

TEST REPORT

Report Number: R13761452-E1

Applicant : Milwaukee Electric Tool Corp
13135 W Lisbon Road
Brookefield, WI 53005
United States

Model : 2191-20

FCC ID : P36-219120

IC : 25187-219120

EUT Description : Wireless Earbuds

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C: 2022
ISED RSS-247 ISSUE 2: 2017
ISED RSS-GEN ISSUE 5 +A2: 2021

Date Of Issue:
2023-06-22

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2022-10-11	Initial Issue	Brian Kiewra
V2	2023-02-19	Updated model number	Niklas Haydon
V3	2023-06-22	Revised section 6.5 to justify only testing 1Mbps for spurious emissions. Added DC correction column in to low channel spurious. Values were correct, just missing column.	Brian Kiewra

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Milwaukee Electric Tool Corp
13135 W Lisbon Road
Brookefield, WI 53005
United States

EUT DESCRIPTION: Wireless Earbuds

MODEL: 2191-20

SERIAL NUMBER: Non-serialized

SAMPLE RECEIPT DATE: 2021-04-15

DATE TESTED: 2021-06-02 to 2021-10-22

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C: 2022	Complies
ISED RSS-247 Issue 2: 2017	Complies
ISED RSS-GEN Issue 5 + A2: 2021	Complies

UL LLC 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 LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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, or any agency of the U.S. government.

Approved & Released
For UL LLC By:



Francisco deAnda
Staff Engineer
Consumer, Medical and IT Segment
UL Verifications Services

Prepared By:



Brian Kiewra
Project Engineer
Consumer, Medical and IT Segment
UL LLC

2. TEST RESULTS SUMMARY

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.

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

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15: 2022, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A2: 2021, and RSS-247 Issue 2: 2017.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 0751.06, 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
<input type="checkbox"/>	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
<input checked="" type="checkbox"/>	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

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	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%
Time	3.39%

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

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

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

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

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a pair of wireless earbuds with a Bluetooth and BLE transceiver. This report covers BLE testing only.

6.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	2.60	1.82

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

The radio utilizes an FPCB antenna, with a maximum gain of 2.64dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was v1.6.2.6

The test utility software used during testing was RF_test_tool_v5.2.2.69

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. Radiated emission performed on 1Mbps as worst-case based on power and PSD.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

Both the left earbud and right earbud are electrically identical, therefore one earbud was used for testing with the exception of power line conducted emissions testing. For power line conducted emissions testing, the EUT was placed in its charging case.

Worst-case data rates as provided by the client were:

1Mbps
 2Mbps

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer/Brand	Model	Serial Number	FCC ID
None				

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	I/O	1	Micro-USB	Shielded	<3m	Used only to plug in to charging case

SETUP DIAGRAMS

Please refer to R13761452-EP1 for setup diagrams

7. MEASUREMENT METHOD

Duty Cycle: ANSI C63.10 Subclause- 11.6

6 dB BW: ANSI C63.10 Subclause -11.8.1 RBW \geq DTS BW

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

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

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

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

Emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11 and 6.10.4

Emissions in restricted frequency bands: ANSI C63.10 Subclause -11.12.1 and 6.10.5

General Radiated Spurious Emissions: ANSI C63.10-2013 Sections 6.3-6.6

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

Band-edge: ANSI C63.10 Section 6.10

8. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
Common Equipment					
Conducted Room 1					
SA0027 (PRE0126407)	Spectrum Analyzer	Keysight Technologies	N9030A	2021-06-25	2022-06-25
HI0090 (PRE0191271)	Environmental Meter	Fisher Scientific	15-077-963	2021-07-12	2022-07-12
HI0090 (PRE0191271)	Environmental Meter	Fisher Scientific	15-077-963	2020-06-26	2021-06-26*
SOFTEMI	Antenna Port Software	UL	Version 2021.05.28	NA	NA
Conducted Room 2					
SA0025 (PRE0126407)	Spectrum Analyzer	Keysight Technologies	N9030A	2021-04-01	2022-06-10
PWM003 (PRE0137345)	RF Power Meter	Keysight Technologies	N1911A	2020-08-28	2021-08-28
PWM003 (PRE0137345)	RF Power Meter	Keysight Technologies	N1911A	2021-08-30	2022-08-30
PWS001	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	N1921A	2021-06-25	2022-06-25
PWS004 (PRE0126443)	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2020-08-12	2021-08-12
HI0096	Environmental Meter	Fisher Scientific	14-650-118	2020-09-23	2021-09-23
SOFTEMI	Antenna Port Software	UL	Version 2021.05.28	NA	NA

* Testing performed while in calibration

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2020-08-20	2021-08-20
	30-1000 MHz				
AT0075	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2020-10-27	2021-10-27
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2020-07-27	2021-07-27
	1-18 GHz				
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2021-05-03	2022-05-03
AT0078	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2020-11-19	2021-11-19
	Gain-Loss Chains				
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2020-07-10	2021-07-10
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2020-07-10	2021-07-10
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2020-07-06	2021-07-06
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-30	2022-03-30
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-10	2022-03-10
SOFTEMI	EMI Software	UL	Version 9.5 (04 Mar 2021)		
	Additional Equipment used				
s/n 200037635	Environmental Meter	Fisher Scientific	06-662-4	2020-01-22	2022-01-22
s/n 181474341	Environmental Meter	Fisher Scientific	15-077-963	2020-08-06	2021-08-06

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2021-04-05	2022-04-05
HI0090	Environmental Meter	Fisher Scientific	14-650-118	2020-06-26	2021-06-26
LISN003	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2020-08-18	2021-08-18
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2020-08-18	2021-08-18
ATA222	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2021-04-05	2022-04-05
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (04 Mar 21)		
	Miscellaneous (if needed)				
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2020-08-08	2021-08-08

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

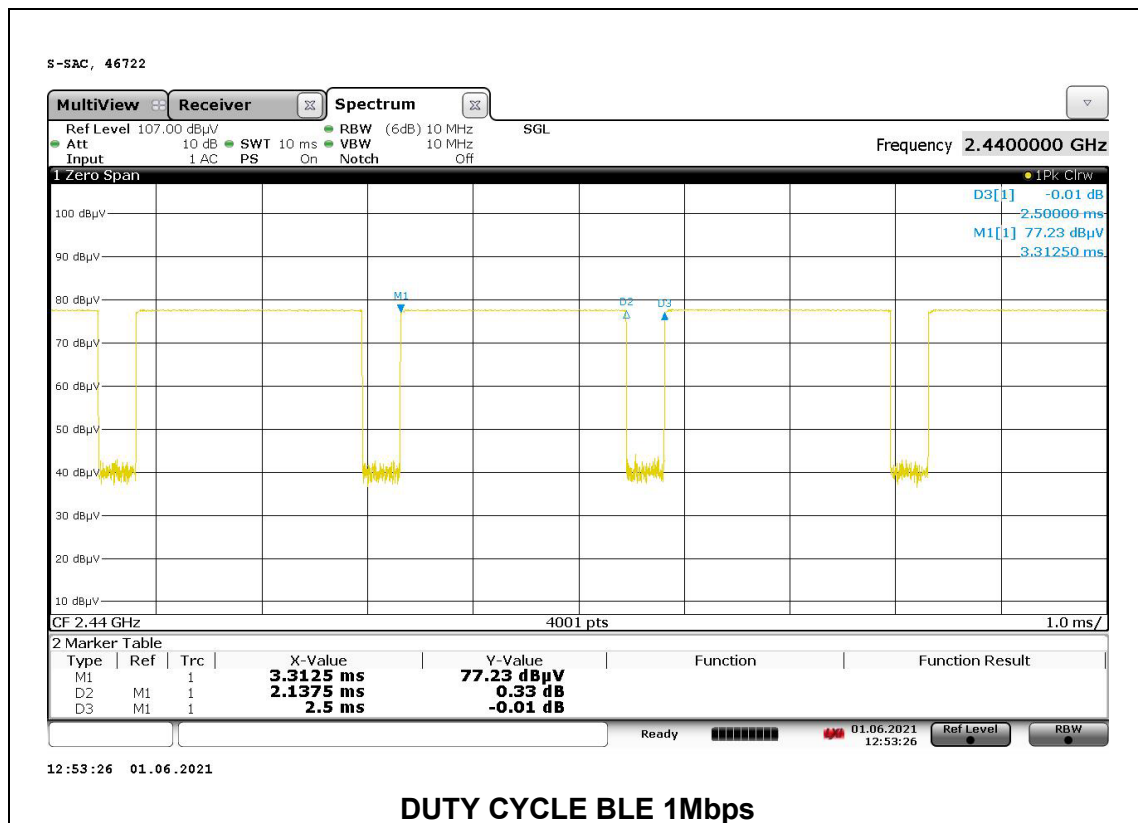
PROCEDURE

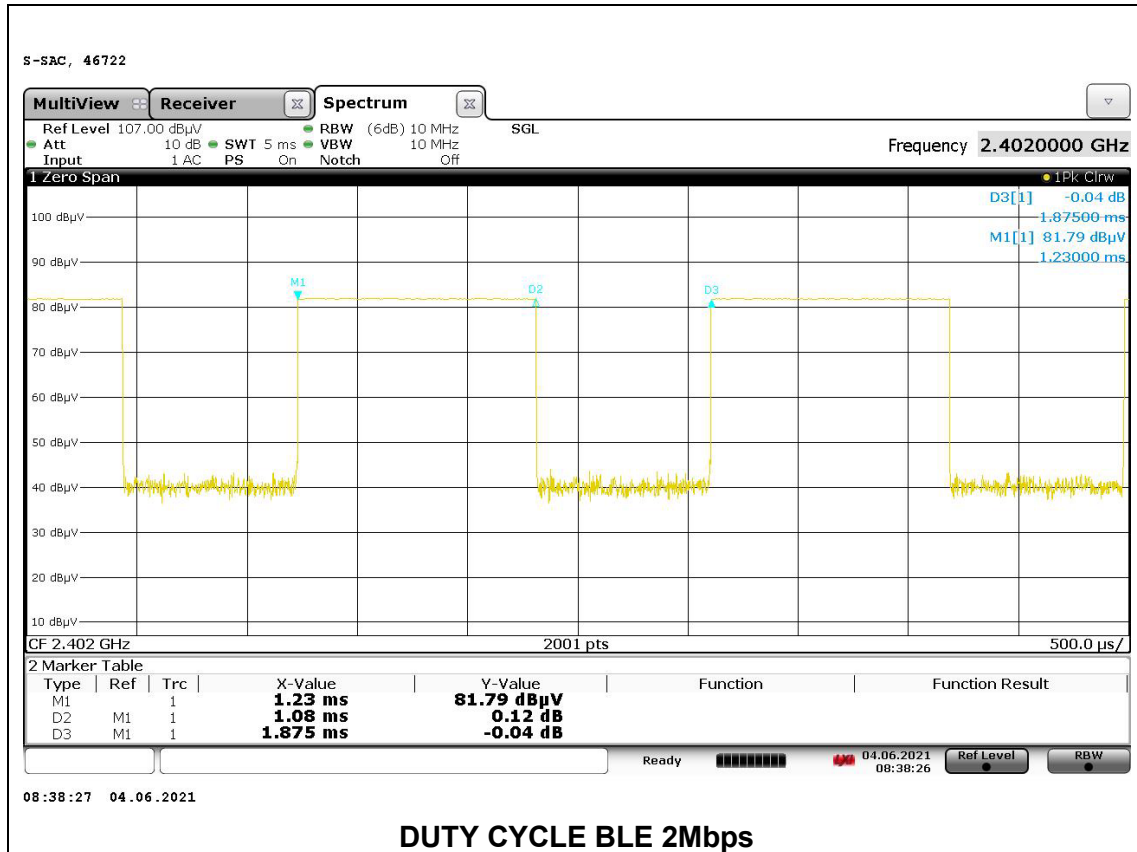
KDB 558074 Zero-Span Spectrum Analyzer Method.

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						
BLE 1Mbps	2.138	2.500	0.855	85.50%	1.36	0.468
BLE 2Mbps	1.080	1.875	0.576	57.60%	4.79	0.926

DUTY CYCLE PLOTS





9.2. 99% BANDWIDTH

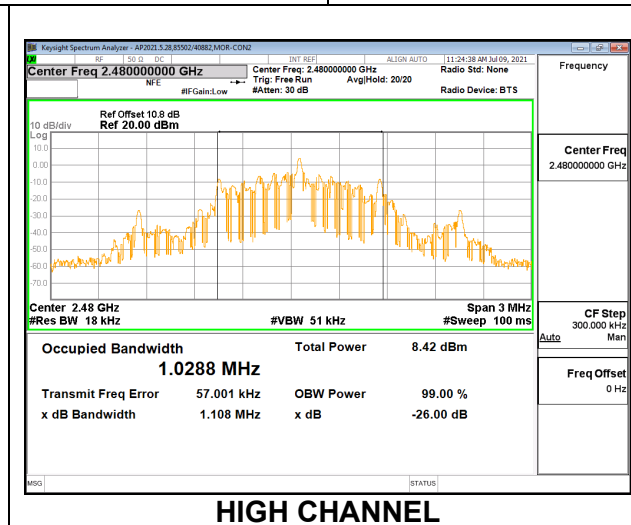
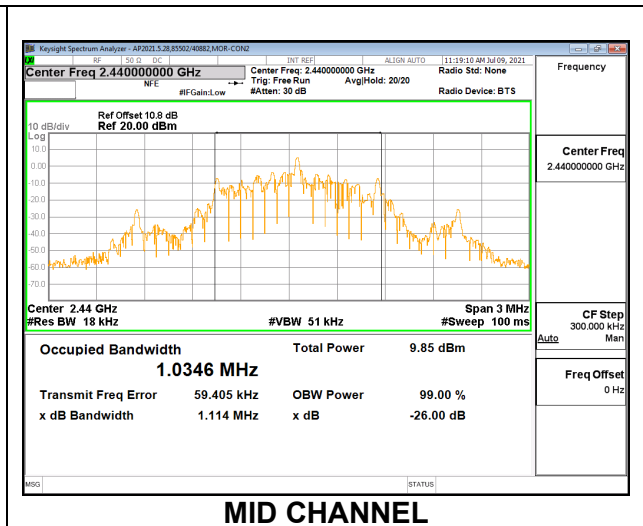
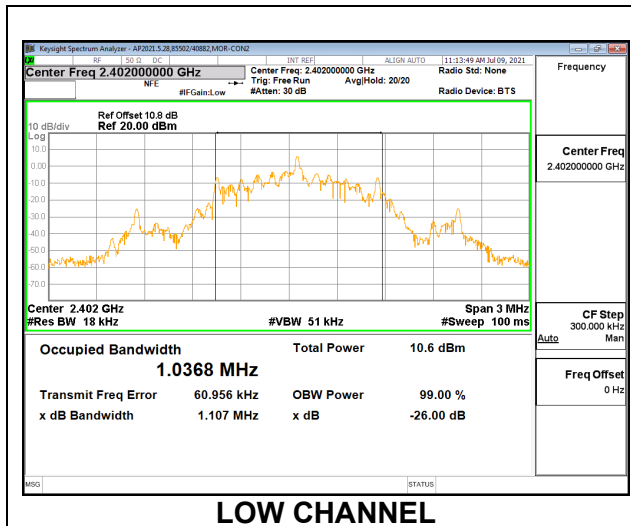
LIMITS

None; for reporting purposes only.

