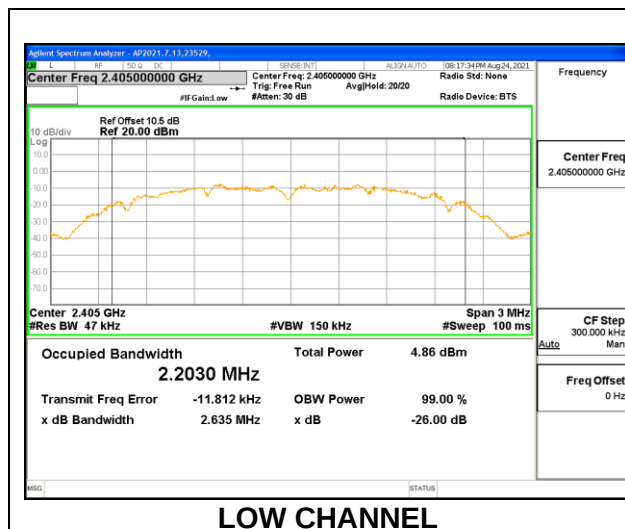
INTERNAL ANTENNA CONFIGURATION

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2405	2.2138
Middle	2440	2.2108
High	2480	2.2163



EXTERNAL ANTENNA CONFIGURATION

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2405	2.2030
Middle	2440	2.2079
High	2480	2.2070



9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

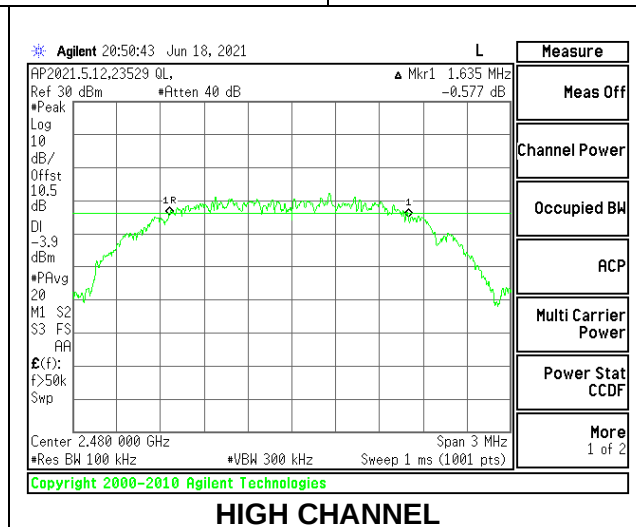
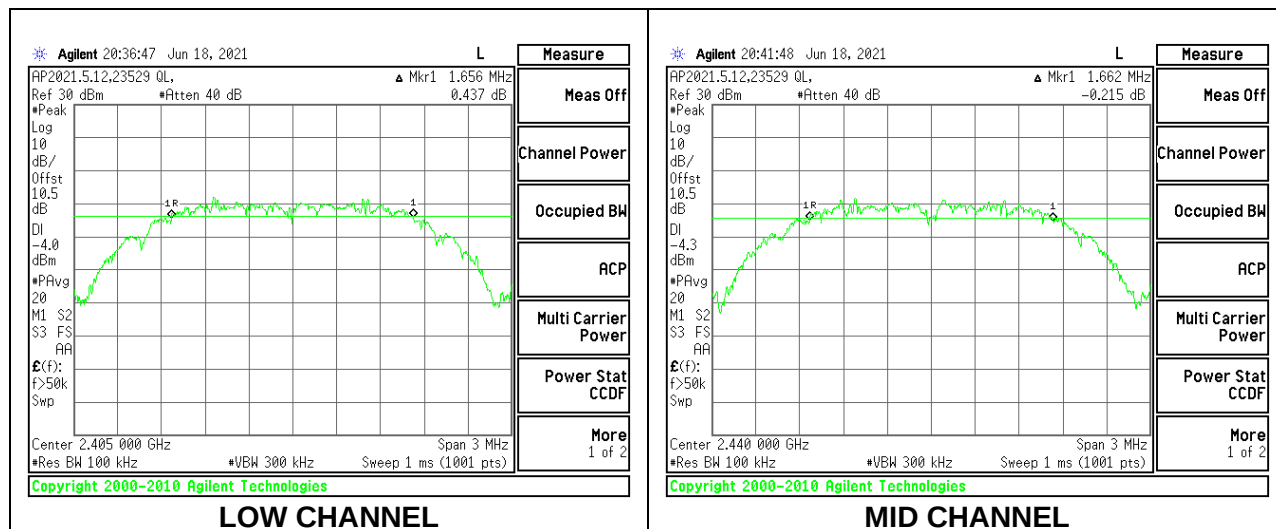
RSS-247 5.2 (a)

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

RESULTS

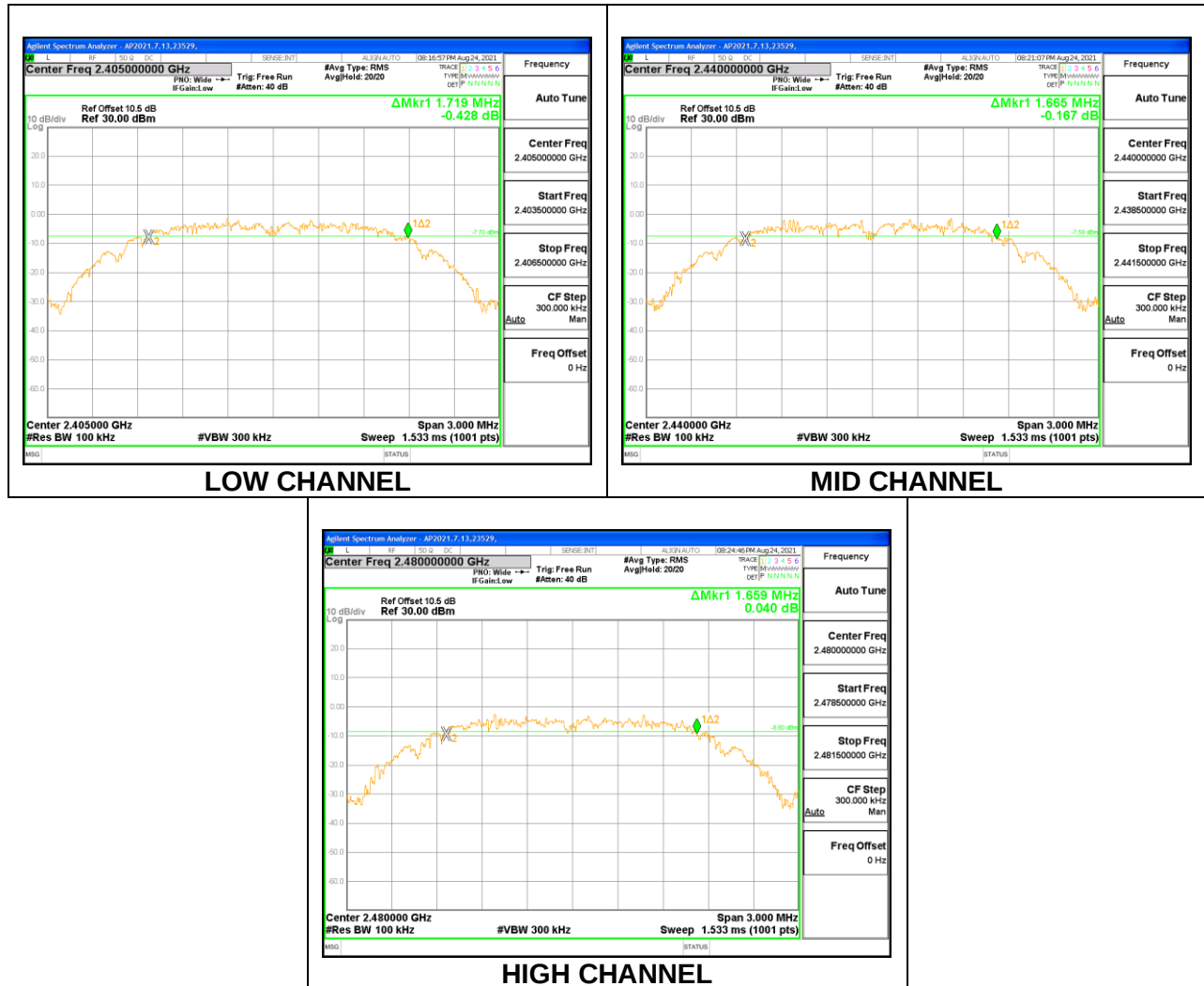
INTERNAL ANTENNA CONFIGURATION

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2405	1.656	0.5
Middle	2440	1.662	0.5
High	2480	1.635	0.5



EXTERNAL ANTENNA CONFIGURATION

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2405	1.719	0.5
Middle	2440	1.665	0.5
High	2480	1.659	0.5



9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband peak power sensor. Peak output power was read directly from power meter.

RESULTS

INTERNAL ANTENNA CONFIGURATION

Tested By:	23529 QL
Date:	6/18/2021

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2405	6.37	30	-23.63
Middle	2440	6.29	30	-23.71
High	2480	6.17	30	-23.83

EXTERNAL ANTENNA CONFIGURATION

Tested By:	23529 QL
Date:	8/24/2021

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2405	2.85	30	-27.15
Middle	2440	2.68	30	-27.32
High	2480	1.72	30	-28.28

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter.

RESULTS

INTERNAL ANTENNA CONFIGURATION

Tested By:	23549 QL
Date:	6/18/2021

Channel	Frequency (MHz)	AV power (dBm)
Low	2405	6.22
Middle	2440	6.16
High	2480	6.03

EXTERNAL ANTENNA CONFIGURATION

Tested By:	23549 QL
Date:	8/24/2021

Channel	Frequency (MHz)	AV power (dBm)
Low	2405	2.69
Middle	2440	2.5
High	2480	1.54

9.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

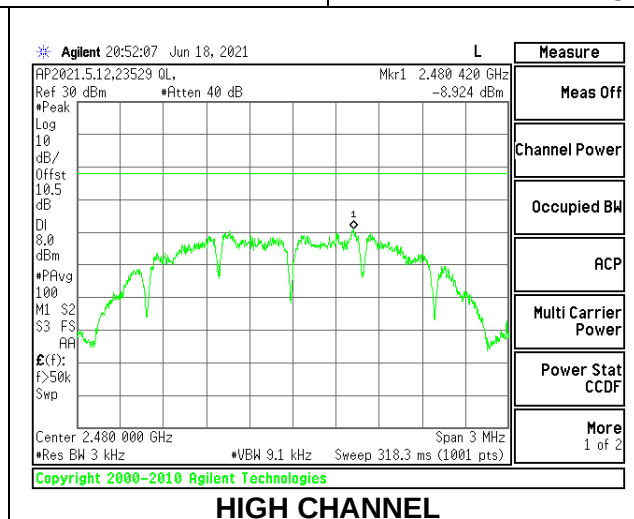
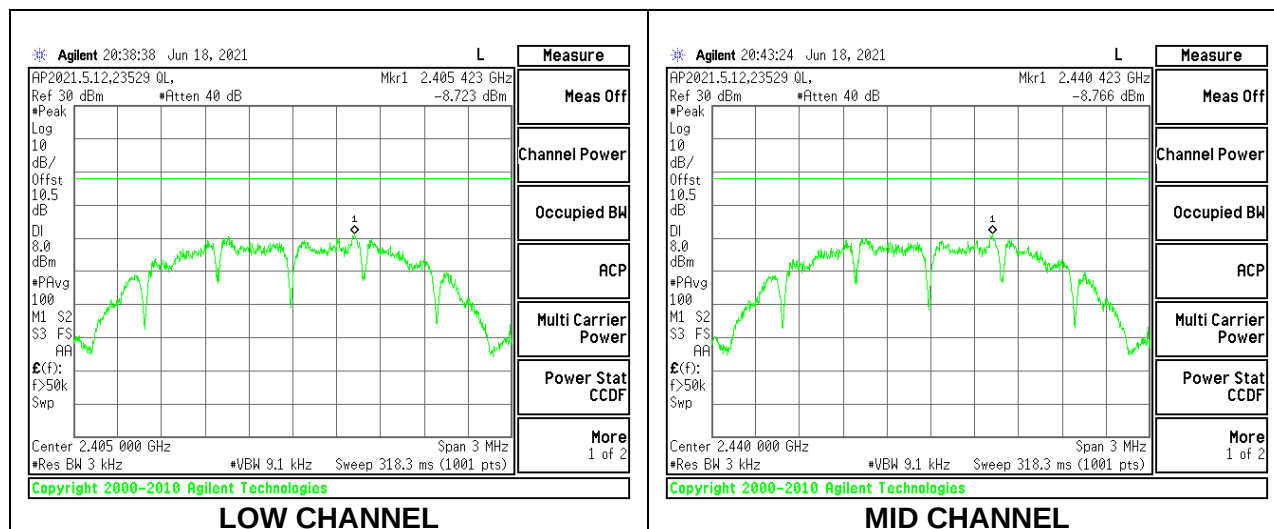
RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

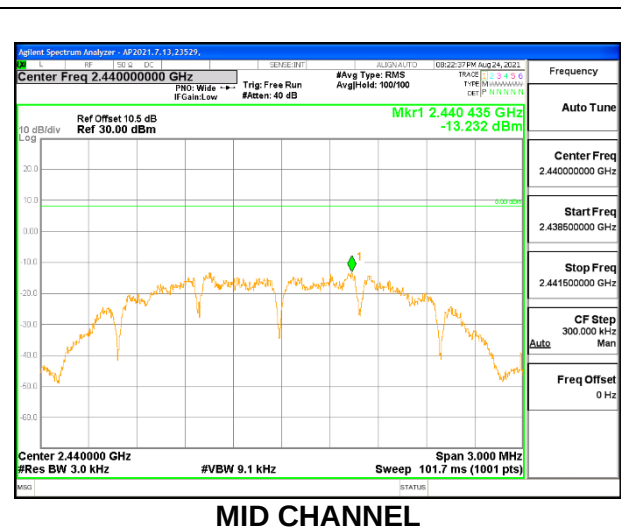
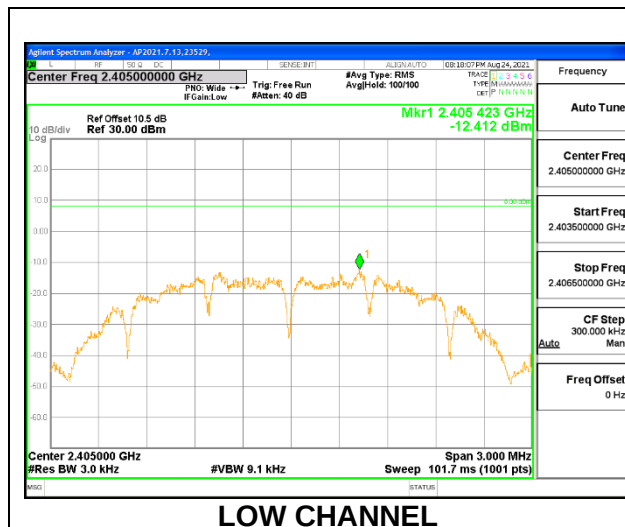
INTERNAL ANTENNA CONFIGURATION

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2405	-8.723	8	-16.72
Middle	2440	-8.766	8	-16.77
High	2480	-8.924	8	-16.92



EXTERNAL ANTENNA CONFIGURATION

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2405	-12.412	8	-20.41
Middle	2440	-13.232	8	-21.23
High	2480	-14.111	8	-22.11



9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

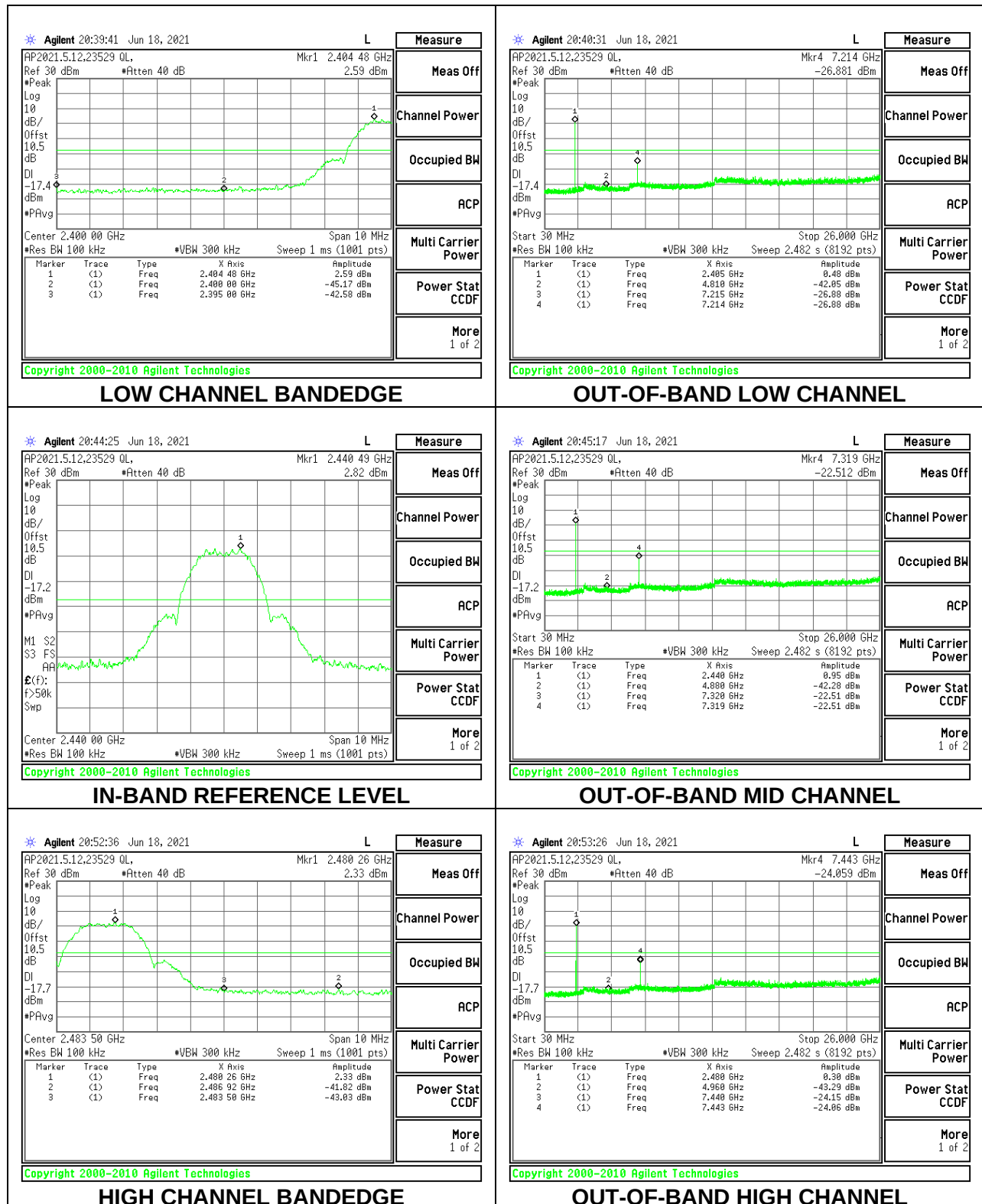
FCC §15.247 (d)

RSS-247 5.5

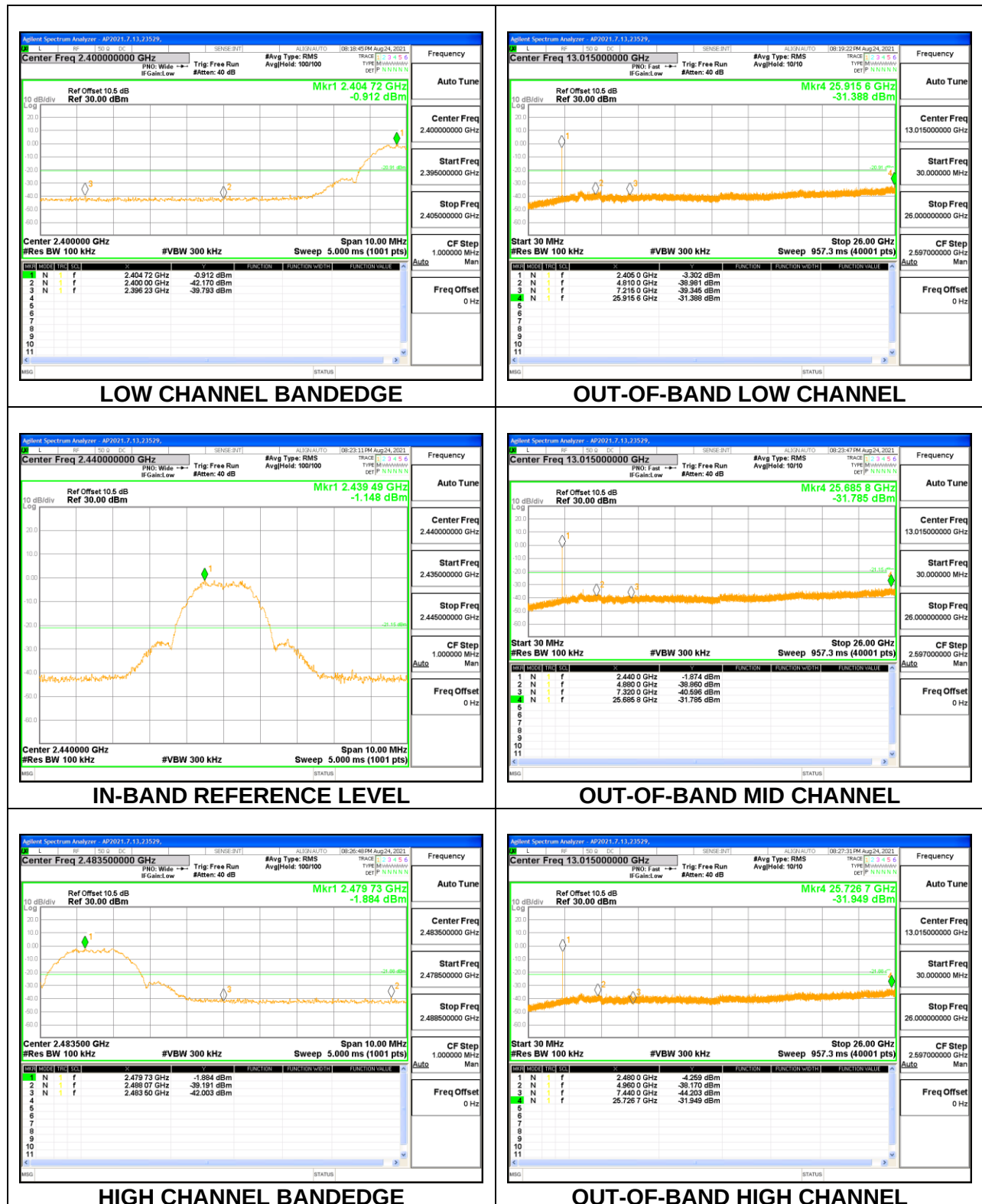
Output power was measured based on the use of a peak measurement, therefore, spurious emissions are required to be 20 dBc.

RESULTS

INTERNAL ANTENNA CONFIGURATION



EXTERNAL ANTENNA CONFIGURATION



10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

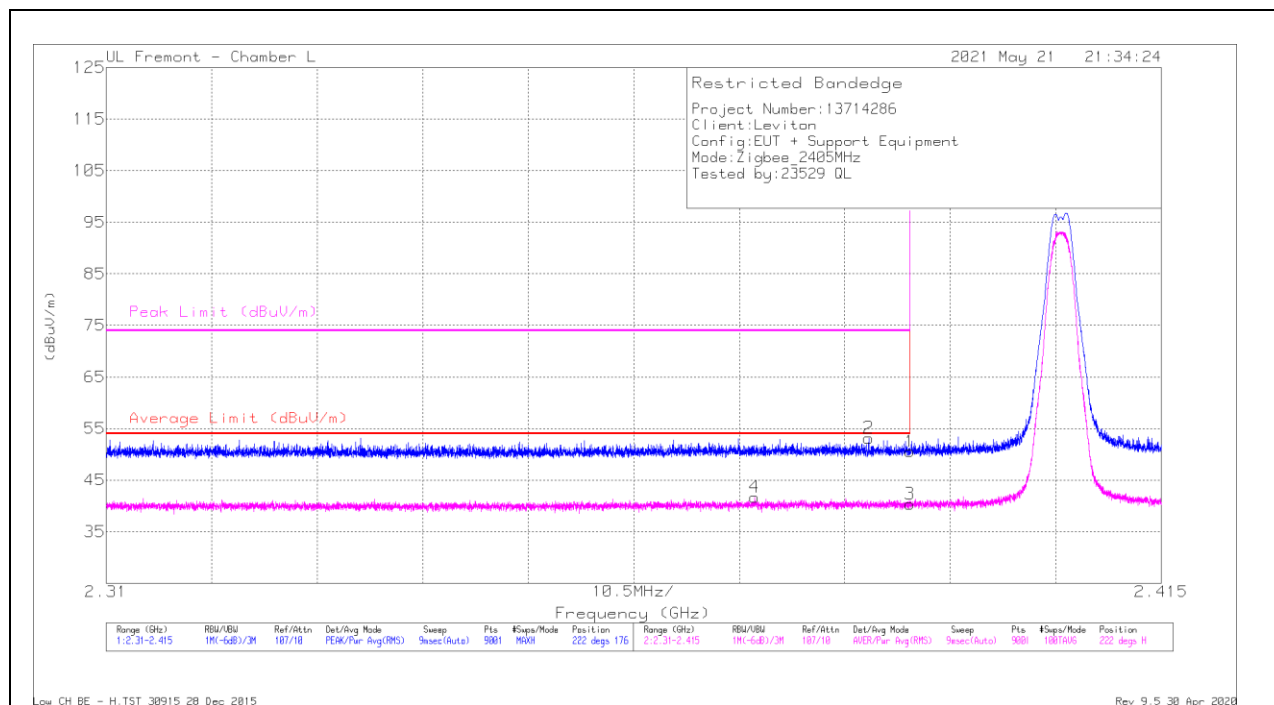
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

10.2. TRANSMITTER ABOVE 1 GHz

INTERNAL ANTENNA CONFIGURATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



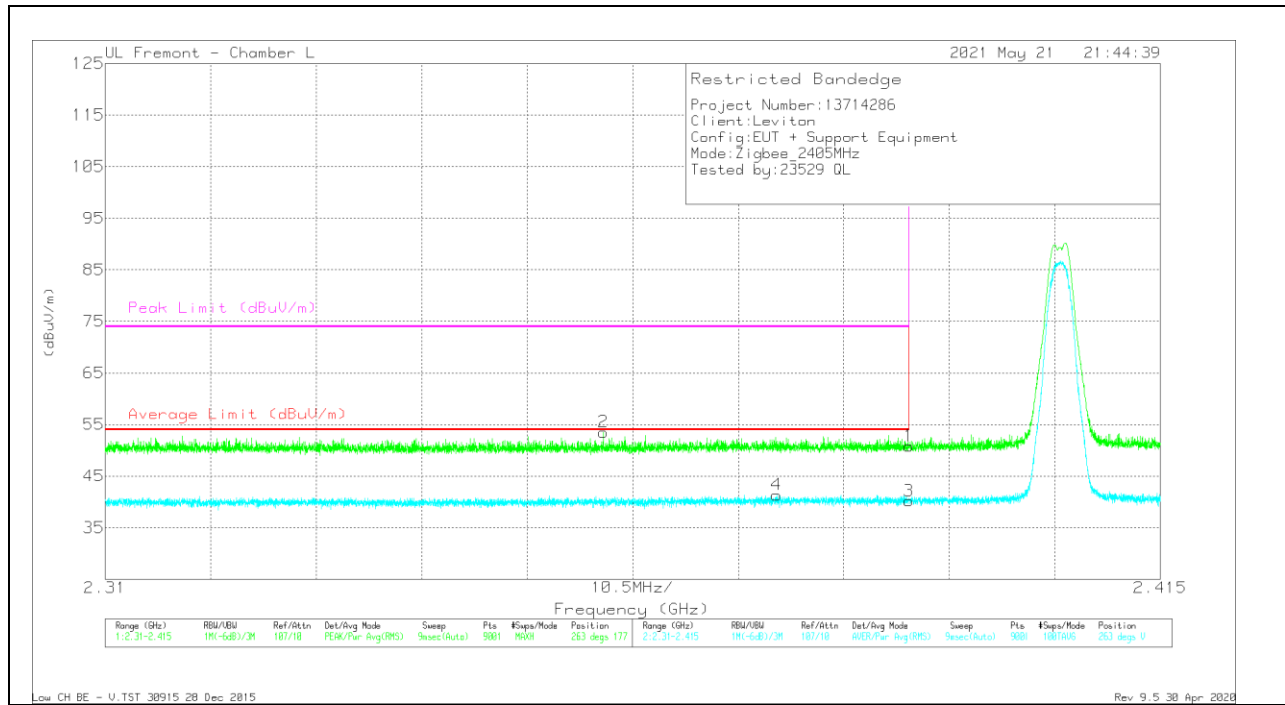
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	37.94	Pk	31.9	-19.3	50.54	-	-	74	-23.46	222	176	H
2	* 2.38588	40.74	Pk	31.8	-19.4	53.14	-	-	74	-20.86	222	176	H
3	* 2.38999	27.77	RMS	31.9	-19.3	40.37	54	-13.63	-	-	222	176	H
4	* 2.37452	29.31	RMS	31.8	-19.4	41.71	54	-12.29	-	-	222	176	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	38.23	Pk	31.9	-19.3	50.83	-	-	74	-23.17	263	177	V
2	* 2.35958	41.24	Pk	31.7	-19.4	53.54	-	-	74	-20.46	263	177	V
3	* 2.38999	27.61	RMS	31.9	-19.3	40.21	54	-13.79	-	-	263	177	V
4	* 2.37682	28.96	RMS	31.8	-19.4	41.36	54	-12.64	-	-	263	177	V

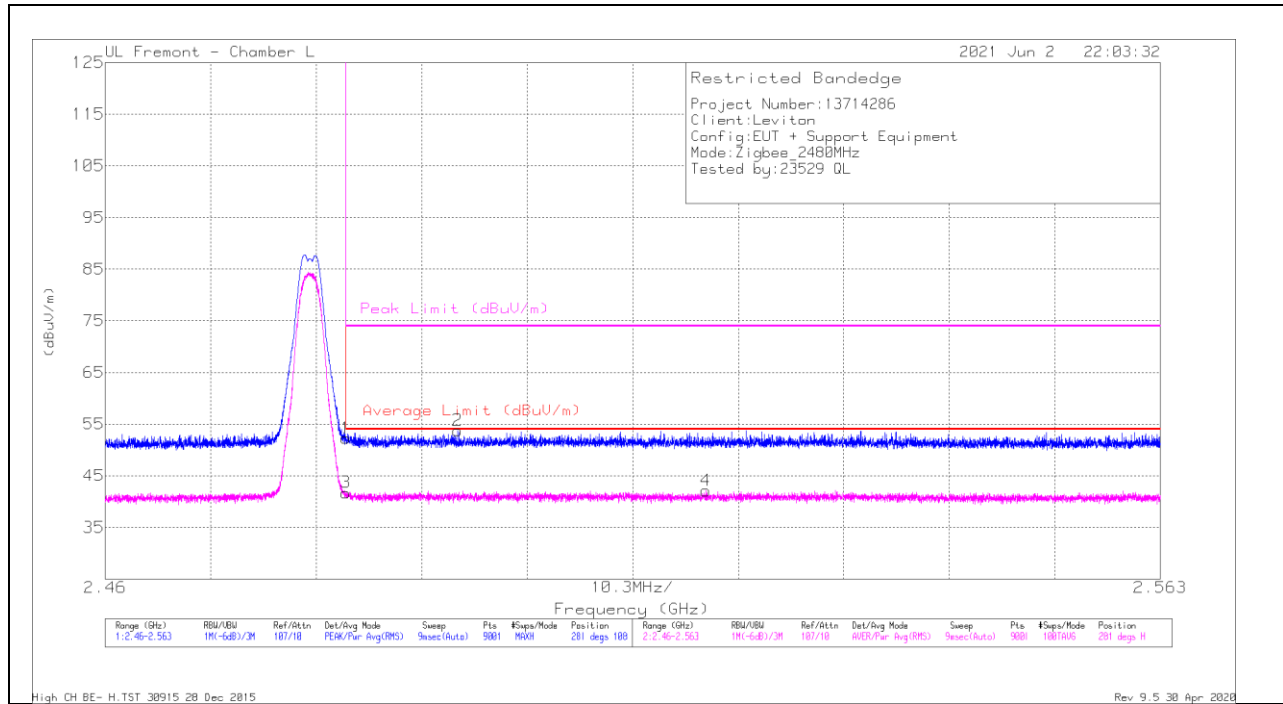
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

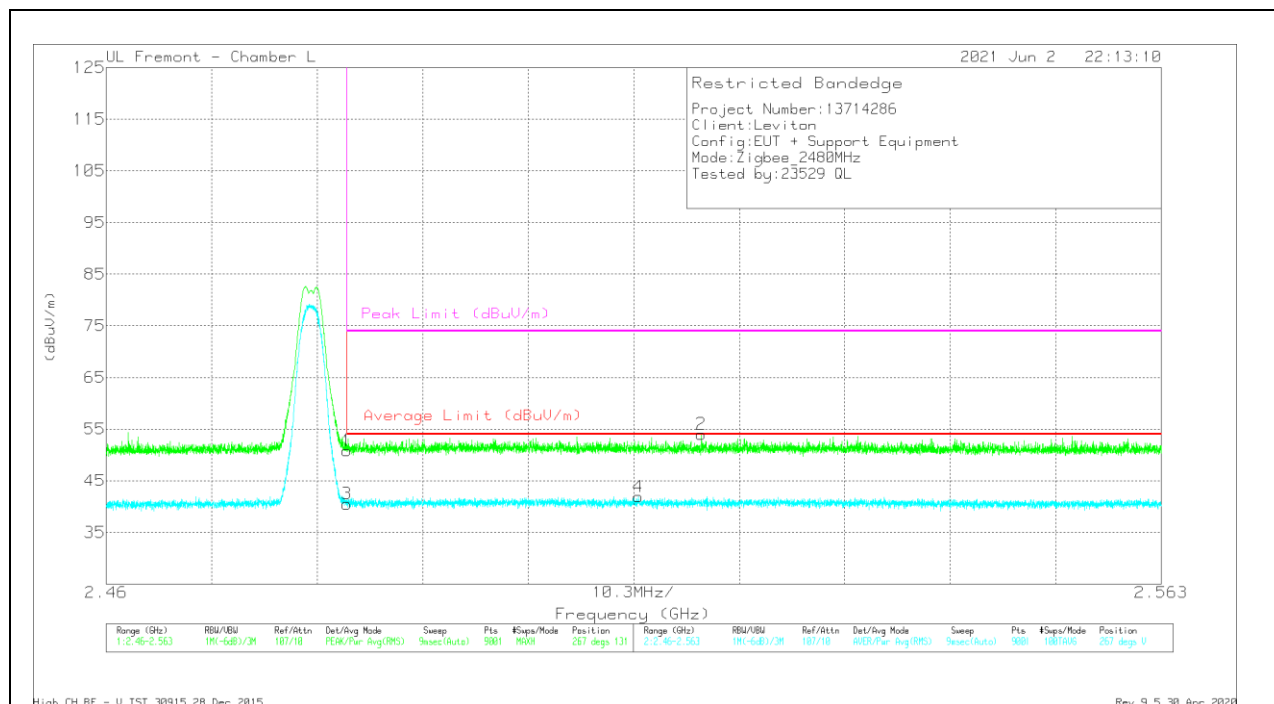
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	38.97	PK	32.3	-19	52.27	-	-	74	-21.73	281	108	H
2	* 2.4944	40.45	PK	32.4	-19.1	53.75	-	-	74	-20.25	281	108	H
3	* 2.48351	28.43	RMS	32.3	-19	41.73	54	-12.27	-	-	281	108	H
4	2.51866	28.81	RMS	32.4	-19.1	42.11	54	-11.89	-	-	281	108	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK - Peak detector
RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	37.52	Pk	32.3	-19	50.82	-	-	74	-23.18	267	131	V
2	2.51809	40.7	Pk	32.4	-19.1	54	-	-	74	-20	267	131	V
3	* 2.48351	27.22	RMS	32.3	-19	40.52	54	-13.48	-	-	267	131	V
4	2.51197	28.51	RMS	32.4	-19	41.91	54	-12.09	-	-	267	131	V