RESULTS

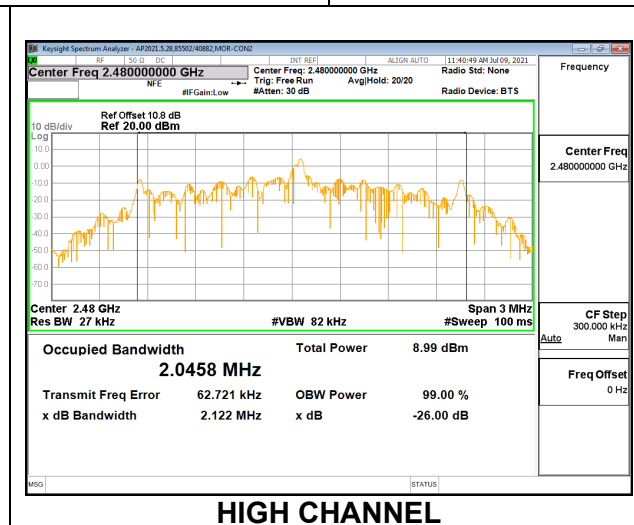
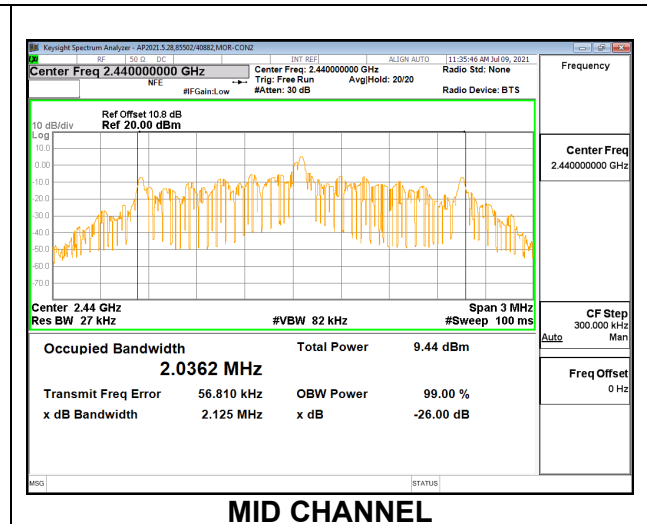
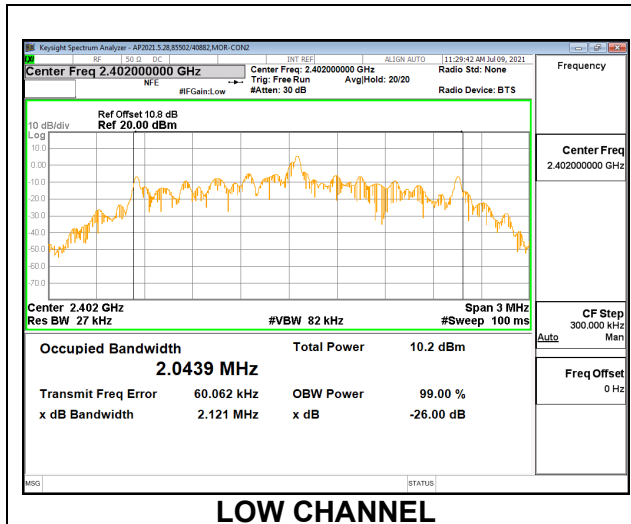
9.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0368
Middle	2440	1.0346
High	2480	1.0288



9.2.2. BLE (2Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.0439
Middle	2440	2.0362
High	2480	2.0458



9.3. 6 dB BANDWIDTH

LIMITS

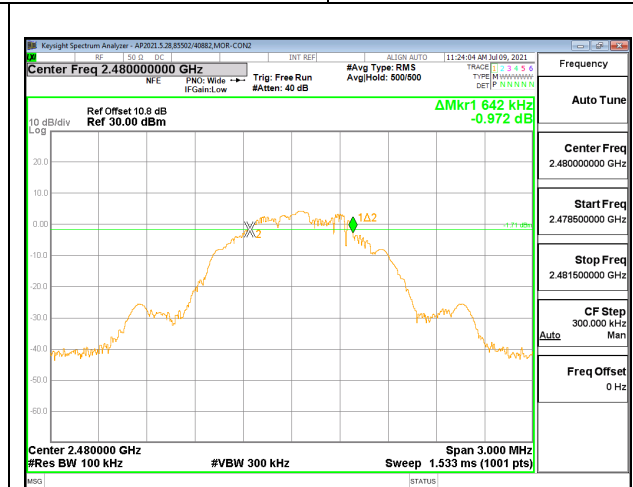
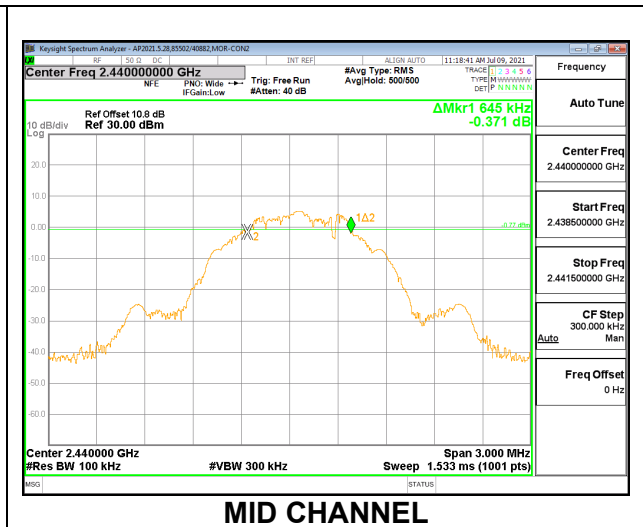
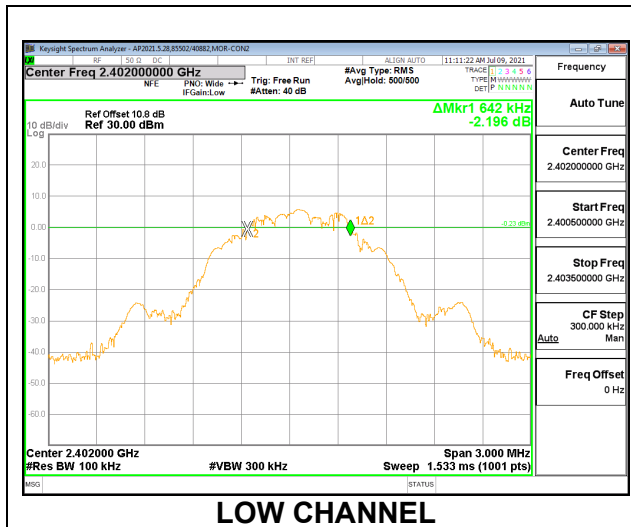
FCC §15.247 (a) (2)
 RSS-247 5.2 (a)

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

RESULTS

9.3.1. BLE (1Mbps)

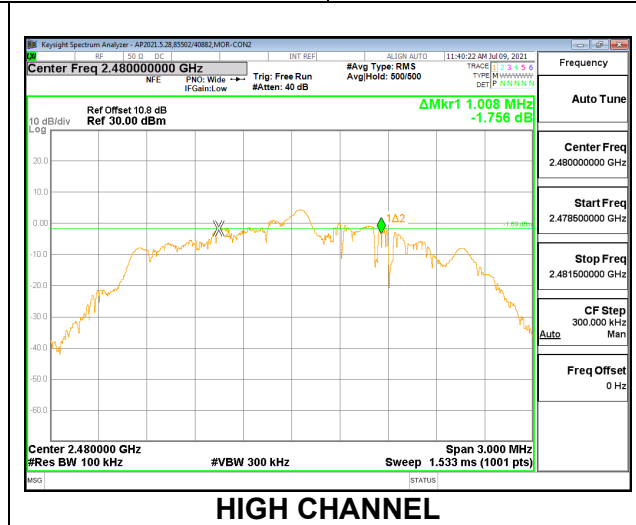
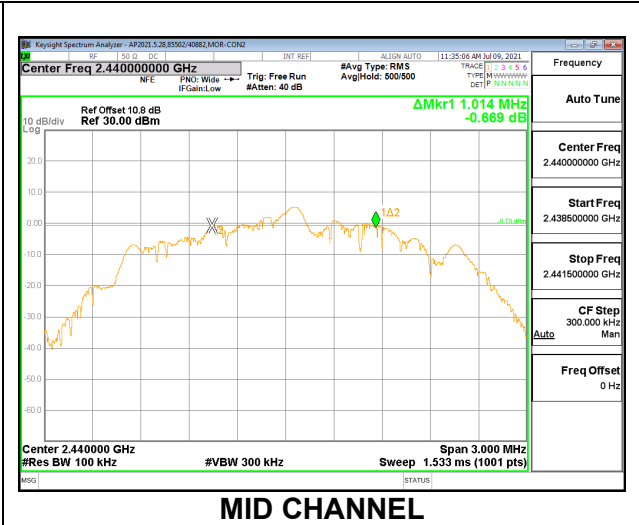
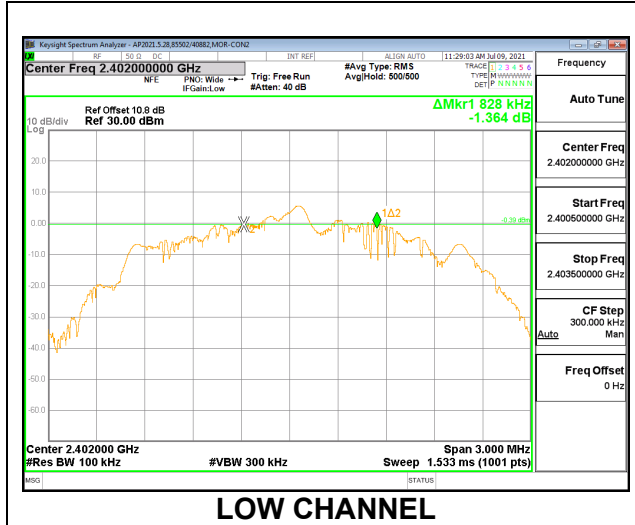
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6420	0.5
Middle	2440	0.6450	0.5
High	2480	0.6420	0.5



HIGH CHANNEL

9.3.2. BLE (2Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.8280	0.5
Middle	2440	1.0140	0.5
High	2480	1.0080	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 cable assembly insertion loss of 10.98 dB (including 10 dB pad and 0.98 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

RESULTS

9.4.1. BLE (1Mbps)

Tested By:	85502/40882
Date:	2021-10-22

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.35	30	-27.650
Middle	2440	2.60	30	-27.400
High	2480	1.99	30	-28.010

9.4.2. BLE (2Mbps)

Tested By:	85502/40882
Date:	2021-10-22

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.38	30	-27.620
Middle	2440	2.14	30	-27.860
High	2480	1.99	30	-28.010

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.98 dB (including 10 dB pad and 0.98 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

RESULTS

9.5.1. BLE (1Mbps)

Tested By:	85502/40882
Date:	2021-10-22

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	2.03
Middle	2440	2.33
High	2480	1.61

9.5.2. BLE (2Mbps)

Tested By:	85502/40882
Date:	2021-10-25

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	2.08
Middle	2440	1.86
High	2480	1.72

9.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)
 RSS-247 (5.2) (b)

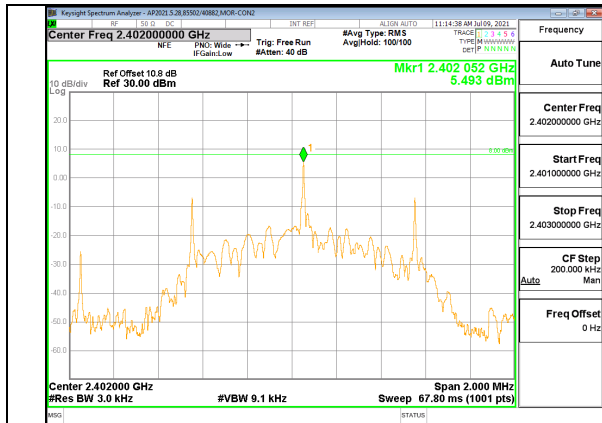
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Note – PSD was run at a higher power setting than output power measurements. Therefore, PSD results are considered to be worst case.

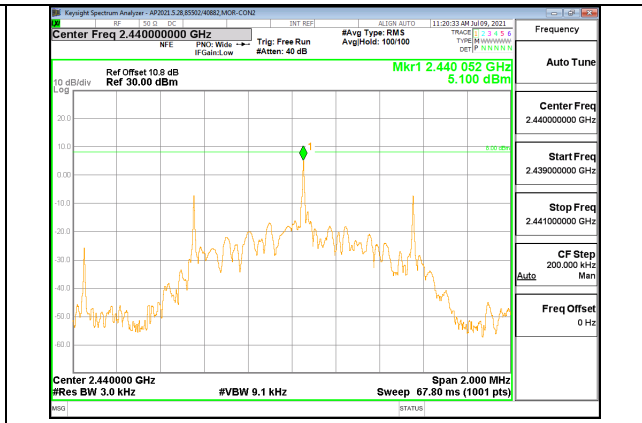
RESULTS

9.6.1. BLE (1Mbps)

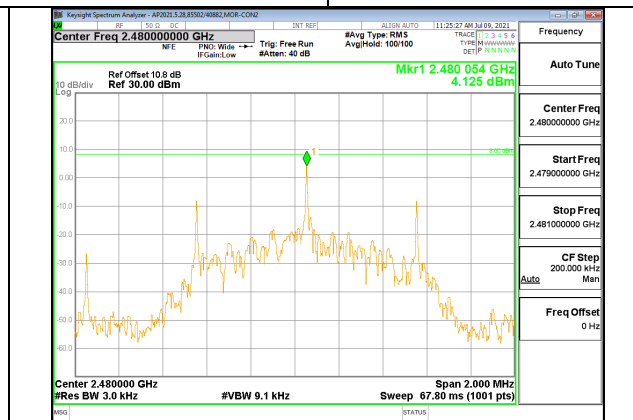
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	5.493	8	-2.51
Middle	2440	5.100	8	-2.90
High	2480	4.125	8	-3.88



LOW CHANNEL



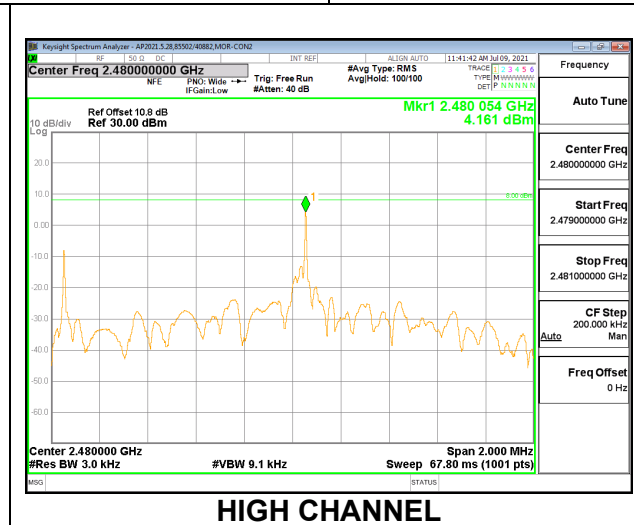
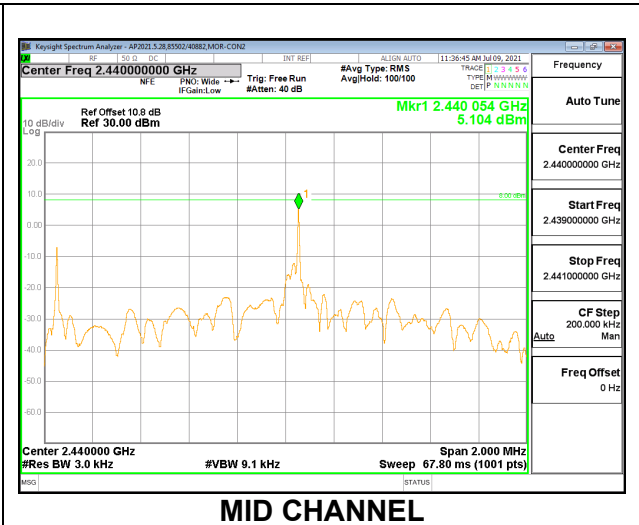
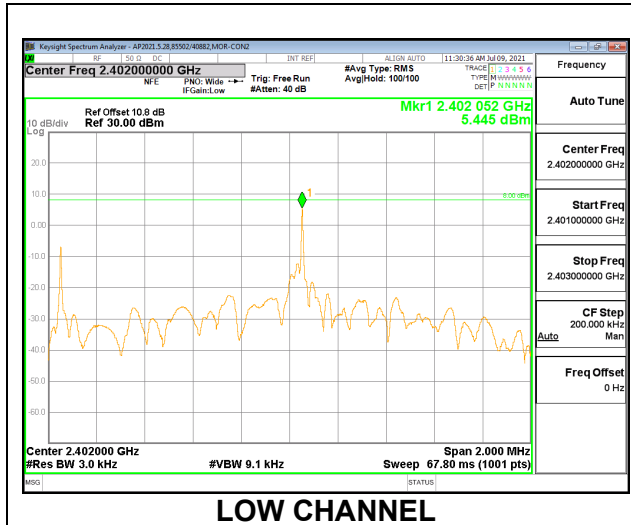
MID CHANNEL