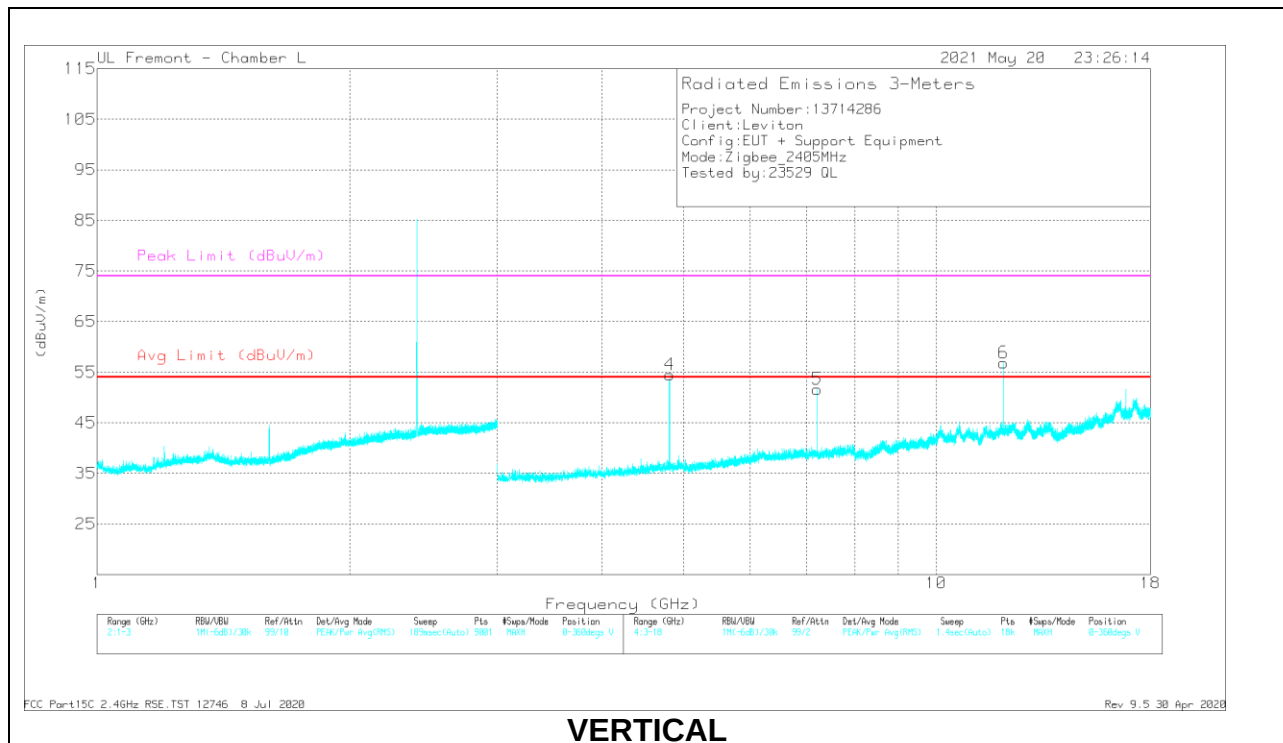
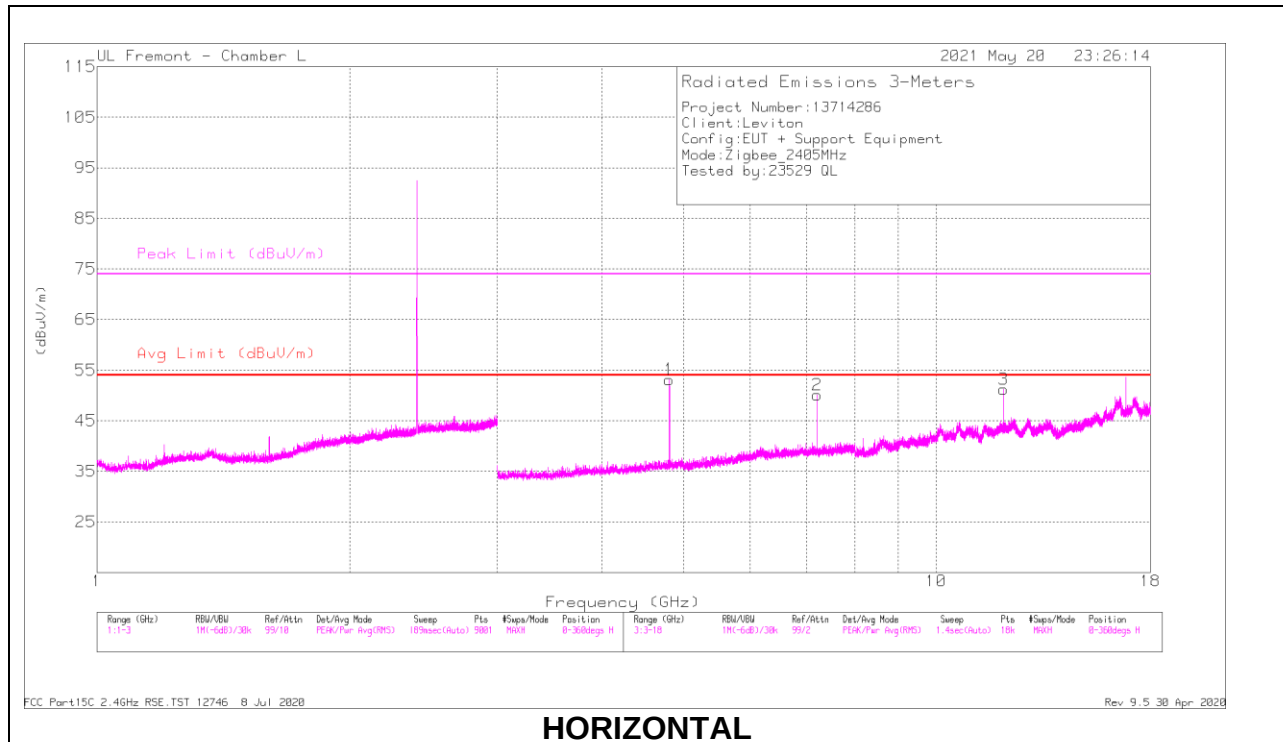
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.80889	51.48	PK2	34.2	-24.6	0	61.08	-	-	74	-12.92	192	193	H
	* 4.80892	45.94	AV	34.2	-24.6	-3.6	51.94	54	-2.06	-	-	192	193	H
2	7.21326	42.66	PK2	35.5	-20.3	0	57.86	-	-	-	-	183	102	H
3	* 12.0223	38.44	PK2	38.7	-16.3	0	60.84	-	-	74	-13.16	289	149	H
	* 12.02227	30.77	AV	38.7	-16.3	-3.6	49.57	54	-4.43	-	-	289	149	H
6	* 12.02236	42.16	PK2	38.7	-16.3	0	64.56	-	-	74	-9.44	161	101	V
	* 12.02222	34.96	AV	38.7	-16.3	-3.6	53.76	54	-0.24	-	-	161	101	V
4	* 4.80879	50.03	PK2	34.2	-24.6	0	59.63	-	-	74	-14.37	229	101	V
	* 4.80899	44.18	AV	34.2	-24.6	-3.6	50.18	54	-3.82	-	-	229	101	V
5	7.21655	43.5	PK2	35.6	-20.4	0	58.7	-	-	-	-	190	101	V

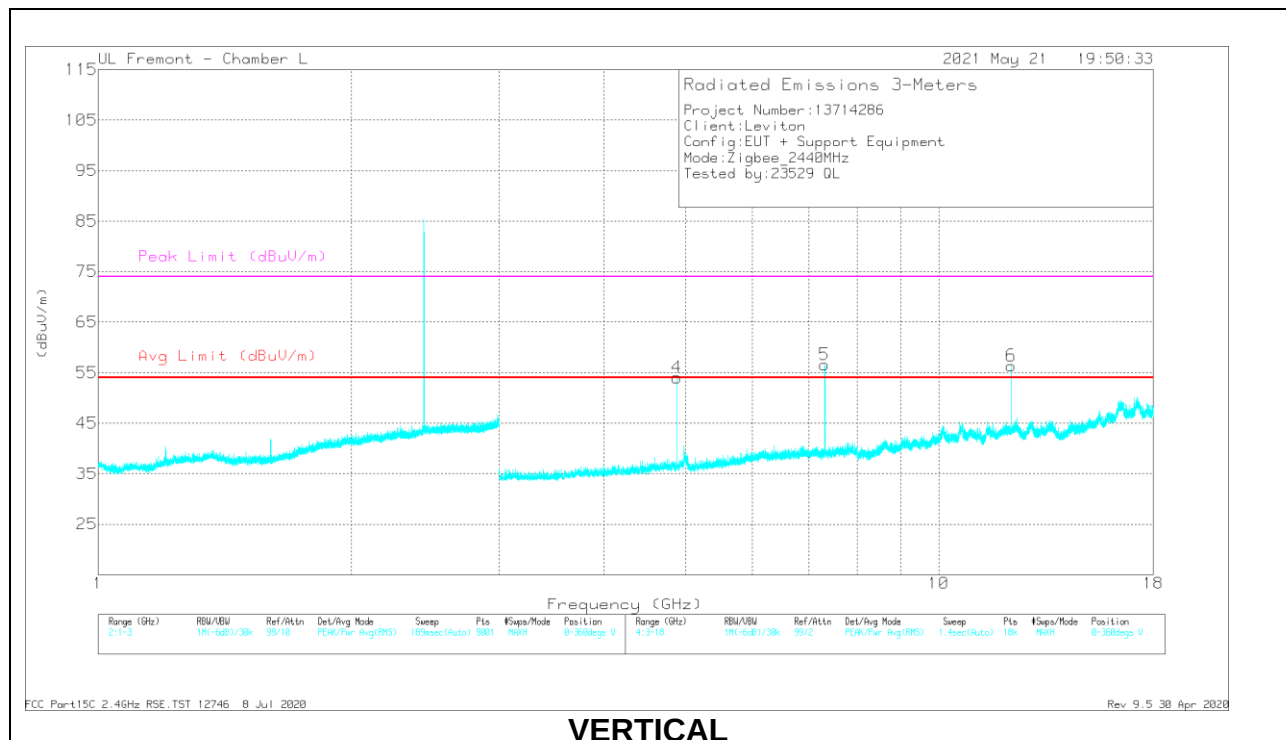
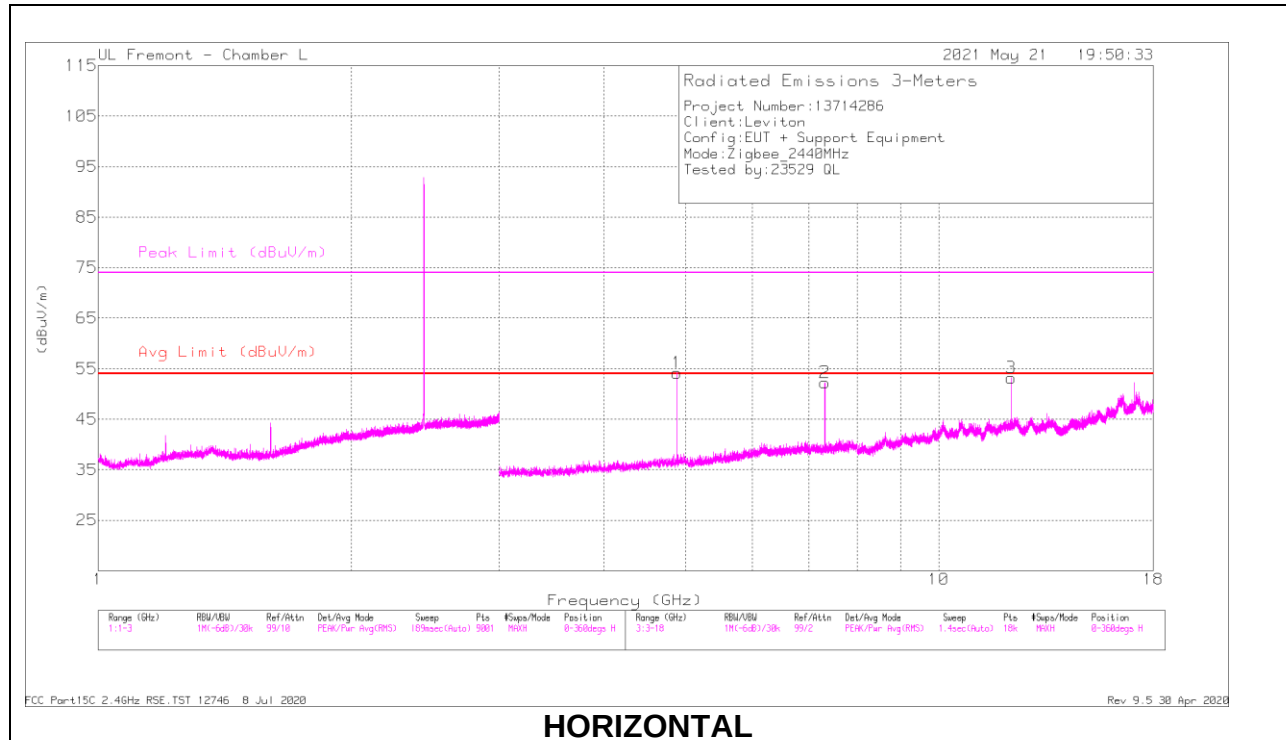
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

AV = Linear Average reading + Duty Cycle Correction Factor(KDB558074 Section 11, Question 3 (c)

Duty Cycle Correction Factor = -3.6 dB. Refer to Section 9.1

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.88103	49.72	PK2	34.1	-24.3	0	59.52	-	-	74	-14.48	225	101	H
	* 4.88103	44.58	AV	34.1	-24.3	-3.6	50.78	54	-3.22	-	-	225	101	H
2	* 7.31855	45.55	PK2	35.5	-20.1	0	60.95	-	-	74	-13.05	245	100	H
	* 7.3186	38.71	AV	35.5	-20.1	-3.6	50.51	54	-3.49	-	-	245	100	H
3	* 12.20269	38.95	PK2	39	-16.7	0	61.25	-	-	74	-12.75	284	101	H
	* 12.19728	31.19	AV	38.9	-16.7	-3.6	49.79	54	-4.21	-	-	284	101	H
4	* 4.87888	51.11	PK2	34.1	-24.4	0	60.81	-	-	74	-13.19	242	101	V
	* 4.87911	45.28	AV	34.1	-24.4	-3.6	51.38	54	-2.62	-	-	242	101	V
5	* 7.31829	46.89	PK2	35.5	-20.1	0	62.29	-	-	74	-11.71	180	101	V
	* 7.32146	41.82	AV	35.5	-20.1	-3.6	53.62	54	-0.38	-	-	180	101	V
6	* 12.19743	41.27	PK2	38.9	-16.7	0	63.47	-	-	74	-10.53	227	115	V
	* 12.20248	33.9	AV	39	-16.7	-3.6	52.6	54	-1.4	-	-	227	115	V

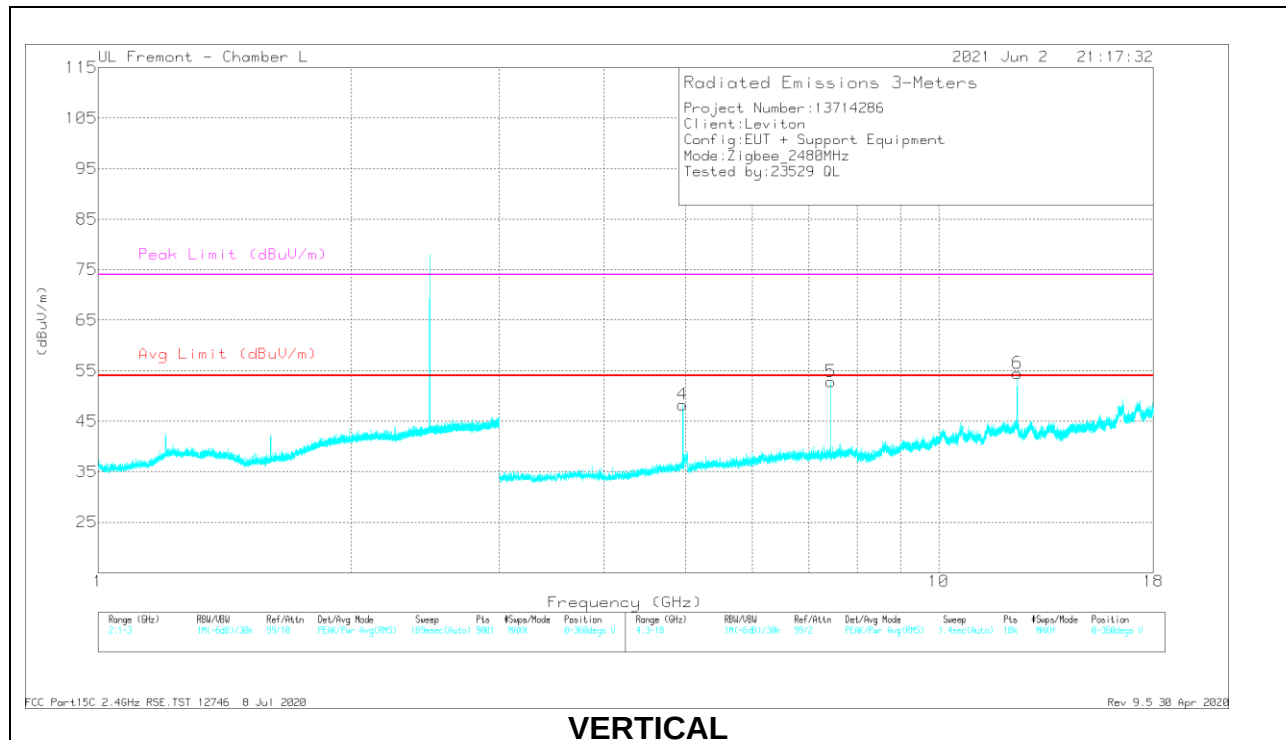
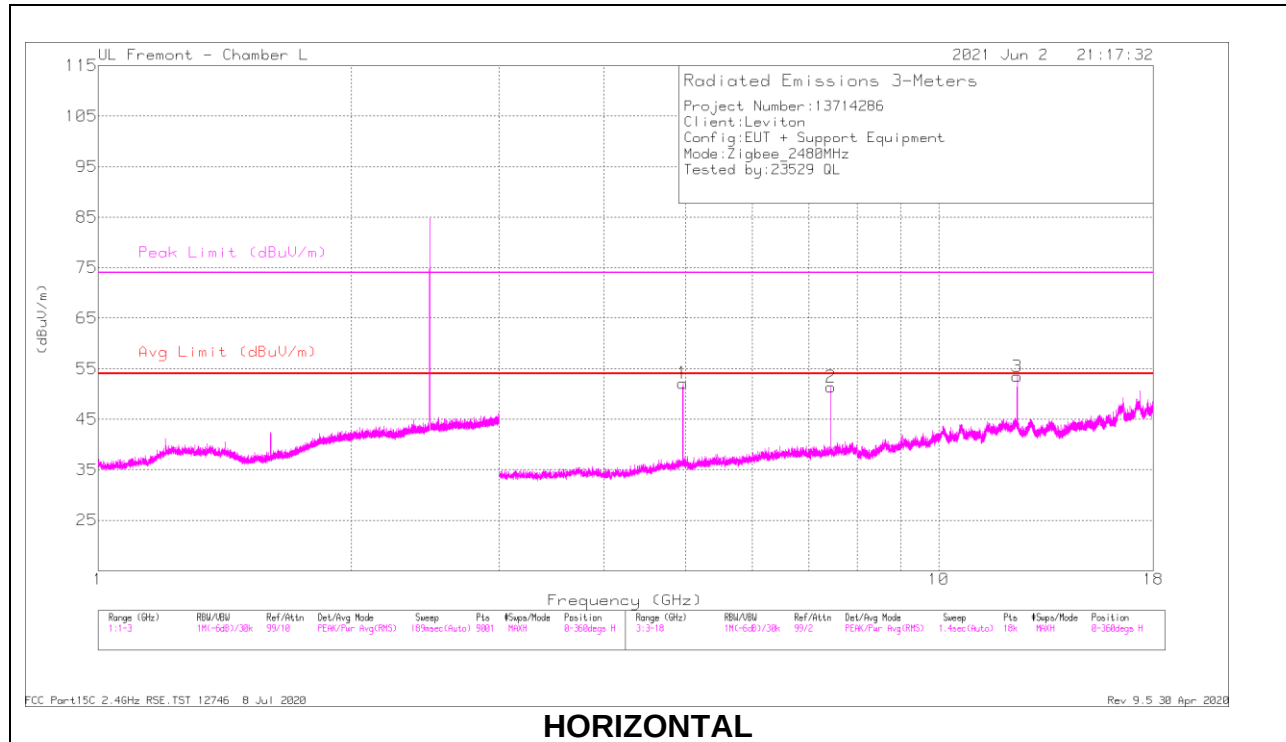
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