HIGH CHANNEL

9.6.2. BLE (2Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	5.445	8	-2.56
Middle	2440	5.104	8	-2.90
High	2480	4.161	8	-3.84



9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

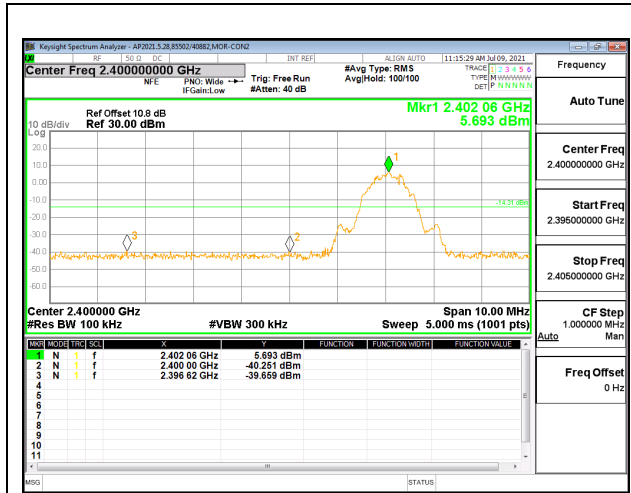
FCC §15.247 (d)

RSS-247 5.5

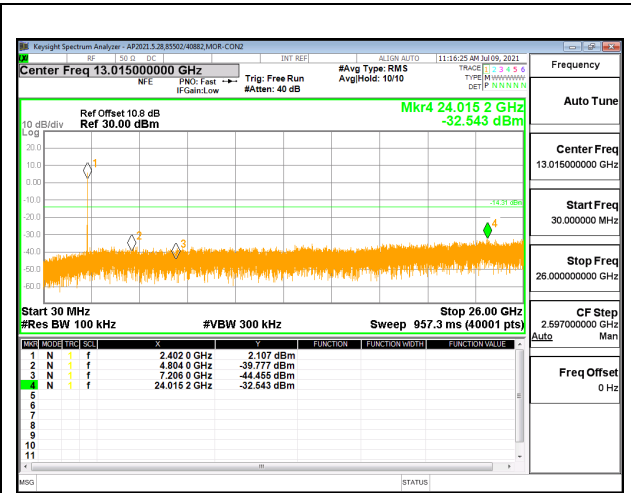
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

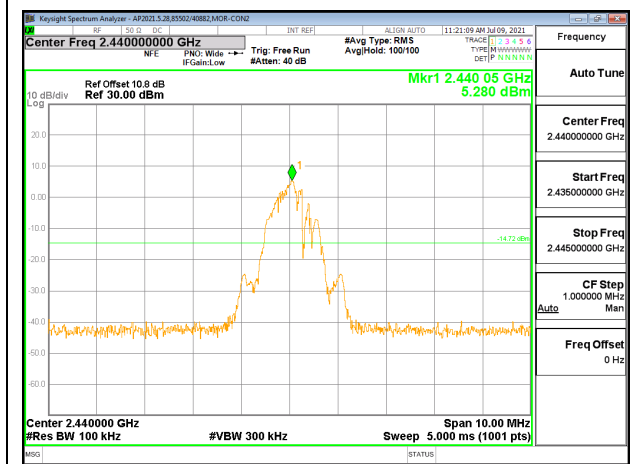
9.7.1. BLE (1Mbps)



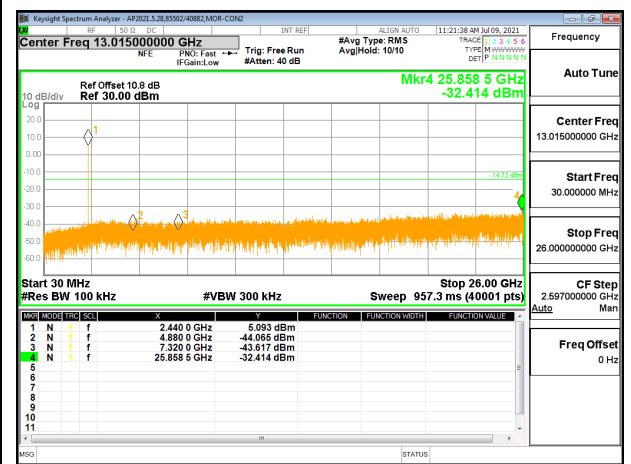
LOW CHANNEL BANDEDGE



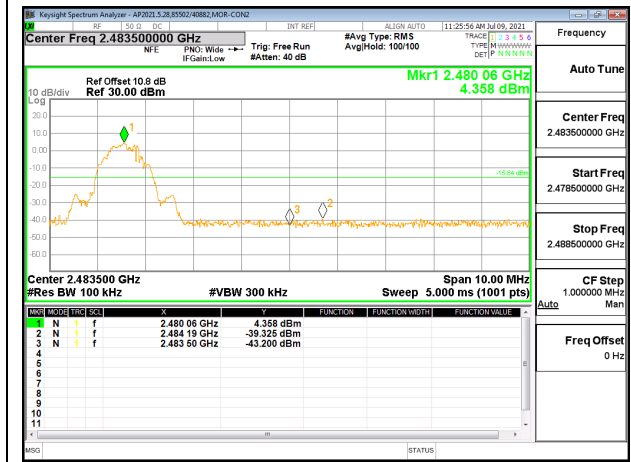
OUT-OF-BAND LOW CHANNEL



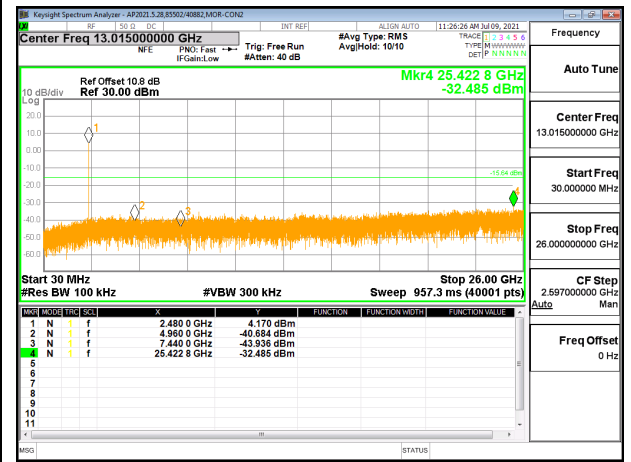
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

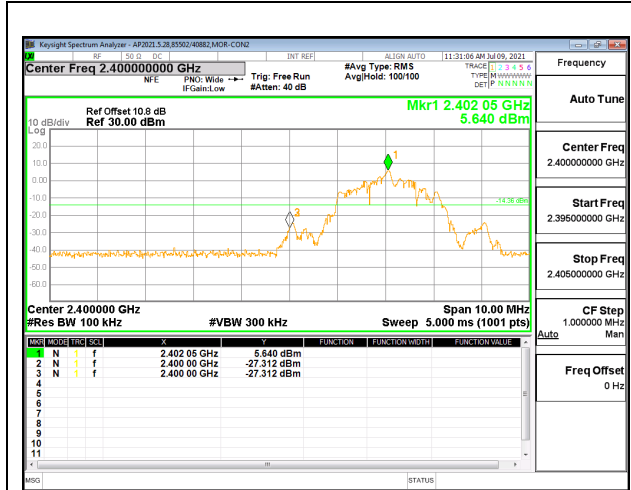


HIGH CHANNEL BANDEDGE

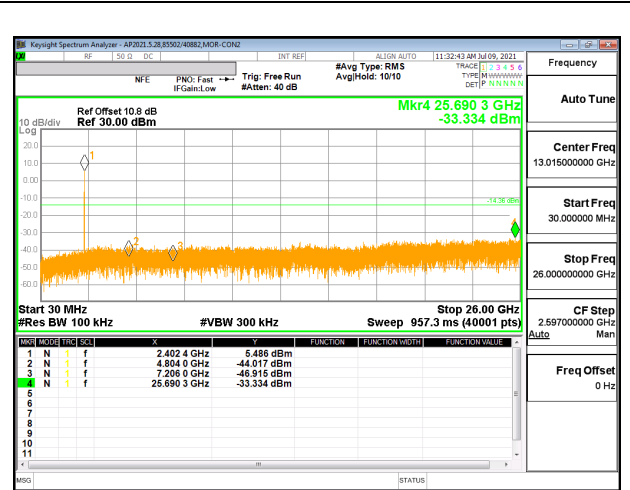


OUT-OF-BAND HIGH CHANNEL

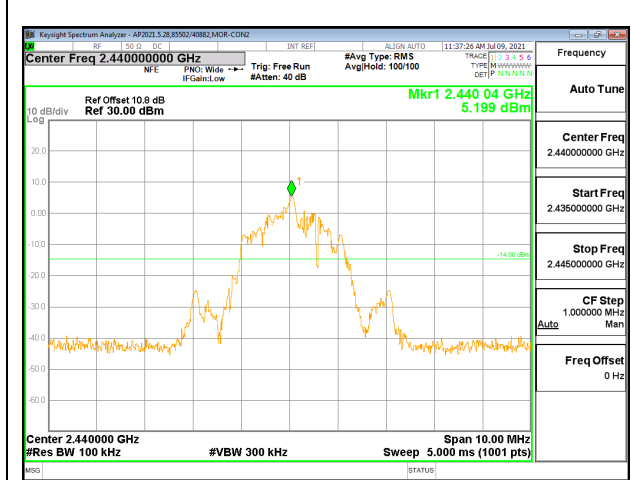
9.7.2. BLE (2Mbps)



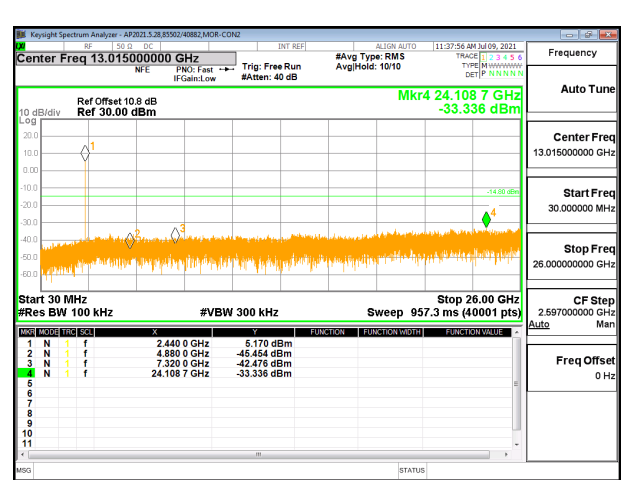
LOW CHANNEL BANDEDGE



OUT-OF-BAND LOW CHANNEL



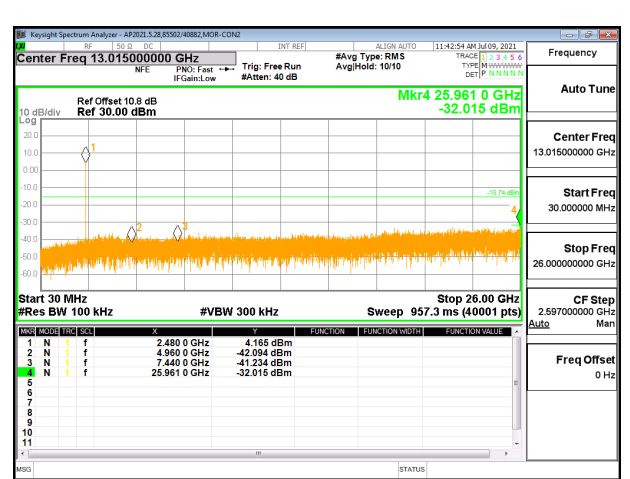
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

FCC §15.205 and §15.209

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

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	-

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
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.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table), using the free space impedance of 377 Ohms. For example the measurement at frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to $Y - 51.5 = Z$ dBuA/m, which has the same margin, W dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

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.

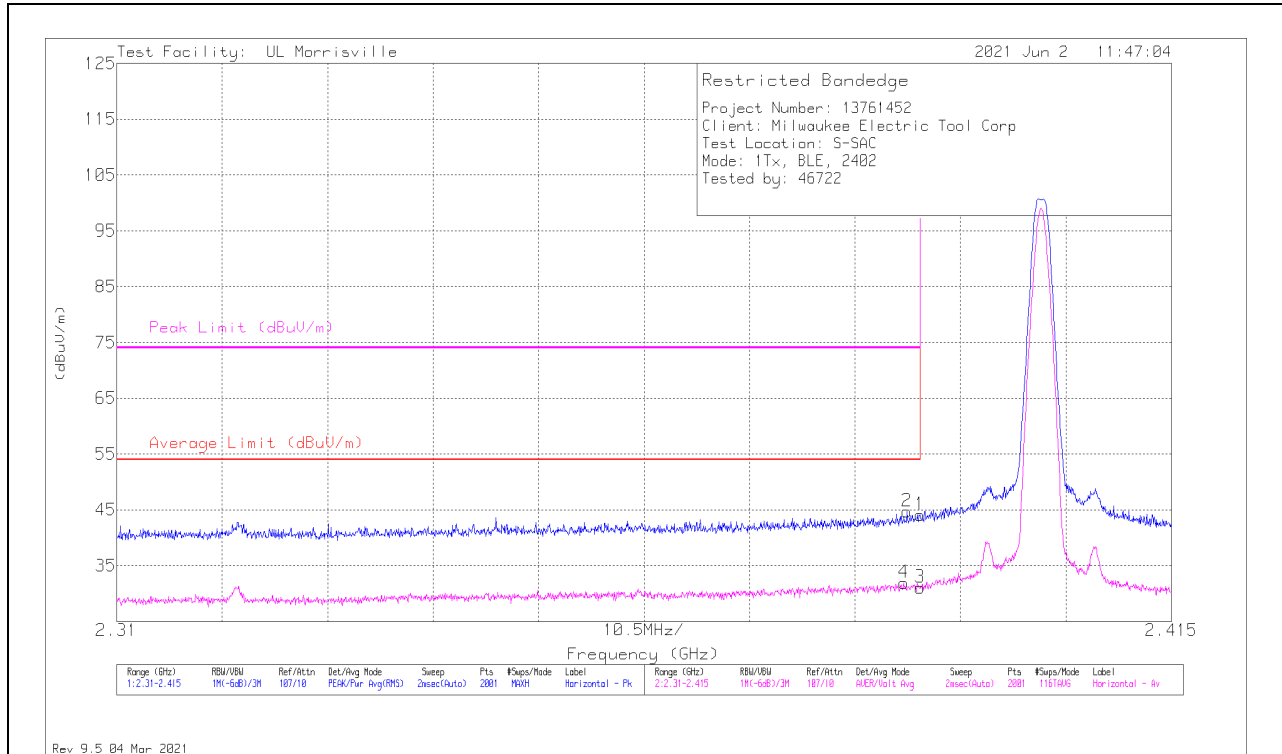
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1Mbps)

Antenna 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	36.24	Pk	31.9	-24	0	44.14	-	-	74	-29.86	140	304	H
2	* ** 2.38865	36.77	Pk	31.9	-24	0	44.67	-	-	74	-29.33	140	304	H
3	* ** 2.38996	21.83	ADV	31.9	-24	1.36	31.09	54	-22.91	-	-	140	304	H
4	* ** 2.38833	22.5	ADV	32	-24	1.36	31.86	54	-22.14	-	-	140	304	H

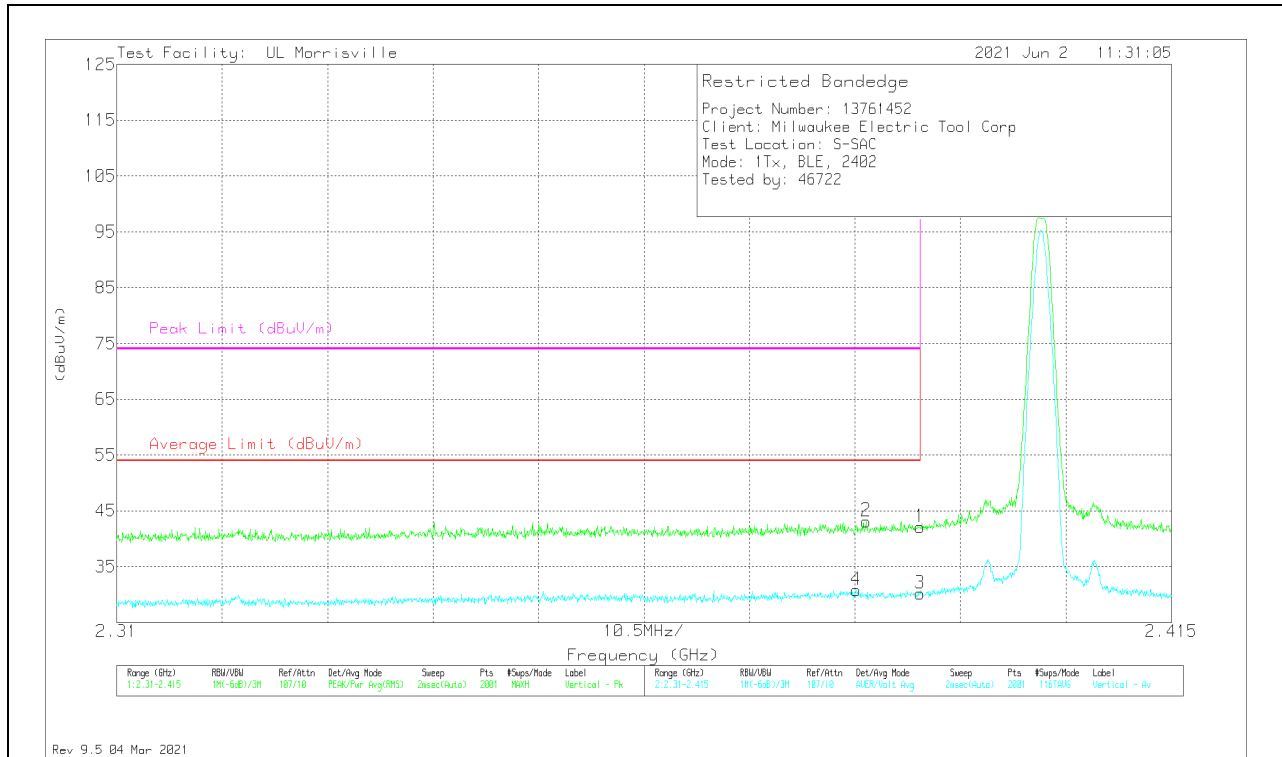
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.38996	34.18	Pk	31.9	-24	0	42.08	-	-	74	-31.92	248	132	V
2	*** 2.3846	34.85	Pk	32.2	-23.9	0	43.15	-	-	74	-30.85	248	132	V
3	** 2.38996	20.95	ADV	31.9	-24	1.36	30.21	54	-23.79	-	-	248	132	V
4	** 2.38361	21.02	ADV	32.3	-23.9	1.36	30.78	54	-23.22	-	-	248	132	V

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

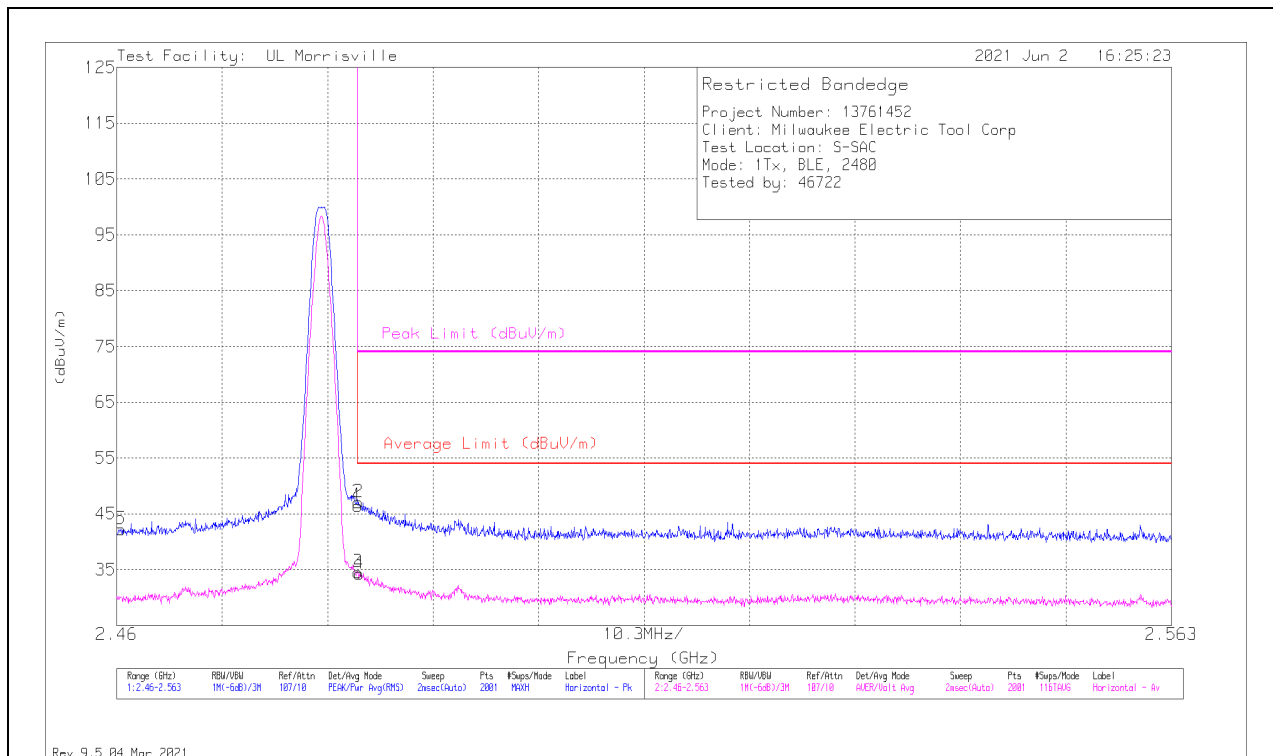
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	38.38	Pk	32.5	-24.4	0	46.48	-	-	74	-27.52	126	312	H
2	* ** 2.48359	38.95	Pk	32.5	-24.4	0	47.05	-	-	74	-26.95	126	312	H
3	* ** 2.48354	25.02	ADV	32.5	-24.4	1.36	34.48	54	-19.52	-	-	126	312	H
4	* ** 2.48369	24.79	ADV	32.5	-24.4	1.36	34.25	54	-19.75	-	-	126	312	H
5	2.46041	34.17	Pk	32.5	-24.4	0	42.27	-	-	-	-	126	312	H

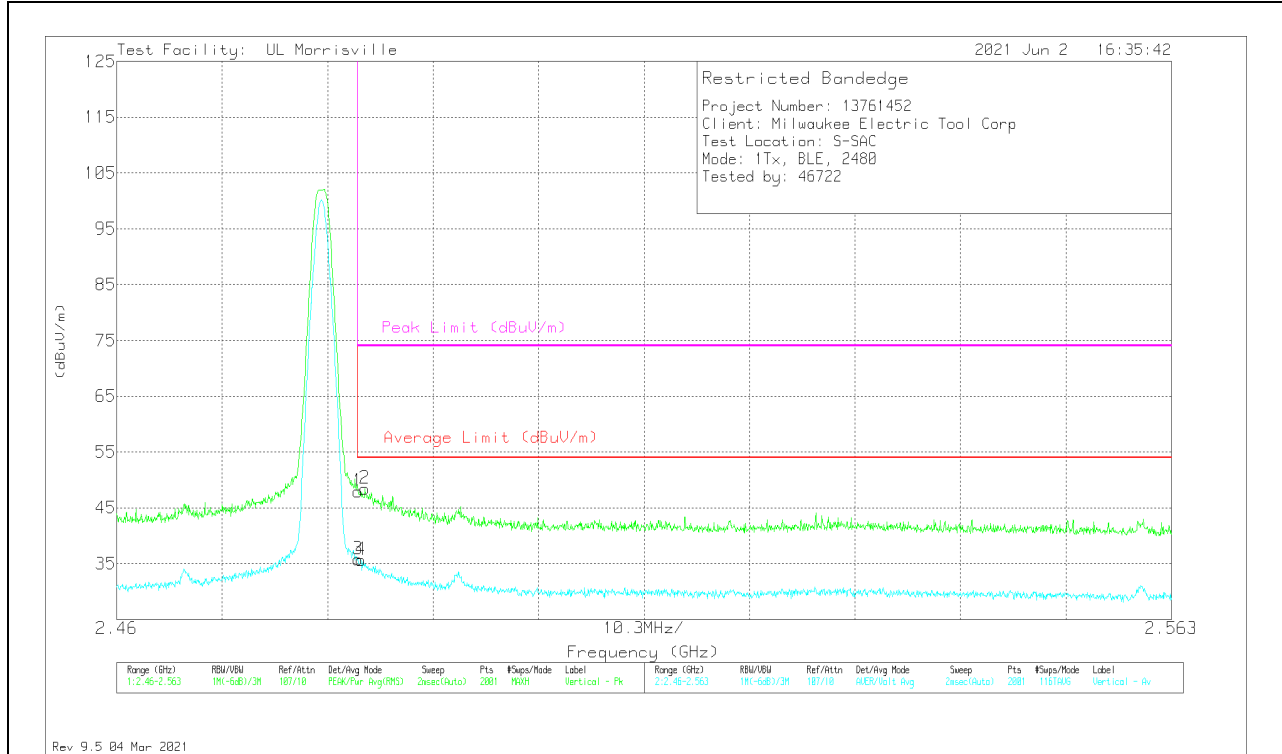
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

VERTICAL RESULT

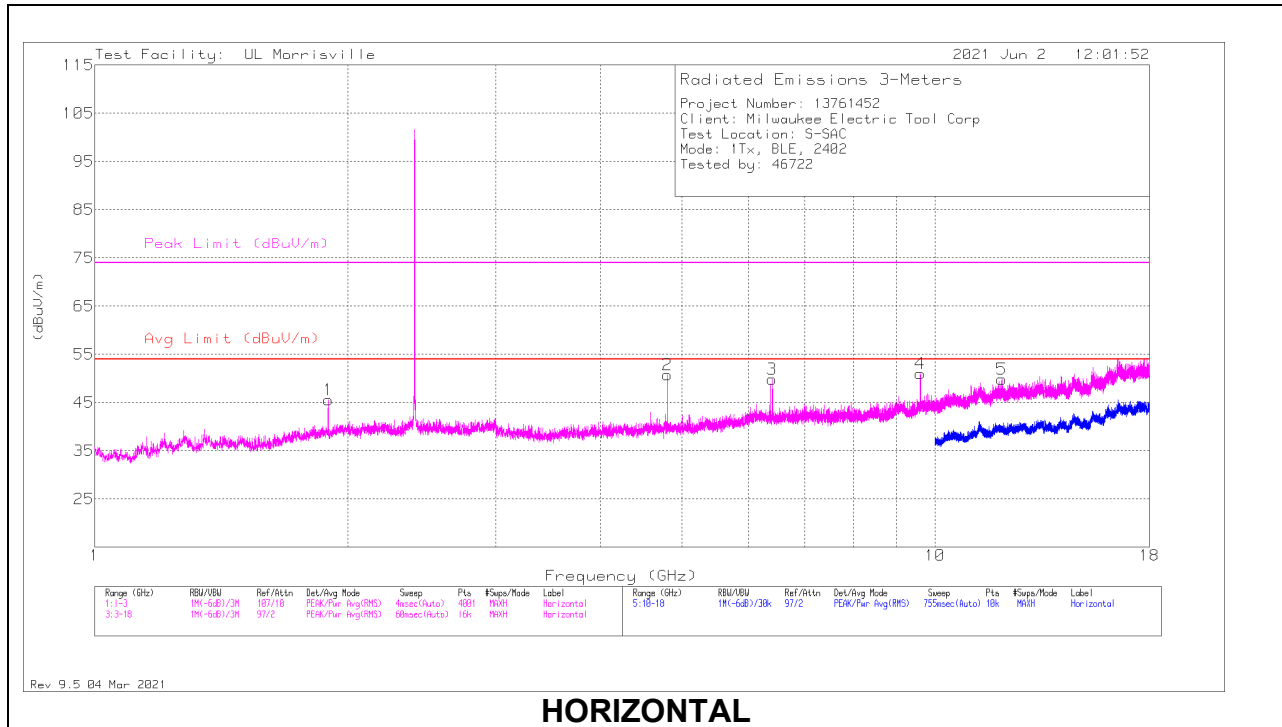


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	39.84	Pk	32.5	-24.4	0	47.94	-	-	74	-26.06	192	304	V
2	* ** 2.48421	40.35	Pk	32.5	-24.4	0	48.45	-	-	74	-25.55	192	304	V
3	* ** 2.48354	26.26	ADV	32.5	-24.4	1.36	35.72	54	-18.28	-	-	192	304	V
4	* ** 2.48384	26.22	ADV	32.5	-24.4	1.36	35.68	54	-18.32	-	-	192	304	V

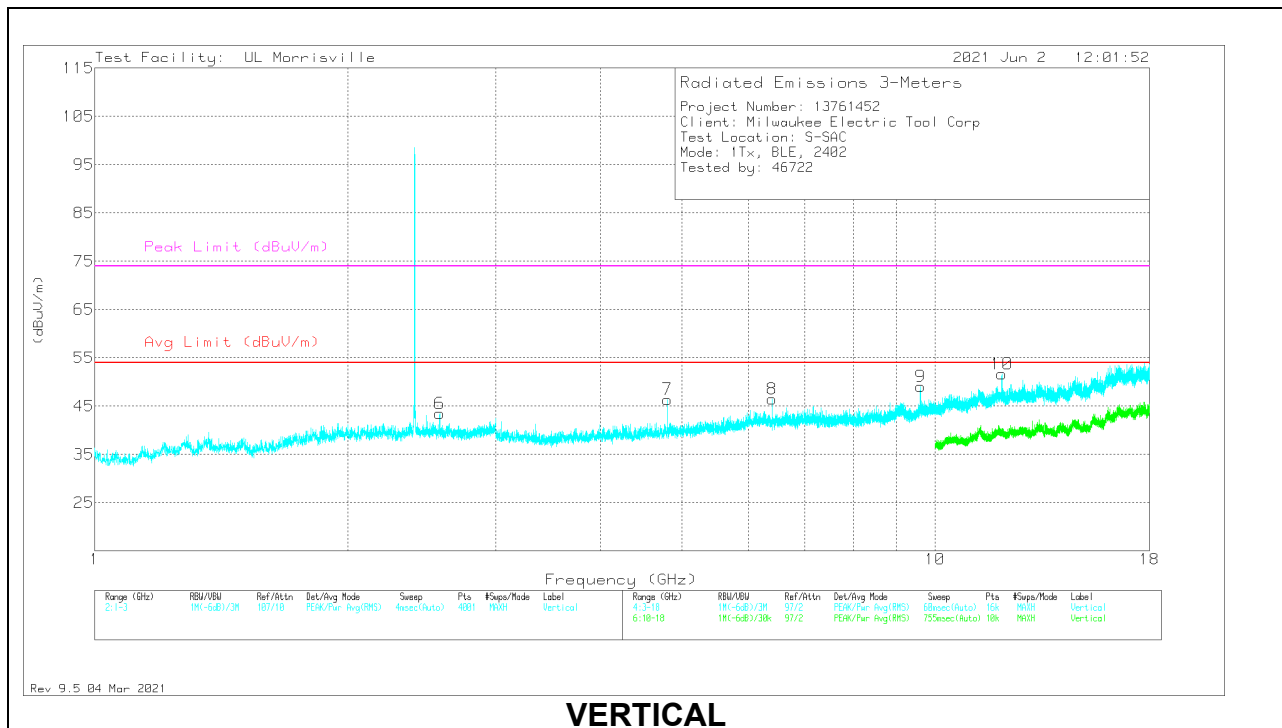
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector
 ADV - Linear Voltage Average