AV = Linear Average reading + Duty Cycle Correction Factor(KDB558074 Section 11, Question 3 (c)

Duty Cycle Correction Factor = -3.6 dB. Refer to Section 9.1

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.95884	47.89	PK2	34.2	-23.2	0	58.89	-	-	74	-15.11	324	193	H
	* 4.96102	42.36	AV	34.2	-23.3	-3.6	49.66	54	-4.34	-	-	324	193	H
2	* 7.43839	42.3	PK2	35.7	-19.9	0	58.1	-	-	74	-15.9	357	260	H
	* 7.43843	33.27	AV	35.7	-19.9	-3.6	45.47	54	-8.53	-	-	357	260	H
3	* 12.39712	38.86	PK2	39.1	-16.3	0	61.66	-	-	74	-12.34	261	168	H
	* 12.39702	31.74	AV	39.1	-16.3	-3.6	50.94	54	-3.06	-	-	261	168	H
4	* 4.96102	43.25	PK2	34.2	-23.3	0	54.15	-	-	74	-19.85	325	103	V
	* 4.95899	35.05	AV	34.2	-23.2	-3.6	42.45	54	-11.55	-	-	325	103	V
5	* 7.43839	43.81	PK2	35.7	-19.9	0	59.61	-	-	74	-14.39	263	103	V
	* 7.43844	35.78	AV	35.7	-19.9	-3.6	47.98	54	-6.02	-	-	263	103	V
6	* 12.39715	39.3	PK2	39.1	-16.3	0	62.1	-	-	74	-11.9	300	101	V
	* 12.39714	30.51	AV	39.1	-16.3	-3.6	49.71	54	-4.29	-	-	300	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

AV = Linear Average reading + Duty Cycle Correction Factor(KDB558074 Section 11, Question 3 (c)

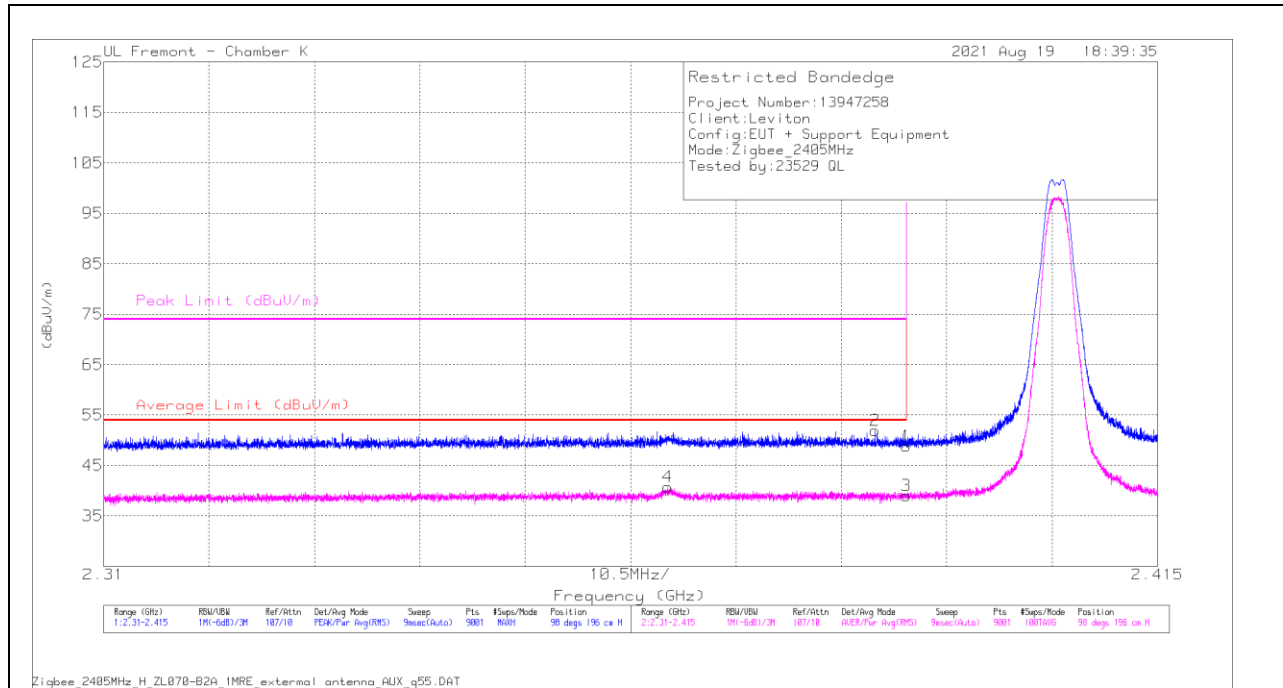
Duty Cycle Correction Factor = -3.6 dB. Refer to Section 9.1

EXTERNAL ANTENNA CONFIGURATION

Note: Project number 13947258 is the same project as 13714286

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



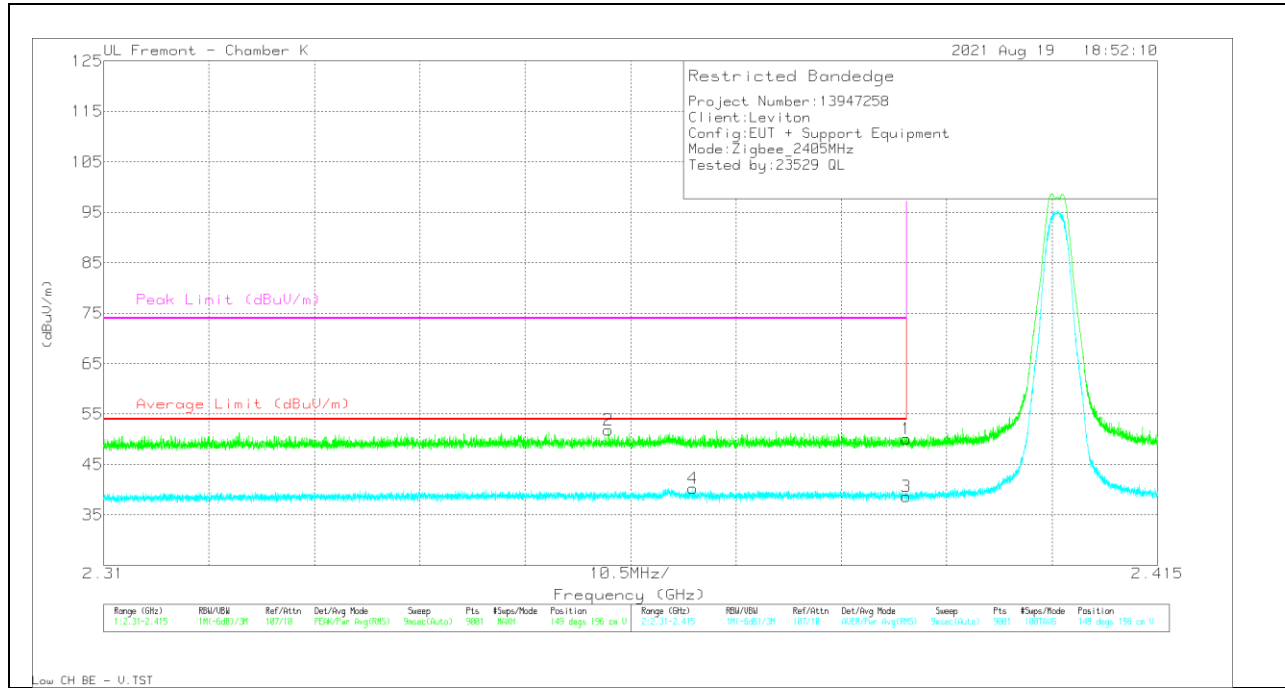
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	50.88	Pk	32.4	-34.4	48.88	-	-	74	-25.12	98	196	H
2	* 2.38686	53.95	Pk	32.4	-34.4	51.95	-	-	74	-22.05	98	196	H
3	* 2.38999	41.03	RMS	32.4	-34.4	39.03	54	-14.97	-	-	98	196	H
4	* 2.36621	42.85	RMS	32.4	-34.5	40.75	54	-13.25	-	-	98	196	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT

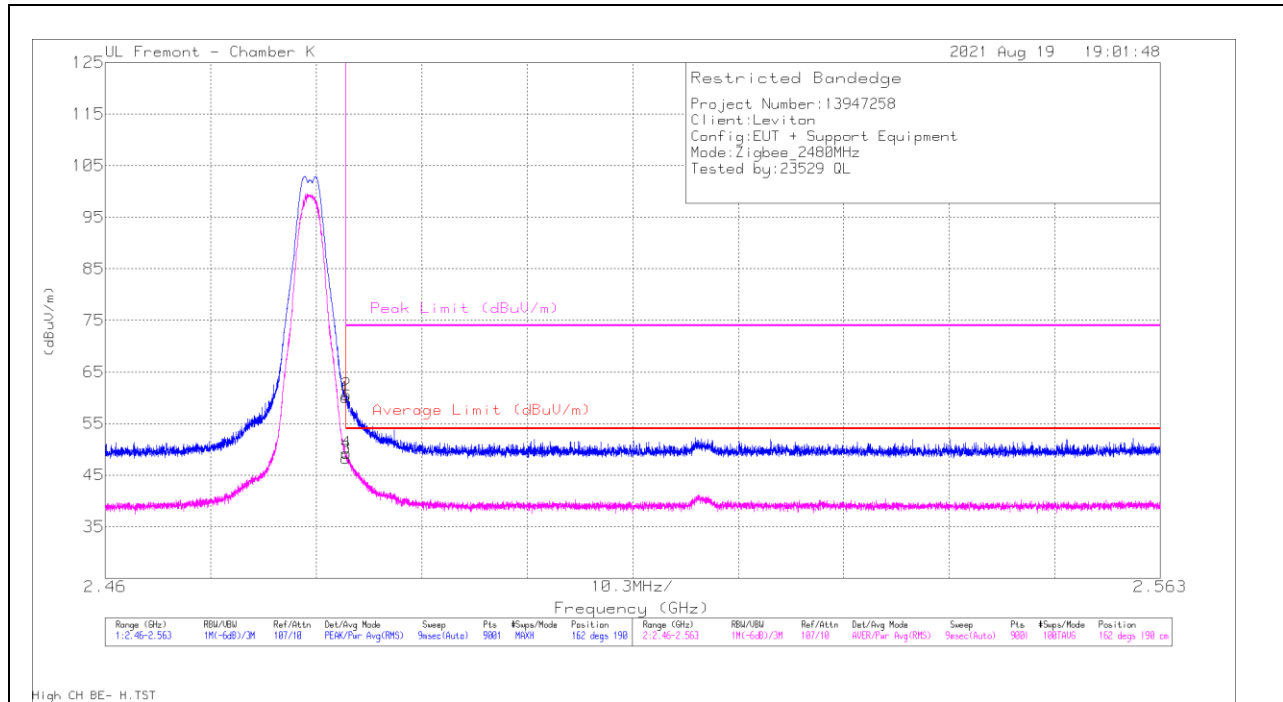


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	52.14	Pk	32.4	-34.4	50.14	-	-	74	-23.86	149	196	V
2	* 2.36031	53.98	Pk	32.4	-34.6	51.78	-	-	74	-22.22	149	196	V
3	* 2.38999	40.65	RMS	32.4	-34.4	38.65	54	-15.35	-	-	149	196	V
4	* 2.36873	42.37	RMS	32.4	-34.5	40.27	54	-13.73	-	-	149	196	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

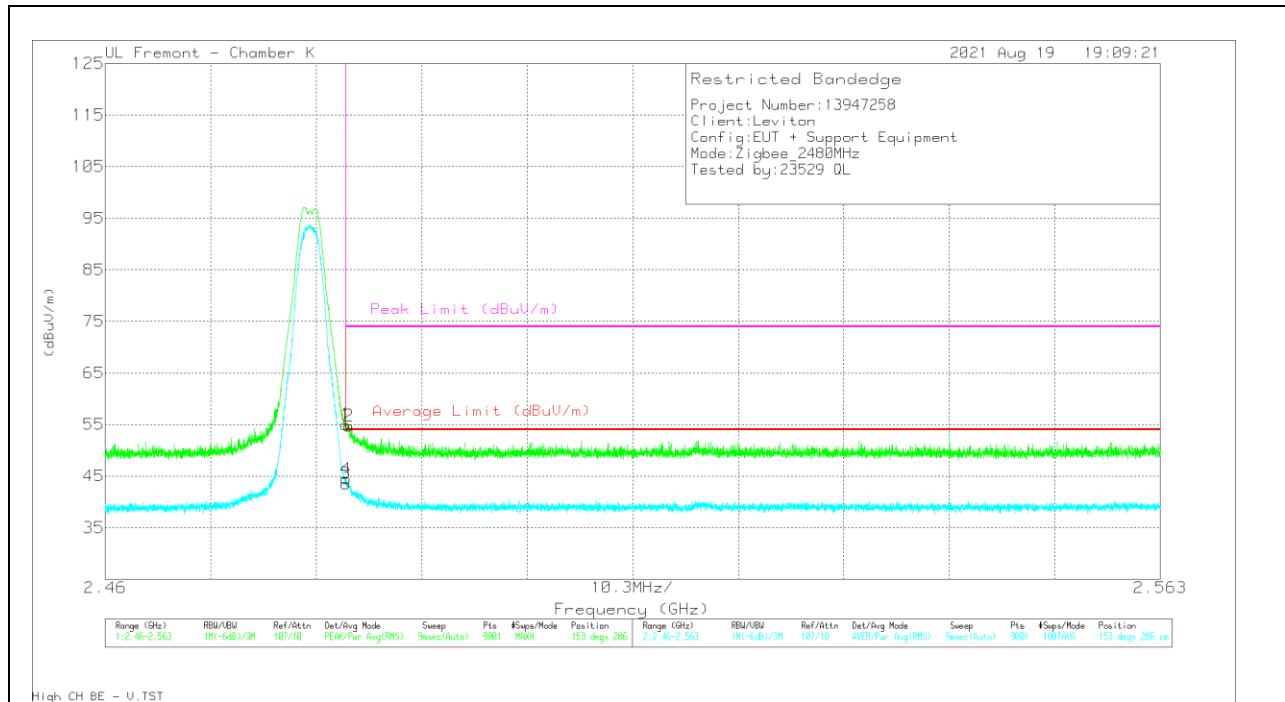
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	61.54	Pk	32.5	-34	60.04	-	-	74	-13.96	162	190	H
2	* 2.48354	62.06	Pk	32.5	-34	60.56	-	-	74	-13.44	162	190	H
3	* 2.48351	49.78	RMS	32.5	-34	48.28	54	-5.72	-	-	162	190	H
4	* 2.48356	50.75	RMS	32.5	-34	49.25	54	-4.75	-	-	162	190	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	56.49	Pk	32.5	-34	54.99	-	-	74	-19.01	153	286	V
2	* 2.48382	56.21	Pk	32.5	-34	54.71	-	-	74	-19.29	153	286	V
3	* 2.48351	45.05	RMS	32.5	-34	43.55	54	-10.45	-	-	153	286	V
4	* 2.48352	45.95	RMS	32.5	-34	44.45	54	-9.55	-	-	153	286	V