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (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	** 1.89729	41.89	PK2	30.9	-22.3	0	50.49	-	-	74	-23.51	80	389	H
	** 1.89702	20.99	ADV	30.9	-22.3	1.36	30.95	54	-23.05	-	-	80	389	H
6	** 2.57215	34.71	PK2	32.7	-25	0	42.41	-	-	74	-31.59	230	101	V
	** 2.57438	22.91	ADV	32.7	-25	1.36	31.97	54	-22.03	-	-	230	101	V
2	*** 4.80414	51.19	PK2	34.1	-30.9	0	54.39	-	-	74	-19.61	204	146	H
	*** 4.804	46.96	ADV	34.1	-30.9	1.36	51.52	54	-2.48	-	-	204	146	H
5	*** 12.01121	44.22	PK2	38.7	-24.1	0	58.82	-	-	74	-15.18	198	101	H
	*** 12.00928	36.61	ADV	38.7	-24.1	1.36	52.57	54	-1.43	-	-	198	101	H
7	*** 4.80424	48.89	PK2	34.1	-30.9	0	52.09	-	-	74	-21.91	180	271	V
	*** 4.80399	44.02	ADV	34.1	-30.9	1.36	48.58	54	-5.42	-	-	180	271	V
10	*** 12.01002	41.78	PK2	38.7	-24.1	0	56.38	-	-	74	-17.62	262	226	V
	*** 12.00932	32.73	ADV	38.7	-24.1	1.36	48.69	54	-5.31	-	-	262	226	V
3	6.405	42.8	Pk	35.5	-28.5	0	49.8	-	-	-	-	0-360	101	H
8	6.405	39.48	Pk	35.5	-28.5	0	46.48	-	-	-	-	0-360	101	V
4	9.6075	40.39	Pk	36.9	-26.3	0	50.99	-	-	-	-	0-360	101	H
9	9.60844	38.53	Pk	36.9	-26.3	0	49.13	-	-	-	-	0-360	200	V

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

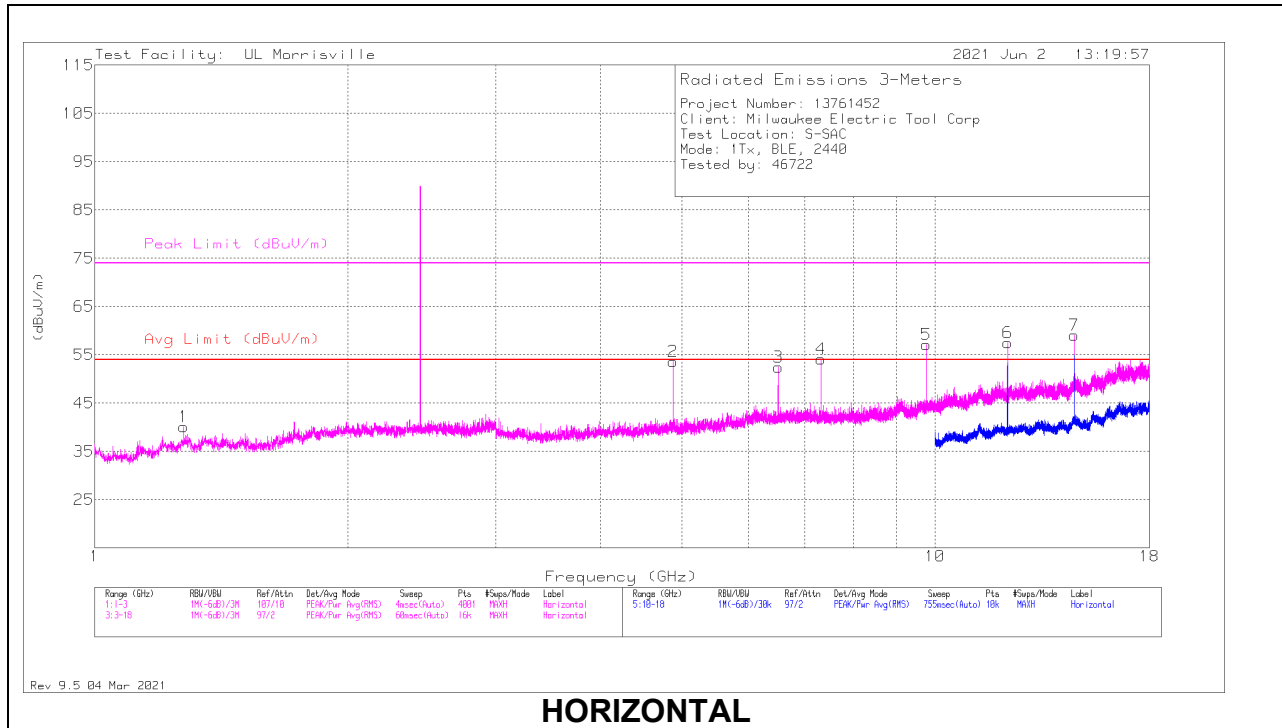
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

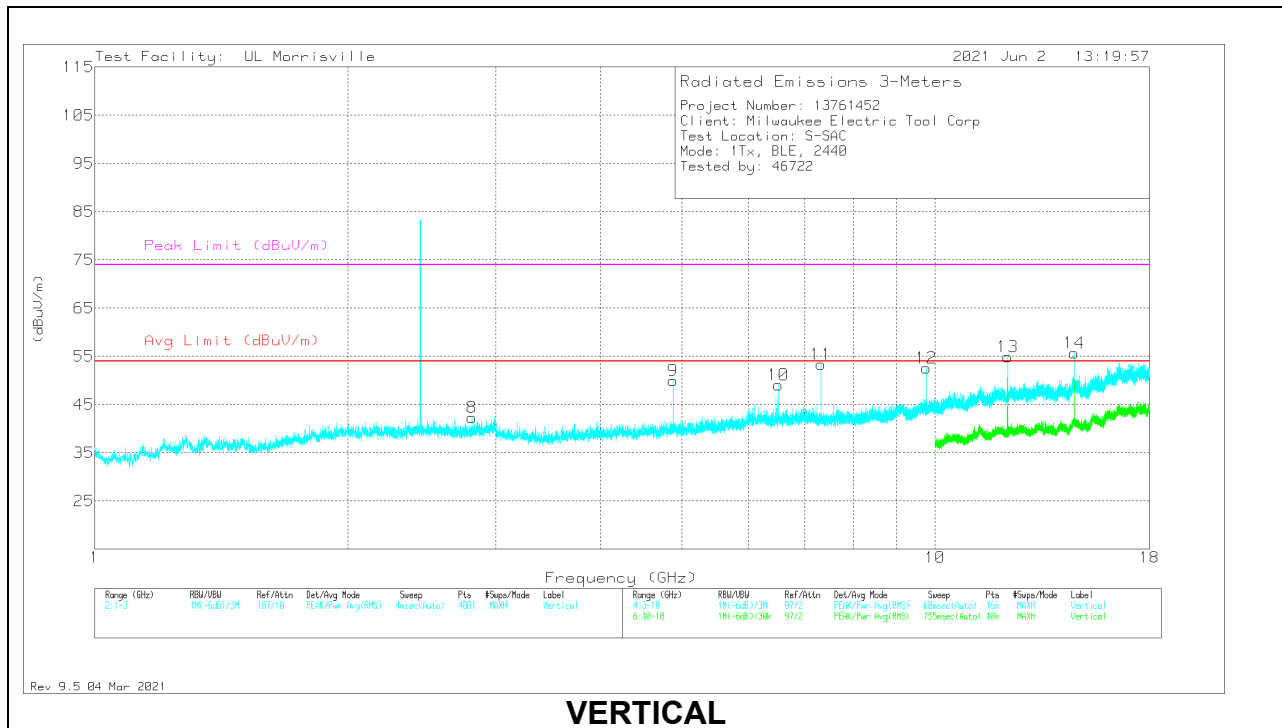
PK2 - Maximum Peak

ADV - Linear Voltage Average

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (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	* 1.27789	34.49	PK2	29.6	-23.2	0	40.89	-	-	74	-33.11	40	154	H
	* 1.27769	21.34	ADV	29.6	-23.2	1.36	27.74	54	-26.26	-	-	40	154	H
8	*** 2.80805	35.94	PK2	32.5	-25.9	0	42.54	-	-	74	-31.46	307	186	V
	*** 2.81134	23.01	ADV	32.6	-25.9	1.36	29.71	54	-24.29	-	-	307	186	V
2	*** 4.88028	51.92	PK2	34.2	-30.8	0	55.32	-	-	74	-18.68	202	107	H
	*** 4.87999	47.27	ADV	34.2	-30.8	1.36	50.67	54	-3.33	-	-	202	107	H
4	*** 7.31925	47.72	PK2	35.7	-27.4	0	56.02	-	-	74	-17.98	39	111	H
	*** 7.31996	41.61	ADV	35.7	-27.4	1.36	49.91	54	-4.09	-	-	39	111	H
6	*** 12.20112	46.1	PK2	38.8	-24.2	0	60.7	-	-	74	-13.3	197	107	H
	*** 12.2005	38.29	ADV	38.8	-24.2	1.36	52.89	54	-1.11	-	-	197	107	H
9	*** 4.88024	49.51	PK2	34.2	-30.8	0	52.91	-	-	74	-21.09	175	243	V
	*** 4.87999	44.49	ADV	34.2	-30.8	1.36	47.89	54	-6.11	-	-	175	243	V
11	*** 7.31999	47.72	PK2	35.7	-27.4	0	56.02	-	-	74	-17.98	89	104	V
	*** 7.32002	41.19	ADV	35.7	-27.4	1.36	49.49	54	-4.51	-	-	89	104	V
13	*** 12.20119	43.18	PK2	38.8	-24.2	0	57.78	-	-	74	-16.22	156	104	V
	*** 12.20059	35.12	ADV	38.8	-24.2	1.36	49.72	54	-4.28	-	-	156	104	V
3	6.50625	46.21	Pk	35.6	-29.4	0	52.41	-	-	-	-	0-360	101	H
10	6.50625	42.92	Pk	35.6	-29.4	0	49.12	-	-	-	-	0-360	200	V
5	9.76031	46.09	Pk	36.9	-25.9	0	57.09	-	-	-	-	0-360	101	H
12	9.76031	41.62	Pk	36.9	-25.9	0	52.62	-	-	-	-	0-360	101	V
7	14.64094	42.38	Pk	39.7	-23	0	59.08	-	-	-	-	0-360	101	H
14	14.64094	39.04	Pk	39.7	-23	0	55.74	-	-	-	-	0-360	101	V

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

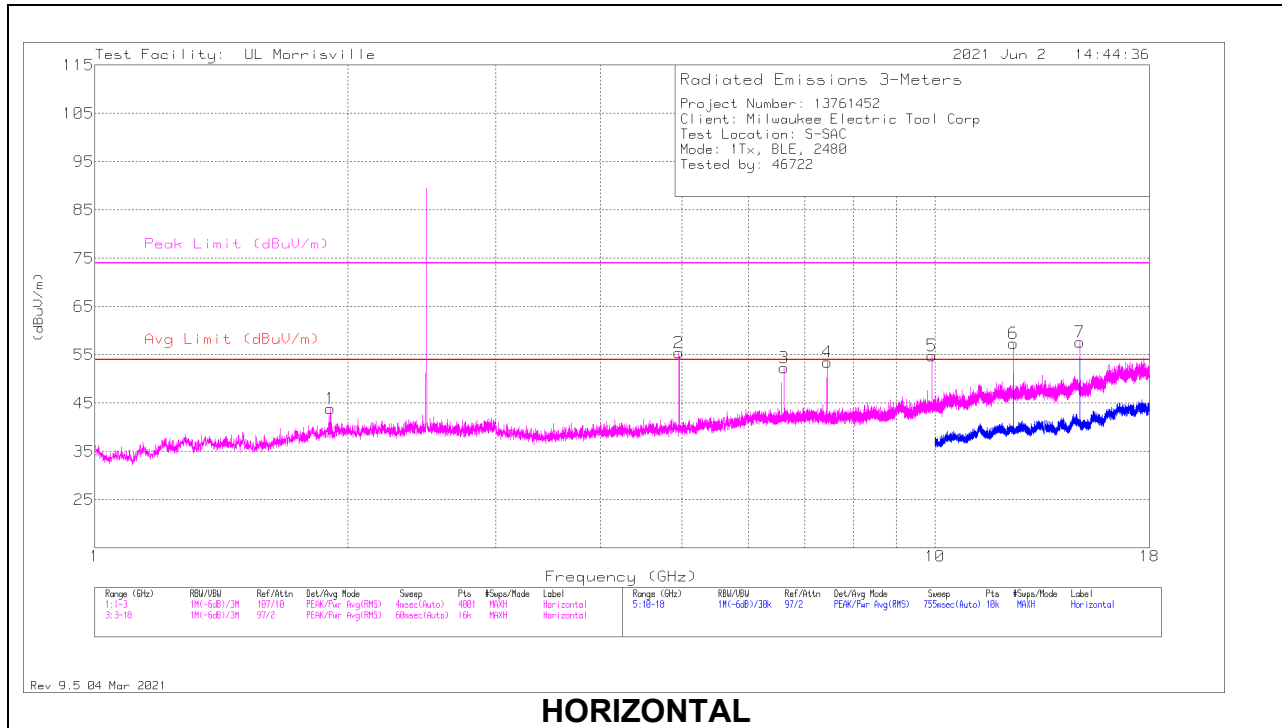
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

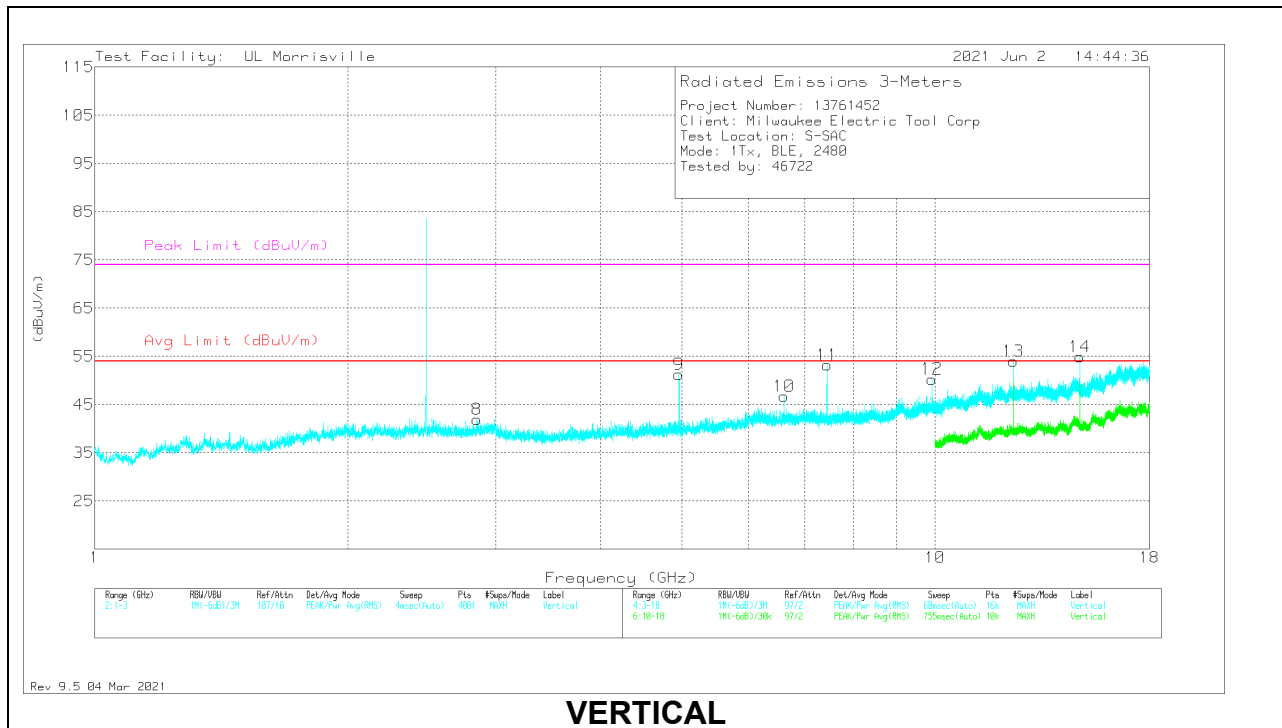
PK2 - Maximum Peak

ADV - Linear Voltage Average

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (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	** 1.90727	40.51	PK2	30.9	-22.4	0	49.01	-	-	74	-24.99	317	205	H
	** 1.90656	20.58	ADV	30.9	-22.4	1.36	30.44	54	-23.56	-	-	317	205	H
8	*** 2.85344	35.65	PK2	32.7	-25.9	0	42.45	-	-	74	-31.55	59	101	V
	*** 2.85286	23.52	ADV	32.7	-25.9	1.36	31.68	54	-22.32	-	-	59	101	V
2	*** 4.96015	51.38	PK2	34	-31	0	54.38	-	-	74	-19.62	338	113	H
	*** 4.96005	46.85	ADV	34	-31	1.36	51.21	54	-2.79	-	-	338	113	H
4	*** 7.44045	44.43	PK2	35.6	-27.7	0	52.33	-	-	74	-21.67	275	110	H
	*** 7.44009	37.32	ADV	35.6	-27.7	1.36	46.58	54	-7.42	-	-	275	110	H
6	*** 12.40052	37.72	PK2	38.8	-24.4	0	52.12	-	-	74	-21.88	208	105	H
	*** 12.39922	27.32	ADV	38.8	-24.4	1.36	43.18	54	-10.82	-	-	208	105	H
9	*** 4.95987	46.08	PK2	34	-31	0	49.08	-	-	74	-24.92	136	101	V
	*** 4.96001	39.82	ADV	34	-31	1.36	44.18	54	-9.82	-	-	136	101	V
11	*** 7.43982	41.52	PK2	35.6	-27.7	0	49.42	-	-	74	-24.58	91	237	V
	*** 7.43998	32.84	ADV	35.6	-27.7	1.36	42.1	54	-11.9	-	-	91	237	V
13	*** 12.40113	36	PK2	38.8	-24.4	0	50.4	-	-	74	-23.6	72	346	V
	*** 12.40062	24.26	ADV	38.8	-24.4	1.36	40.02	54	-13.98	-	-	72	346	V
3	6.61313	44.49	Pk	35.8	-28	0	52.29	-	-	-	-	0-360	101	H
10	6.61313	38.9	Pk	35.8	-28	0	46.7	-	-	-	-	0-360	200	V
5	9.91969	43.75	Pk	36.9	-25.8	0	54.85	-	-	-	-	0-360	101	H
12	9.91969	39.21	Pk	36.9	-25.8	0	50.31	-	-	-	-	0-360	101	V
7	14.87906	41.12	Pk	39.7	-23.2	0	57.62	-	-	-	-	0-360	101	H
14	14.87906	38.38	Pk	39.7	-23.2	0	54.88	-	-	-	-	0-360	101	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

PK2 - Maximum Peak

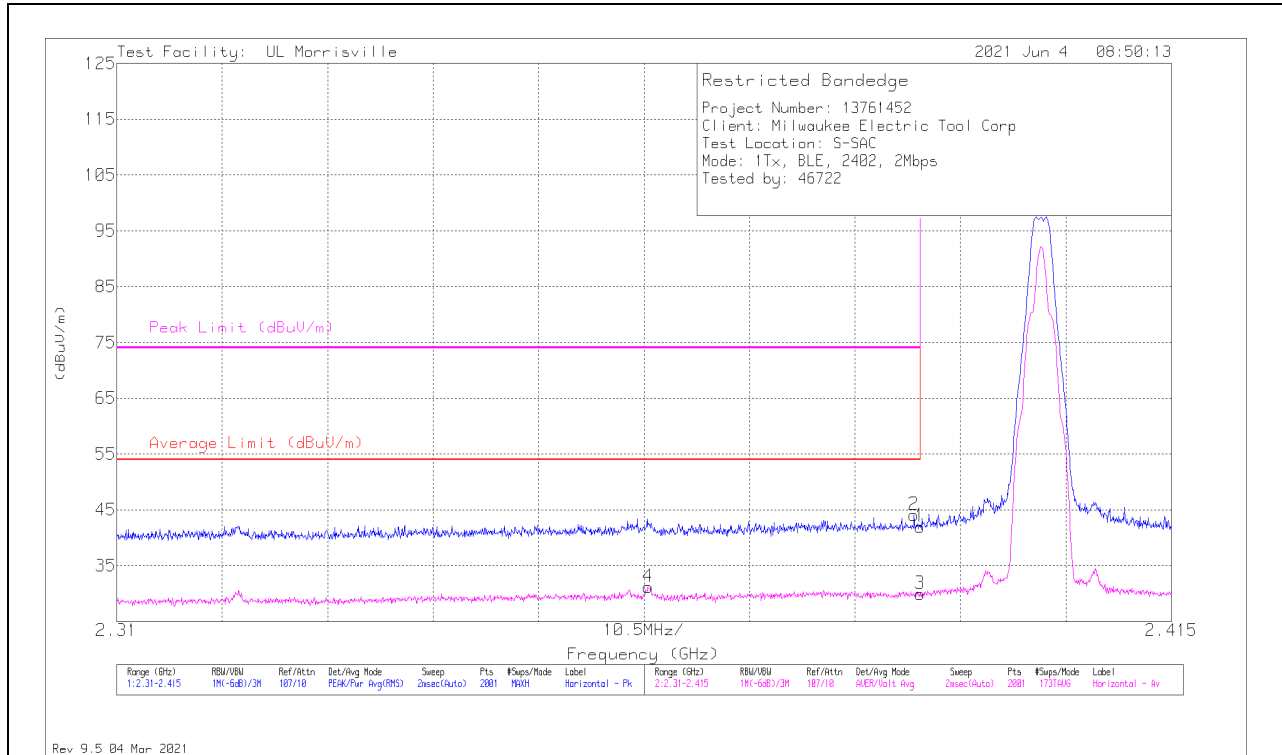
ADV - Linear Voltage Average

10.2.2. BLE (2Mbps)

Antenna 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	34.13	Pk	31.9	-24	0	42.03	-	-	74	-31.97	118	185	H
2	* ** 2.38938	36.22	Pk	31.9	-24	0	44.12	-	-	74	-29.88	118	185	H
3	* ** 2.38996	17.23	ADV	31.9	-24	4.79	29.92	54	-24.08	-	-	118	185	H
4	* ** 2.36292	18.1	ADV	32.2	-23.9	4.79	31.19	54	-22.81	-	-	118	185	H

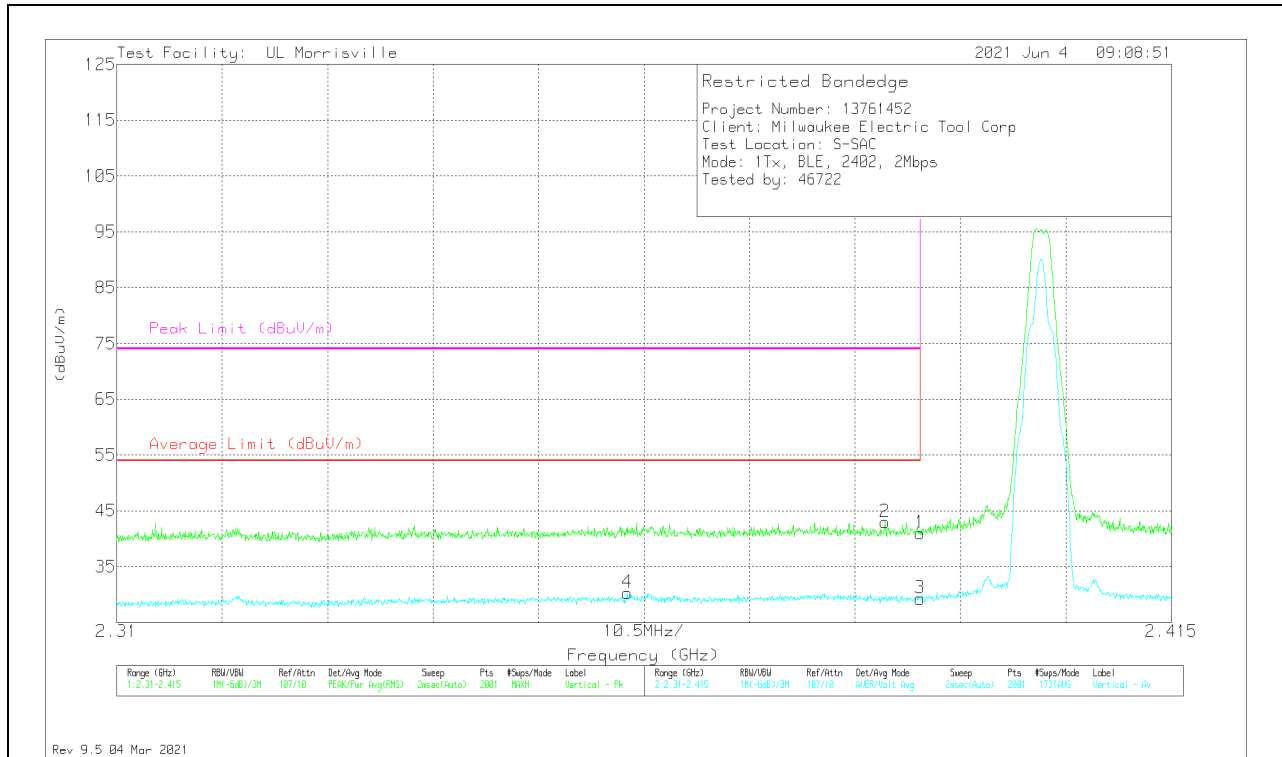
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	33.06	Pk	31.9	-24	0	40.96	-	-	74	-33.04	6	388	V
2	* ** 2.38649	34.87	Pk	32.1	-24	0	42.97	-	-	74	-31.03	6	388	V
3	* ** 2.38996	16.56	ADV	31.9	-24	4.79	29.25	54	-24.75	-	-	6	388	V
4	* ** 2.36082	17.17	ADV	32.2	-23.9	4.79	30.26	54	-23.74	-	-	6	388	V

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

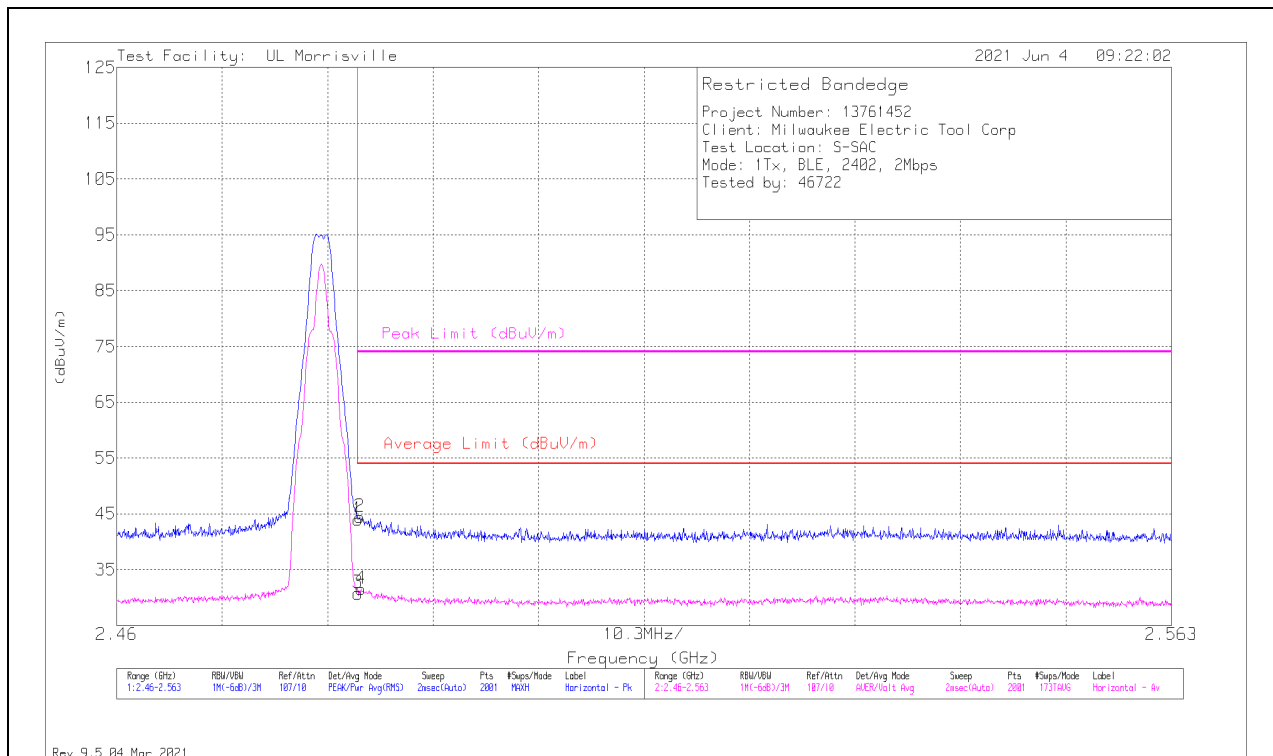
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	35.83	Pk	32.5	-24.4	0	43.93	-	-	74	-30.07	97	112	H
2	* ** 2.48374	36.32	Pk	32.5	-24.4	0	44.42	-	-	74	-29.58	97	112	H
3	* ** 2.48354	17.85	ADV	32.5	-24.4	4.79	30.74	54	-23.26	-	-	97	112	H
4	* ** 2.48384	18.62	ADV	32.5	-24.4	4.79	31.51	54	-22.49	-	-	97	112	H

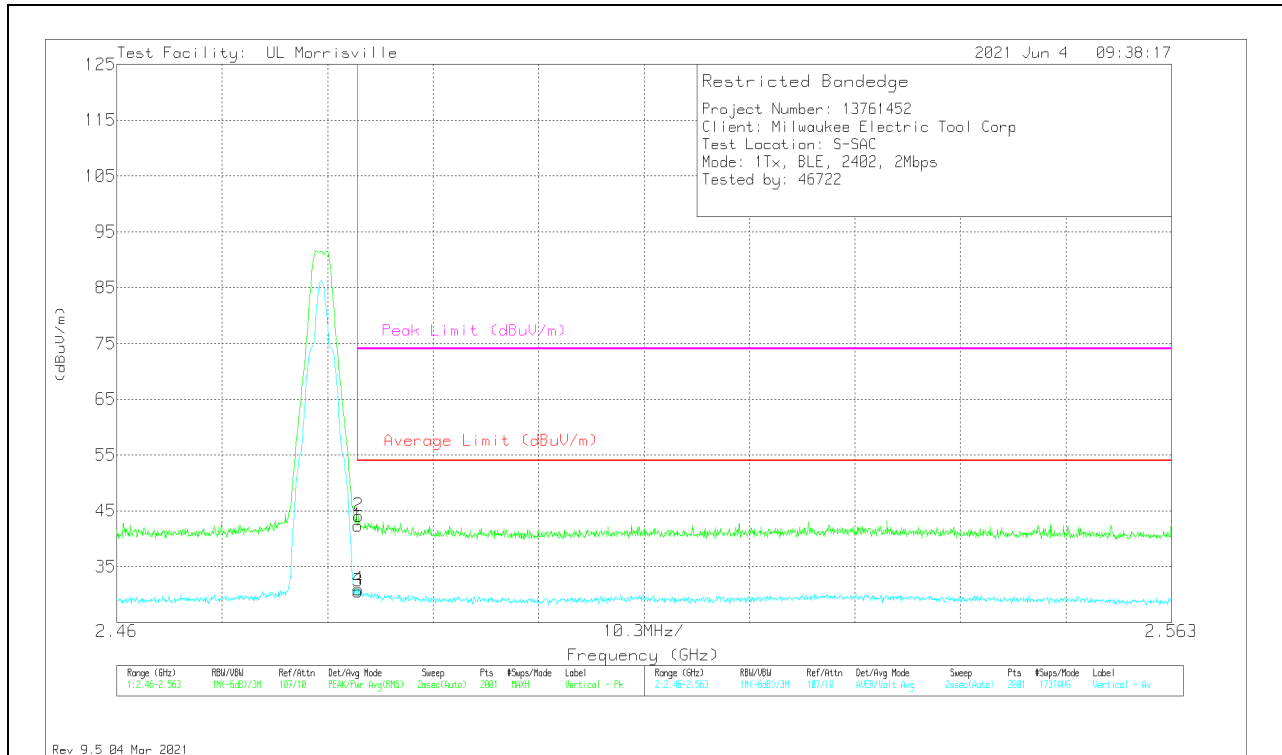
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