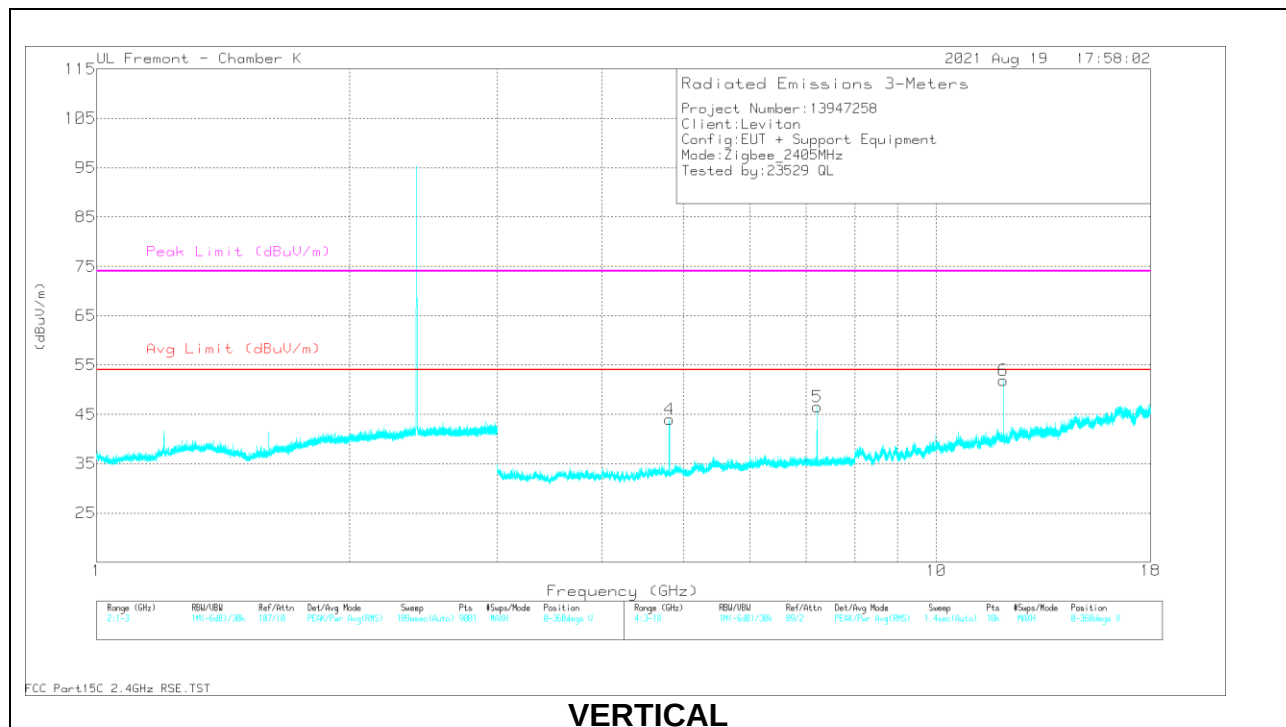
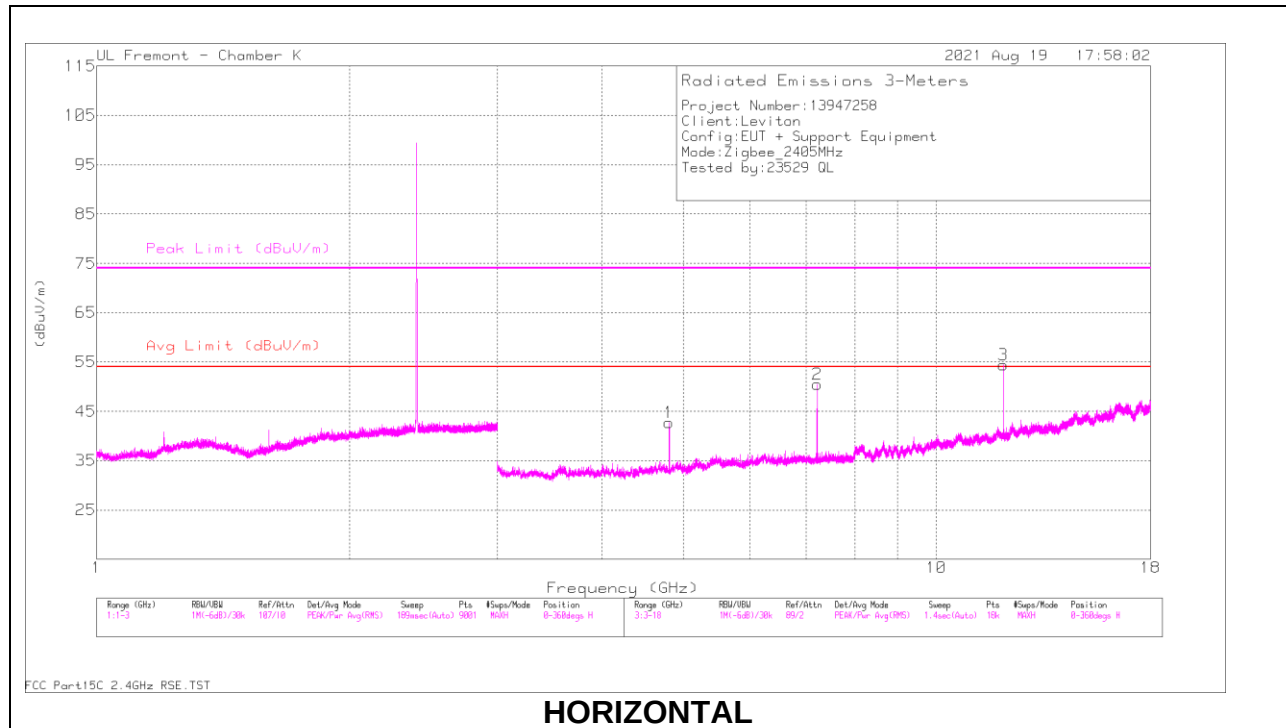
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	DCCF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.81101	56.78	PK2	34.3	-40	0	51.08	-	-	74	-22.92	217	205	H
	* 4.80906	49.24	AV	34.3	-39.9	-3.6	40.04	54	-13.96	-	-	217	205	H
2	7.21654	60.09	PK2	36.1	-37.8	0	58.39	-	-	-	-	282	102	H
3	* 12.02756	58.37	PK2	39	-33.7	0	63.67	-	-	74	-10.33	134	194	H
	* 12.02219	51.25	AV	38.9	-33.8	-3.6	52.75	54	-1.25	-	-	134	194	H
4	* 4.81105	57.33	PK2	34.3	-40	0	51.63	-	-	74	-22.37	207	99	V
	* 4.81112	50.69	AV	34.3	-40	-3.6	41.39	54	-12.61	-	-	207	99	V
5	7.21652	56.23	PK2	36.1	-37.8	0	54.53	-	-	-	-	223	106	V
6	* 12.02751	55.98	PK2	39	-33.7	0	61.28	-	-	74	-12.72	214	189	V
	* 12.02791	48.35	AV	38.9	-33.7	-3.6	49.95	54	-4.05	-	-	214	189	V

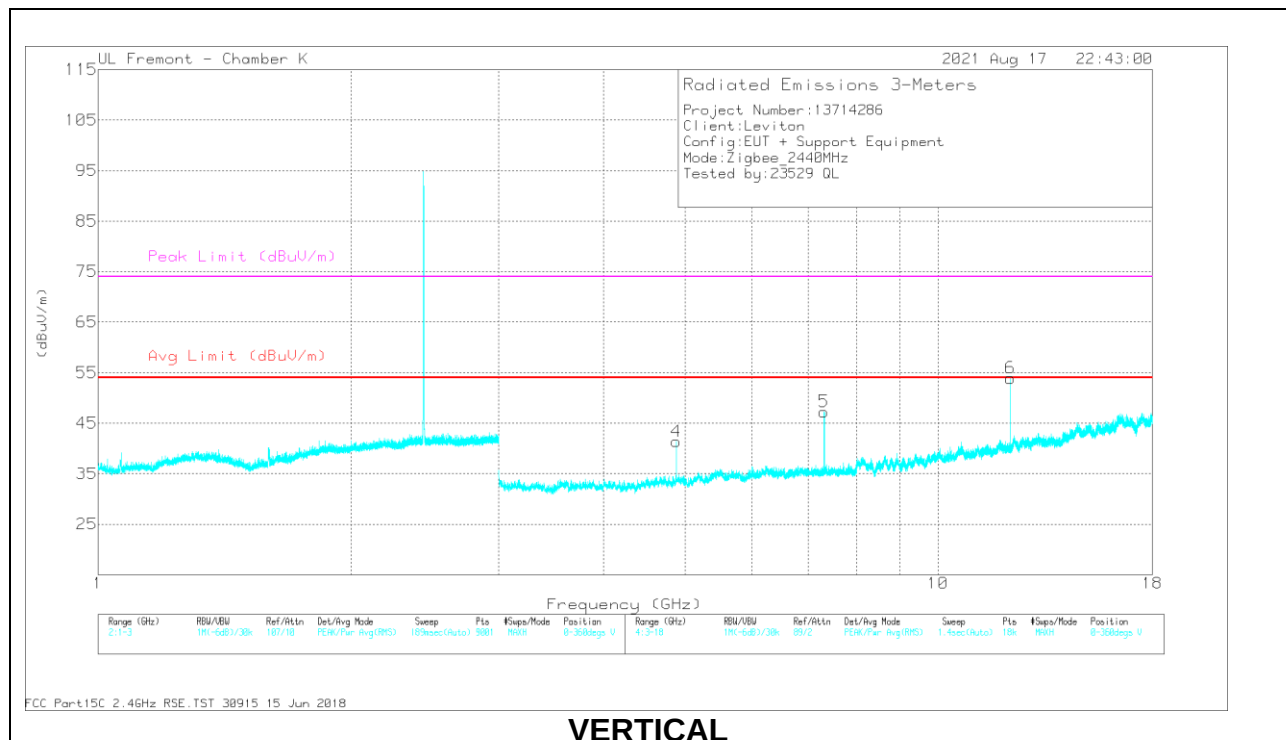
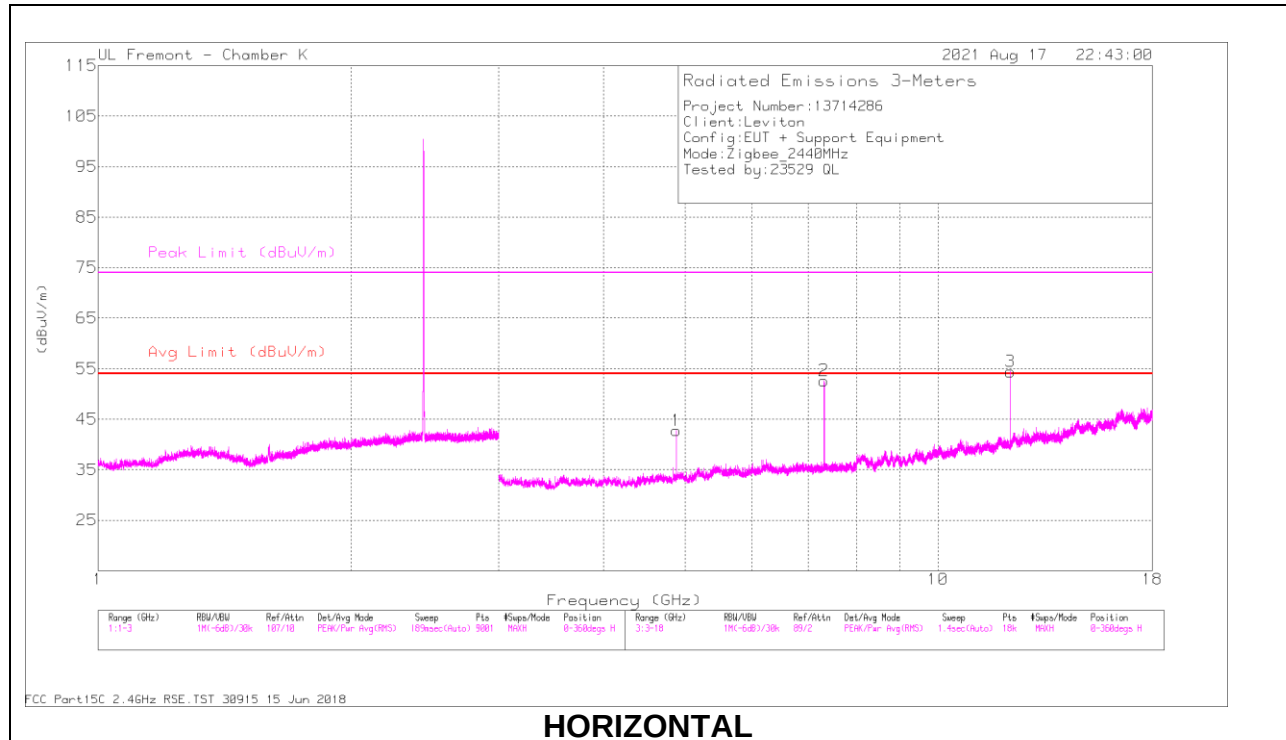
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

AV = Linear Average reading + Duty Cycle Correction Factor(KDB558074 Section 11, Question 3 (c)

Duty Cycle Correction Factor = -3.6 dB. Refer to Section 9.1

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DCCF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.88103	56.25	PK2	34.3	-39.8	0	50.75	-	-	74	-23.25	239	213	H
	* 4.88098	47.86	AV	34.4	-39.8	-3.6	38.86	54	-15.14	-	-	239	213	H
2	* 7.31839	61.4	PK2	36	-37.4	0	60	-	-	74	-14	286	101	H
	* 7.31847	55.14	AV	36	-37.4	-3.6	50.14	54	-3.86	-	-	286	101	H
3	* 12.20245	58.73	PK2	39.2	-33.9	0	64.03	-	-	74	-9.97	133	197	H
	* 12.19746	51.82	AV	39.2	-33.9	-3.6	53.52	54	-0.48	-	-	133	197	H
4	* 4.8789	55.59	PK2	34.4	-39.9	0	50.09	-	-	74	-23.91	178	101	V
	* 4.87901	47.51	AV	34.4	-39.9	-3.6	38.41	54	-15.59	-	-	178	101	V
5	* 7.32149	58.1	PK2	36	-37.4	0	56.7	-	-	74	-17.3	258	113	V
	* 7.3184	51.4	AV	36	-37.4	-3.6	46.40	54	-7.6	-	-	258	113	V
6	* 12.20235	56.49	PK2	39.2	-33.9	0	61.79	-	-	74	-12.21	226	176	V
	* 12.20268	49.26	AV	39.2	-33.9	-3.6	50.96	54	-3.04	-	-	226	176	V

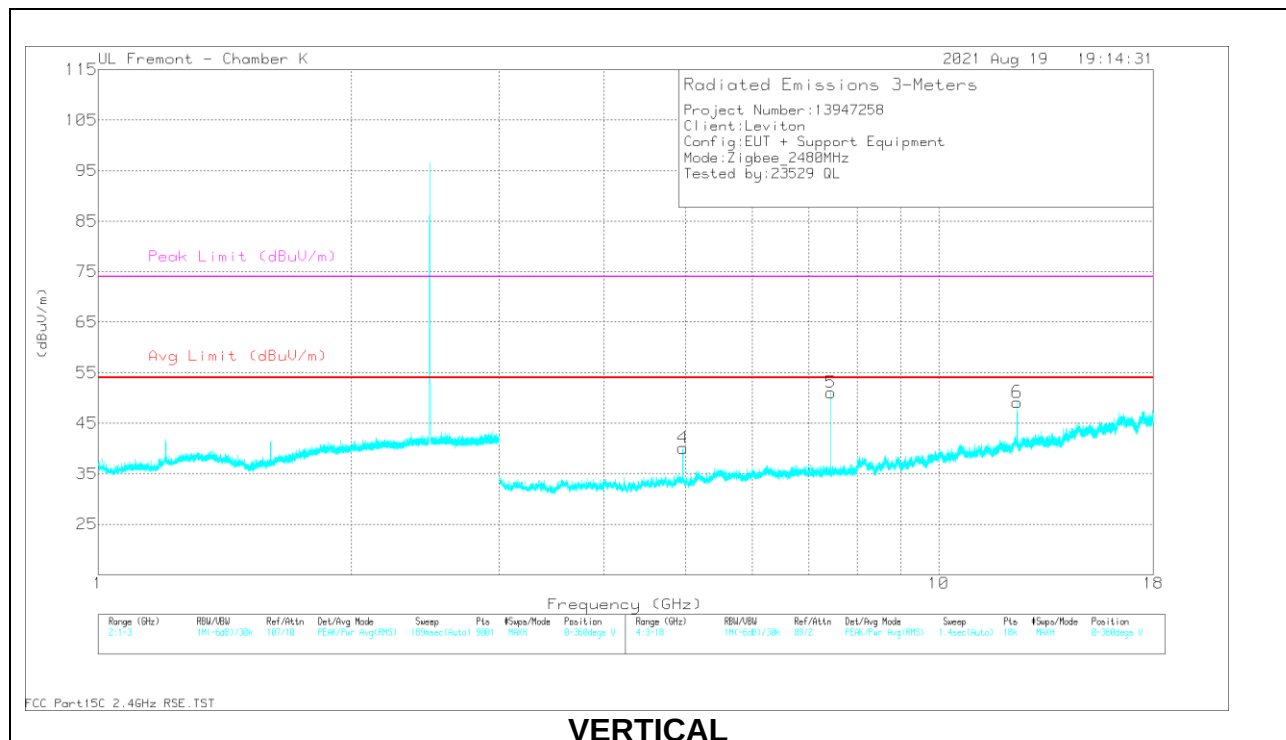
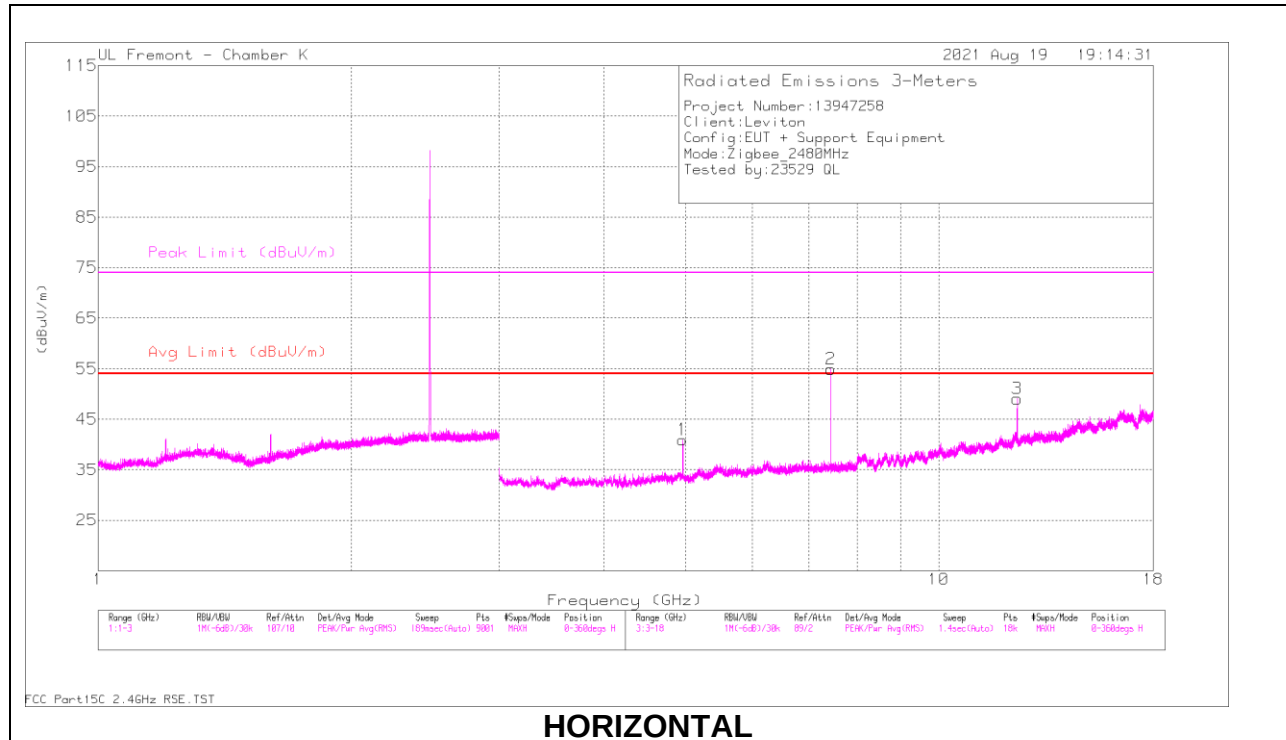
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