VERTICAL RESULT



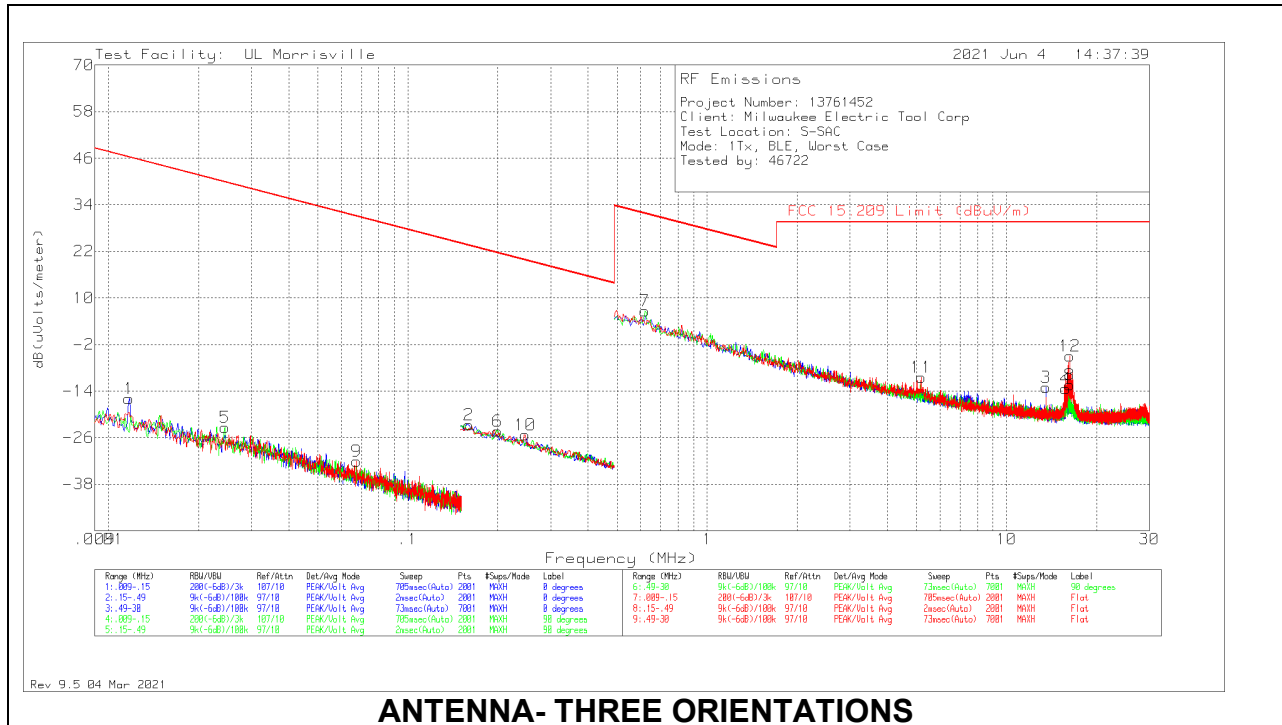
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	34.2	Pk	32.5	-24.4	0	42.3	-	-	74	-31.7	184	307	V
2	* ** 2.48364	36.01	Pk	32.5	-24.4	0	44.11	-	-	74	-29.89	184	307	V
3	* ** 2.48354	17.62	ADV	32.5	-24.4	4.79	30.51	54	-23.49	-	-	184	306	V
4	* ** 2.48359	17.99	ADV	32.5	-24.4	4.79	30.88	54	-23.12	-	-	184	306	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 ** - indicates frequency in Taiwan NCC LP0002 Restricted Band
 Pk - Peak detector
 ADV - Linear Voltage Average

10.3. WORST CASE BELOW 30MHZ

Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were $40 \cdot \log(\text{test distance} / \text{specification distance})$.

E-FIELD SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

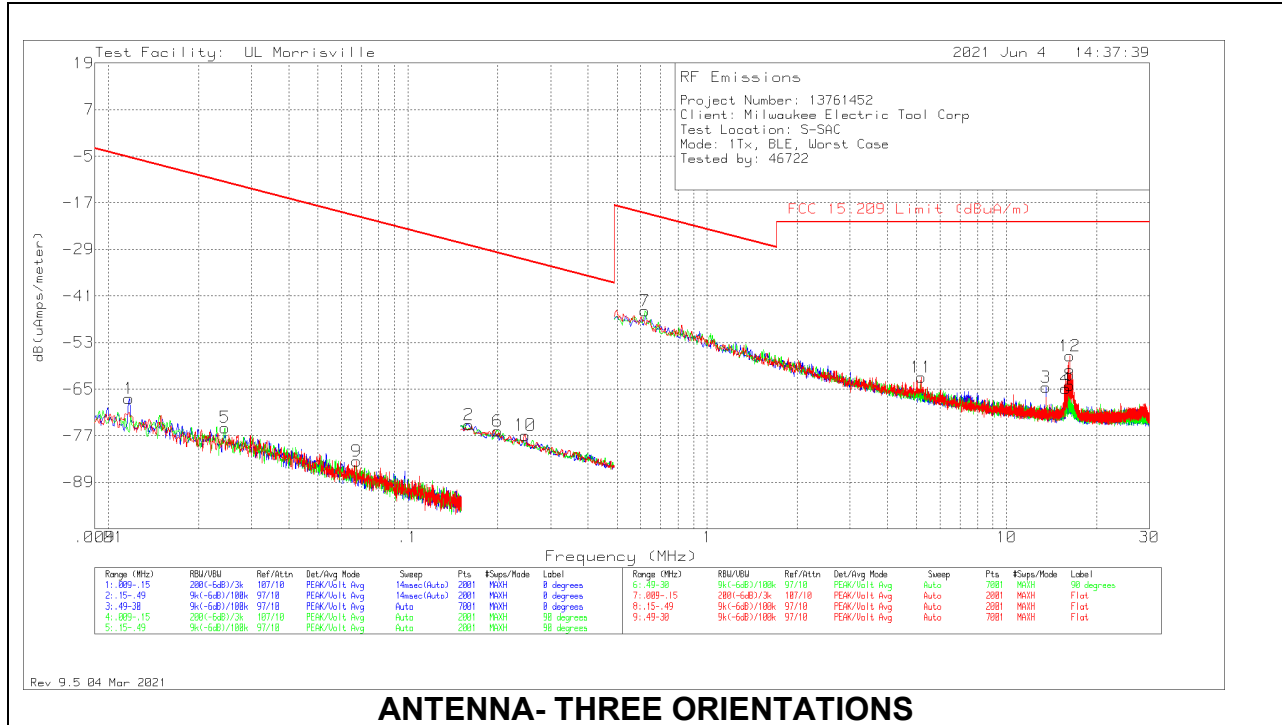


Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBUV)	Det	AT0079 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 Avg/Qp Limit (dBUV/m)	FCC 15.209 Pk Limit (dBUV/m)	Margin (dB)	Azimuth (Degs)	Antenna Face
1	.0117	46.74	Pk	17.2	.1	-80	-15.96	46.24	66.24	-62.2	0-360	On
2	.15986	46.35	Pk	10.8	.1	-80	-22.75	23.53	43.53	-46.28	0-360	On
3	13.5596	15.91	Pk	10.4	.7	-40	-12.99	29.54	-	-42.53	0-360	On
4	15.76035	15.57	Pk	10.3	.8	-40	-13.33	29.54	-	-42.87	0-360	On
5	.02448	42.96	Pk	13.5	.1	-80	-23.44	39.83	59.83	-63.27	0-360	Off
6	.19998	44.81	Pk	10.8	.1	-80	-24.29	21.58	41.58	-45.87	0-360	Off
7	.6207	35.58	Pk	10.8	.2	-40	6.58	31.75	-	-25.17	0-360	Off
8	16.26627	16.43	Pk	10.3	.8	-40	-12.47	29.54	-	-42.01	0-360	Off
9	.0675	36.48	Pk	11.3	.1	-80	-32.12	31.02	51.02	-63.14	0-360	Flat
10	.24639	43.72	Pk	10.8	.1	-80	-25.38	19.77	39.77	-45.15	0-360	Flat
11	5.17819	18.08	Pk	11	.4	-40	-10.52	29.54	-	-40.06	0-360	Flat
12	16.25784	23.99	Pk	10.3	.8	-40	-4.91	29.54	-	-34.45	0-360	Flat

Pk - Peak detector

H-FIELD SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



ANTENNA- THREE ORIENTATIONS

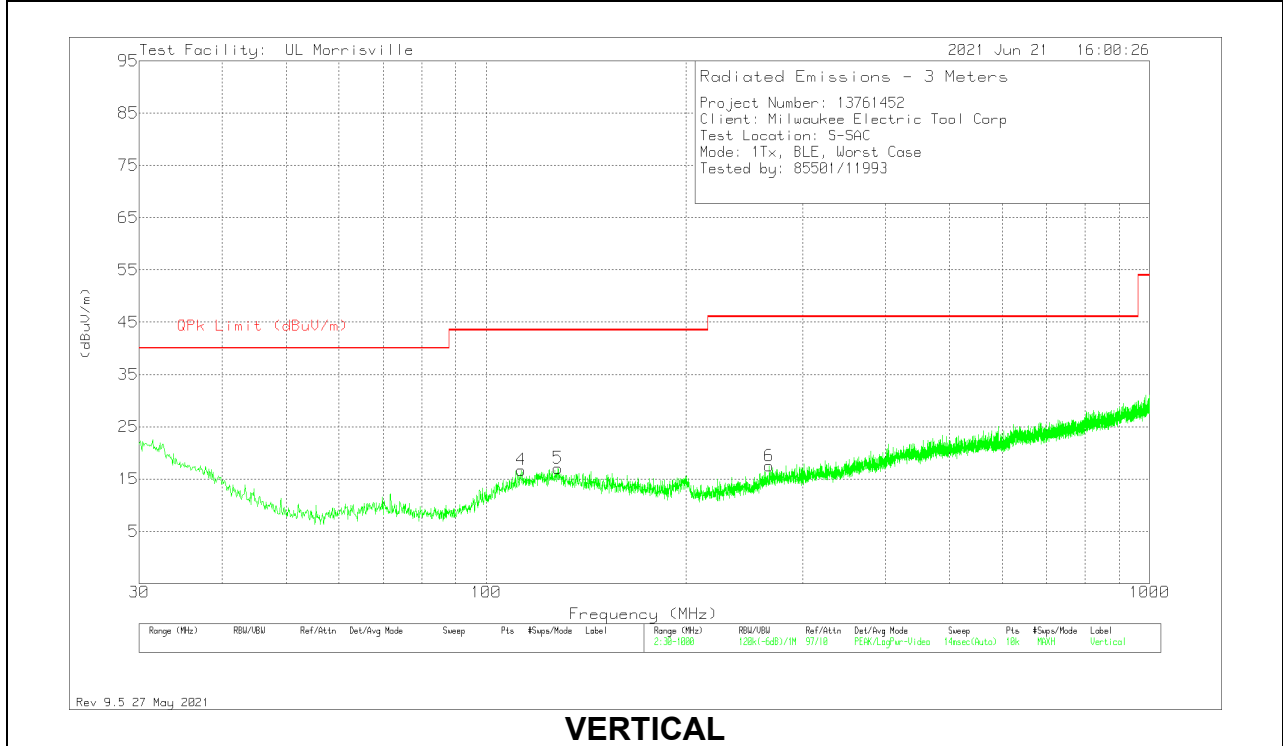
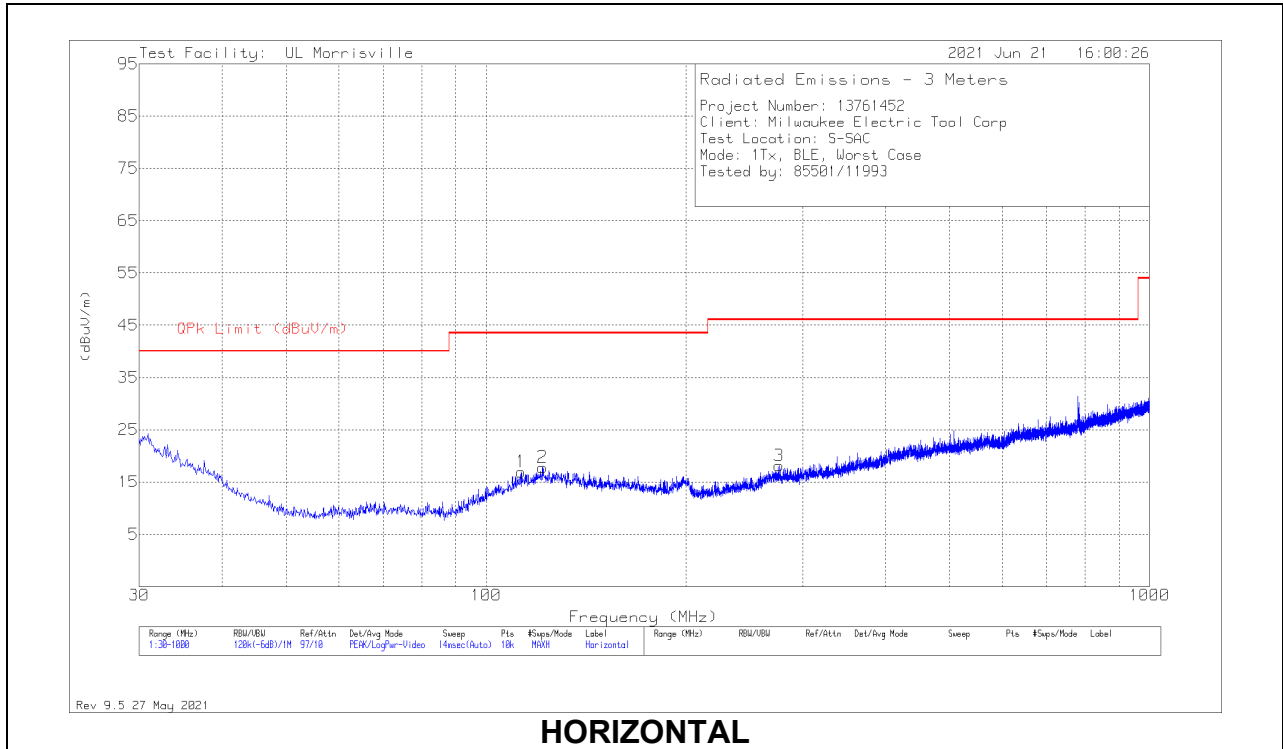
Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	FCC 15.209 Avg/Qp Limit (dBuA/m)	FCC 15.209 Peak Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Antenna Face
1	.0117	46.74	Pk	-34.3	.1	-80	-67.46	-5.26	14.74	-62.2	0-360	On
2	.15986	46.35	Pk	-40.7	.1	-80	-74.25	-27.97	-7.97	-46.28	0-360	On
3	13.5596	15.91	Pk	-41.1	.7	-40	-64.49	-21.96	-	-42.53	0-360	On
4	15.76035	15.57	Pk	-41.2	.8	-40	-64.83	-21.96	-	-42.87	0-360	On
5	.02448	42.96	Pk	-38	.1	-80	-74.94	-11.67	8.33	-63.27	0-360	Off
6	.19998	44.81	Pk	-40.7	.1	-80	-75.79	-29.92	-9.92	-45.87	0-360	Off
7	.6207	35.58	Pk	-40.7	.2	-40	-44.92	-19.75	-	-25.17	0-360	Off
8	16.26627	16.43	Pk	-41.2	.8	-40	-63.97	-21.96	-	-42.01	0-360	Off
9	.0675	36.48	Pk	-40.2	.1	-80	-83.62	-20.48	-0.48	-63.14	0-360	Flat
10	.24639	43.72	Pk	-40.7	.1	-80	-76.88	-31.73	-11.73	-45.15	0-360	Flat
11	5.17819	18.08	Pk	-40.5	.4	-40	-62.02	-21.96	-	-40.06	0-360	Flat
12	16.25784	23.99	Pk	-41.2	.8	-40	-56.41	-21.96	-	-34.45	0-360	Flat

Pk - Peak detector

10.4. WORST CASE BELOW 1 GHZ

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



Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 113.032	28.03	Pk	19.1	-30.2	16.93	43.52	-26.59	0-360	400	H
2	* ** 121.665	27.98	Pk	20	-30.2	17.78	43.52	-25.74	0-360	300	H
3	* ** 276.477	27.52	Pk	19.4	-28.8	18.12	46.02	-27.9	0-360	300	H
4	* ** 112.935	27.82	Pk	19.1	-30.2	16.72	43.52	-26.8	0-360	100	V
5	* ** 128.358	27.16	Pk	20	-30.1	17.06	43.52	-26.46	0-360	100	V
6	* ** 267.068	27.31	Pk	19.1	-28.9	17.51	46.02	-28.51	0-360	100	V

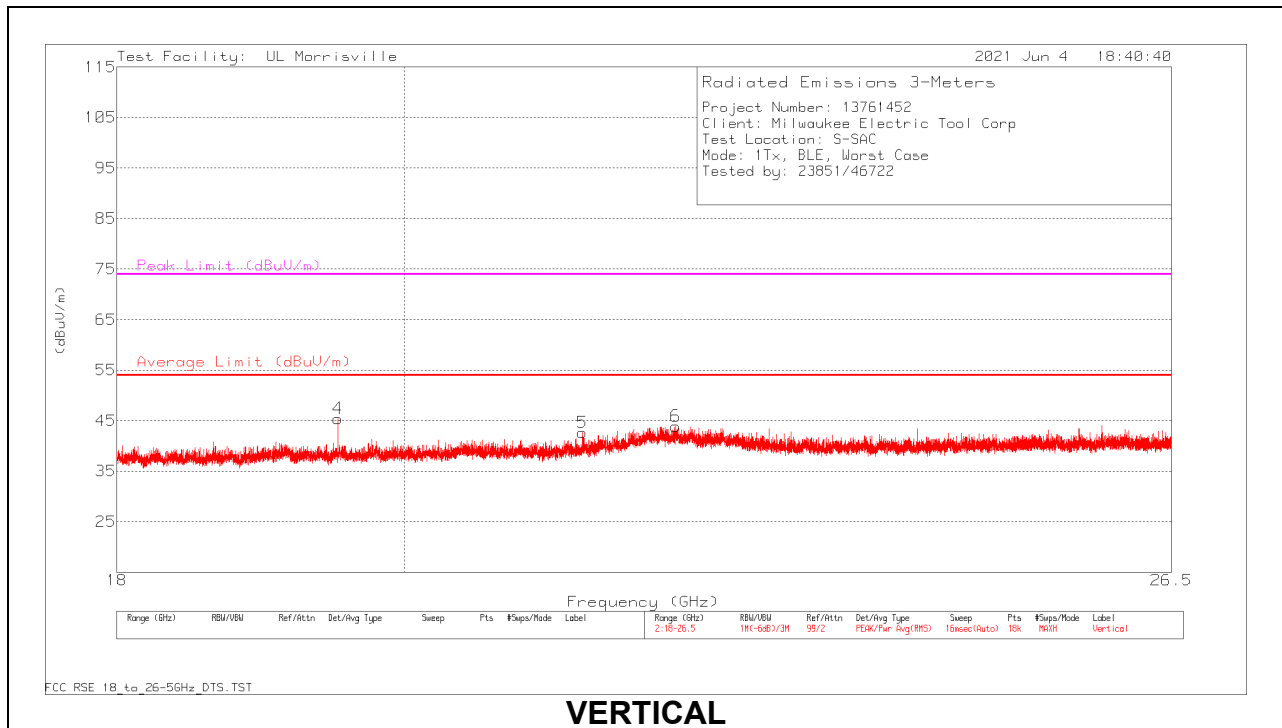
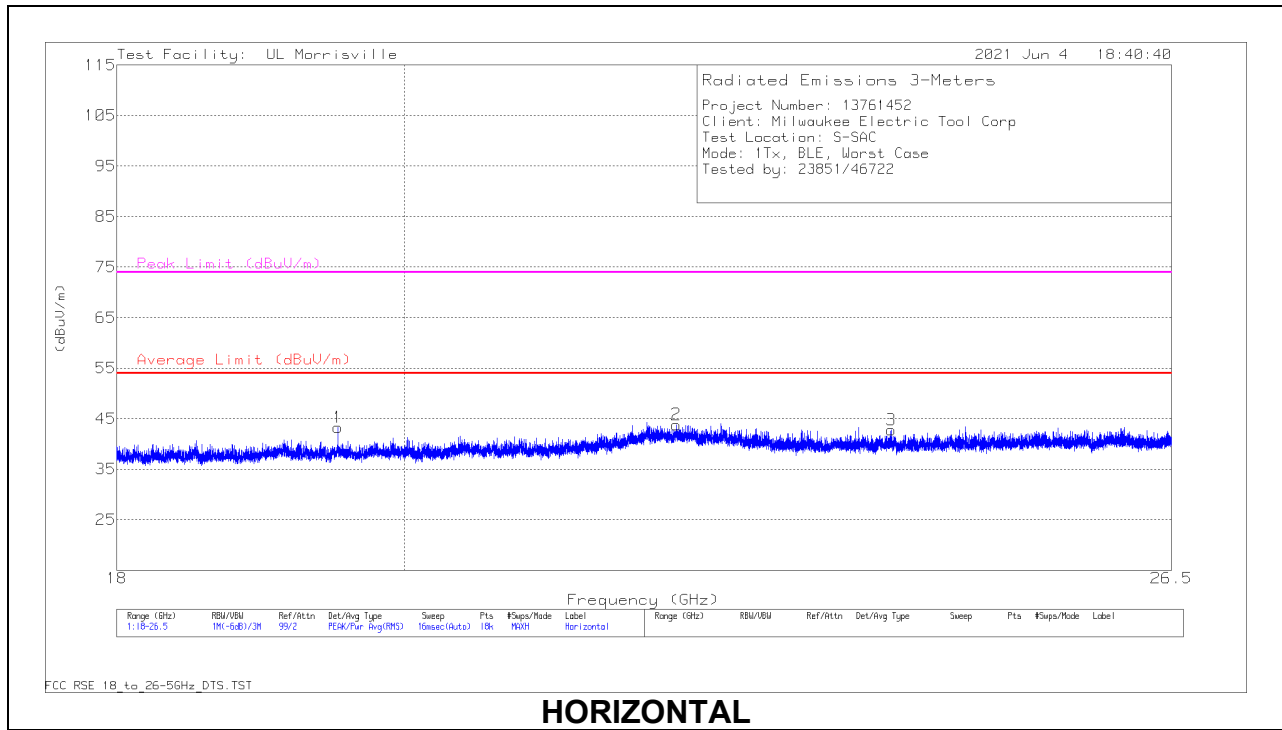
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

10.5. WORST CASE 18-26 GHZ

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



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0063 AF (dB/m)	Amp/Cbl (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 19.52017	48.74	Pk	33.5	-39	0	43.24	54	-10.76	74	-30.76	0-360	101	H
2	* ** 22.10006	46.23	Pk	36.7	-39.1	0	43.83	54	-10.17	74	-30.17	0-360	199	H
3	* ** 23.91207	46.38	Pk	34.9	-38.5	0	42.78	54	-11.22	74	-31.22	0-360	199	H
4	* ** 19.51969	50.94	Pk	33.5	-39	0	45.44	54	-8.56	74	-28.56	0-360	101	V
5	* ** 21.3506	47.4	Pk	34.6	-39.3	0	42.7	54	-11.3	74	-31.3	0-360	150	V
6	* ** 22.09345	46.35	Pk	36.8	-39.2	0	43.95	54	-10.05	74	-30.05	0-360	200	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

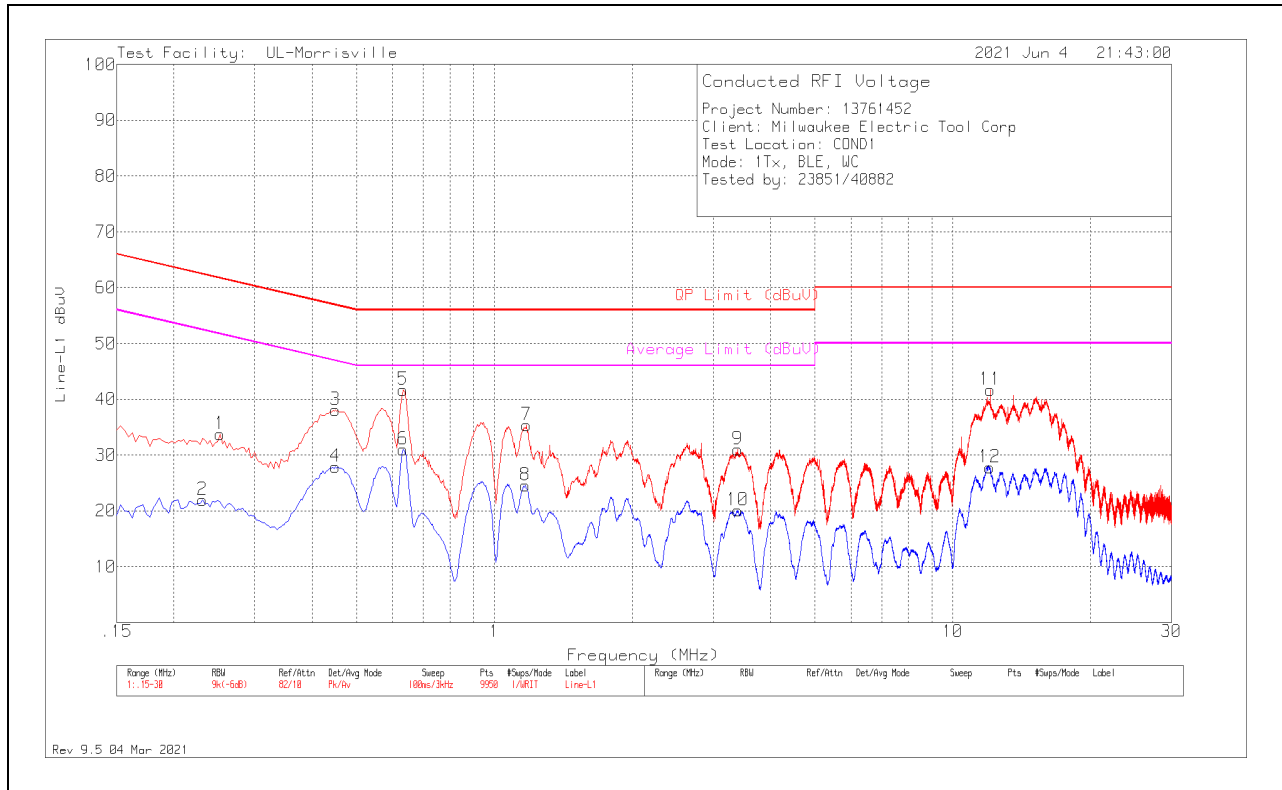
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

RESULTS

11.1. AC Power Line Norm

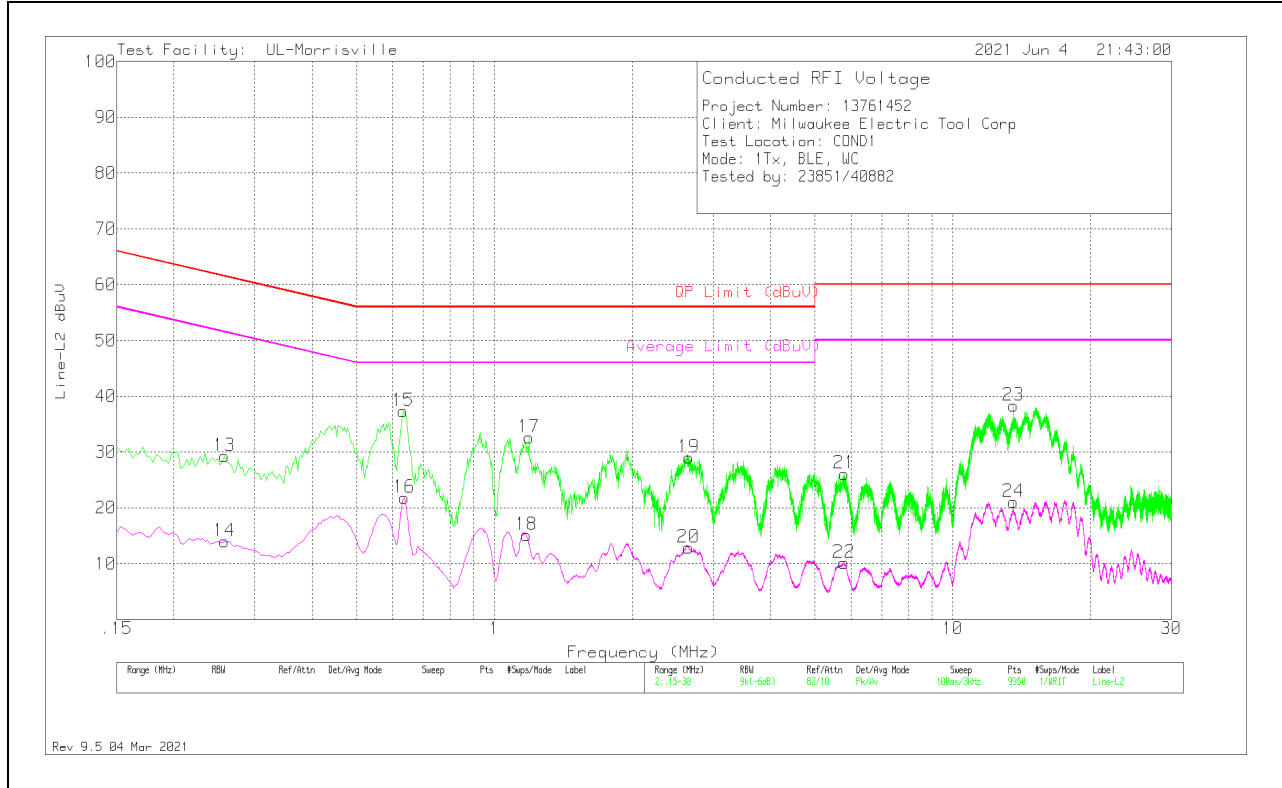
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
2	.231	12.04	Av	.1	9.8	21.94	-	-	52.41	-30.47
1	.252	23.82	Pk	.1	9.8	33.72	61.69	-27.97	-	-
3	.45	28.17	Pk	.1	9.8	38.07	56.88	-18.81	-	-
4	.45	17.98	Av	.1	9.8	27.88	-	-	46.88	-19
5	.633	31.88	Pk	0	9.8	41.68	56	-14.32	-	-
6	.633	21.16	Av	0	9.8	30.96	-	-	46	-15.04
8	1.167	14.75	Av	0	9.8	24.55	-	-	46	-21.45
7	1.176	25.57	Pk	0	9.8	35.37	56	-20.63	-	-
9	3.393	21.15	Pk	0	9.9	31.05	56	-24.95	-	-
10	3.393	10.12	Av	0	9.9	20.02	-	-	46	-25.98
12	12.024	17.64	Av	.1	10	27.74	-	-	50	-22.26
11	12.066	31.62	Pk	.1	10	41.72	60	-18.28	-	-

Pk - Peak detector
 Av - Average detector

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.258	19.4	Pk	.1	9.8	29.3	61.5	-32.2	-	-
14	.258	4.15	Av	.1	9.8	14.05	-	-	51.5	-37.45
15	.633	27.51	Pk	0	9.8	37.31	56	-18.69	-	-
16	.636	11.99	Av	0	9.8	21.79	-	-	46	-24.21
18	1.176	5.26	Av	0	9.8	15.06	-	-	46	-30.94
17	1.191	22.79	Pk	0	9.8	32.59	56	-23.41	-	-
20	2.652	3.1	Av	0	9.8	12.9	-	-	46	-33.1
19	2.658	19.22	Pk	0	9.8	29.02	56	-26.98	-	-
22	5.79	.17	Av	.1	9.9	10.17	-	-	50	-39.83
21	5.796	16.1	Pk	.1	9.9	26.1	60	-33.9	-	-
23	13.56	28.08	Pk	.1	10.1	38.28	60	-21.72	-	-
24	13.56	10.85	Av	.1	10.1	21.05	-	-	50	-28.95

Pk - Peak detector
 Av - Average detector

12. SETUP PHOTOS

Please refer to R13761452-EP1 for setup photos

END OF TEST REPORT