AV = Linear Average reading + Duty Cycle Correction Factor(KDB558074 Section 11, Question 3 (c)

Duty Cycle Correction Factor = -3.6 dB. Refer to Section 9.1

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DCCF	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 7.43846	62.74	PK2	36.1	-37.2	0	61.64	-	-	74	-12.36	201	99	H
	* 7.44156	56.62	AV	36.1	-37.1	-3.6	52.02	54	-1.98	-	-	201	99	H
2	* 4.95899	55.73	PK2	34.3	-39.9	0	50.13	-	-	74	-23.87	180	292	H
	* 4.95892	47.87	AV	34.3	-39.9	-3.6	38.67	54	-15.33	-	-	180	292	H
3	* 12.39732	53.37	PK2	39.3	-33.4	0	59.27	-	-	74	-14.73	166	164	H
	* 12.39728	45.38	AV	39.3	-33.4	-3.6	47.68	54	-6.32	-	-	166	164	H
4	* 4.95882	54.75	PK2	34.3	-39.9	0	49.15	-	-	74	-24.85	213	98	V
	* 4.96083	46.29	AV	34.3	-39.9	-3.6	37.09	54	-16.91	-	-	213	98	V
5	* 7.44152	59.26	PK2	36.1	-37.1	0	58.26	-	-	74	-15.74	205	197	V
	* 7.43842	52.92	AV	36.1	-37.2	-3.6	48.22	54	-5.78	-	-	205	197	V
6	* 12.3974	52.38	PK2	39.3	-33.4	0	58.28	-	-	74	-15.72	216	184	V
	* 12.40254	44.24	AV	39.3	-33.4	-3.6	46.54	54	-7.46	-	-	216	184	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

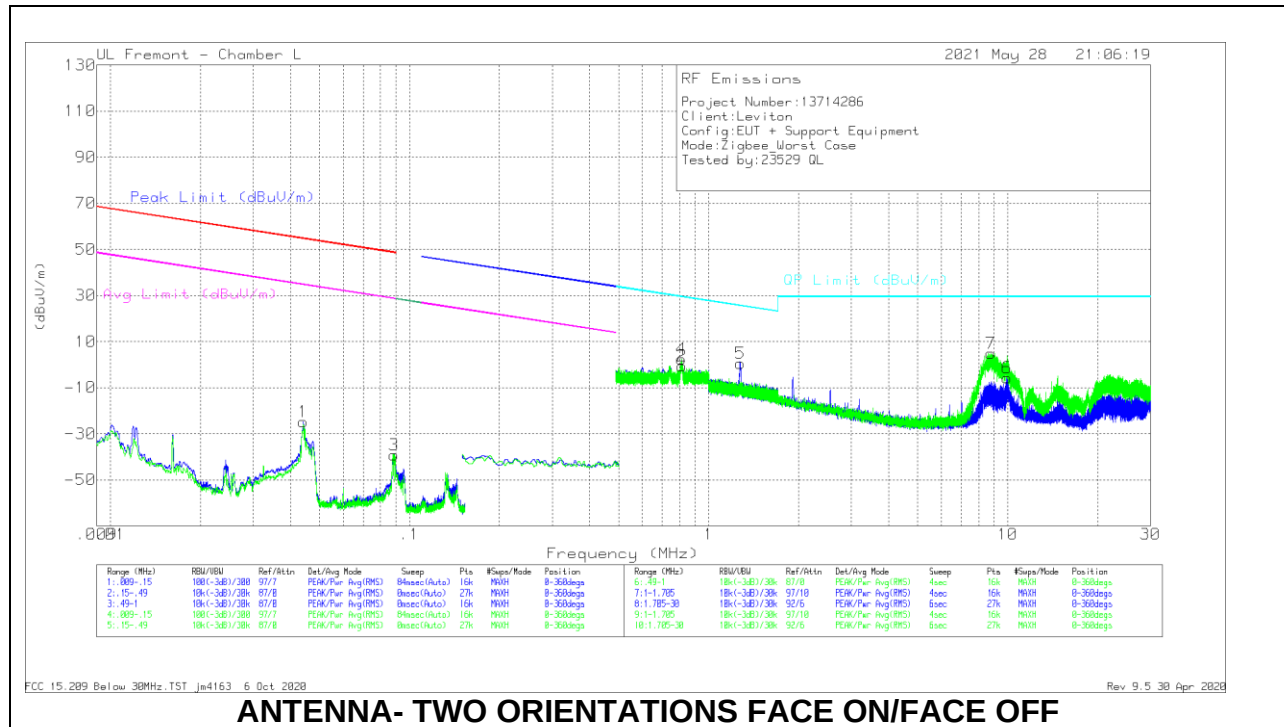
PK2 - KDB558074 Method: Maximum Peak

AV = Linear Average reading + Duty Cycle Correction Factor(KDB558074 Section 11, Question 3 (c)

Duty Cycle Correction Factor = -3.6 dB. Refer to Section 9.1

10.3. WORST CASE BELOW 30MHz

SPURIOUS EMISSIONS BELOW 30 MHz (INTERNAL ANTENNA WORST-CASE CONFIGURATION)



ANTENNA- TWO ORIENTATIONS FACE ON/FACE OFF

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.04417	29.81	Pk	57.2	-31.8	-80	-24.79	54.68	-79.47	34.68	-59.47	0-360
3	.08893	17.11	Pk	55.8	-32	-80	-39.09	48.6	-87.69	28.6	-67.69	0-360

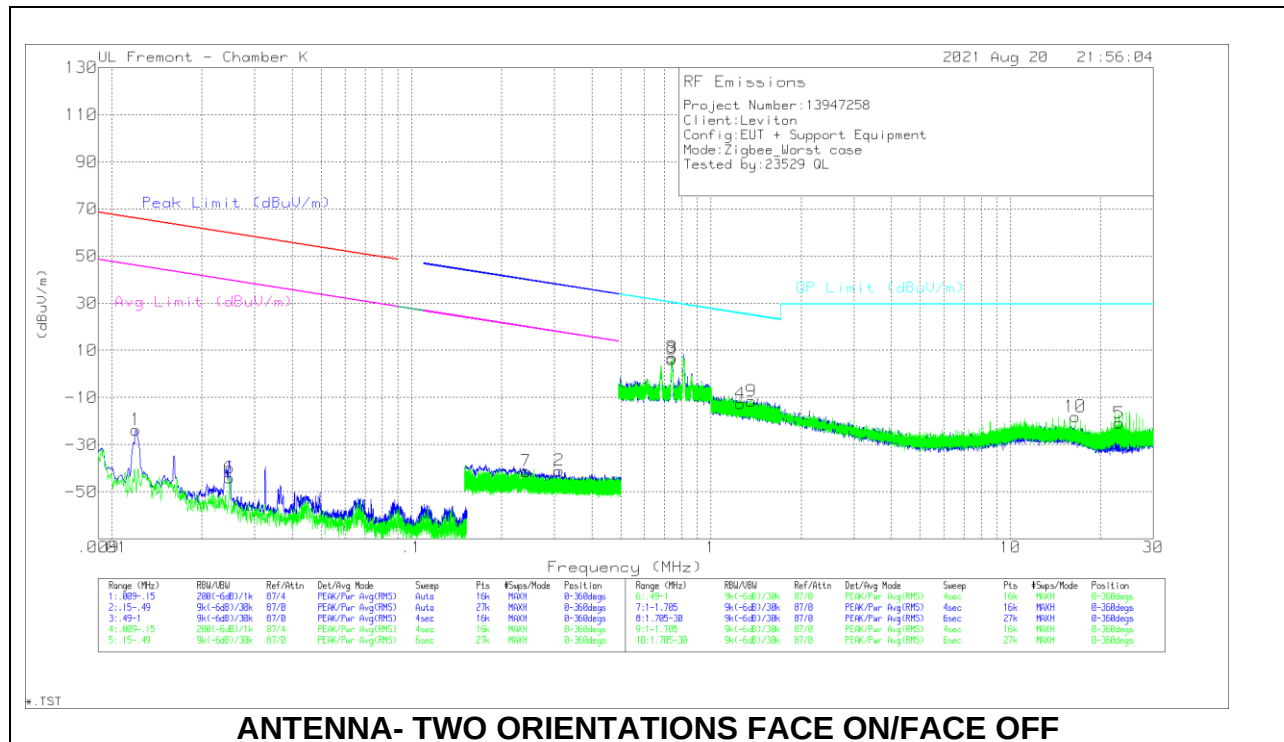
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
2	.81477	14.96	Pk	56.3	-31.9	-40	-.64	29.4	-30.04	0-360
4	.81157	18	Pk	56.3	-31.9	-40	2.4	29.43	-27.03	0-360
5	1.27408	27.02	Pk	45.4	-31.9	-40	.52	25.52	-25	0-360
6	9.96743	31.38	Pk	34.6	-31.6	-40	-5.62	29.5	-35.12	0-360
7	8.79367	42.11	Pk	34.4	-31.6	-40	4.91	29.5	-24.59	0-360

Pk - Peak detector

SPURIOUS EMISSIONS BELOW 30 MHz (EXTERNAL ANTENNA WORST-CASE CONFIGURATION)

Note: Project number 13947258 is the same project as 13714286



Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (E ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01202	27.67	Pk	60.1	-31.5	-80	-23.73	65.98	-89.71	45.98	-69.71	-	-	-	-	0-360
2	.31119	14.96	Pk	56.2	-32.2	-80	-41.04	-	-	-	-	37.75	-78.79	17.75	-58.79	0-360
6	.02464	9.49	Pk	58.5	-32.1	-80	-44.11	59.75	-	39.75	-83.86	-	-	-	-	0-360
								103.86	-	-	-	-	-	-	-	-
7	.24123	14.75	Pk	56.2	-32.2	-80	-41.25	-	-	-	-	39.97	-81.22	19.97	-61.22	0-360

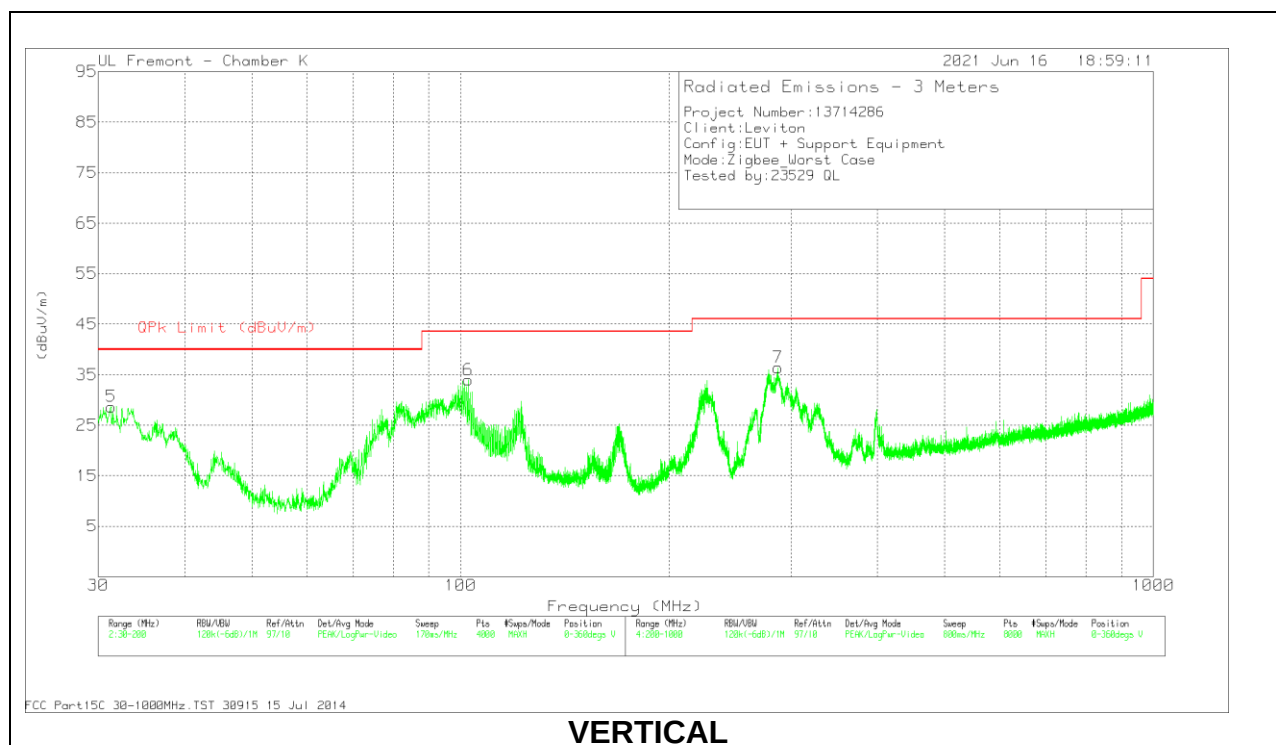
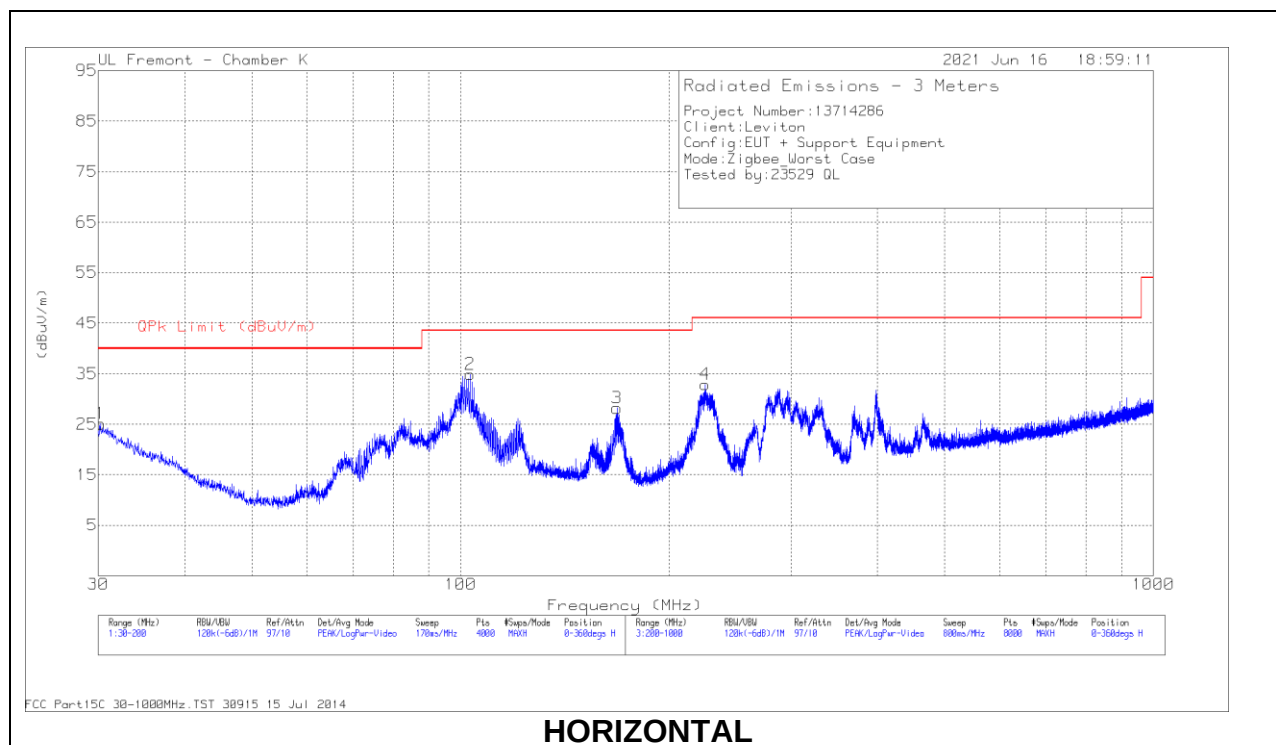
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (E ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.74149	22.26	Pk	56.2	-32.2	-40	6.26	30.21	-23.95	0-360
8	.74229	23	Pk	56.2	-32.2	-40	7	30.2	-23.2	0-360
4	1.25485	14.11	Pk	45.4	-32.1	-40	-12.59	25.66	-38.25	0-360
5	23.03704	17.33	Pk	33.4	-31.6	-40	-20.87	29.5	-50.37	0-360
9	1.36529	15.74	Pk	44.8	-32.1	-40	-11.56	24.92	-36.48	0-360
10	16.4556	19.96	Pk	33.6	-31.7	-40	-18.14	29.5	-47.64	0-360

Pk - Peak detector

10.4. WORST CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (INTERNAL ANTENNA WORST-CASE CONFIGURATION)



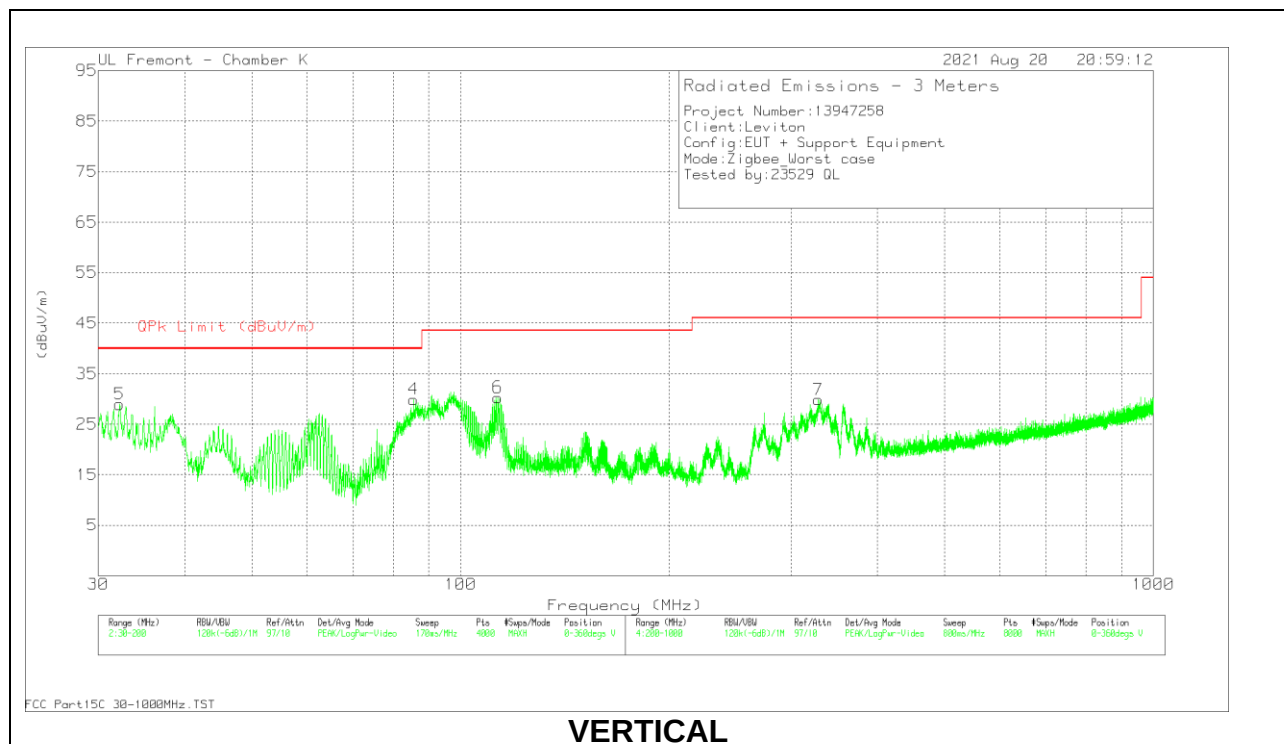
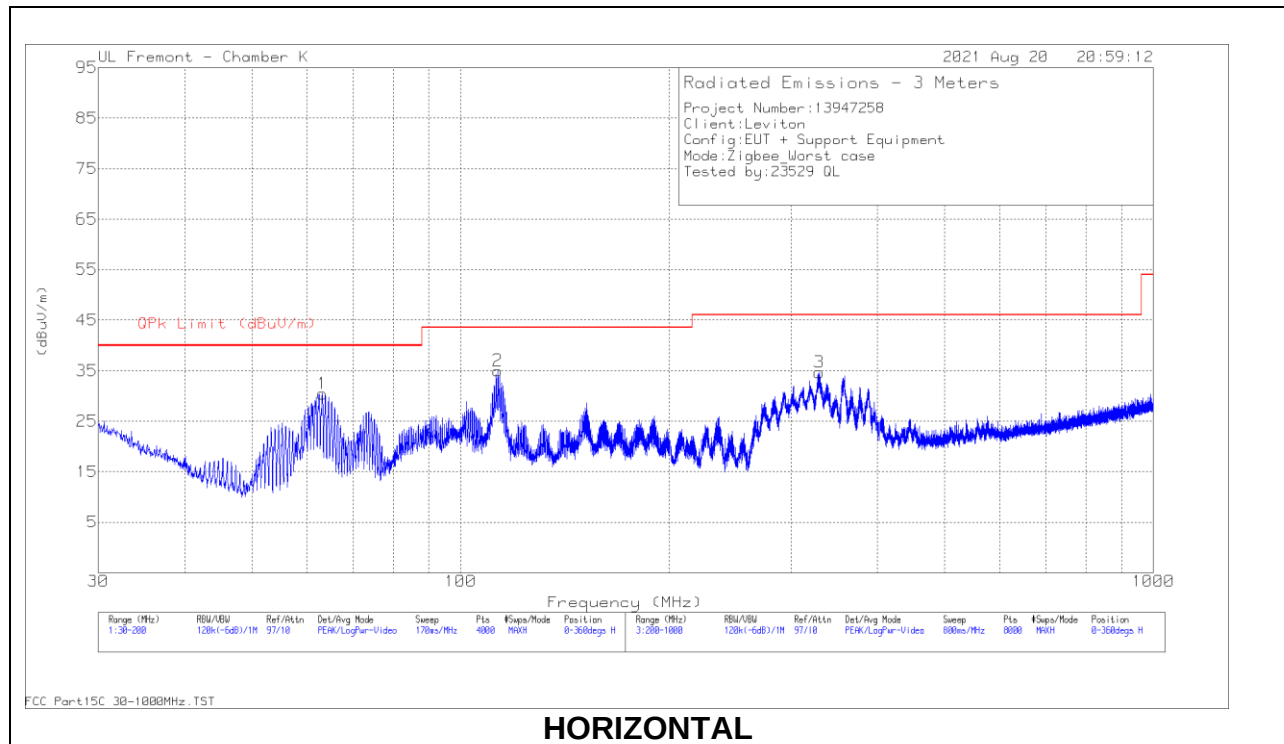
Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF 81560 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.2126	28.89	Pk	27.8	-31.6	25.09	40	-14.91	0-360	199	H
2	102.5052	50.02	Pk	16.9	-30.9	36.02	43.52	-7.5	155	315	H
	102.5052	45.39	Qp	16.9	-30.9	31.39	43.52	-12.13	155	315	H
3	168.1608	40.6	Pk	18.1	-30.5	28.2	43.52	-15.32	0-360	99	H
5	31.3178	33.27	Pk	27	-31.6	28.67	40	-11.33	0-360	101	V
6	101.9195	49.74	Pk	16.8	-30.9	35.64	43.52	-7.88	113	101	V
	101.9195	45.75	Qp	16.8	-30.9	31.65	43.52	-11.87	113	101	V
4	225.5033	45.59	Pk	17.5	-30.2	32.89	46.02	-13.13	0-360	101	H
7	287.2113	46.7	Pk	19.6	-29.9	36.4	46.02	-9.62	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

SPURIOUS EMISSIONS 30 TO 1000 MHz (EXTERNAL ANTENNA WORST-CASE CONFIGURATION)

Note: Project number 13947258 is the same project as 13714286



Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF 81560 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	63.2011	47.73	Pk	13.9	-31.2	30.43	40	-9.57	0-360	295	H
2	* 113.1941	47.12	Pk	19.1	-30.8	35.42	43.52	-8.1	204	309	H
	* 113.1941	43.82	Qp	19.1	-30.8	32.12	43.52	-11.4	204	309	H
4	86.8776	49.01	Pk	13.4	-31	31.41	40	-8.59	116	102	V
	86.8776	42.39	Qp	13.4	-31	24.79	40	-15.21	116	102	V
5	32.2106	34.25	Pk	26.3	-31.6	28.95	40	-11.05	0-360	100	V
6	* 113.2365	41.98	Pk	19.1	-30.8	30.28	43.52	-13.24	0-360	100	V
3	* 329.5168	43.87	Pk	20.6	-29.8	34.67	46.02	-11.35	0-360	100	H
7	* 328.4167	39.16	Pk	20.5	-29.8	29.86	46.02	-16.16	0-360	199	V

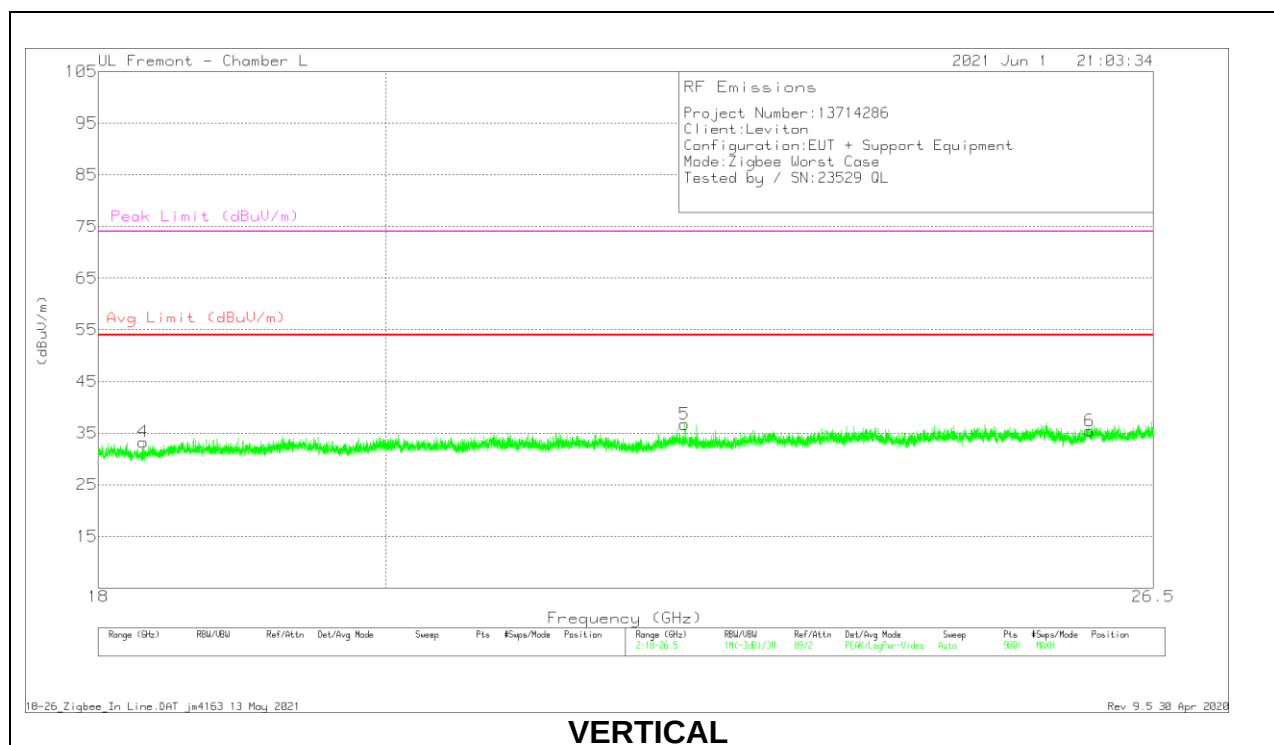
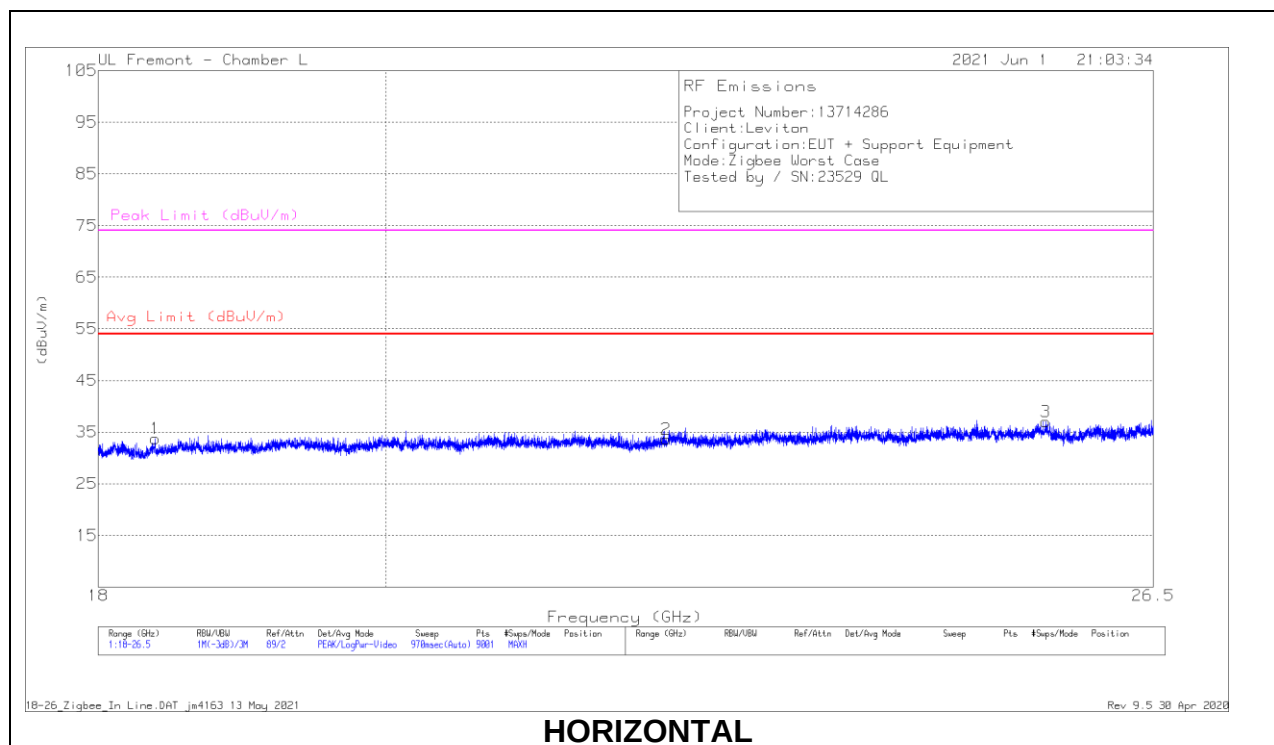
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

10.5. WORST CASE 18-26 GHz

SPURIOUS EMISSIONS 18-26GHz (INTERNAL ANTENNA WORST-CASE CONFIGURATION)



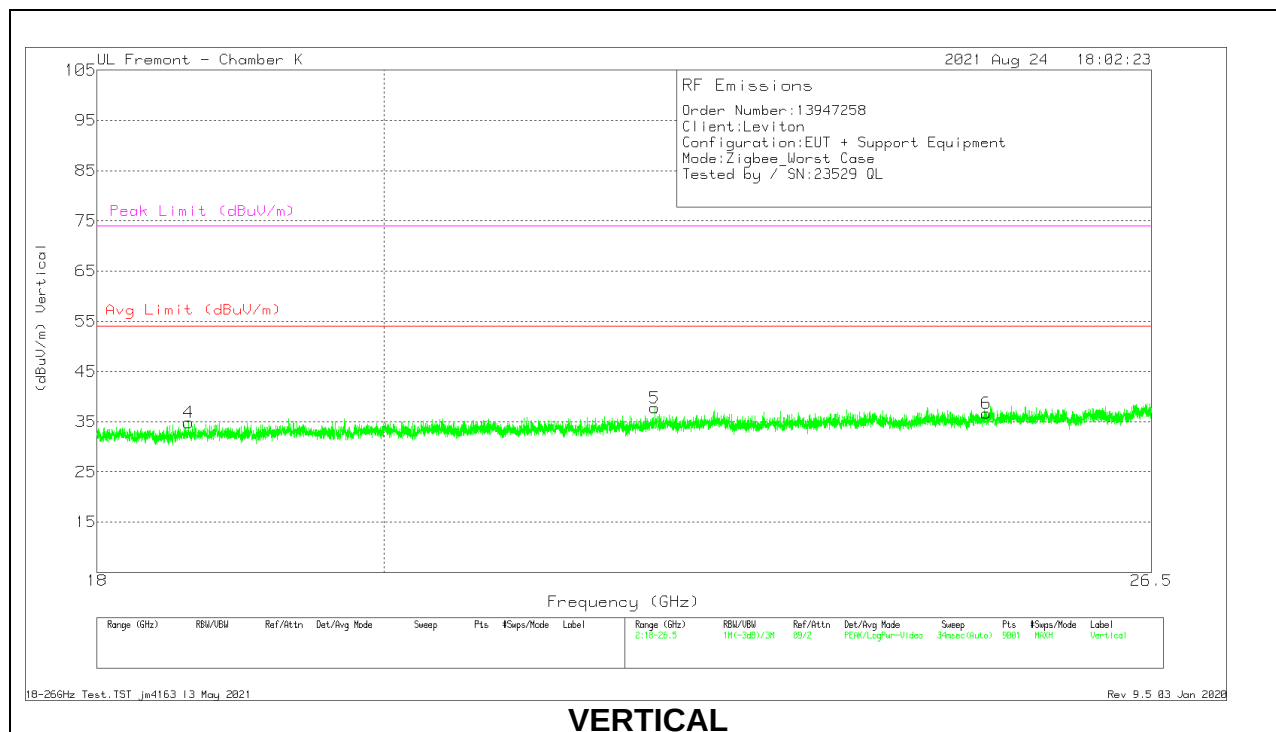
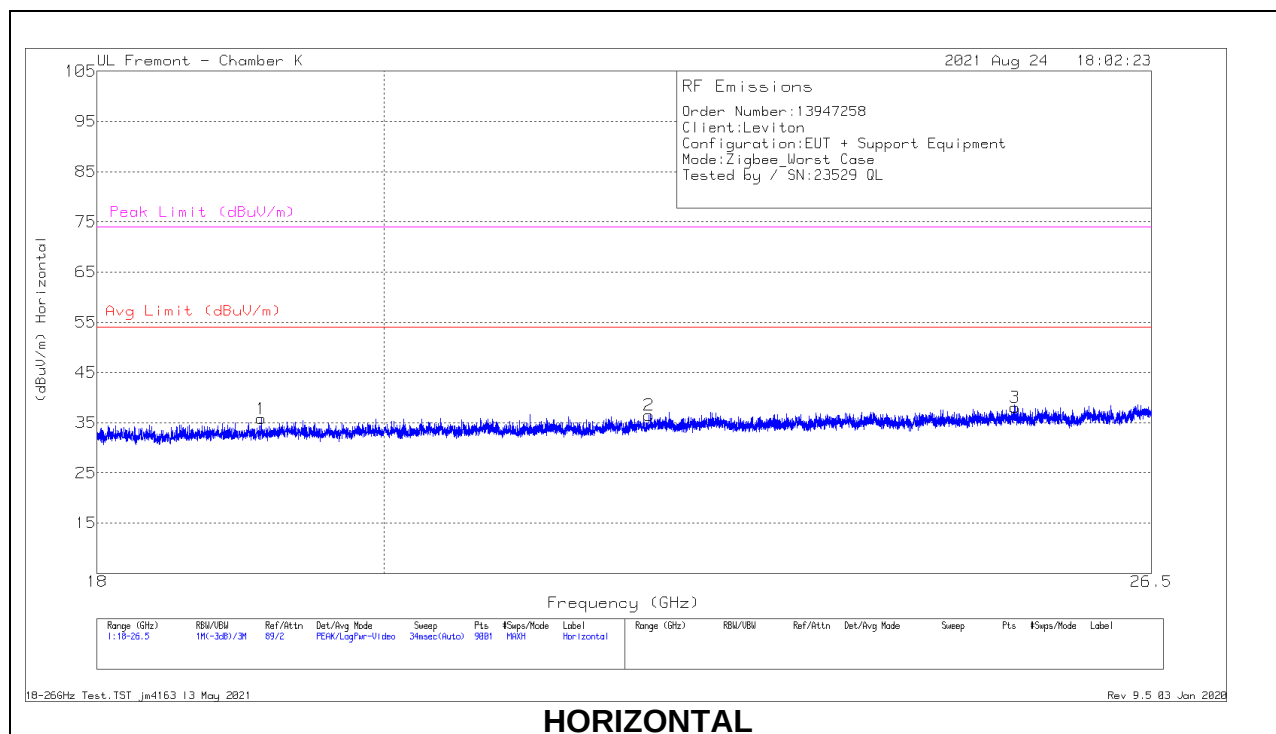
18 – 26 GHz Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T447 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.37967	70.31	Pk	32.3	-59.4	-9.5	33.71	54	-20.29	74	-40.29
2	22.16689	67.31	Pk	33.5	-57.7	-9.5	33.61	54	-20.39	74	-40.39
3	25.47433	67.2	Pk	34.5	-55.2	-9.5	37	54	-17	74	-37
4	18.29844	70.2	Pk	32.3	-59.7	-9.5	33.3	54	-20.7	74	-40.7
5	22.31422	70.44	Pk	33.6	-57.8	-9.5	36.74	54	-17.26	74	-37.26
6	25.89177	65.85	Pk	34.4	-55.3	-9.5	35.45	54	-18.55	74	-38.55

Pk - Peak detector

SPURIOUS EMISSIONS 18-26GHz (EXTERNAL ANTENNA WORST-CASE CONFIGURATION)

Note: Project number 13947258 is the same project as 13714286



18 – 26 GHz Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	18-26GHz Horn	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.11728	69.82	Pk	33	-57.5	-9.5	35.82	54	-18.18	74	-38.18
2	22.03939	69.78	Pk	33.9	-57.7	-9.5	36.48	54	-17.52	74	-37.52
3	25.20611	67.15	Pk	35.7	-55.3	-9.5	38.05	54	-15.95	74	-35.95
4	18.61483	70.42	Pk	32.7	-58.8	-9.5	34.82	54	-19.18	74	-39.18
5	22.08661	70.86	Pk	34.1	-57.7	-9.5	37.76	54	-16.24	74	-36.24
6	24.94355	66.58	Pk	35.2	-55.6	-9.5	36.68	54	-17.32	74	-37.32

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

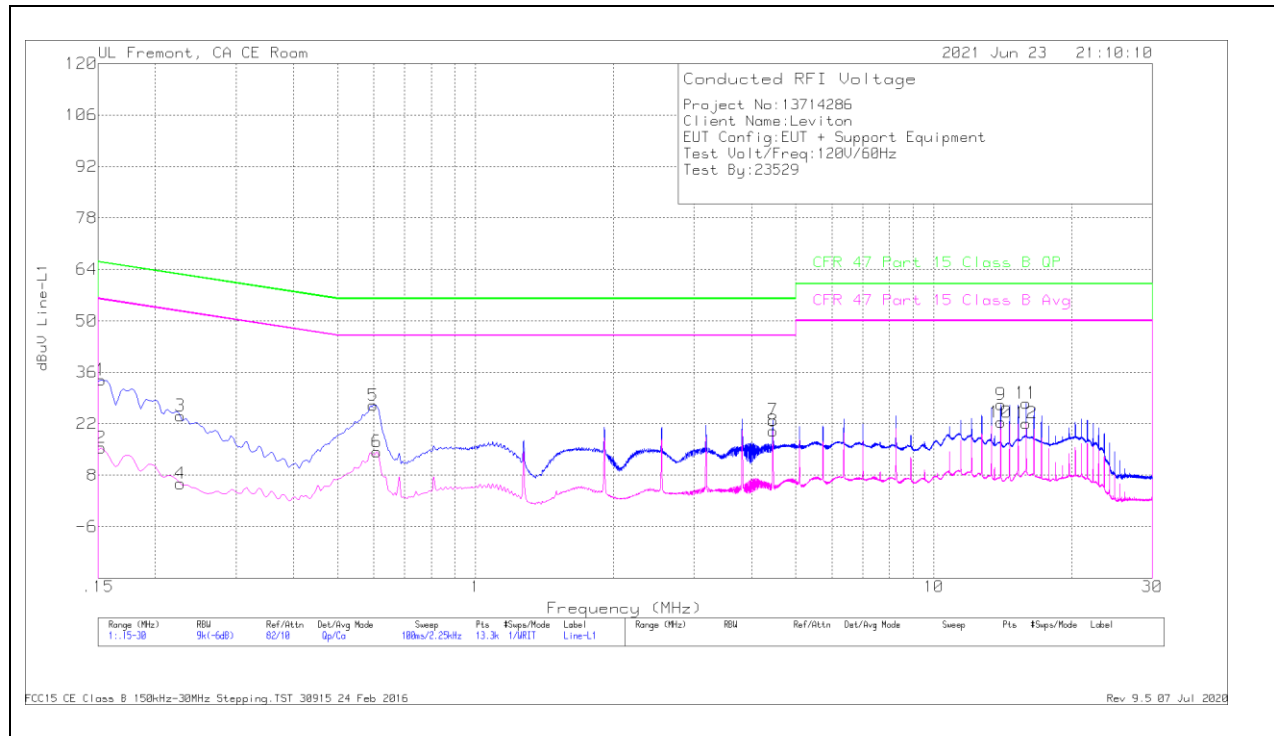
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

RESULTS

INTERNAL ANTENNA CONFIGURATION

LINE 1 RESULTS

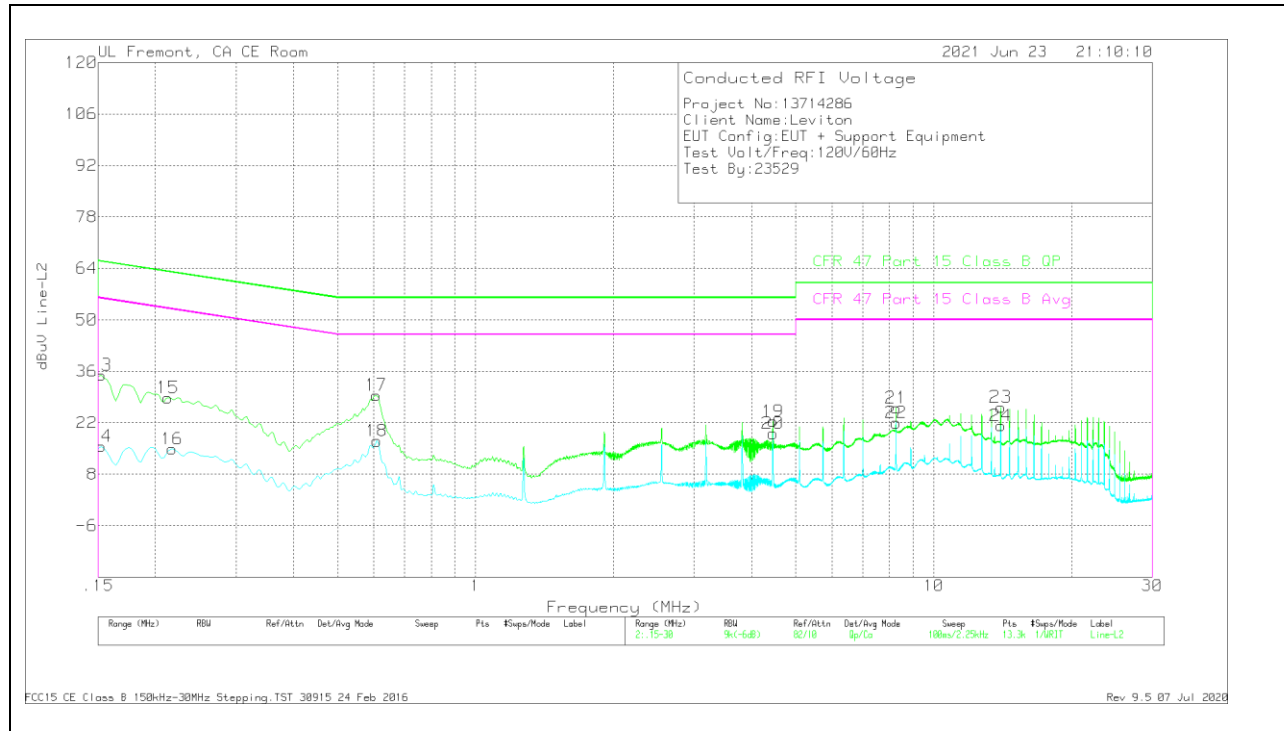


Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 L1	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.15225	24.44	Qp	.1	0	9.4	33.94	65.88	-31.94	-	-
2	.15225	5.99	Ca	.1	0	9.4	15.49	-	-	55.88	-40.39
3	.2265	14.86	Qp	0	0	9.3	24.16	62.58	-38.42	-	-
4	.2265	-3.56	Ca	0	0	9.3	5.74	-	-	52.58	-46.84
5	.59775	17.73	Qp	0	0	9.3	27.03	56	-28.97	-	-
6	.609	5.08	Ca	0	0	9.3	14.38	-	-	46	-31.62
7	4.4565	13.61	Qp	0	.1	9.3	23.01	56	-32.99	-	-
8	4.45425	10.68	Ca	0	.1	9.3	20.08	-	-	46	-25.92
9	14.0055	17.73	Qp	0	.2	9.3	27.23	60	-32.77	-	-
10	14.00325	12.89	Ca	0	.2	9.3	22.39	-	-	50	-27.61
11	15.91575	18.08	Qp	0	.2	9.3	27.58	60	-32.42	-	-
12	15.91463	12.65	Ca	0	.2	9.3	22.15	-	-	50	-27.85

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz

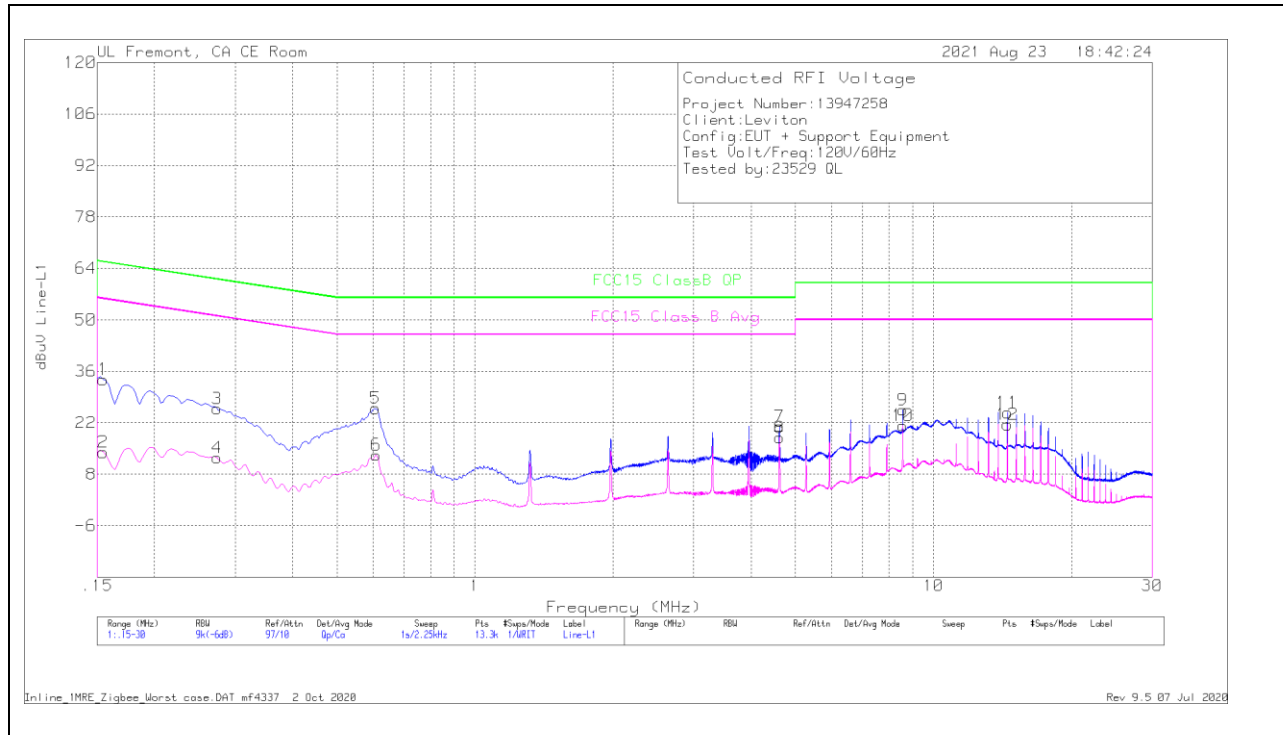
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 L2	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
13	.15225	25.53	Qp	0	0	9.4	34.93	65.88	-30.95	-	-
14	.15225	6.19	Ca	0	0	9.4	15.59	-	-	55.88	-40.29
15	.213	19.47	Qp	0	0	9.3	28.77	63.09	-34.32	-	-
16	.2175	5.56	Ca	0	0	9.3	14.86	-	-	52.91	-38.05
17	.60675	20.17	Qp	0	0	9.3	29.47	56	-26.53	-	-
18	.609	7.76	Ca	0	0	9.3	17.06	-	-	46	-28.94
19	4.45425	12.99	Qp	0	.1	9.3	22.39	56	-33.61	-	-
20	4.45425	9.7	Ca	0	.1	9.3	19.1	-	-	46	-26.9
21	8.27475	16.52	Qp	0	.2	9.3	26.02	60	-33.98	-	-
22	8.27475	12.51	Ca	0	.2	9.3	22.01	-	-	50	-27.99
23	14.00325	16.64	Qp	.1	.2	9.3	26.24	60	-33.76	-	-
24	14.00325	11.59	Ca	.1	.2	9.3	21.19	-	-	50	-28.81

Qp - Quasi-Peak detector
Ca - CISPR average detection

EXTERNAL ANTENNA CONFIGURATION

Note: Project number 13947258 is the same project as 13714286

LINE 1 RESULTS

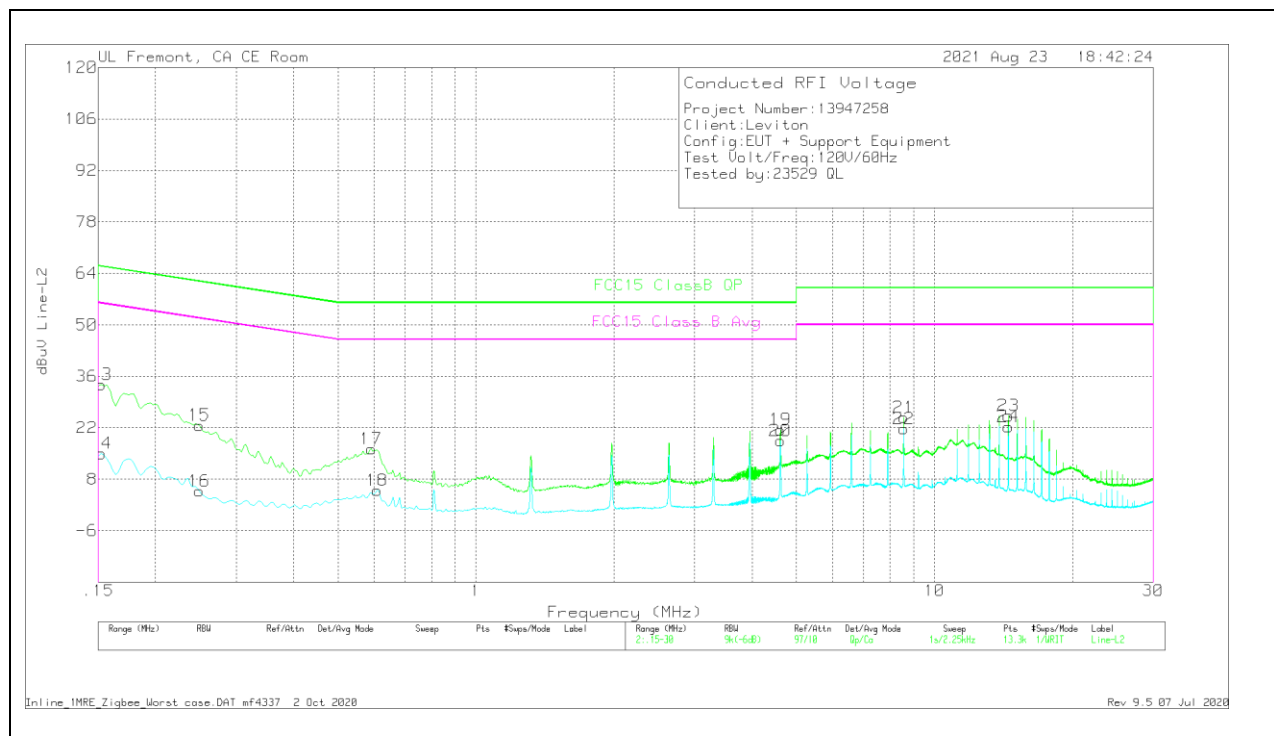


Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 L1	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	FCC15 Class B QP	Margin (dB)	FCC15 Class B Avg	Margin (dB)
2	.1545	4.48	Ca	.1	0	9.4	13.98	-	-	55.75	-41.77
4	.27375	3.15	Ca	0	0	9.3	12.45	-	-	51	-38.55
6	.609	3.92	Ca	0	0	9.3	13.22	-	-	46	-32.78
8	4.61175	8.54	Ca	0	.1	9.3	17.94	-	-	46	-28.06
10	8.56725	11.73	Ca	0	.2	9.3	21.23	-	-	50	-28.77
12	14.496	12.01	Ca	0	.2	9.3	21.51	-	-	50	-28.49
1	.1545	24.28	Qp	.1	0	9.4	33.78	65.75	-31.97	-	-
3	.27375	16.54	Qp	0	0	9.3	25.84	61	-35.16	-	-
5	.60675	16.63	Qp	0	0	9.3	25.93	56	-30.07	-	-
7	4.614	11.62	Qp	0	.1	9.3	21.02	56	-34.98	-	-
9	8.56725	15.97	Qp	0	.2	9.3	25.47	60	-34.53	-	-
11	14.49825	15.24	Qp	0	.2	9.3	24.74	60	-35.26	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 L2	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	FCC15 Class B QP	Margin (dB)	FCC15 Class B Avg	Margin (dB)
14	.15225	5.6	Ca	0	0	9.4	15	-	-	55.88	-40.88
16	.249	-4.53	Ca	0	0	9.3	4.77	-	-	51.79	-47.02
18	.609	-4.37	Ca	0	0	9.3	4.93	-	-	46	-41.07
20	4.61175	9.05	Ca	0	.1	9.3	18.45	-	-	46	-27.55
22	8.565	12.23	Ca	0	.2	9.3	21.73	-	-	50	-28.27
24	14.49375	12.71	Ca	.1	.2	9.3	22.31	-	-	50	-27.69
13	.15225	24.34	Qp	0	0	9.4	33.74	65.88	-32.14	-	-
15	.249	13.35	Qp	0	0	9.3	22.65	61.79	-39.14	-	-
17	.591	6.92	Qp	0	0	9.3	16.22	56	-39.78	-	-
19	4.61175	12.03	Qp	0	.1	9.3	21.43	56	-34.57	-	-
21	8.565	15.3	Qp	0	.2	9.3	24.8	60	-35.2	-	-
23	14.49375	15.66	Qp	.1	.2	9.3	25.26	60	-34.74	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection