TEST REPORT

Report Number : R13752847-E1

Applicant	:	Dynetics 1002 Explorer Boulevard Huntsville, AL 35806
Model	:	4120L
FCC ID	:	QFS001-10100192
EUT Description	:	Ground Radar
Test Standard(s)	:	FCC CFR47 PART 90.103

Date of Issue:
2021-09-27

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 USA
Tel: (919) 549-1400

ACCREDITED
CERT #0751.06

REVISION HISTORY

Ver.	Issue Date	Revisions	Revised By
1	2021-09-22	Initial Release	Mike Antola
2	2021-09-27	Updated antenna gain and FCC ID	

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Dynetics
1002 Explorer Boulevard
Huntsville, AL 35806-2806

EUT DESCRIPTION: Ground Radar

MODEL: 4120L

SERIAL NUMBER: 1781

SAMPLE RECEIVE DATE: 2021-06-14

DATE TESTED: 2021-07-15 to 2021-07-21

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
47 CFR Part 90.103	Compliant

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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.

Approved & Released
For UL LLC by:

Dan Coronia
Operations Leader
UL – Consumer Technology Division

Prepared By:

Mike Antola
Staff Engineer
UL – Consumer Technology Division

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, 47 CFR Part 90 and ANSI C63.26-2015.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Perimeter Park Drive, Suite B, Morrisville, NC 27560.

UL LLC is accredited 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
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	703469
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. 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.

4.2. 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.)

4.3. 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
Antenna Port Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	0.57%

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

4.4. 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 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 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 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a wide-band ground radar used to monitor a specific area.

5.2. MAXIMUM OUTPUT POWER

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

Channel	Mode 1 Peak power (dBm)	Mode 2 Peak Power (dBm)	Mode 3 Peak Power (dBm)
Low Channel	42.53	42.43	42.17
Middle Channel	42.90	42.83	42.59
High Channel	42.81	42.54	42.29

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna type is a patch array antenna. The maximum antenna gain is 12 dBi. The antenna connector type is SMA.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was revision 136030507.

The EUT software installed during testing was revision 4120L-448.

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT operates in three specific modes as follows: Mode 1, Mode 2, and Mode 3. All modes and three channels (low, middle, high) were tested during antenna-port measurements.

All modes were tested during radiated spurious emissions testing. The low, middle, and high channels were evaluated in the 1-18GHz range, while the highest-power channel was evaluated in the other ranges of interest.

Radiated >18GHz is intended to cover both radiated and conducted emissions.

The device is intended to operate in only one orientation and was thus testing in the device's intended orientation.

The operating frequencies of the EUT are as follows:

Center Frequencies (MHz)	Mode	Channel
3023.4375	1,2,3	Low
3039.0625	1,2,3	Mid
3070.3125	1,2,3	High

Due to the high power of the device and measurement equipment limitations the antenna port was terminated for emissions in ranges 9kHz – 18GHz. Testing above 18GHz was performed with the antenna.

5.6. DESCRIPTION OF TEST SETUP

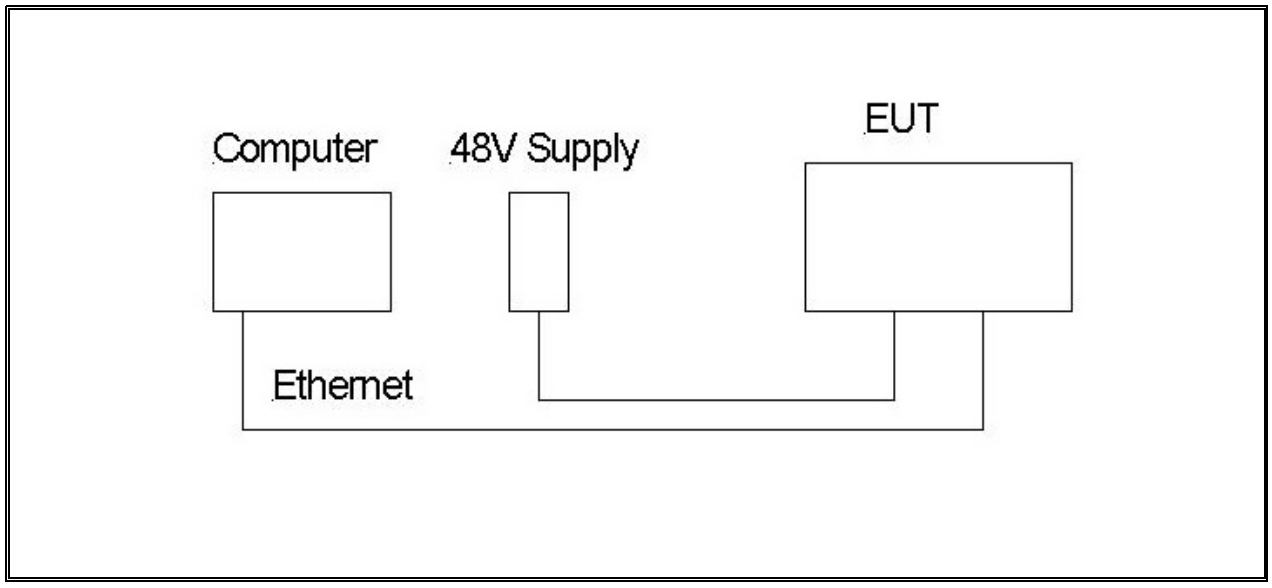
SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Dell	E6440	CY9BM32	-
Attenuator	Pasternack	1829	PE7214-30	-
Splitter	Mini-Circuits	ZFSC-2-372-S+	SQU30301801S	-
Splitter	Mini-Circuits	ZFSC-2-372-S+	SUU77201349S	-
Filter	K&L Microwave	6FV30-3200/U100-0/0	1	-
Filter	K&L Microwave	6FV30-3200/U100-0/0	2	-
Power Supply	Omron	S8VKG 48048	NA	-

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	SMA	1	SMA	-	>3m	Antenna port
2	Mil Spec Weatherproof	1	Circular Milspec	-	<3m	Power and Communication

SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment were 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.
	Conducted Room 1				
SA0027	Spectrum Analyzer	Keysight Technologies	N9030A	2021-06-25	2022-06-25
SA0026	Spectrum Analyzer	Keysight Technologies	N9030A	2020-07-16	2021-07-16
207726	Temp/Humid Chamber	Thermotron	SM-32-8200	2021-01-04	2022-01-04
HI0094	Environmental Meter	Fisher Scientific	06-662-4	2020-01-21	2022-01-21
SOFTEMI	Antenna Port Software	UL	Version 2021.05.28	NA	NA

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	30-1000 MHz				
206210	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2021-03-11	2022-03-11
	1-18 GHz				
206211	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2021-03-11	2022-03-11
	Gain-Loss Chains				
C4-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2021-05-07	2022-05-07
C4-SAC03	Gain-loss string: 1-18GHz	Various	Various	2021-05-07	2022-05-07
	Receiver & Software				
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-09	2022-03-09
SOFTEMI	EMI Software	UL	Version 9.5 (27 May 2021)		
	Additional Equipment used				
s/n 200037635	Environmental Meter	Fisher Scientific	06-662-4	2020-01-21	2022-01-21
LPF008	DC-1000MHz low-pass filter	Pasternack	PE8720	2021-05-24	2022-05-24

Note: All testing completed prior to equipment calibration expiration

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

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
AT0059	Active Loop Antenna	EMCO	6502	2020-08-06	2021-08-06
	18-40 GHz				
AT0063	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2020-10-30	2021-10-30
AT0061	Horn Antenna, 26-40GHz	ARA	MWH-2640/B	2020-10-30	2021-10-30
	Gain-Loss Chains				
N-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2020-07-29	2021-07-29
N-SAC04	Gain-loss string: 18-40GHz	Various	Various	2020-07-31	2021-07-31
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-30	2022-03-30
SOFTEMI	EMI Software	UL	Version 9.5 (24 Jun 2021)		
	Additional Equipment used				
s/n 181474341	Environmental Meter	Fisher Scientific	15-077-963	2020-08-06	2021-08-06

7. RF POWER OUTPUT

REQUIREMENT

§2.1046 Measurements required: RF power output.

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

§90.205 Output Power.
(r) All other frequency bands. Requested transmitter power will be considered and authorized on a case by case basis.

TEST PROCEDURE

The transmitter output was connected to the input of Spectrum Analyzer via calibrated coaxial cable and attenuator.

The output power was measured with the spectrum analyzer at the low, middle and high channel for each mode.

- Set the spectrum analyzer span wide enough or greater than the modulated signal BW.
- Set a spectrum analyzer at peak detection mode with VBW ≥ RBW. The RBW was set to largest available (8MHz). It is less then overall bandwidth of individual channel but is larger than bandwidth of individual pulse within a channel.
- Set a marker to point the corresponding peak value.

Note: 8MHz RBW is adequate for a pulse width of 2048ns (1/T=488.3kHz)

TABULAR RESULTS

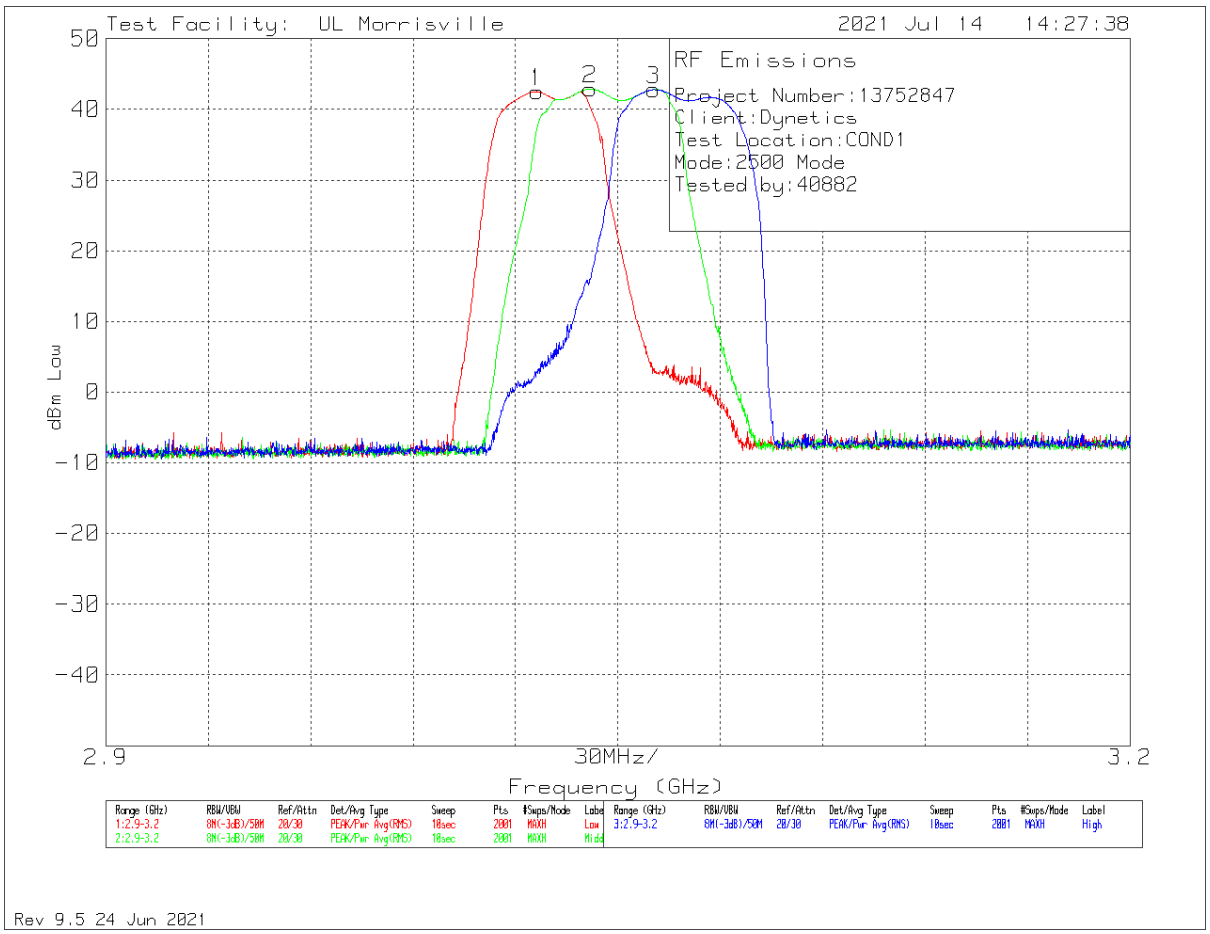
Channel	Mode 1 Peak power (dBm)	Mode 2 Peak Power (dBm)	Mode 3 Peak Power (dBm)
Low Channel	42.53	42.43	42.17
Middle Channel	42.90	42.83	42.59
High Channel	42.81	42.54	42.29

***** The maximum power was derived from exported numeric trace data.

Date: 2021-07-15
Location: Conducted 1
Tested by: 40882

RESULTS

Mode1 – Low/Mid/High Channel Plot

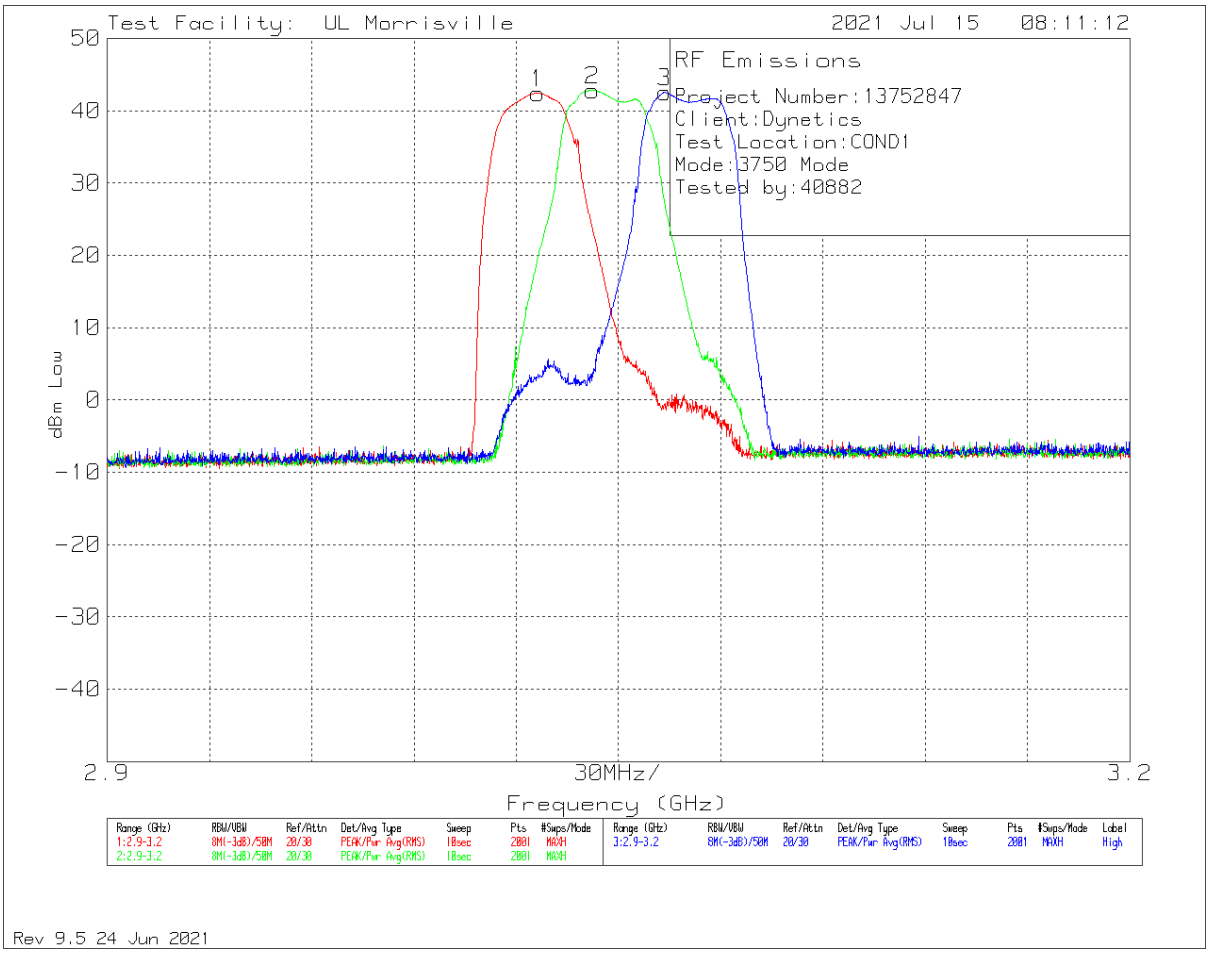


Mode 1 Data

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm
1	3.0263	11.13	Pk	31	.4	42.53
2	3.04183	11.6	Pk	30.9	.4	42.9
3	3.0605	11.51	Pk	30.9	.4	42.81

Pk - Peak detector

Mode 2 – Low/Mid/High Channel Plot

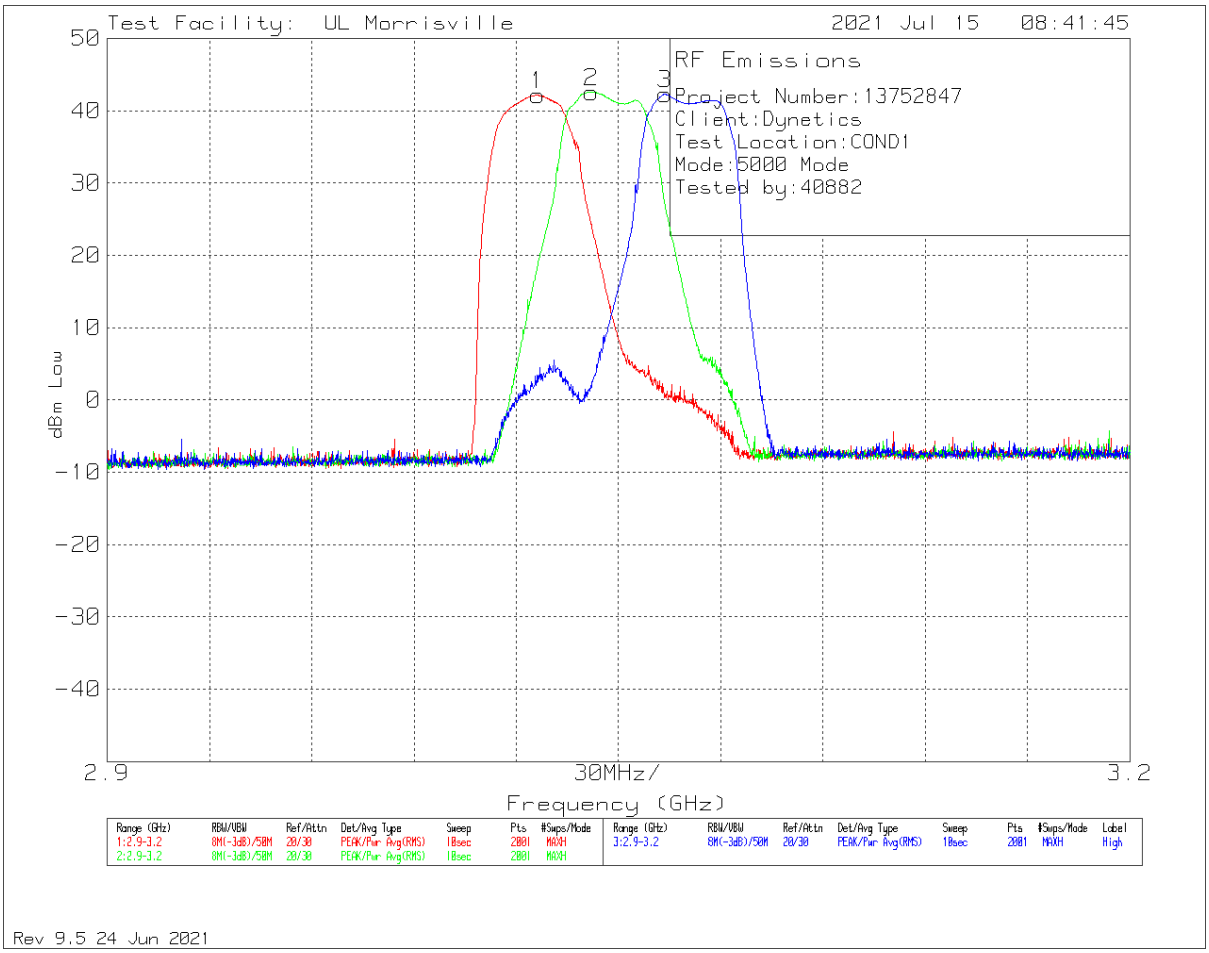


Mode 2 Data

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm
1	3.0263	11.03	Pk	31	.4	42.43
2	3.04235	11.53	Pk	30.9	.4	42.83
3	3.06358	11.14	Pk	31	.4	42.54

Pk - Peak detector

Mode 3 – Low/Mid/High Channel Plot



Mode 3 Data

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm
1	3.0263	10.77	Pk	31	.4	42.17
2	3.04205	11.29	Pk	30.9	.4	42.59
3	3.06365	10.89	Pk	31	.4	42.29

Pk - Peak detector

8. EMISSIONS TEST RESULTS

8.1. OCCUPIED BANDWIDTH

RULE PART(S)

§2.105 Measurements required: Occupied bandwidth.

§90.207 Types of emissions.
(k) For radiolocation operations as may be authorized in accordance with subpart F, unless otherwise provided for any type of emission may be authorized upon a satisfactory showing of need.

§90.209 Bandwidth Limitation.
Above 2500 MHz:
[2]Bandwidths for radiolocation stations in the 420-450 MHz band and for stations operating in bands subject to this footnote will be reviewed and authorized on a case-by-case basis.

LIMITS

For reporting purposes only.

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band.

MODES TESTED

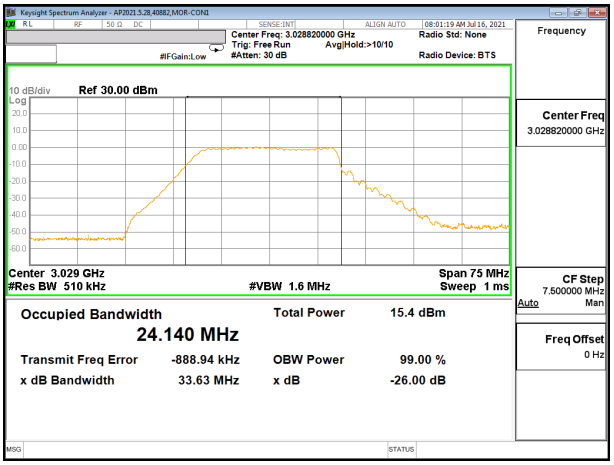
TABULAR RESULTS

Channel	Mode 1 99% Bandwidth MHz	Mode 2 99% Bandwidth MHz	Mode 3 99% Bandwidth MHz
Low Channel	24.140	15.969	15.698
Middle Channel	32.990	16.961	16.474
High Channel	30.961	16.727	16.402

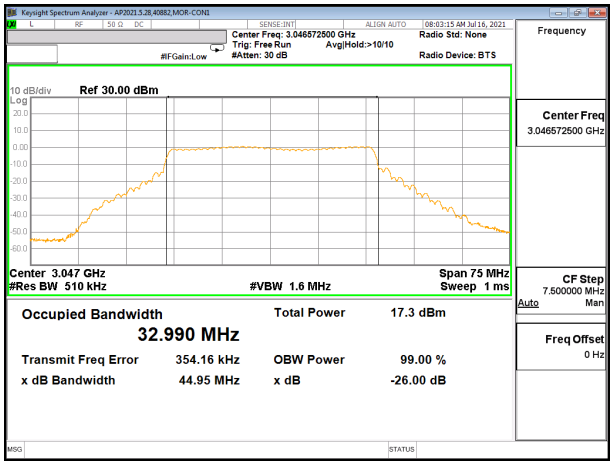
GRAPHICAL RESULTS

MODE 1

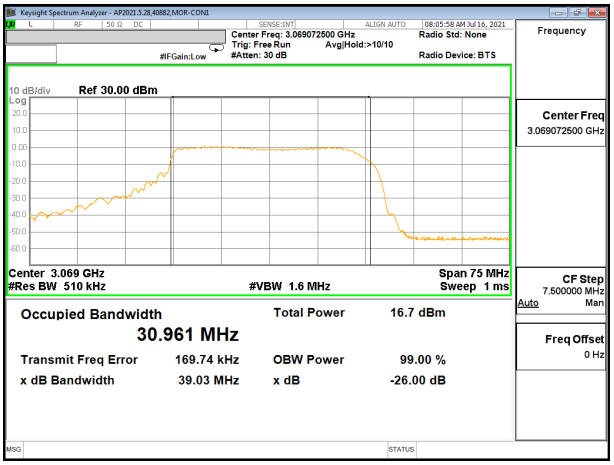
Low CH



Middle CH



High CH

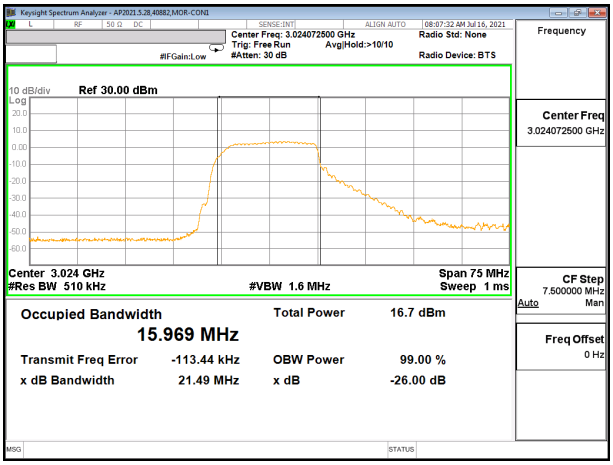


Date: 2021-07-16
Location: Conducted 1
Tested by: 40882

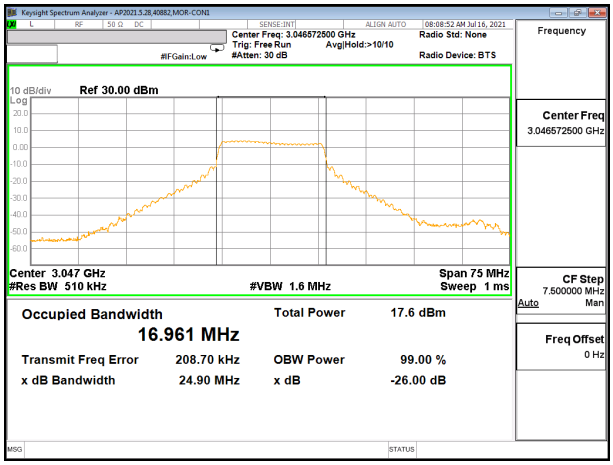
Detector: Peak
Mode: Max Hold

MODE 2

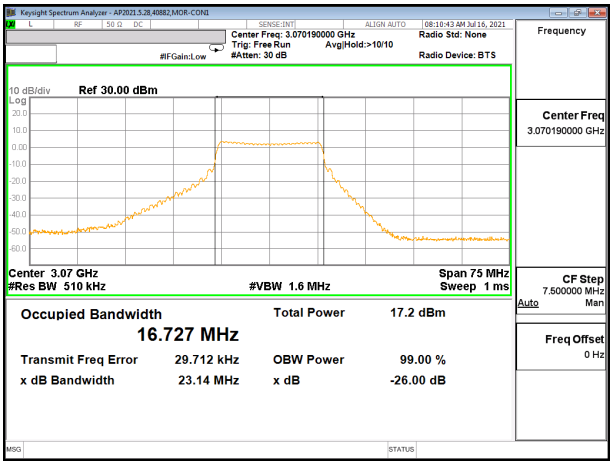
Low CH



Middle CH



High CH

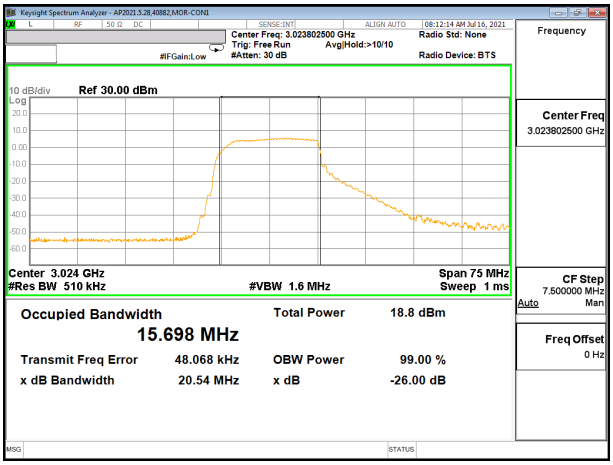


Date: 2021-07-16
Location: Conducted 1
Tested by: 40882

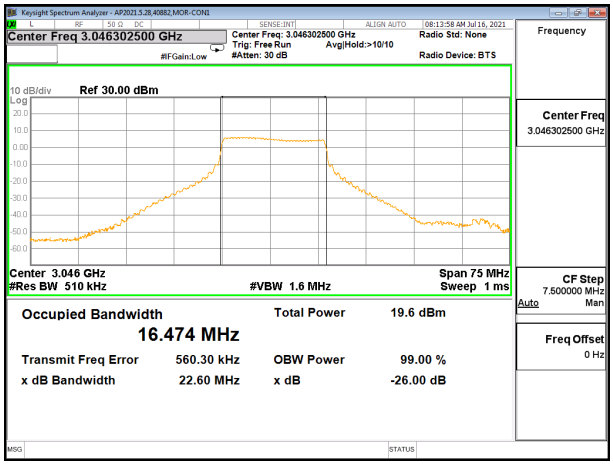
Detector: Peak
Mode: Max Hold

MODE 3

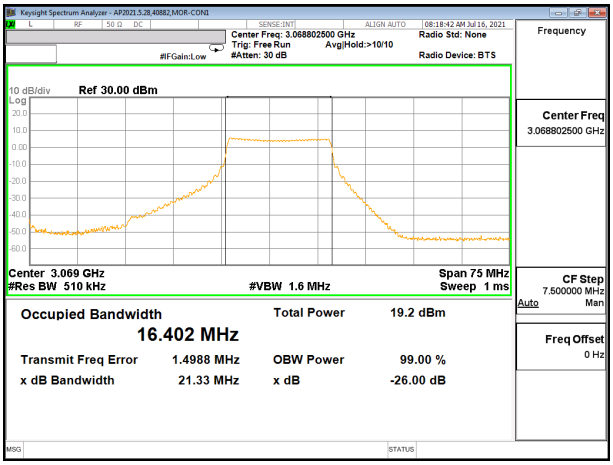
Low CH



Middle CH



High CH



Date: 2021-07-16
Location: Conducted 1
Tested by: 40882

Detector: Peak
Mode: Max Hold

8.2. BAND EDGE

RULE PART(S)

§2.1051 Measurements required: Spurious emissions at antenna terminals. (At the band edges [3000 to 3100 MHz])

§90.210 Emission Mask

Mask of 90.210(b) is met as all emissions are below -13dBc as worst case limit.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB. (-13dBm)

TEST PROCEDURE

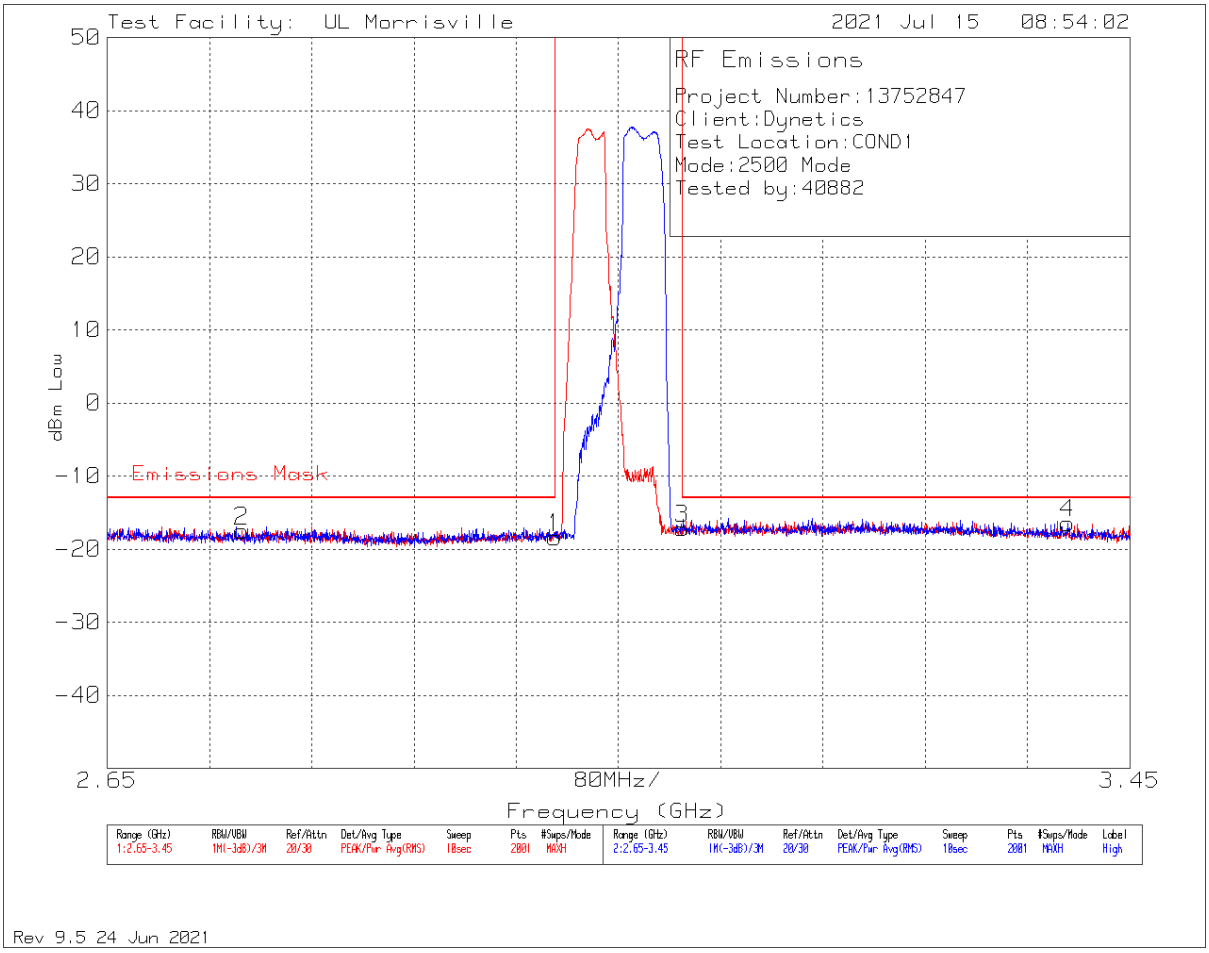
The transmitter output was connected to the input of Spectrum Analyzer via calibrated coaxial cable and attenuator.

The output power was measured with the spectrum analyzer at the low and high channel for each mode.

TESTED BY

Date: 2021-07-16
Location: Conducted 1
Tested by: 40882

MODE 1

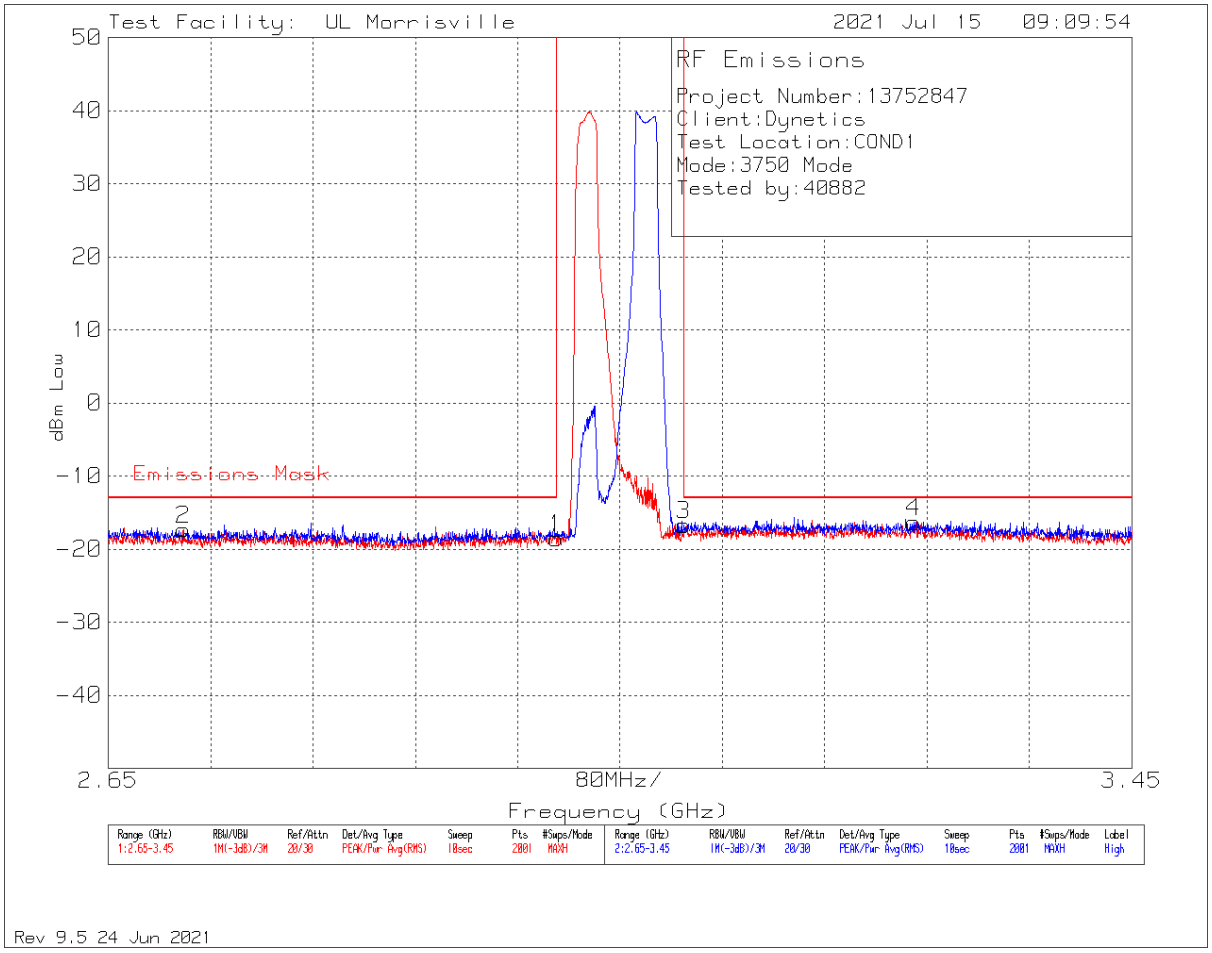


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	Emissions Mask	PK Margin (dB)
2	2.7556	-49.01	Pk	31.1	.4	-17.51	-13	-4.51
1	3	-49.82	Pk	31	.4	-18.42	-13	-5.42
3	3.1	-48.58	Pk	31	.4	-17.18	-13	-4.18
4	3.4012	-48.14	Pk	31.2	.4	-16.44	-13	-3.44

Pk - Peak detector

Note:
Marker 1 and 2 are for low Bandedge.
Marker 3 and 4 are for high Bandedge.

MODE 2

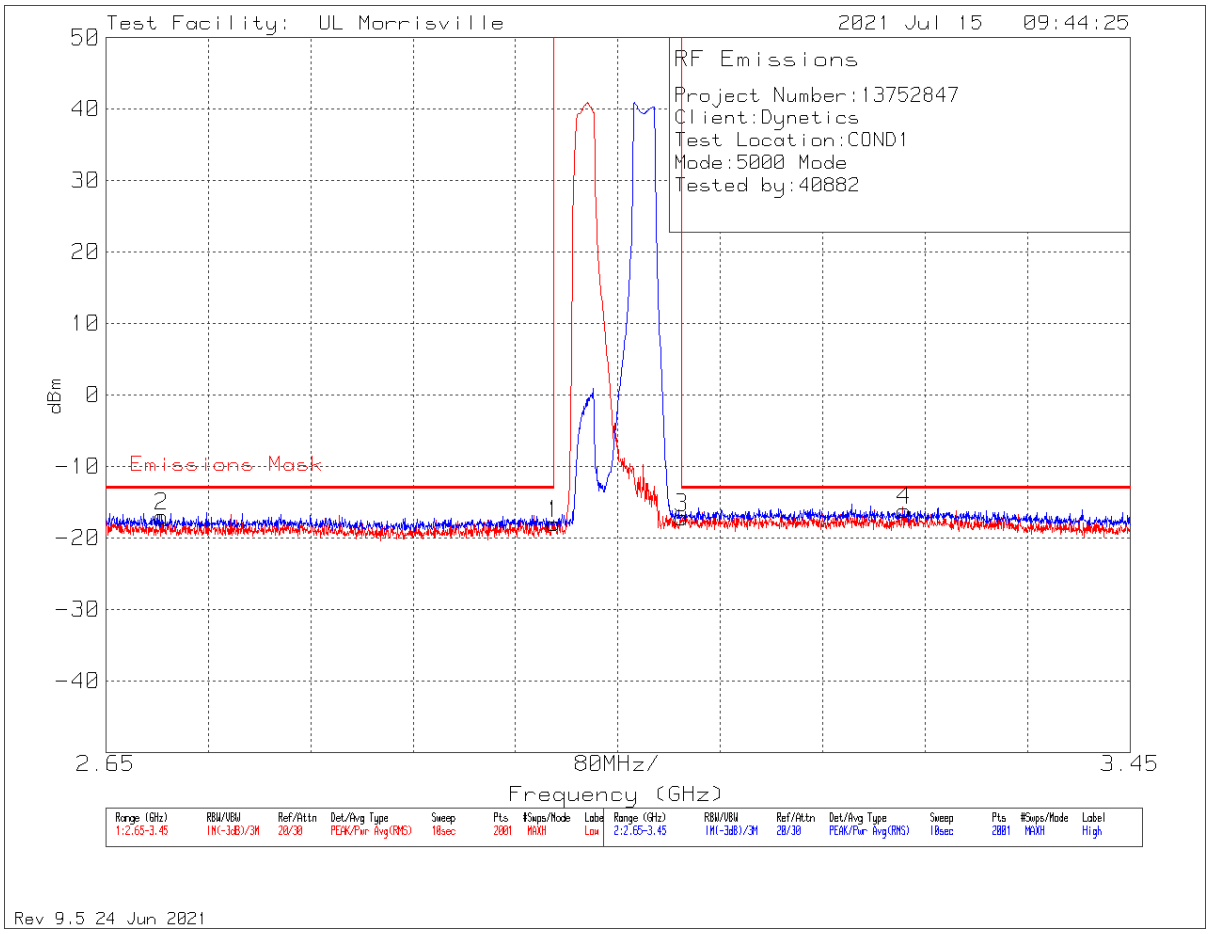


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	Emissions Mask	PK Margin (dB)
2	2.7088	-48.71	Pk	31	.4	-17.31	-13	-4.31
1	3	-49.9	Pk	31	.4	-18.5	-13	-5.5
3	3.1	-48.1	Pk	31	.4	-16.7	-13	-3.7
5	3.2796	-47.79	Pk	31.1	.4	-16.29	-13	-3.29

Pk - Peak detector

Note:
Marker 1 and 2 are for low Bandedge.
Marker 3 and 4 are for high Bandedge.

MODE 3



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	Emissions Mask	PK Margin (dB)
2	2.6936	-48.36	Pk	31	.4	-16.96	-13	-3.96
1	3	-49.35	Pk	31	.4	-17.95	-13	-4.95
3	3.1	-48.51	Pk	31	.4	-17.11	-13	-4.11
4	3.2736	-47.64	Pk	31.1	.4	-16.14	-13	-3.4

Pk - Peak detector

Note:
Marker 1 and 2 are for low Bandedge.
Marker 3 and 4 are for high Bandedge.

8.3. OUT OF BAND EMISSIONS

RULE PART(S)

§2.1051 Measurements required: Spurious emissions at antenna terminals.
§2.1053 Measurements required: Field strength of spurious radiation.
§90.210 Emission Masks

Mask of 90.210(b) is met as all emissions are below -13dBc as worst-case limit.

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

For antenna port the RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For radiated emissions the radio output was terminated with artificial antenna (50Ohm Load). The measured electric field was converted to an EIRP value using the theoretical relationships given in section 5.2.7 of ANSI C63.26-2015 and is outlined below.

Know

(1) EIRP = E -95.2 (At a measurement distance of 3m.)

Where

EIRP = equivalent isotropically radiated power in dBm
E = electric field in dBuV/m

(2) E = AF + V + G/L

Where

AF = antenna factor of receive antenna in dB/m.
V = receiver measured voltage in dBuV
G/L = gain-loss string between receive antenna and receiver

(3) V (dBuV) = W (dBm) + 107dB

Combine all the above and get the following:

EIRP = (AF + V + G/L) - 95.2 = (AF + (W + 107) +G/L) - 95.2
EIRP = AF + V + G/L + 11.8

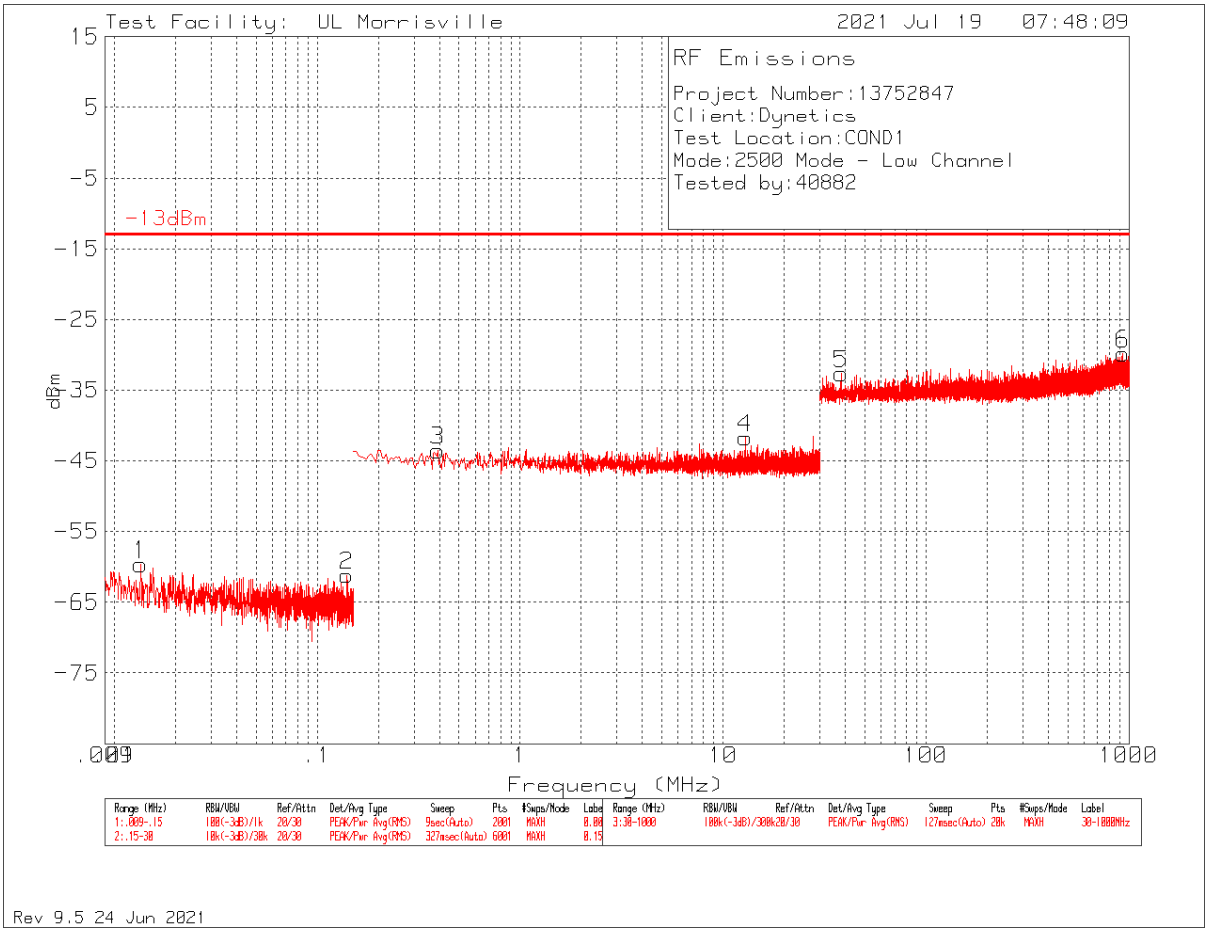
This EIRP value was then compared to the emissions limit of -13dBm.

TESTED BY

Date: 2021-07-15 to 2021-07-21
Location: Conducted 1, South Chamber, Chamber 4
Tested by: 40882

8.3.1. ANTENNA PORT OUT OF BAND EMISSIONS

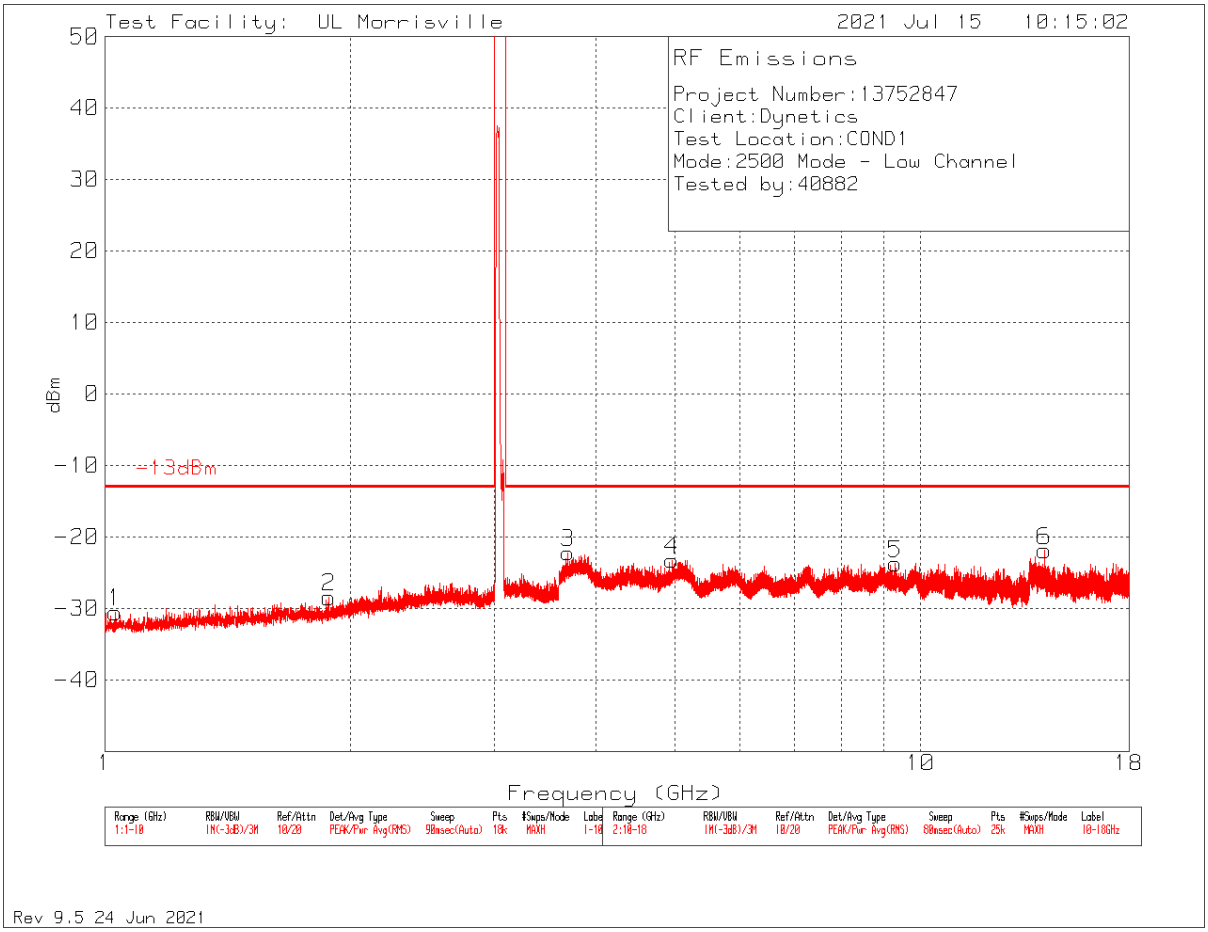
MODE 1 LOW CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Atten (dB)	CBL (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.01347	-90.24	Pk	30.5	.1	-59.64	-13	-46.64
2	.14	-91.76	Pk	30.5	.1	-61.16	-13	-48.16
3	.39378	-74.12	Pk	30.5	.1	-43.52	-13	-30.52
4	12.88103	-72.22	Pk	30.5	.1	-41.72	-13	-28.72
5	38.148	-63.25	Pk	30.5	.1	-32.65	-13	-32.65
6	933.4095	-60.83	Pk	30.8	.2	-29.83	-13	-29.83

Pk - Peak detector

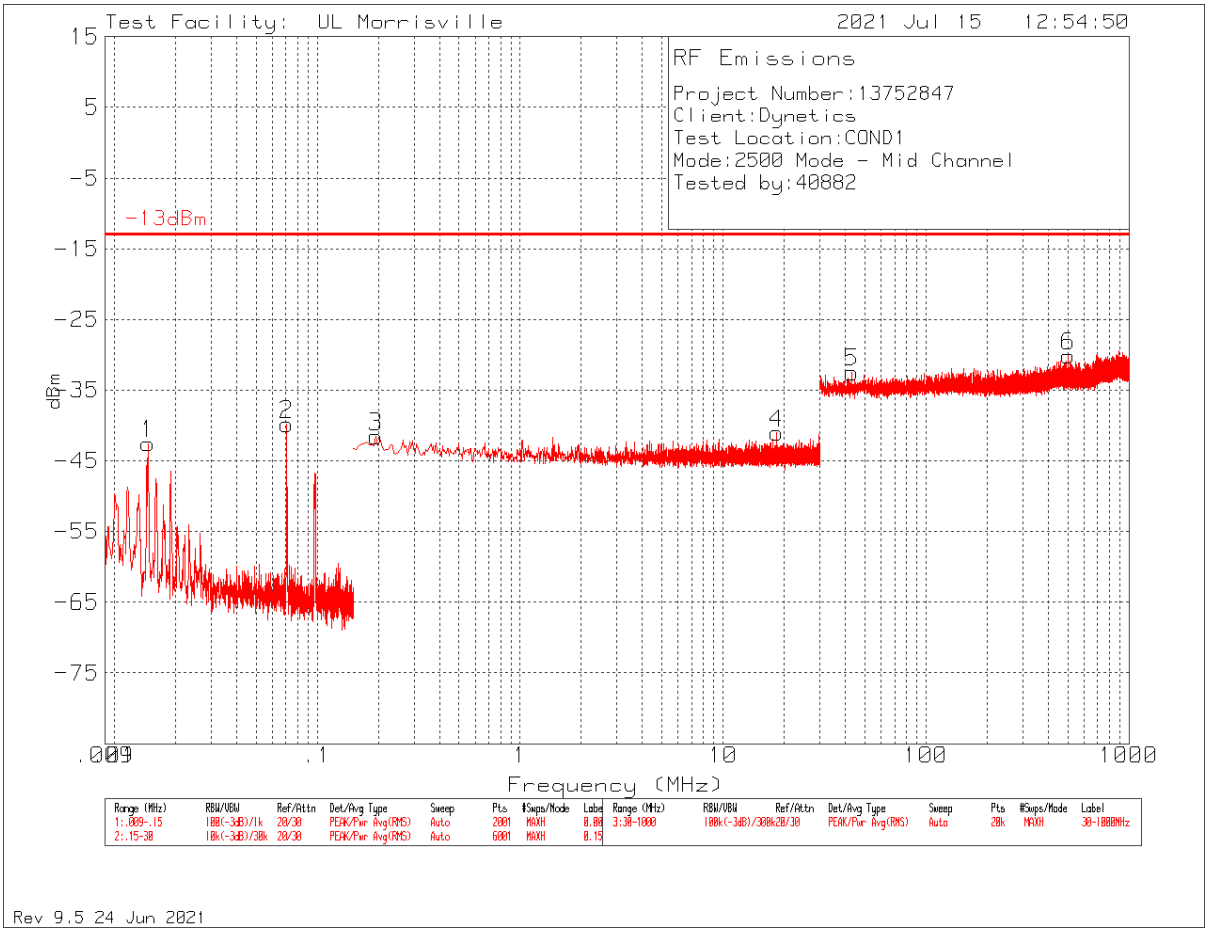
MODE 1 LOW CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	1.0295	-61.53	Pk	30.8	.2	-30.53	-13	-17.53
2	1.882	-59.72	Pk	31	.3	-28.42	-13	-15.42
3	3.6945	-53.68	Pk	31.1	.4	-22.18	-13	-9.18
4	4.955	-54.74	Pk	31	.5	-23.24	-13	-10.24
6	14.18336	-54.07	Pk	31.2	1	-21.87	-13	-8.87
5	9.309	-55.62	Pk	31	.9	-23.72	-13	-10.72

Pk - Peak detector

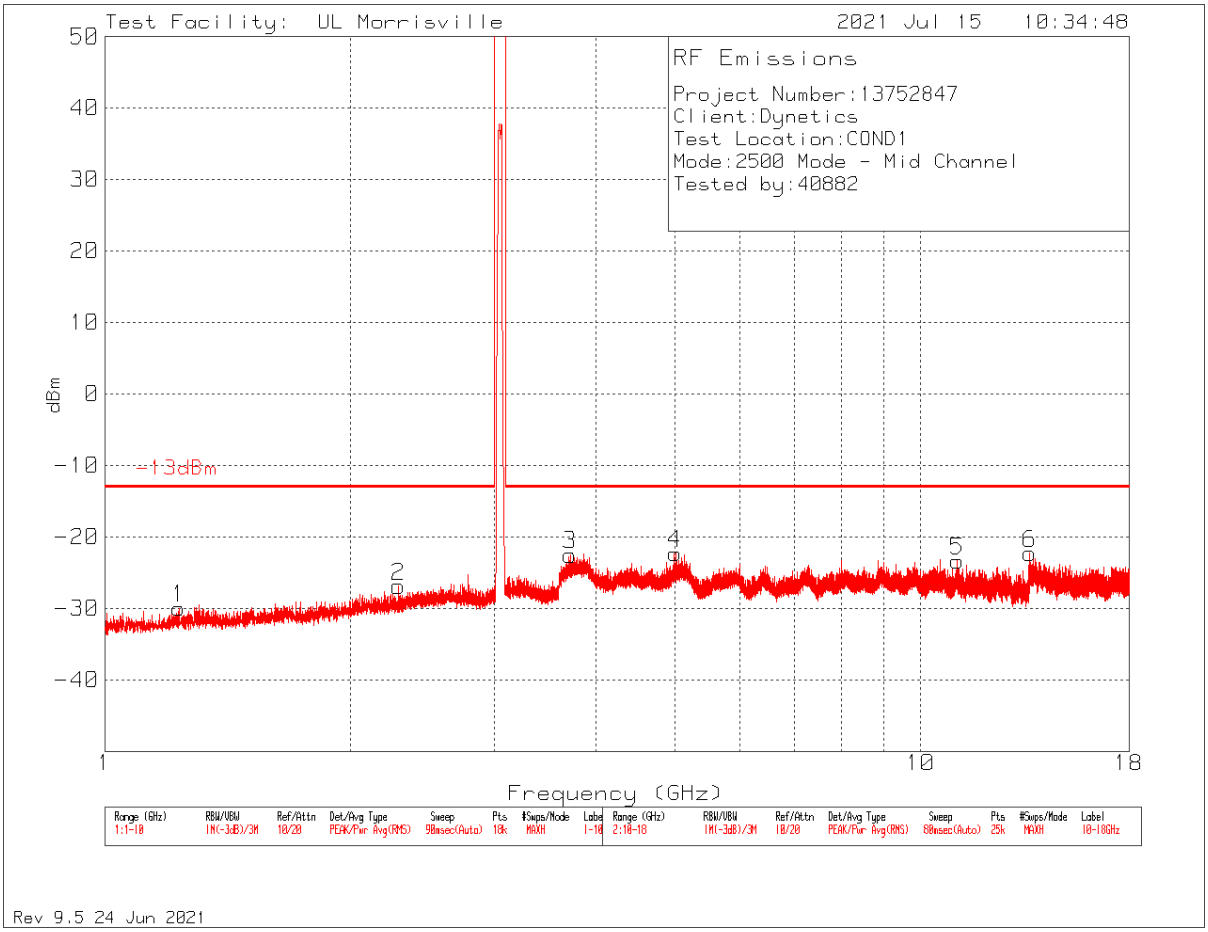
MODE 1 MIDDLE CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Atten (dB)	CBL (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.01468	-73.16	Pk	30.5	.1	-42.56	-13	-29.56
2	.07077	-70.41	Pk	30.5	.1	-39.81	-13	-26.81
3	.19478	-72.14	Pk	30.5	.1	-41.54	-13	28.54
4	18.41323	-71.52	Pk	30.5	0	-41.02	-13	-28.02
2	.07077	-70.41	Pk	30.5	.1	-39.81	-13	-26.81
5	43.095	-62.98	Pk	30.4	.1	-32.48	-13	-19.48
6	501.905	-61.04	Pk	30.7	.2	-30.14	-13	-17.14

Pk - Peak detector

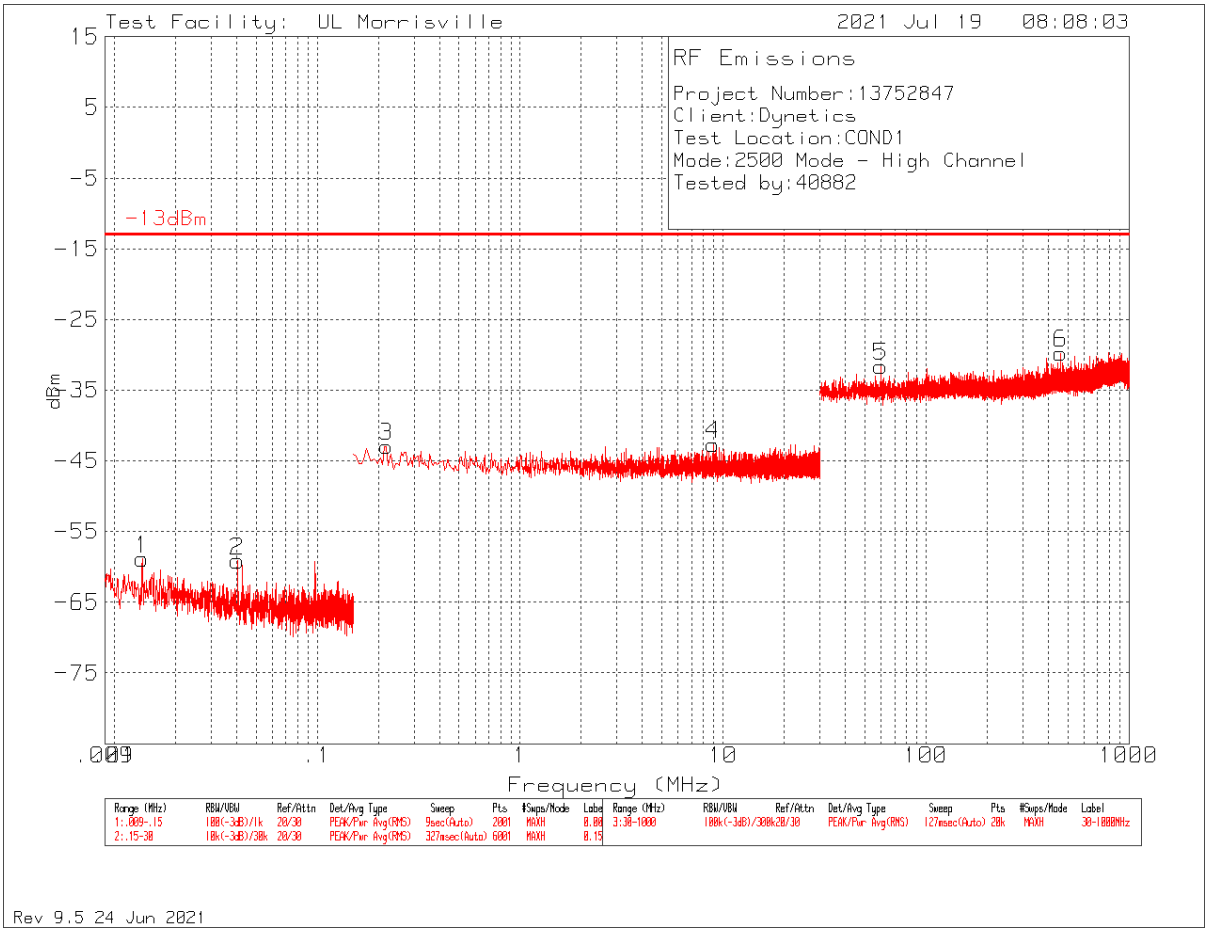
MODE 1 MIDDLE CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	1.2325	-61.16	Pk	30.9	.3	-29.96	-13	-16.96
2	2.2905	-58.07	Pk	30.9	.3	-26.87	-13	-13.87
3	3.7175	-53.99	Pk	31.1	.4	-22.49	-13	-9.49
5	11.08864	-54.94	Pk	30.9	.7	-23.34	-13	-10.34
4	5.004	-53.89	Pk	31.1	.5	-22.29	-13	-9.29
6	13.60384	-55.08	Pk	31.6	1.2	-22.28	-13	-9.28

Pk - Peak detector

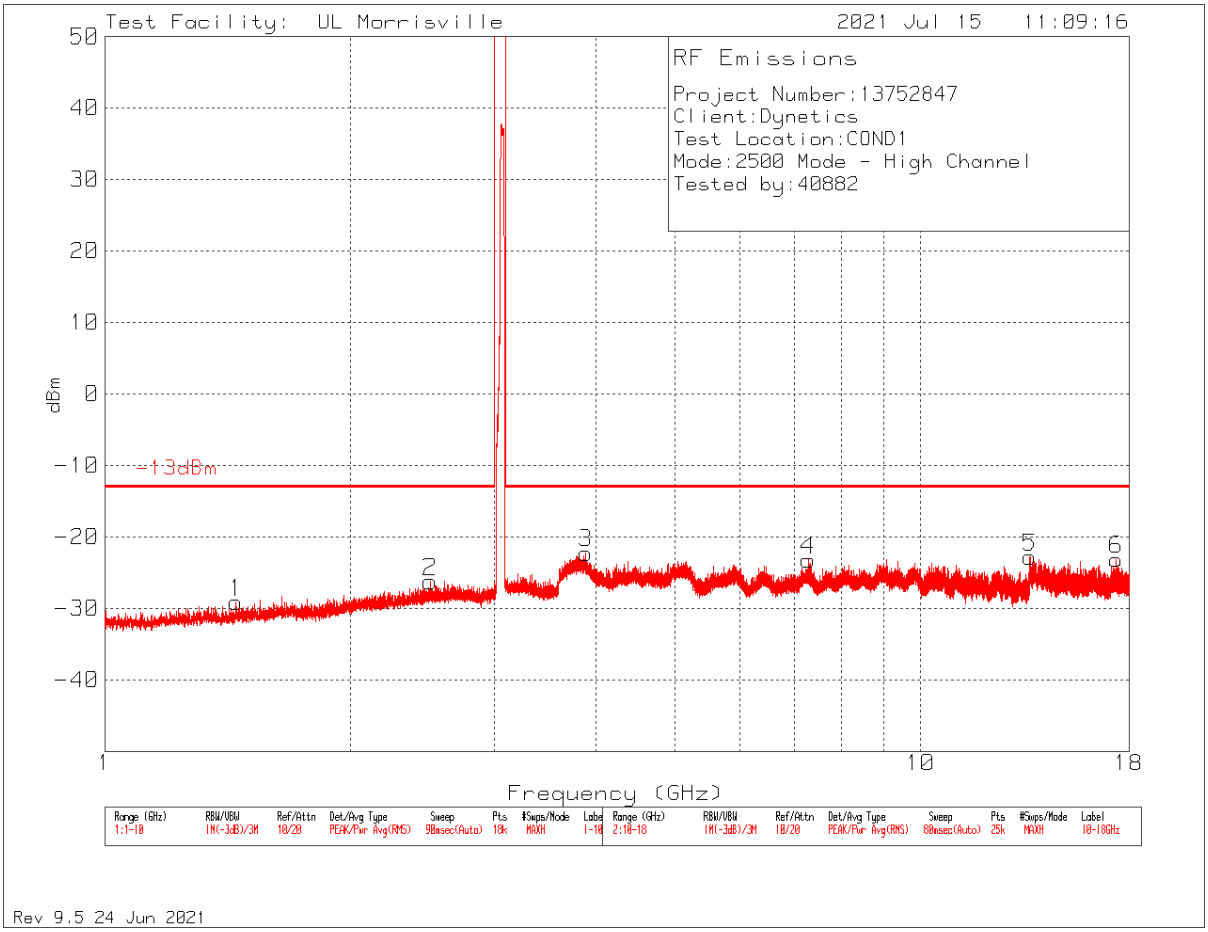
MODE 1 HIGH CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Atten (dB)	CBL (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.01376	-89.48	Pk	30.5	.1	-58.88	-13	-45.88
2	.04052	-89.73	Pk	30.5	.1	-59.13	-13	-46.13
3	.21965	-73.54	Pk	30.5	.1	-42.94	-13	-29.94
4	8.93585	-73.26	Pk	30.5	.1	-42.66	-13	-29.66
2	.04052	-89.73	Pk	30.5	.1	-59.13	-13	-46.13
5	59.8275	-62.22	Pk	30.5	.1	-31.62	-13	-31.62
6	460.5588	-60.66	Pk	30.7	.2	-29.76	-13	-29.76

Pk - Peak detector

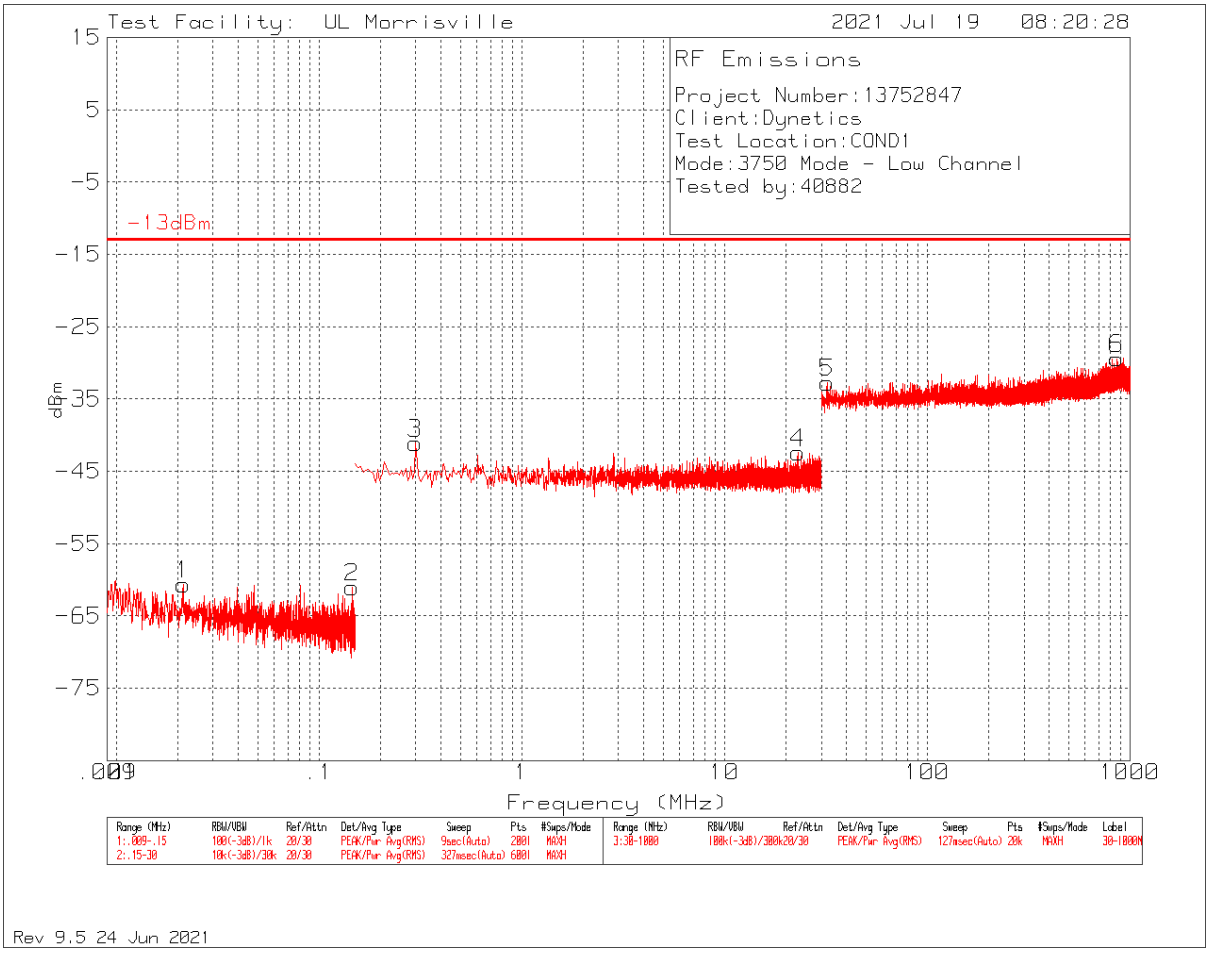
MODE 1 HIGH CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	1.448	-60.3	Pk	30.9	.3	-29.1	-13	-16.1
2	2.505	-57.71	Pk	31.1	.4	-26.21	-13	-13.21
3	3.8865	-53.62	Pk	30.9	.5	-22.22	-13	-9.22
5	13.61056	-55.58	Pk	31.7	1.1	-22.78	-13	-9.78
6	17.36832	-55.03	Pk	30.8	1.1	-23.13	-13	-10.13
4	7.2825	-55.01	Pk	31.2	.6	-23.21	-13	-10.21

Pk - Peak detector

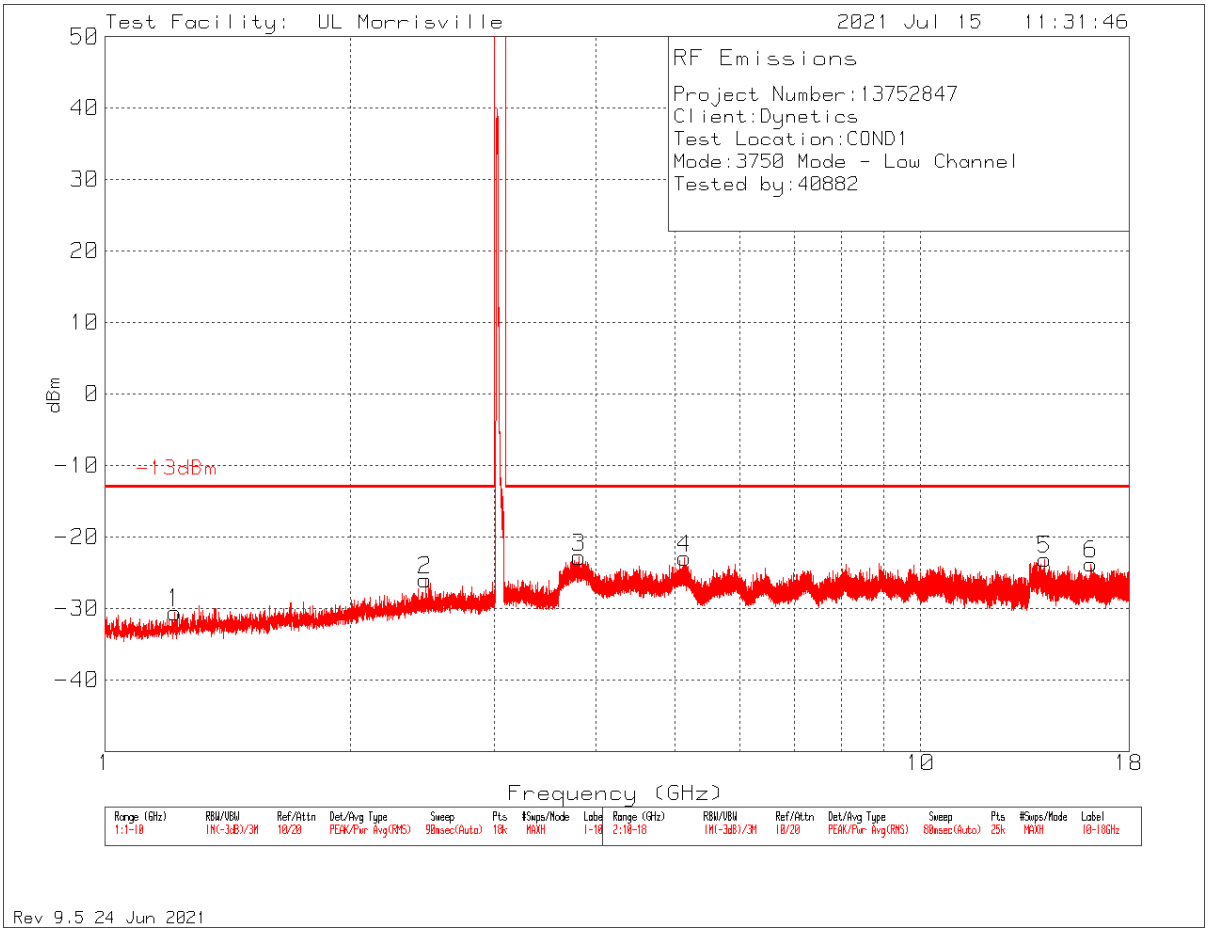
MODE 2 LOW CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Atten (dB)	CBL (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.02135	-91.26	Pk	30.5	.1	-60.66	-13	-47.66
2	.14539	-91.65	Pk	30.5	.1	-61.05	-13	-48.05
3	.29925	-71.74	Pk	30.5	.1	-41.14	-13	-28.14
4	23.08973	-72.94	Pk	30.5	0	-42.44	-13	-29.44
2	.14539	-91.65	Pk	30.5	.1	-61.05	-13	-48.05
5	32.037	-63.25	Pk	30.5	0	-32.75	-13	-19.75
6	861.2415	-60.42	Pk	30.8	.2	-29.42	-13	-16.42

Pk - Peak detector

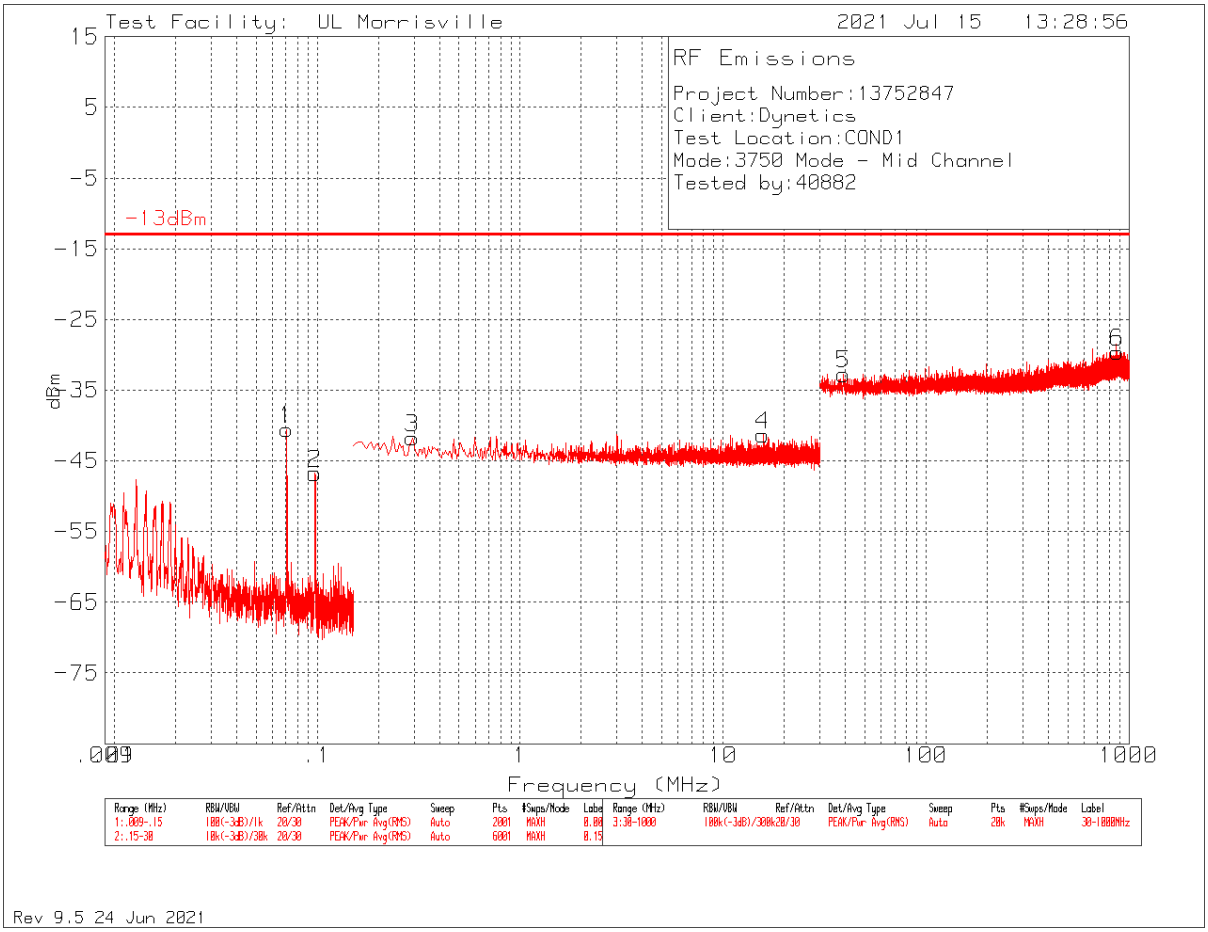
MODE 2 LOW CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	1.218	-61.64	Pk	30.9	.2	-30.54	-13	-17.54
2	2.4705	-57.38	Pk	31	.4	-25.98	-13	-12.98
3	3.8125	-53.9	Pk	30.7	.4	-22.8	-13	-9.8
5	14.19904	-55.33	Pk	31.1	1.1	-23.13	-13	-10.13
4	5.137	-54.43	Pk	31	.5	-22.93	-13	-9.93
6	16.16352	-56.25	Pk	31.5	1	-23.75	-13	-10.75

Pk - Peak detector

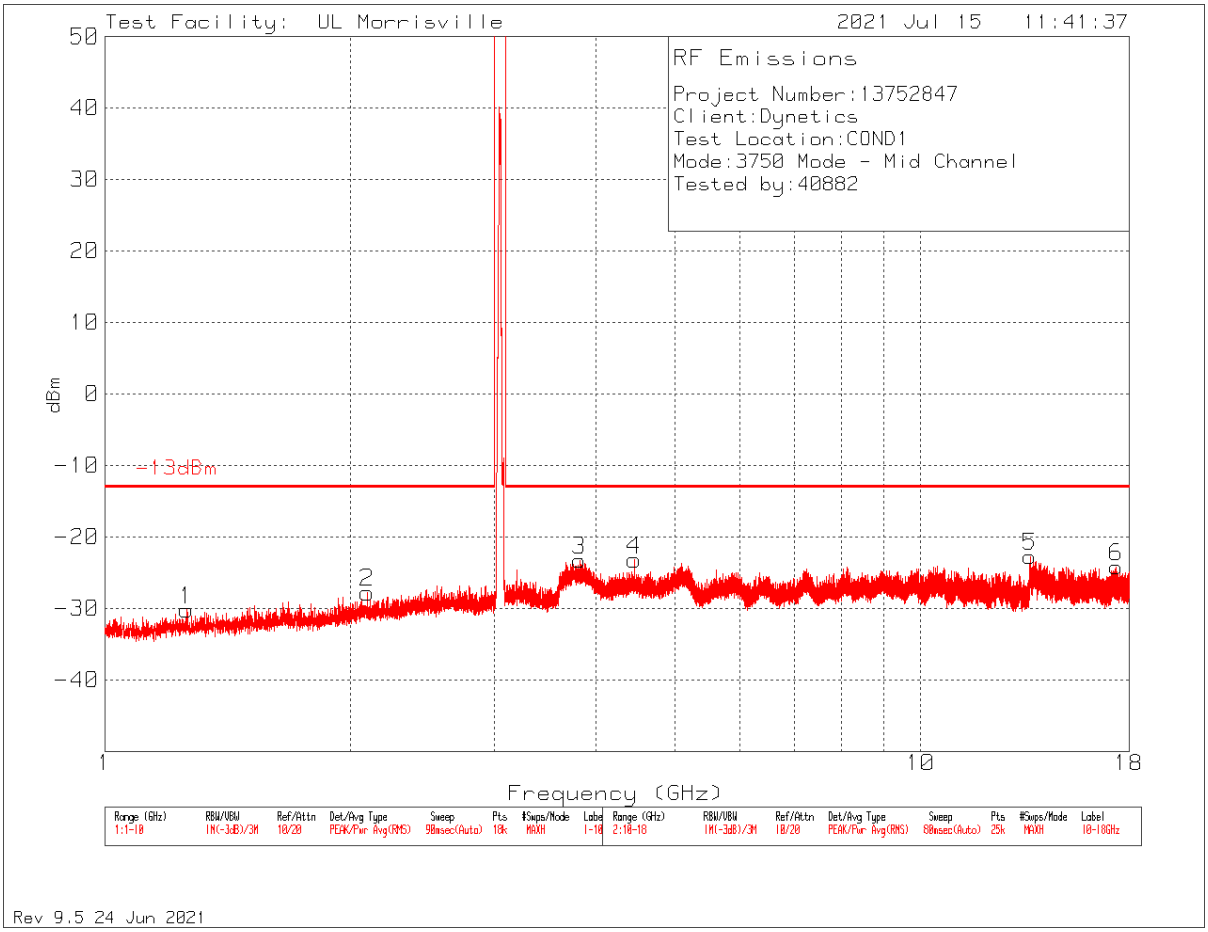
MODE 2 MIDDLE CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Atten (dB)	CBL (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.07077	-71.13	Pk	30.5	.1	-40.53	-13	-27.53
2	.0974	-77.34	Pk	30.5	.1	-46.74	-13	-33.74
3	.29428	-72.34	Pk	30.5	.1	-41.74	-13	-28.74
4	15.7317	-71.82	Pk	30.5	.1	-41.32	-13	-28.32
5	39.215	-63.35	Pk	30.5	.1	-32.75	-13	-32.75
6	873.803	-60.61	Pk	30.8	.2	-29.61	-13	-29.61

Pk - Peak detector

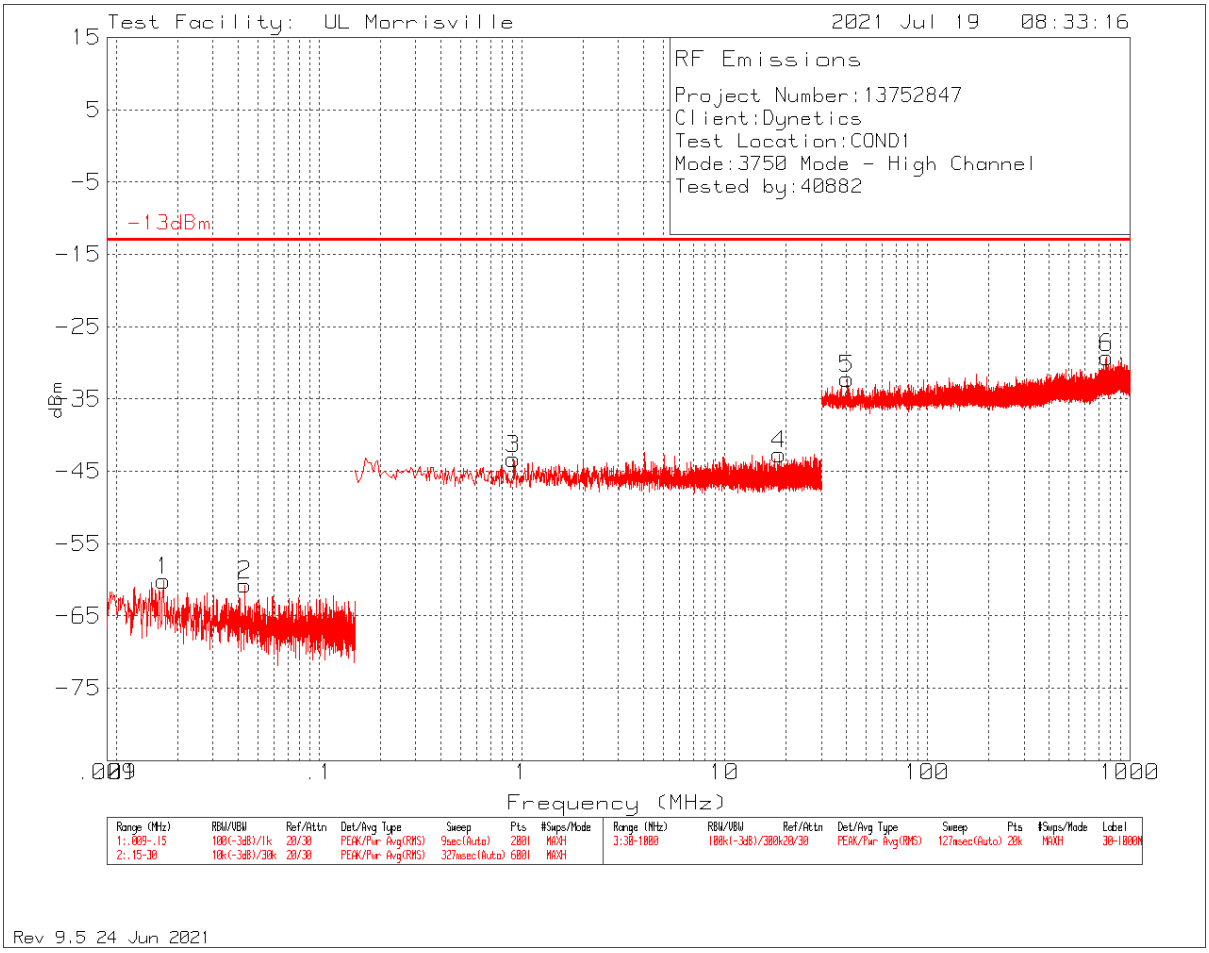
MODE 2 MIDDLE CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	1.2595	-61.38	Pk	30.9	.3	-30.18	-13	-17.18
2	2.0965	-59.16	Pk	31.1	.3	-27.76	-13	-14.76
3	3.8175	-54.35	Pk	30.7	.4	-23.25	-13	-10.25
4	4.456	-54.9	Pk	31.2	.5	-23.2	-13	-10.2
5	13.61088	-55.5	Pk	31.7	1.1	-22.7	-13	-9.7
6	17.36864	-56.06	Pk	30.8	1.1	-24.16	-13	-11.16

Pk - Peak detector

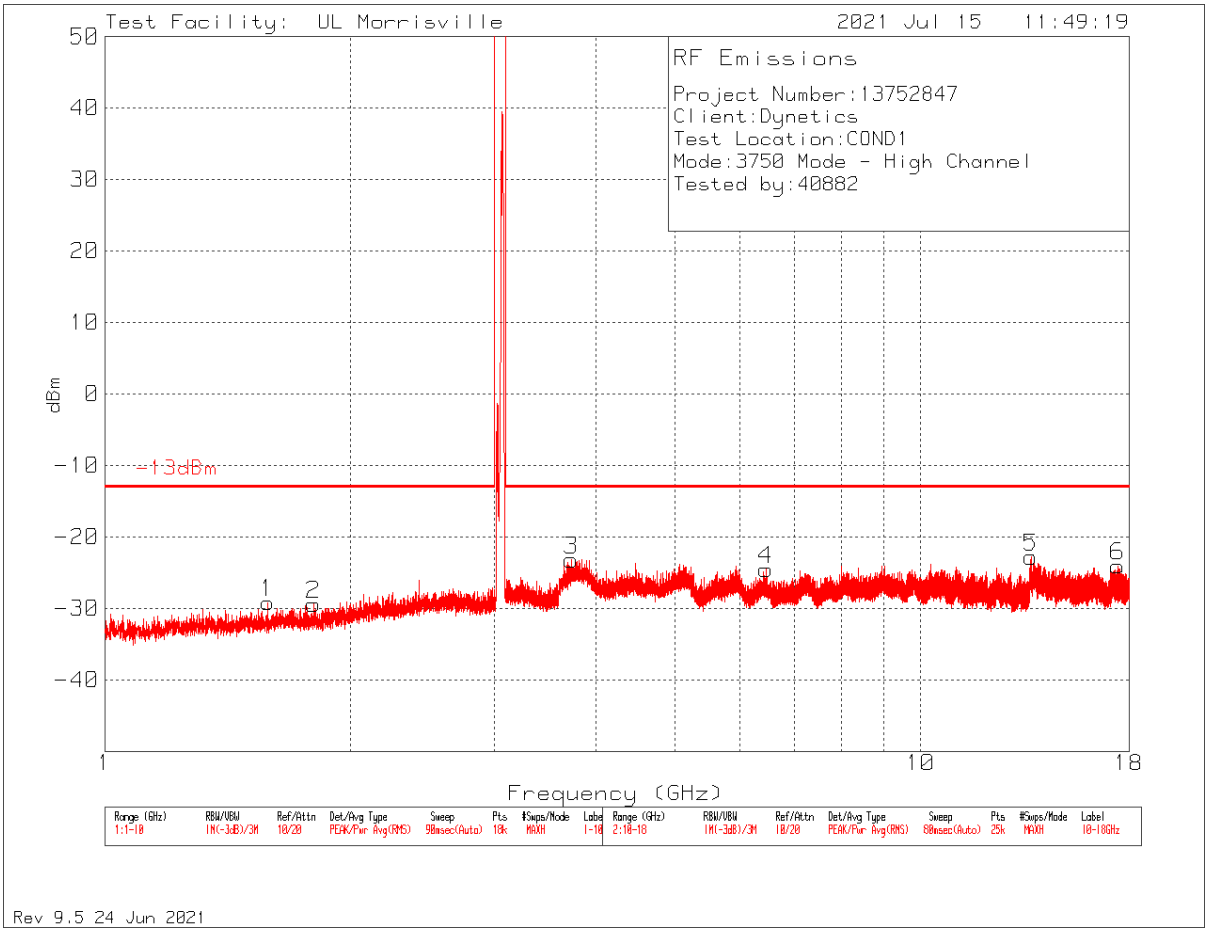
MODE 2 HIGH CHANNEL 9kHz – 1000MHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.01709	-90.74	Pk	30.5	.1	-60.14	-13	-47.14
2	.04308	-91.33	Pk	30.5	.1	-60.73	-13	-47.73
3	.91118	-73.89	Pk	30.5	.1	-43.29	-13	-30.29
4	18.657	-73.18	Pk	30.5	0	-42.68	-13	-29.68
5	40.1365	-62.79	Pk	30.5	.1	-32.19	-13	-19.19
6	769.0915	-60.27	Pk	30.8	.2	-29.27	-13	-16.27

Pk - Peak detector

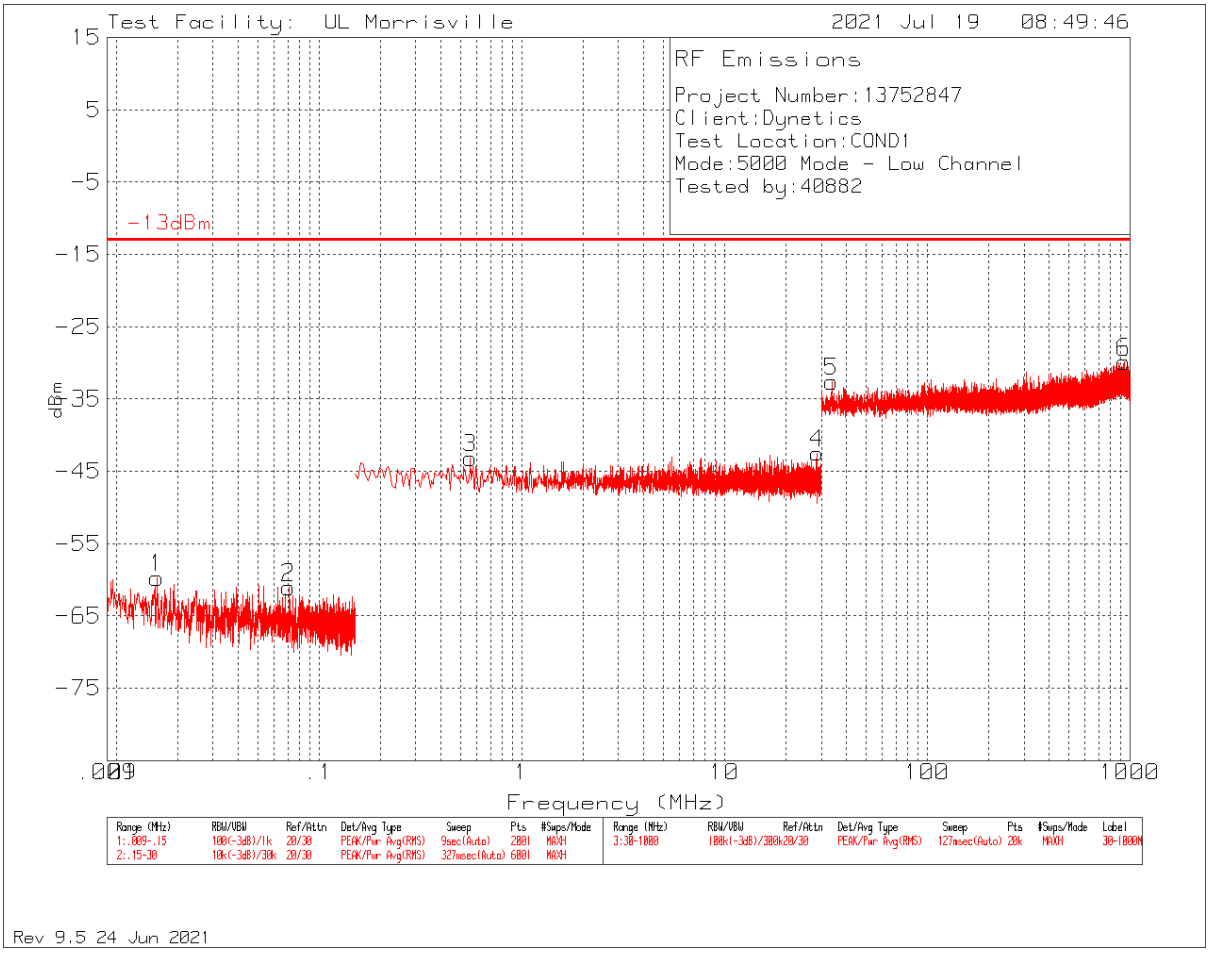
MODE 2 HIGH CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	1.584	-60.34	Pk	30.9	.3	-29.14	-13	-16.14
2	1.803	-60.69	Pk	31	.3	-29.39	-13	-16.39
3	3.7305	-54.58	Pk	31	.4	-23.18	-13	-10.18
5	13.65024	-54.69	Pk	31.1	.8	-22.79	-13	-9.79
6	17.43168	-56.05	Pk	30.9	1.1	-24.05	-13	-11.05
4	6.4605	-56.23	Pk	31.1	.6	-24.53	-13	-11.53

Pk - Peak detector

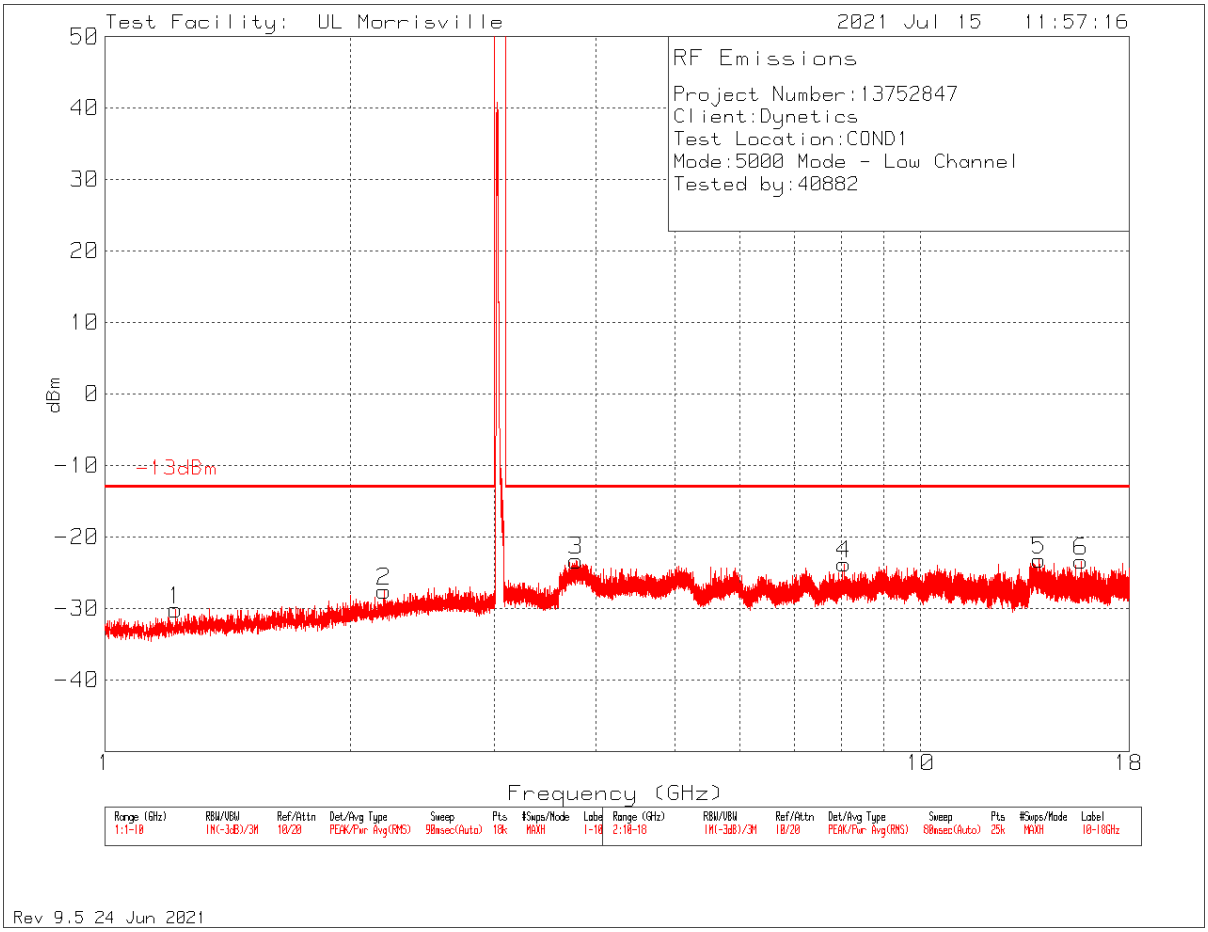
MODE 3 LOW CHANNEL 9kHz – 1000MHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.01582	-90.33	Pk	30.5	.1	-59.73	-13	-46.73
2	.07077	-91.69	Pk	30.5	.1	-61.09	-13	-48.09
3	.55795	-73.78	Pk	30.5	.1	-43.18	-13	-30.18
4	28.71148	-72.99	Pk	30.5	0	-42.49	-13	-29.49
5	33.783	-63.03	Pk	30.4	0	-32.63	-13	-19.63
6	934.2825	-60.9	Pk	30.8	.2	-29.9	-13	-16.9

Pk - Peak detector

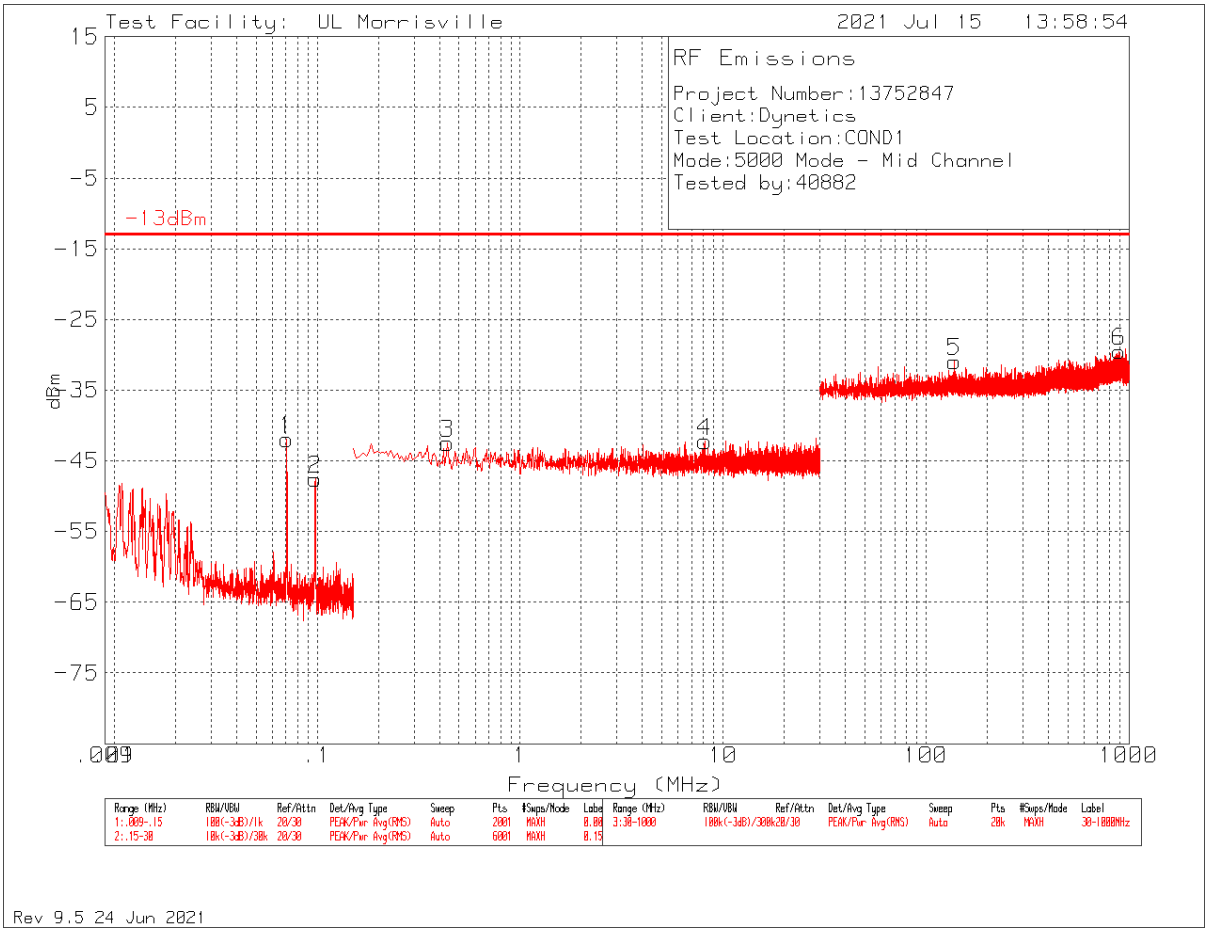
MODE 3 LOW CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	1.221	-61.27	Pk	30.9	.2	-30.17	-13	-17.17
2	2.1985	-58.85	Pk	31	.3	-27.55	-13	-14.55
3	3.7795	-54.59	Pk	30.8	.5	-23.29	-13	-10.29
5	13.97184	-56.21	Pk	31.9	1.1	-23.21	-13	-10.21
6	15.71904	-55.48	Pk	31.1	1	-23.38	-13	-10.38
4	8.055	-55.56	Pk	31.1	.7	-23.76	-13	-10.76

Pk - Peak detector

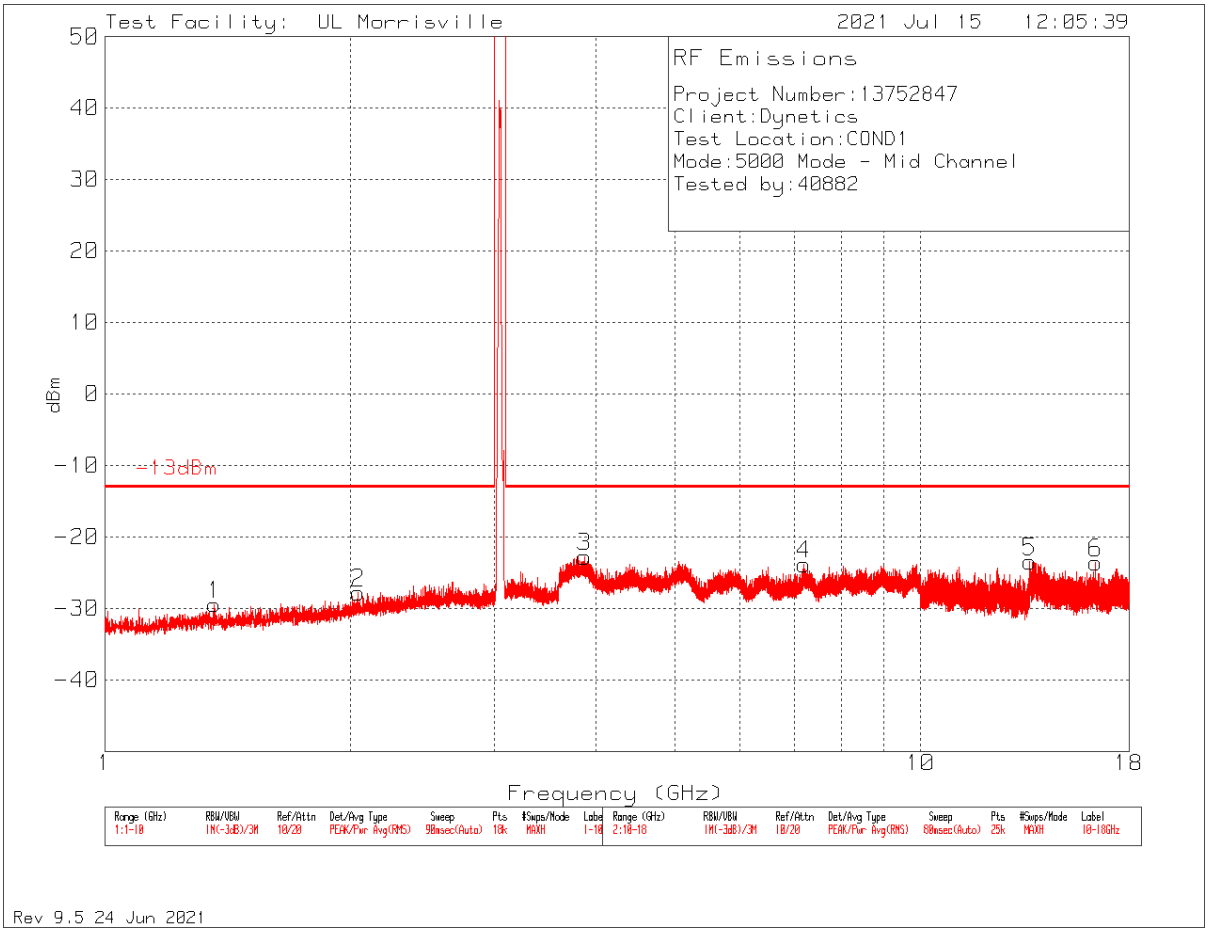
MODE 3 MIDDLE CHANNEL 9kHz – 1000MHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.07077	-72.55	Pk	30.5	.1	-41.95	-13	-28.95
2	.09789	-78.17	Pk	30.5	.1	-47.57	-13	-34.57
3	.43855	-73.09	Pk	30.5	.1	-42.49	-13	-29.49
4	8.1299	-72.82	Pk	30.5	.1	-42.22	-13	-29.22
5	137.864	-61.63	Pk	30.6	.1	-30.93	-13	-17.93
6	894.5125	-60.5	Pk	30.8	.2	-29.5	-13	-29.5

Pk - Peak detector

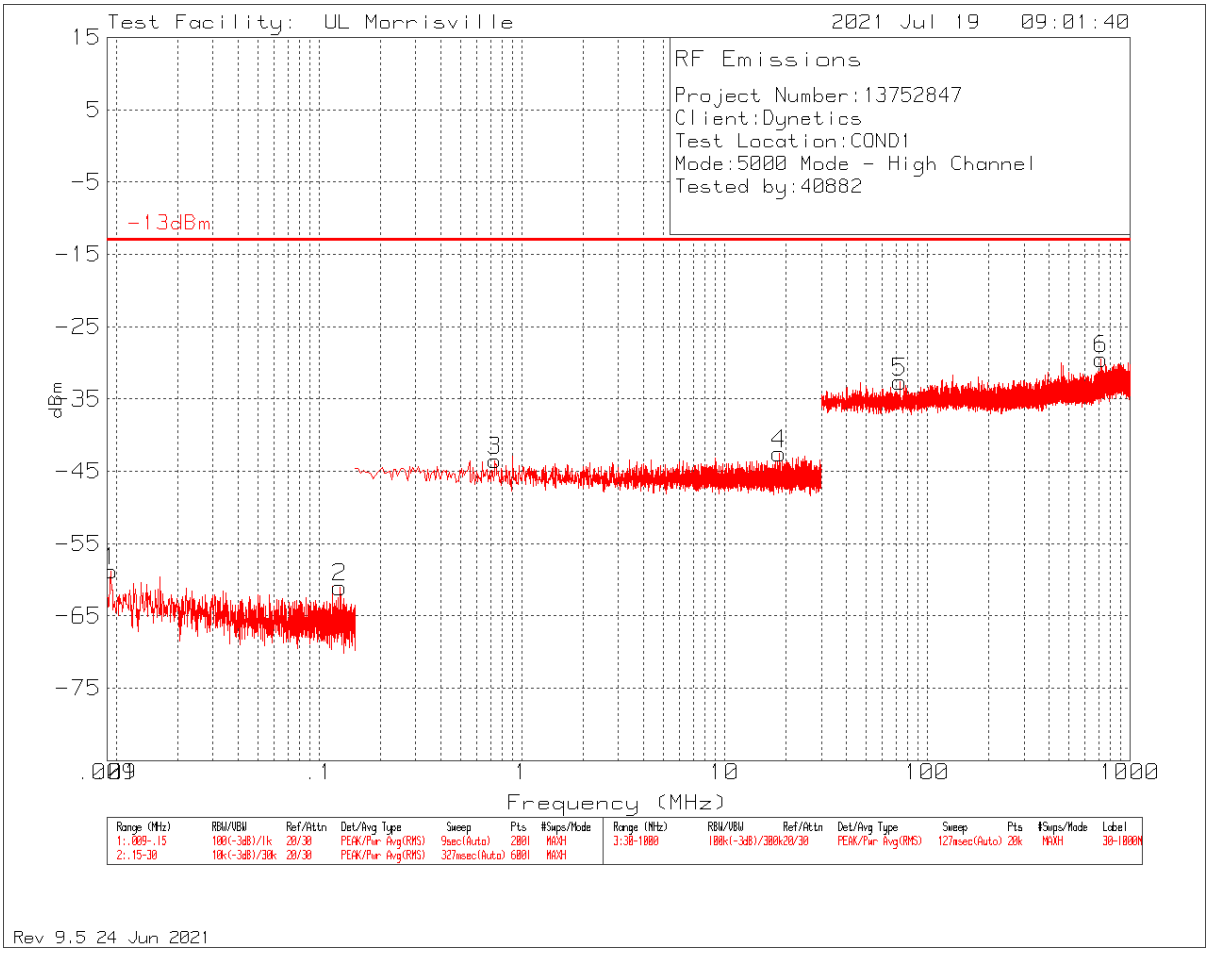
MODE 3 MIDDLE CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	1.3625	-60.62	Pk	30.9	.3	-29.42	-13	-16.42
2	2.044	-59.17	Pk	31.1	.3	-27.77	-13	-14.77
3	3.8725	-54.05	Pk	30.9	.4	-22.75	-13	-9.75
5	13.60096	-56.23	Pk	31.6	1.2	-23.43	-13	-10.43
6	16.38656	-55.96	Pk	31.2	1.2	-23.56	-13	-10.56
4	7.193	-55.5	Pk	31.1	.6	-23.8	-13	-10.8

Pk - Peak detector

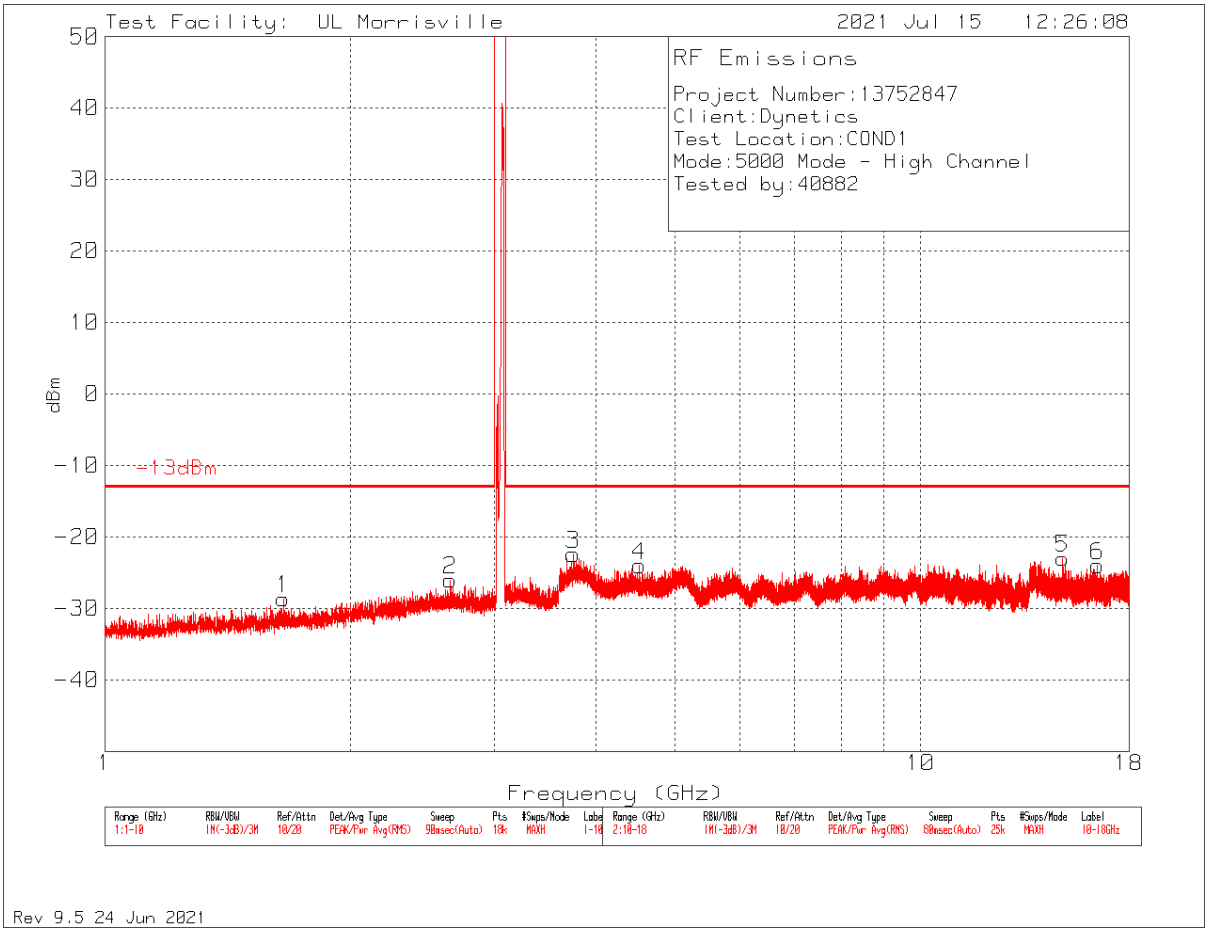
MODE 3 HIGH CHANNEL 9kHz – 1000MHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.00936	-89.39	Pk	30.5	.1	-58.79	-13	-45.79
2	.127	-91.67	Pk	30.5	.1	-61.07	-13	-48.07
3	.73705	-74.12	Pk	30.5	.1	-43.52	-13	-30.52
4	18.5774	-73.07	Pk	30.5	0	-42.57	-13	-29.57
5	73.3105	-63.26	Pk	30.5	.1	-32.66	-13	-19.66
6	721.513	-60.45	Pk	30.8	.2	-29.45	-13	-16.45

Pk - Peak detector

MODE 3 HIGH CHANNEL 1GHz - 18GHz

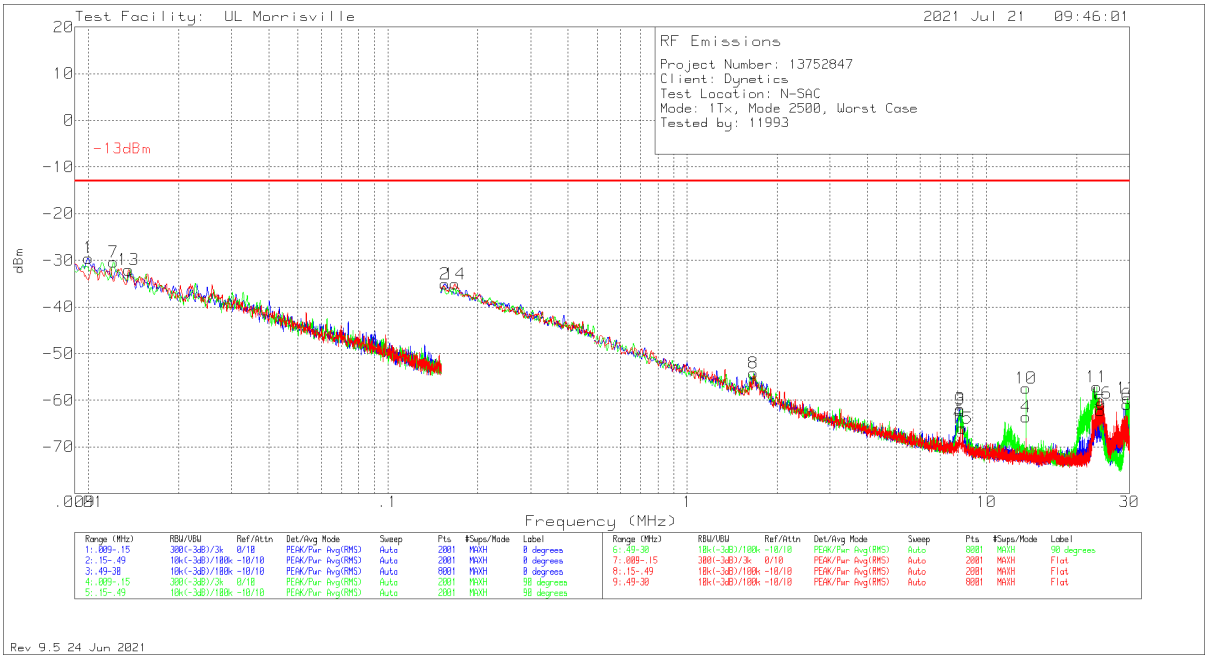


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Atten (dB)	Cbl (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	1.6545	-59.82	Pk	30.9	.3	-28.62	-13	-15.62
2	2.6505	-57.3	Pk	31	.3	-26	-13	-13
3	3.751	-53.7	Pk	30.9	.4	-22.4	-13	-9.4
4	4.5195	-55.39	Pk	30.9	.5	-23.99	-13	-10.99
5	14.92288	-55.09	Pk	31	1.1	-22.99	-13	-9.99
6	16.47456	-55.98	Pk	31	1	-23.98	-13	-10.98

Pk - Peak detector

8.3.2. RADIATED ENCLOSURE PORT OUT OF BAND EMISSIONS

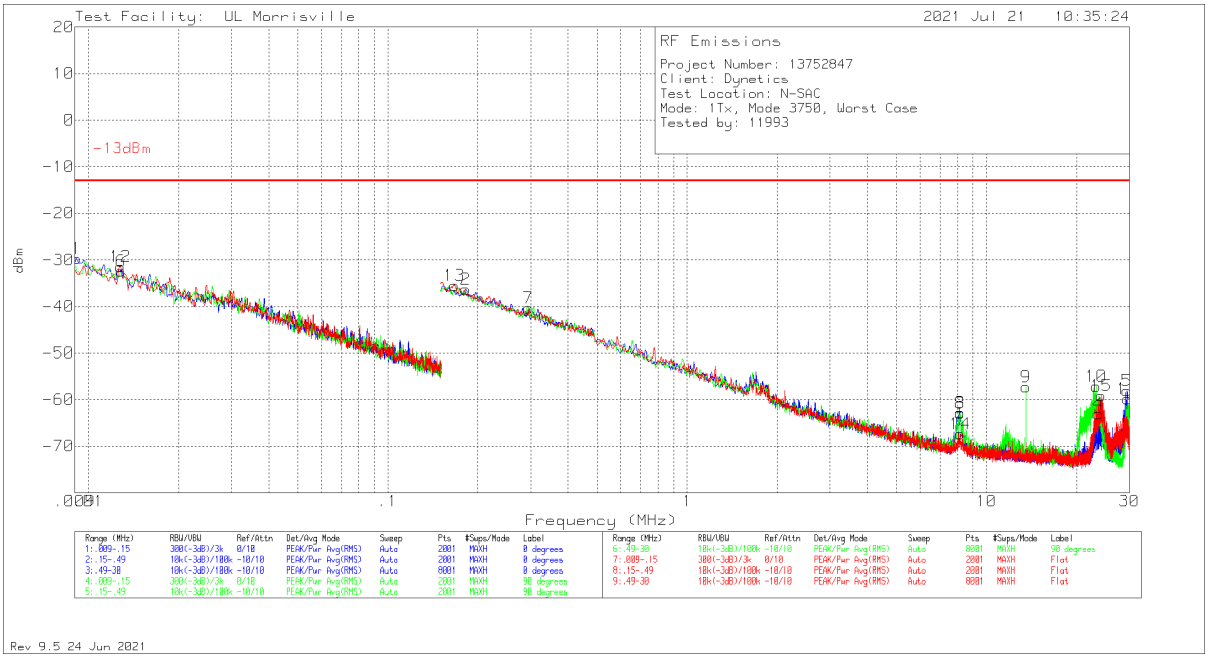
MODE 1 WORST-CASE <30MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0059 (dB/m)	Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Loop Angle
1	.00999	-60.31	Pk	18.9	.1	11.8	-29.51	-13	-16.51	0-360	0 degs
7	.01212	-60.14	Pk	17.9	.1	11.8	-30.34	-13	-17.34	0-360	90 degs
13	.01362	-61.16	Pk	17.2	.1	11.8	-32.06	-13	-19.06	0-360	Flat
2	.15519	-57.39	Pk	10.4	.1	11.8	-35.09	-13	-22.09	0-360	0 degs
14	.1676	-57.41	Pk	10.4	.1	11.8	-35.11	-13	-22.11	0-360	Flat
8	1.66679	-76.94	Pk	10.6	.3	11.8	-54.24	-13	-41.24	0-360	90 degs
9	8.16496	-85.38	Pk	10.8	.6	11.8	-62.18	-13	-49.18	0-360	90 degs
3	8.1705	-85.07	Pk	10.8	.6	11.8	-61.87	-13	-48.87	0-360	0 degs
15	8.29961	-89.17	Pk	10.7	.6	11.8	-66.07	-13	-53.07	0-360	Flat
4	13.56013	-87.01	Pk	10.8	.8	11.8	-63.61	-13	-50.61	0-360	0 degs
10	13.56013	-80.86	Pk	10.8	.8	11.8	-57.46	-13	-44.46	0-360	90 degs
11	23.30647	-79.69	Pk	9.7	1	11.8	-57.19	-13	-44.19	0-360	90 degs
5	24.02213	-84.71	Pk	9.6	1	11.8	-62.31	-13	-49.31	0-360	0 degs
16	24.18445	-82.91	Pk	9.5	1	11.8	-60.61	-13	-47.61	0-360	Flat
6	29.37856	-81.65	Pk	7.9	1.1	11.8	-60.85	-13	-47.85	0-360	0 degs
12	29.55932	-80.35	Pk	7.9	1.1	11.8	-59.55	-13	-46.55	0-360	90 degs

Pk - Peak detector

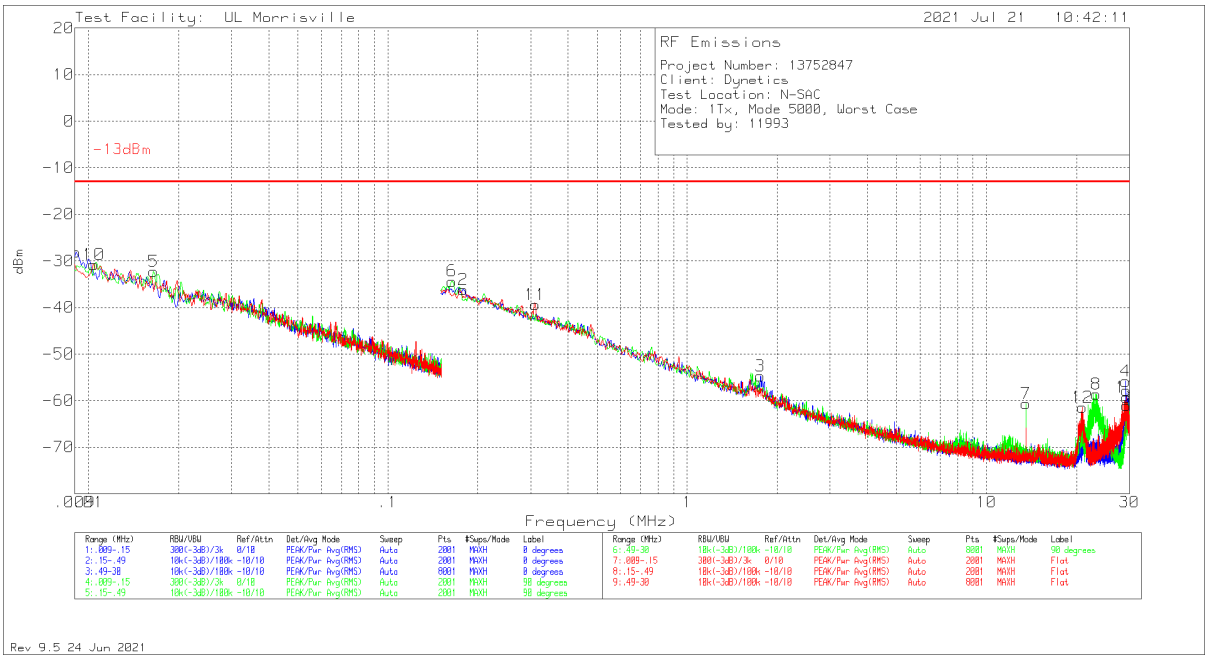
MODE 2 WORST-CASE <30MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0059 (dB/m)	Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Loop Angle
1	.00914	-61.44	Pk	19.8	.1	11.8	-29.74	-13	-16.74	0-360	0 degs
12	.01276	-60.92	Pk	17.6	.1	11.8	-31.42	-13	-18.42	0-360	Flat
6	.01283	-61.82	Pk	17.5	.1	11.8	-32.42	-13	-19.42	0-360	90 degs
13	.16717	-57.75	Pk	10.4	.1	11.8	-35.45	-13	-22.45	0-360	Flat
2	.18213	-58.56	Pk	10.3	.1	11.8	-36.36	-13	-23.36	0-360	0 degs
7	.29484	-62.42	Pk	10.2	.1	11.8	-40.32	-13	-27.32	0-360	90 degs
8	8.14836	-86.1	Pk	10.8	.6	11.8	-62.9	-13	-49.9	0-360	90 degs
14	8.15943	-90.51	Pk	10.8	.6	11.8	-67.31	-13	-54.31	0-360	Flat
3	8.16681	-85.93	Pk	10.8	.6	11.8	-62.73	-13	-49.73	0-360	0 degs
9	13.56013	-80.63	Pk	10.8	.8	11.8	-57.23	-13	-44.23	0-360	90 degs
10	23.19211	-79.8	Pk	9.8	1	11.8	-57.2	-13	-44.2	0-360	90 degs
4	23.62741	-85.53	Pk	9.7	1	11.8	-63.03	-13	-50.03	0-360	0 degs
15	24.10329	-81.51	Pk	9.6	1	11.8	-59.11	-13	-46.11	0-360	Flat
5	29.48923	-78.9	Pk	7.9	1.1	11.8	-58.1	-13	-45.1	0-360	0 degs
11	29.51505	-80.66	Pk	7.9	1.1	11.8	-59.86	-13	-46.86	0-360	90 degs

Pk - Peak detector

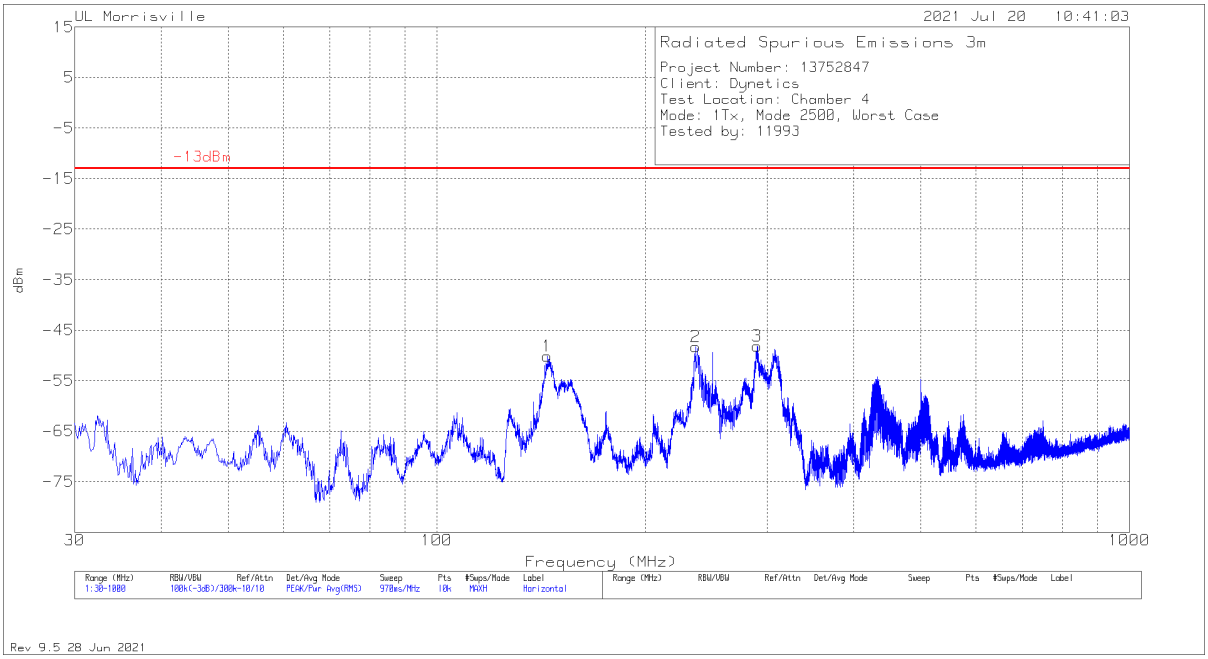
MODE 3 WORST-CASE <30MHz

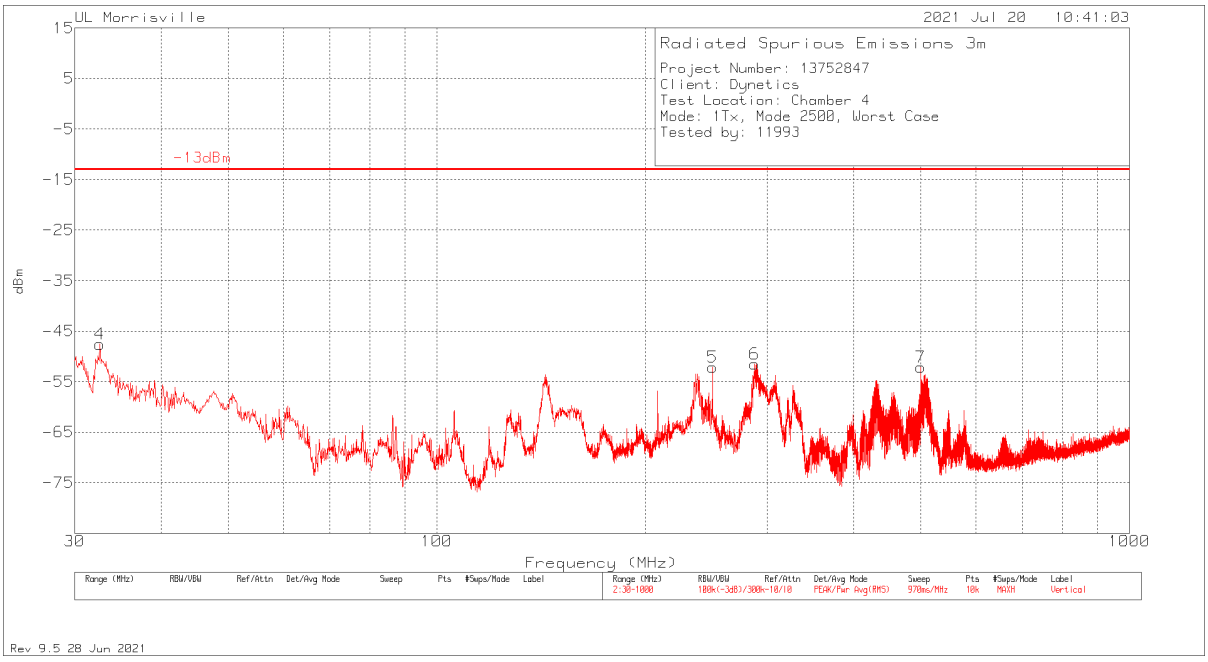


Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0059 (dB/m)	Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Loop Angle
1	.00907	-59.84	Pk	19.8	.1	11.8	-28.14	-13	-15.14	0-360	0 degs
10	.01042	-61.4	Pk	18.7	.1	11.8	-30.8	-13	-17.8	0-360	Flat
5	.01653	-59.91	Pk	15.8	.1	11.8	-32.21	-13	-19.21	0-360	90 degs
6	.16403	-56.65	Pk	10.4	.1	11.8	-34.35	-13	-21.35	0-360	90 degs
2	.17882	-58.36	Pk	10.3	.1	11.8	-36.16	-13	-23.16	0-360	0 degs
11	.31099	-61.55	Pk	10.2	.1	11.8	-39.45	-13	-26.45	0-360	Flat
3	1.75533	-77.37	Pk	10.6	.3	11.8	-54.67	-13	-41.67	0-360	0 degs
7	13.56013	-84	Pk	10.8	.8	11.8	-60.6	-13	-47.6	0-360	90 degs
12	20.86435	-84.46	Pk	10.2	1	11.8	-61.46	-13	-48.46	0-360	Flat
8	23.229	-81.28	Pk	9.8	1	11.8	-58.68	-13	-45.68	0-360	90 degs
4	29.1314	-76.76	Pk	8	1.1	11.8	-55.86	-13	-42.86	0-360	0 degs
9	29.26051	-81.88	Pk	8	1.1	11.8	-60.98	-13	-47.98	0-360	90 degs
13	29.30478	-80.2	Pk	8	1.1	11.8	-59.3	-13	-46.3	0-360	Flat

Pk - Peak detector

MODE 1 WORST-CASE 30-1000 MHz

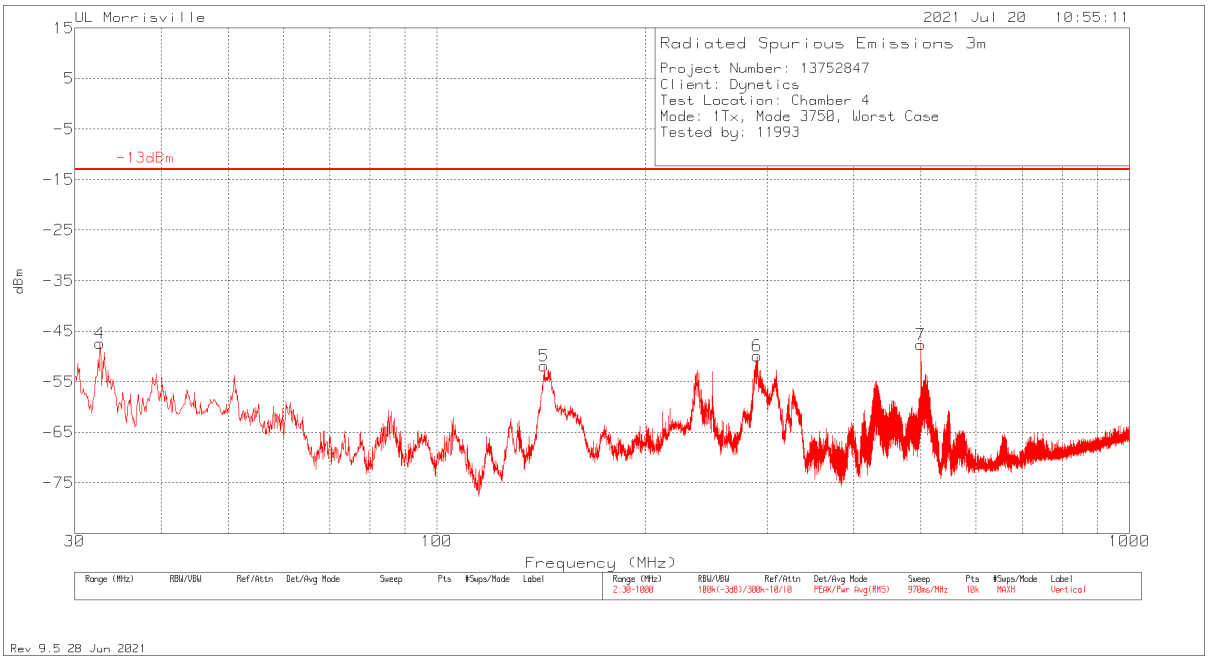




Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0074 (dB/m)	Amp/Cbl (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	Limit (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	32.619	-52.3	Pk	24.1	-31.3	.1	11.8	-47.6	-13	-34.6	0-360	100	V
1	144.363	-49.74	Pk	17.1	-29.6	.3	11.8	-50.14	-13	-37.14	0-360	100	H
2	236.416	-47.66	Pk	16	-28.7	.3	11.8	-48.26	-13	-35.26	0-360	100	H
5	249.996	-51.77	Pk	16.1	-28.6	.3	11.8	-52.17	-13	-39.17	0-360	100	V
6	287.438	-53.04	Pk	17.8	-28.4	.3	11.8	-51.54	-13	-38.54	0-360	100	V
3	290.154	-49.69	Pk	17.8	-28.4	.3	11.8	-48.19	-13	-35.19	0-360	100	H
7	500.062	-59.4	Pk	22	-27	.5	11.8	-52.1	-13	-39.1	0-360	100	V

Pk - Peak detector

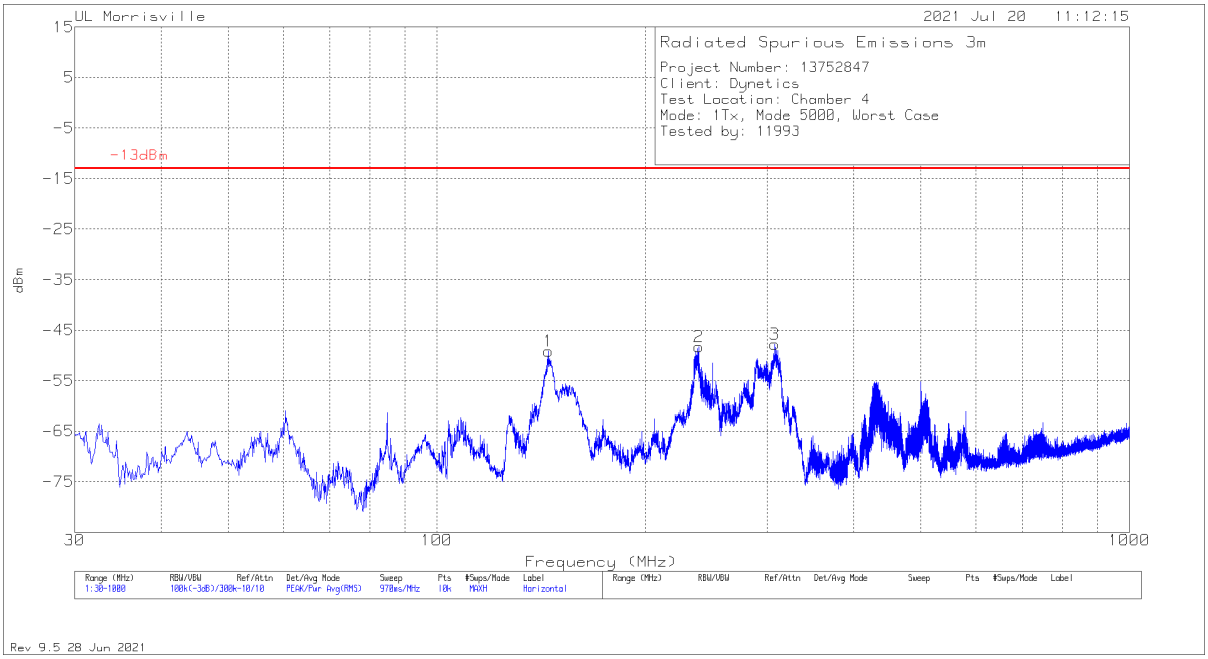
MODE 2 WORST-CASE 30-1000 MHz

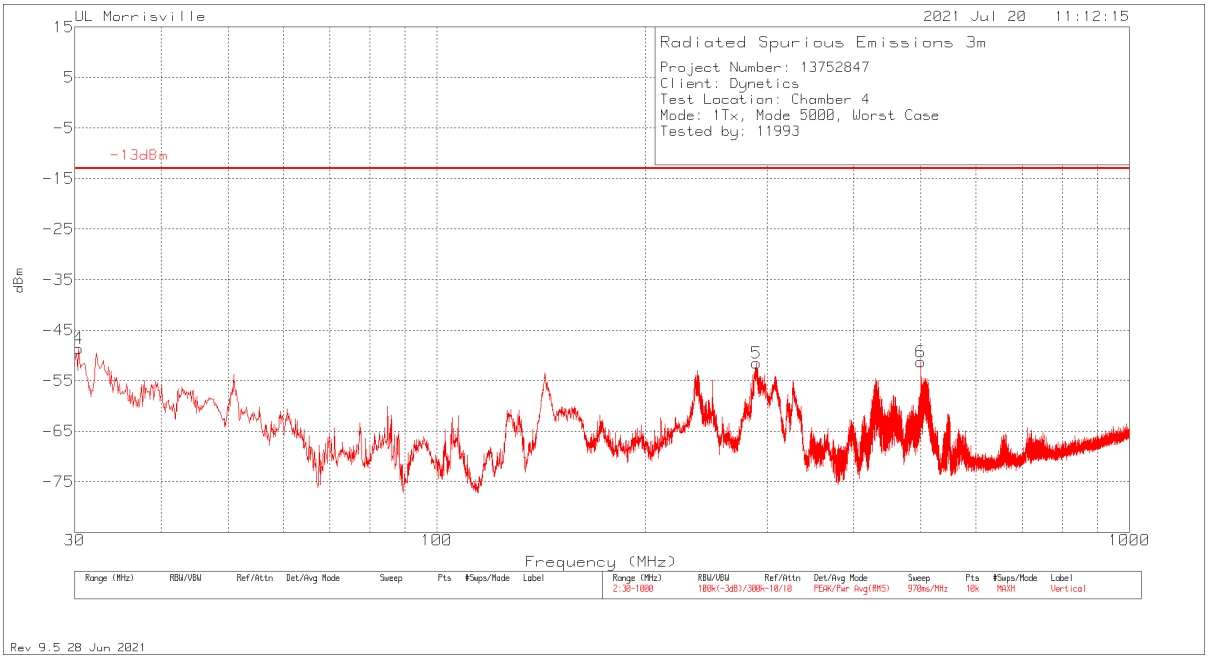


Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0074 (dB/m)	Amp/Cbl (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	Limit (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	32.619	-52.1	Pk	24.1	-31.3	.1	11.8	-47.4	-13	-34.4	0-360	100	V
5	142.811	-51.53	Pk	17.1	-29.6	.3	11.8	-51.93	-13	-38.93	0-360	100	V
1	145.139	-49.25	Pk	17	-29.6	.3	11.8	-49.75	-13	-36.75	0-360	100	H
2	236.028	-48.27	Pk	16	-28.7	.3	11.8	-48.87	-13	-35.87	0-360	100	H
6	290.251	-51.39	Pk	17.8	-28.4	.3	11.8	-49.89	-13	-36.89	0-360	100	V
3	290.833	-47.4	Pk	17.8	-28.4	.3	11.8	-45.9	-13	-32.9	0-360	100	H
7	500.062	-54.98	Pk	22	-27	.5	11.8	-47.68	-13	-34.68	0-360	100	V

Pk - Peak detector

MODE 3 WORST-CASE 30-1000 MHz

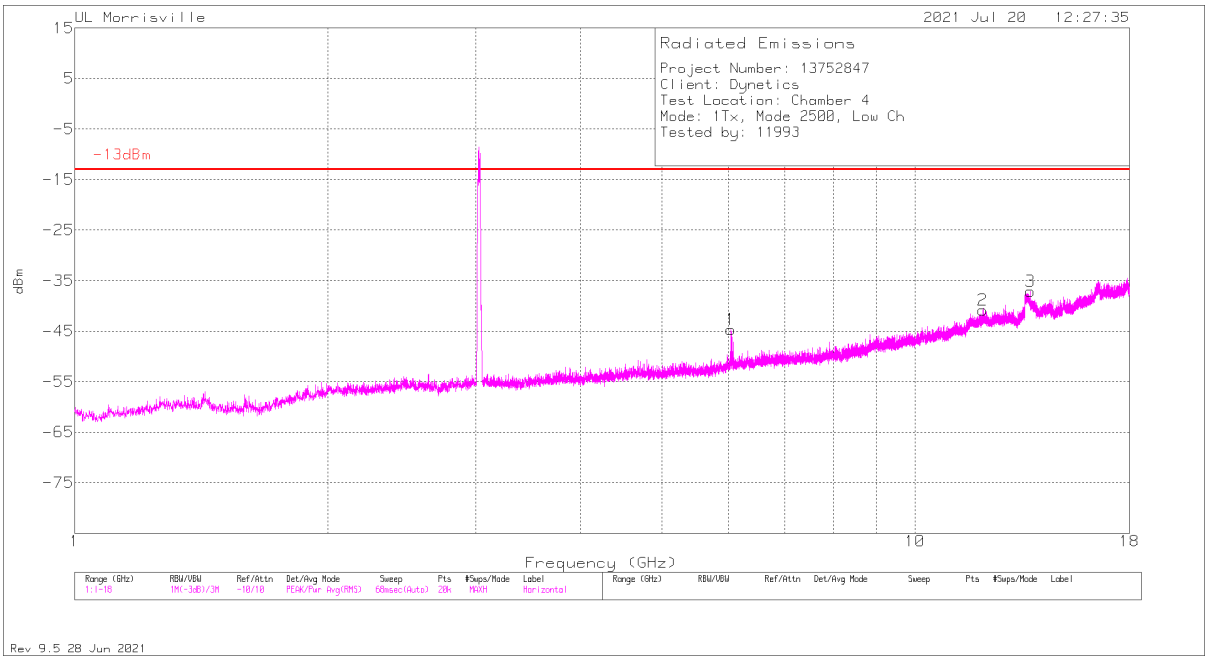


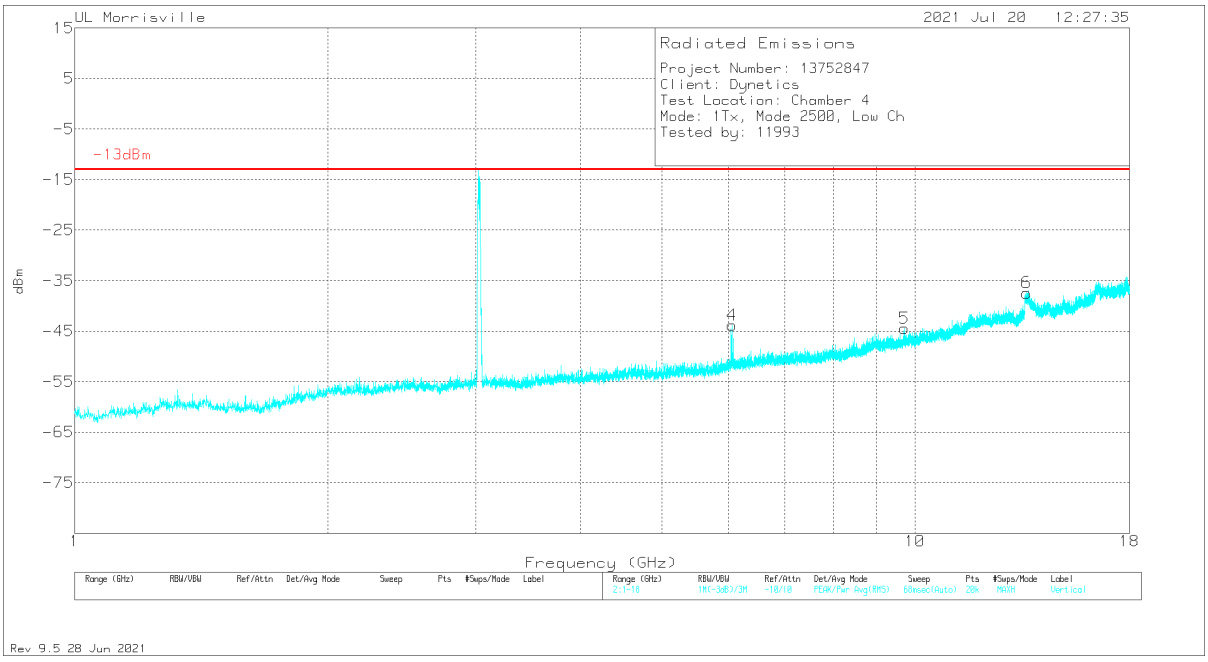


Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0074 (dB/m)	Amp/Cbl (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	Limit (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	30.388	-54.9	Pk	25.7	-31.3	.1	11.8	-48.6	-13	-35.6	0-360	100	V
1	144.945	-48.65	Pk	17	-29.6	.3	11.8	-49.15	-13	-36.15	0-360	100	H
2	238.744	-47.74	Pk	16.1	-28.7	.3	11.8	-48.24	-13	-35.24	0-360	100	H
5	289.475	-53.05	Pk	17.8	-28.4	.3	11.8	-51.55	-13	-38.55	0-360	100	V
3	307.614	-49.94	Pk	18.3	-28.3	.3	11.8	-47.84	-13	-34.84	0-360	100	H
6	500.062	-58.54	Pk	22	-27	.5	11.8	-51.24	-13	-38.24	0-360	100	V
4	30.388	-54.9	Pk	25.7	-31.3	.1	11.8	-48.6	-13	-35.6	0-360	100	V

Pk - Peak detector

MODE 1 LOW CHANNEL 1-18GHz



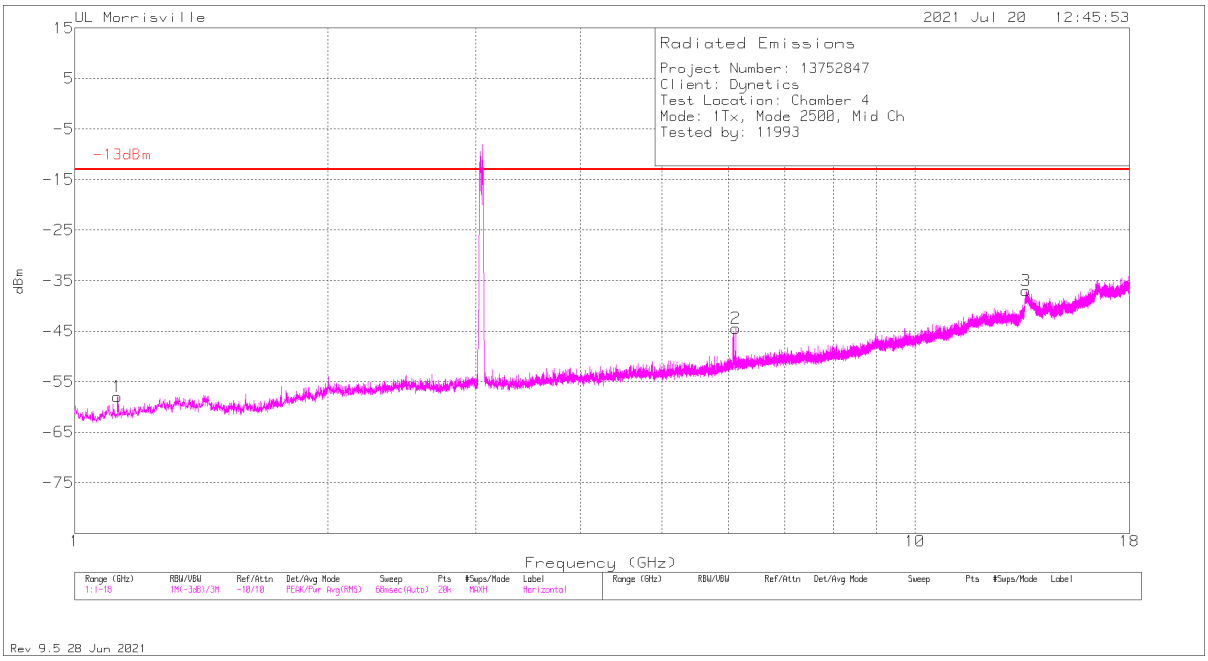


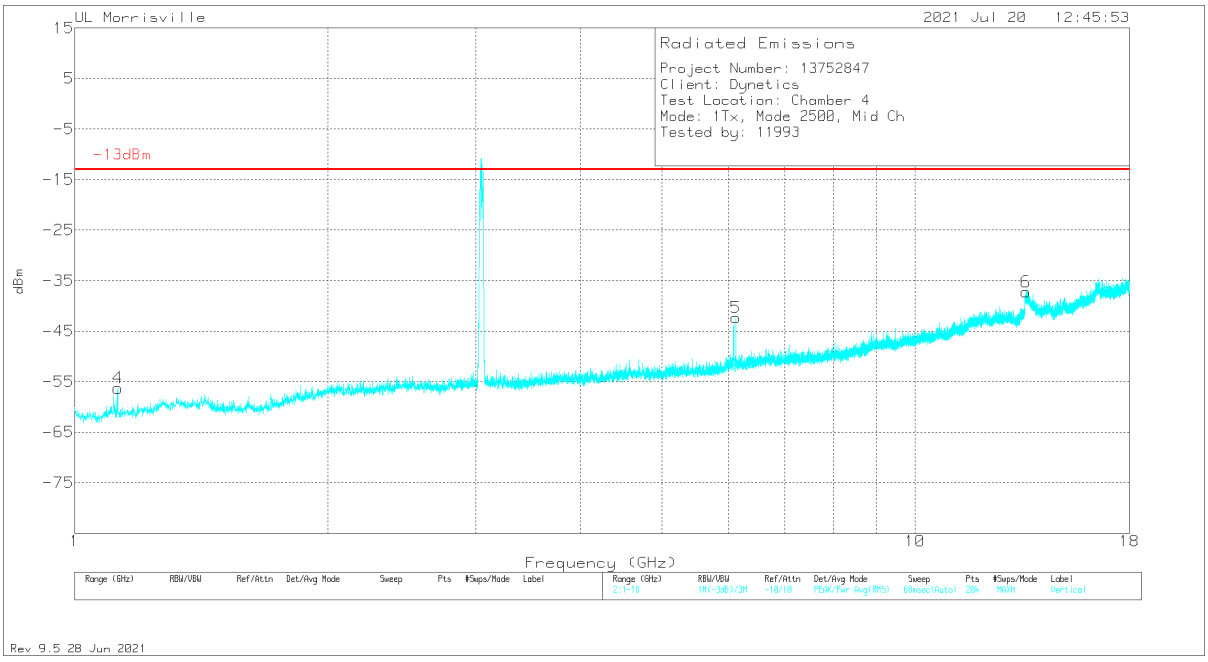
Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	6.036	-60.54	Pk	35.2	-31.1	11.8	-44.64	-13	-31.64	0-360	300	H
4	6.0564	-59.84	Pk	35.2	-31	11.8	-43.84	-13	-30.84	0-360	100	V
5	9.72057	-65.8	Pk	36.7	-27.1	11.8	-44.4	-13	-31.4	0-360	200	V
2	12.04265	-66.68	Pk	38.7	-24.7	11.8	-40.88	-13	-27.88	0-360	200	H
6	13.59043	-64.32	Pk	38.7	-23.6	11.8	-37.42	-13	-24.42	0-360	200	V
3	13.71282	-64	Pk	38.5	-23.4	11.8	-37.1	-13	-24.1	0-360	200	H

Pk - Peak detector

MODE 1 MID CHANNEL 1-18GHz



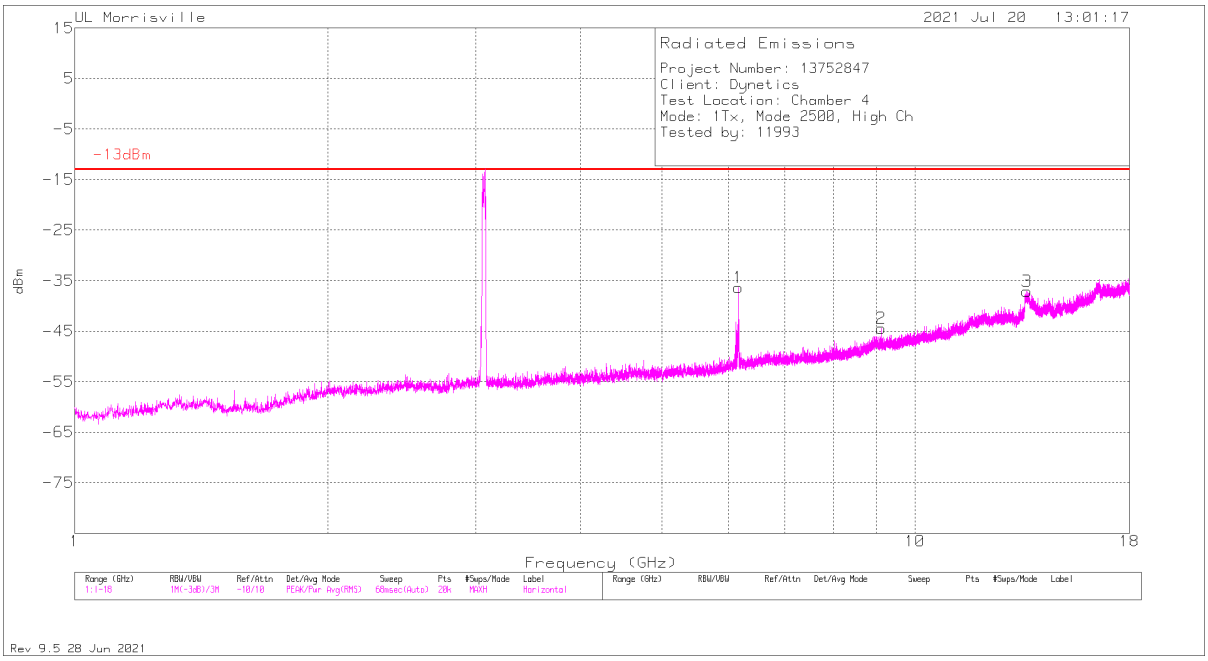


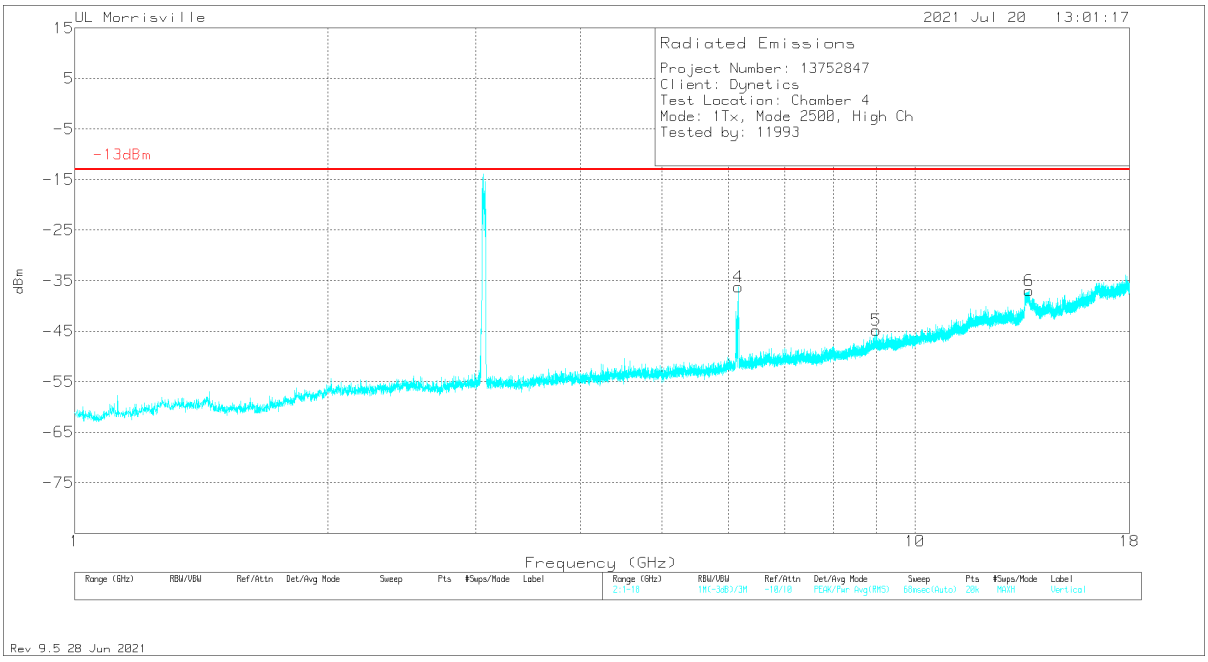
Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.12409	-60.91	Pk	27.4	-36.3	11.8	-58.01	-13	-45.01	0-360	100	H
4	1.12494	-59.19	Pk	27.4	-36.3	11.8	-56.29	-13	-43.29	0-360	200	V
5	6.1193	-58.66	Pk	35.3	-30.8	11.8	-42.36	-13	-29.36	0-360	200	V
2	6.12015	-60.72	Pk	35.3	-30.8	11.8	-44.42	-13	-31.42	0-360	100	H
3	13.54963	-64.07	Pk	38.7	-23.4	11.8	-36.97	-13	-23.97	0-360	100	H
6	13.55218	-64.25	Pk	38.7	-23.5	11.8	-37.25	-13	-24.25	0-360	300	V

Pk - Peak detector

MODE 1 HIGH CHANNEL 1-18GHz



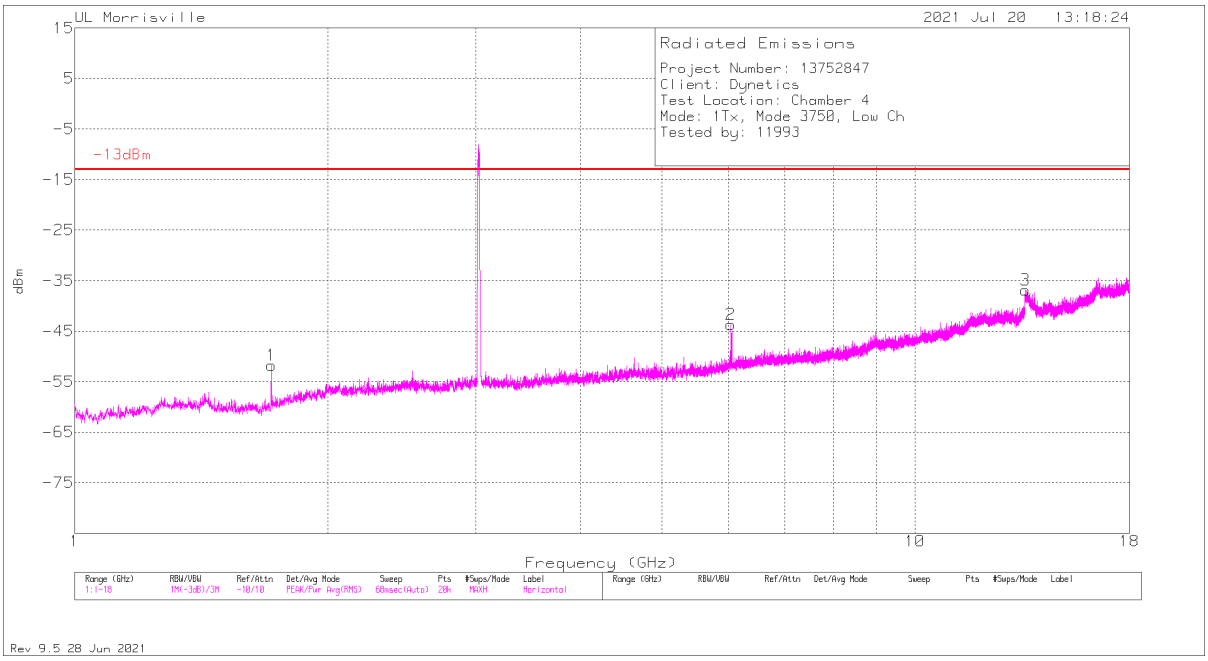


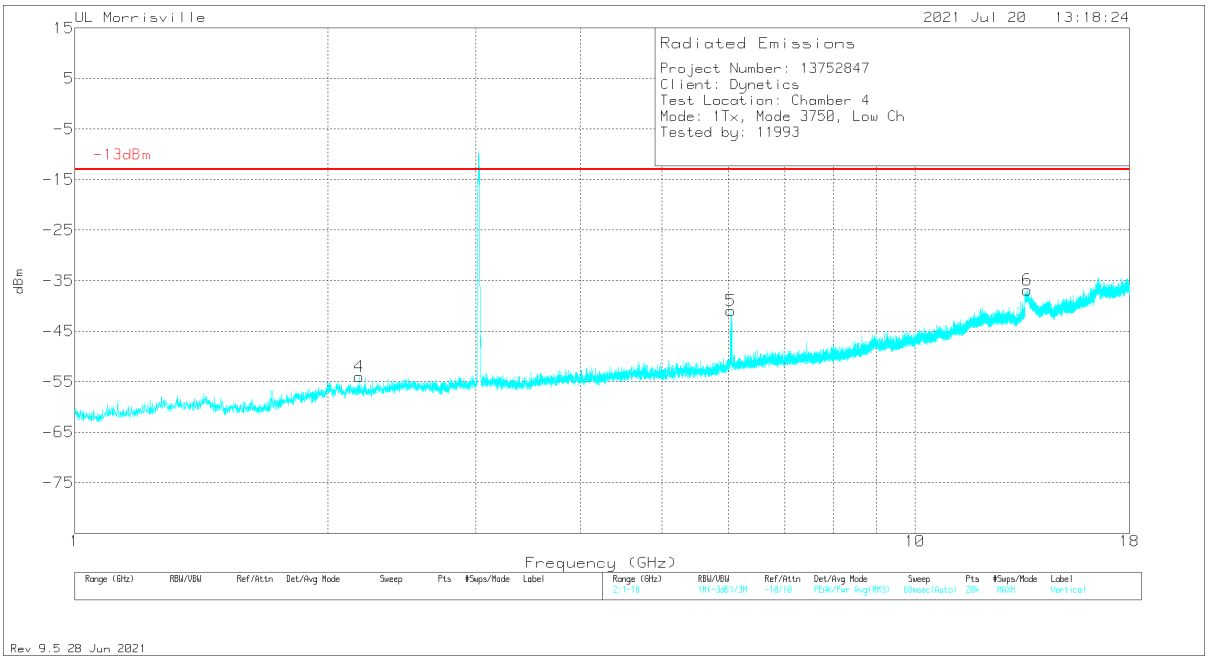
Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	6.16519	-53.02	Pk	35.3	-30.5	11.8	-36.42	-13	-23.42	0-360	100	H
4	6.16774	-52.88	Pk	35.3	-30.5	11.8	-36.28	-13	-23.28	0-360	300	V
5	8.98961	-66.04	Pk	35.9	-26.5	11.8	-44.84	-13	-31.84	0-360	300	V
2	9.12305	-65.46	Pk	36.1	-26.9	11.8	-44.46	-13	-31.46	0-360	100	H
3	13.59213	-64.02	Pk	38.7	-23.6	11.8	-37.12	-13	-24.12	0-360	100	H
6	13.66352	-64	Pk	38.6	-23.4	11.8	-37	-13	-24	0-360	300	V

Pk - Peak detector

MODE 2 LOW CHANNEL 1-18GHz



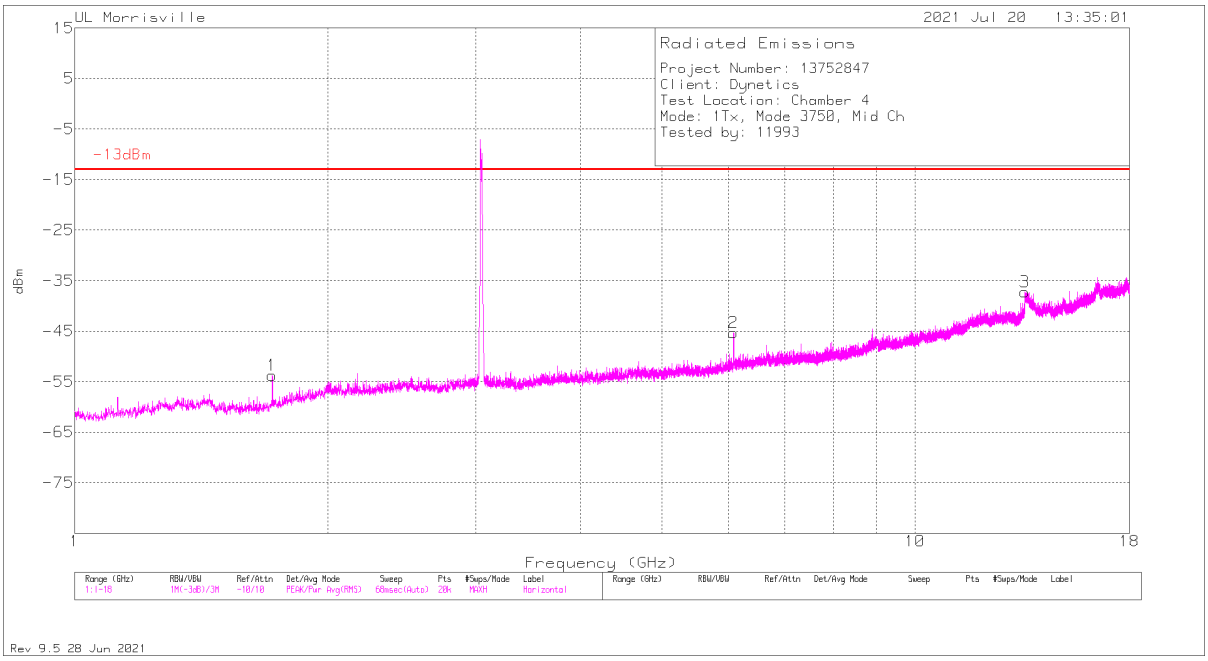


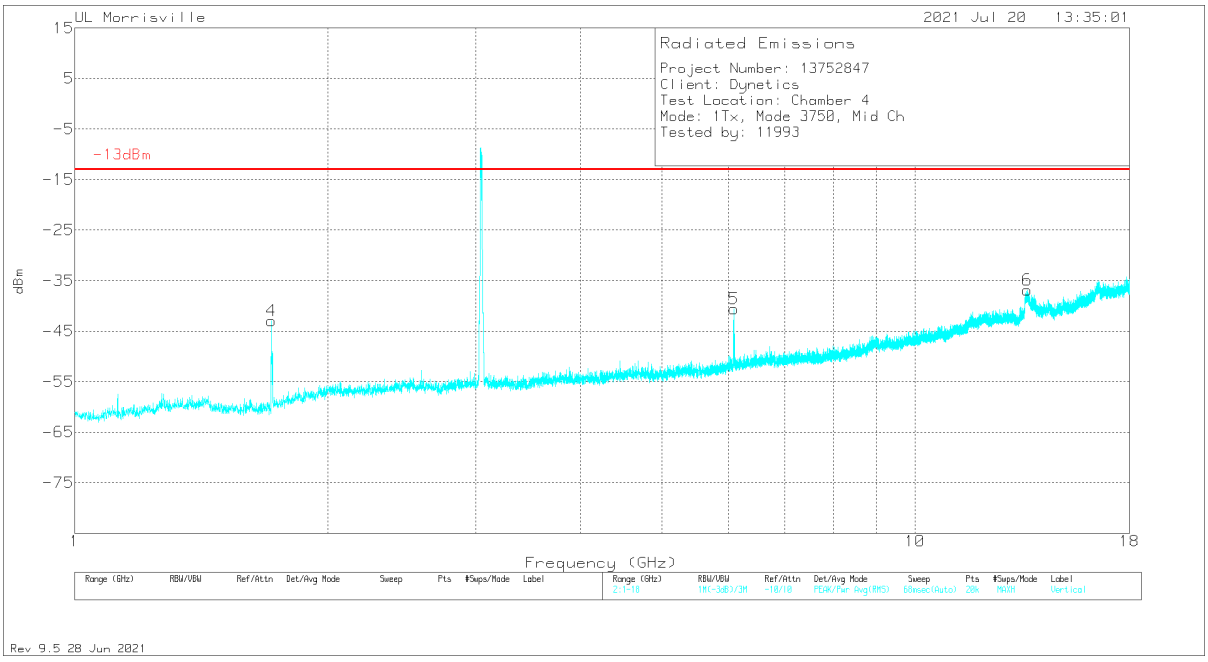
Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.71396	-55.63	Pk	28.7	-36.6	11.8	-51.73	-13	-38.73	0-360	100	H
4	2.17889	-60.75	Pk	31.7	-36.7	11.8	-53.95	-13	-40.95	0-360	200	V
5	6.0326	-56.88	Pk	35.2	-31.1	11.8	-40.98	-13	-27.98	0-360	300	V
2	6.036	-59.6	Pk	35.2	-31.1	11.8	-43.7	-13	-30.7	0-360	100	H
3	13.52838	-63.91	Pk	38.7	-23.4	11.8	-36.81	-13	-23.81	0-360	200	H
6	13.61508	-63.92	Pk	38.7	-23.5	11.8	-36.92	-13	-23.92	0-360	300	V

Pk - Peak detector

MODE 2 MID CHANNEL 1-18GHz



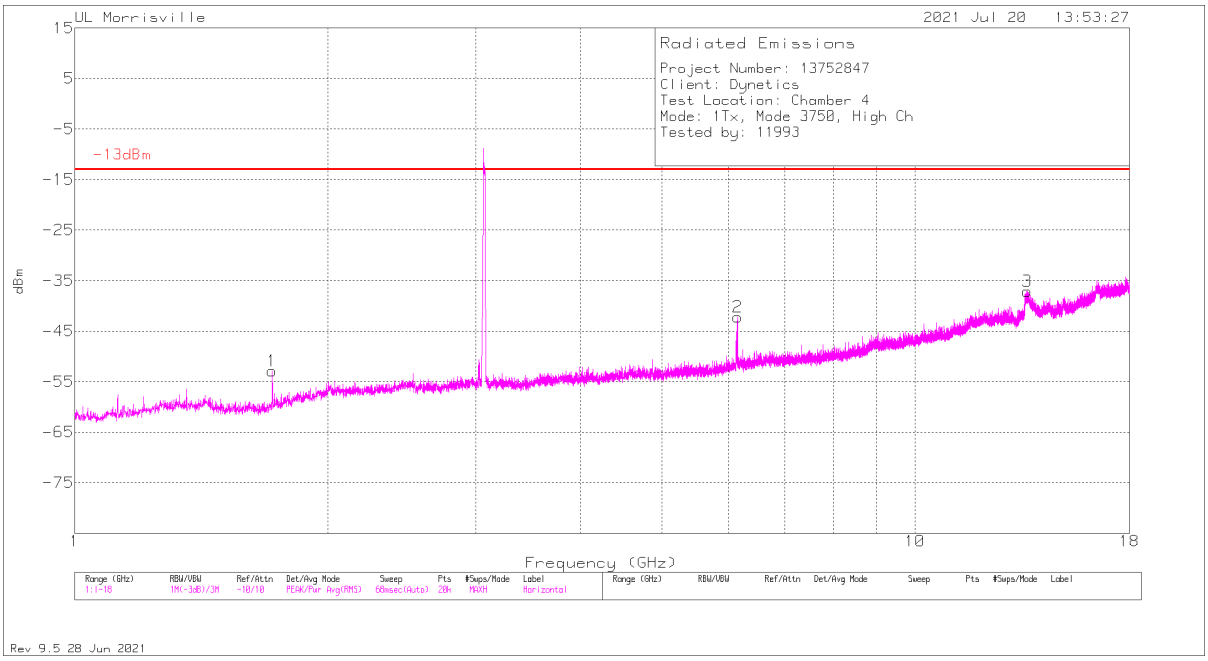


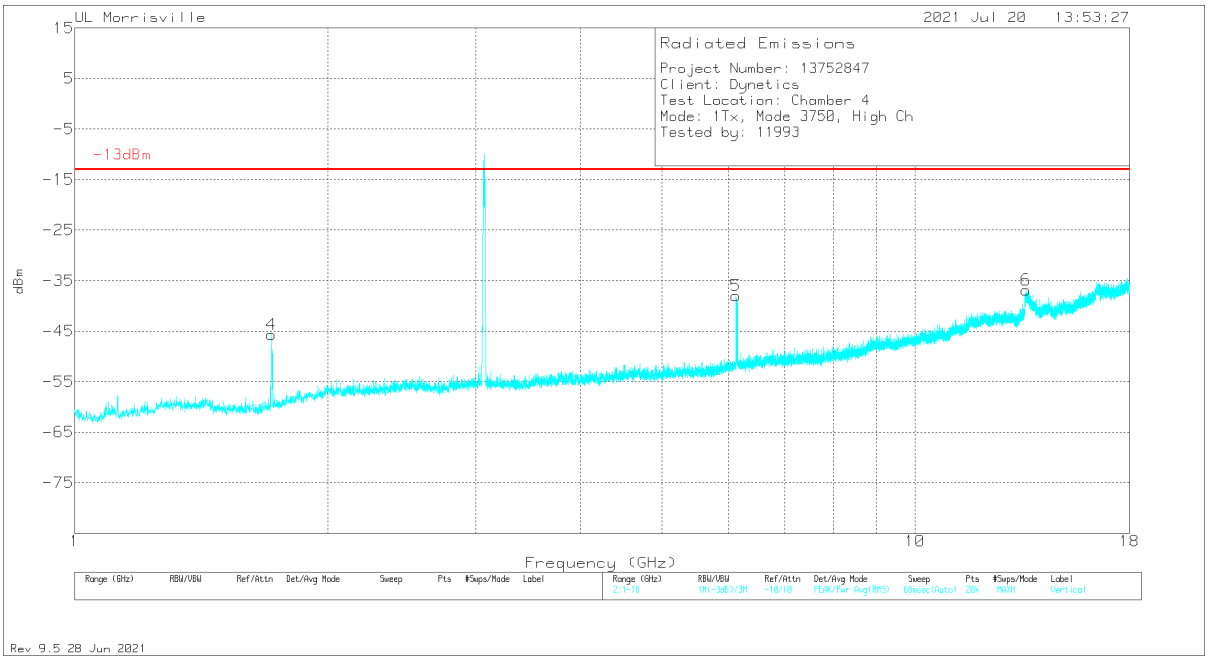
Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	1.71396	-46.86	Pk	28.7	-36.6	11.8	-42.96	-13	-29.96	0-360	300	V
1	1.71821	-57.8	Pk	28.8	-36.6	11.8	-53.8	-13	-40.8	0-360	200	H
2	6.08105	-61.42	Pk	35.2	-30.9	11.8	-45.32	-13	-32.32	0-360	200	H
5	6.08615	-56.69	Pk	35.2	-30.9	11.8	-40.59	-13	-27.59	0-360	300	V
3	13.50968	-64.11	Pk	38.7	-23.6	11.8	-37.21	-13	-24.21	0-360	100	H
6	13.60318	-63.76	Pk	38.7	-23.6	11.8	-36.86	-13	-23.86	0-360	300	V

Pk - Peak detector

MODE 2 HIGH CHANNEL 1-18GHz



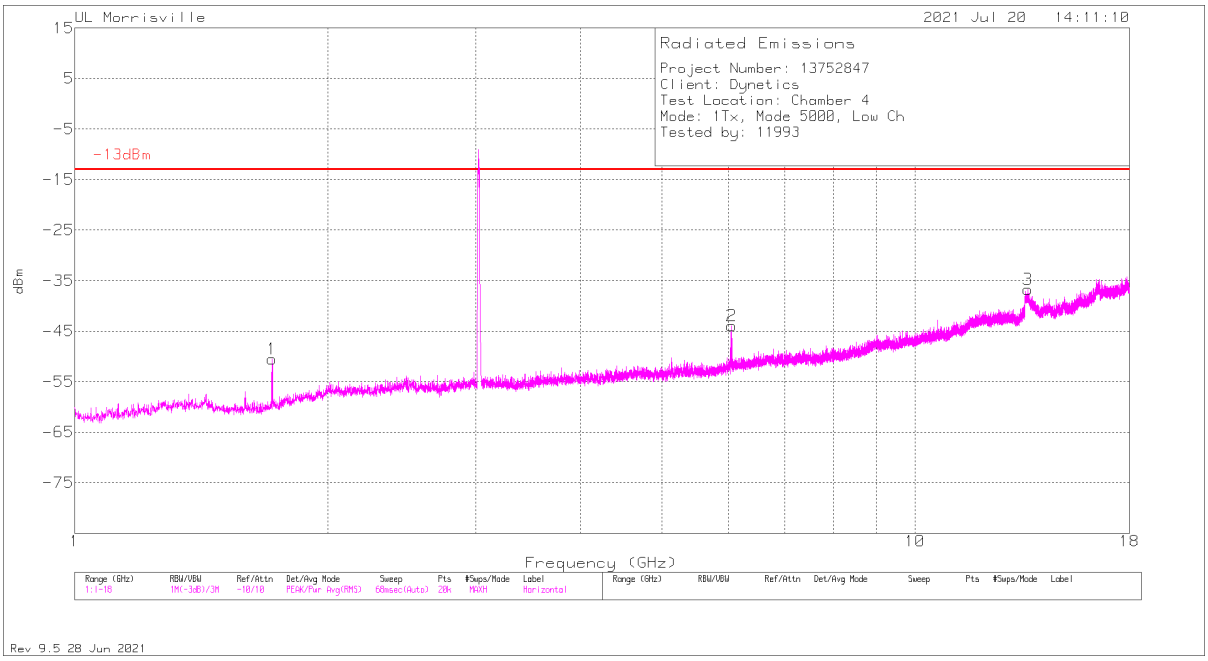


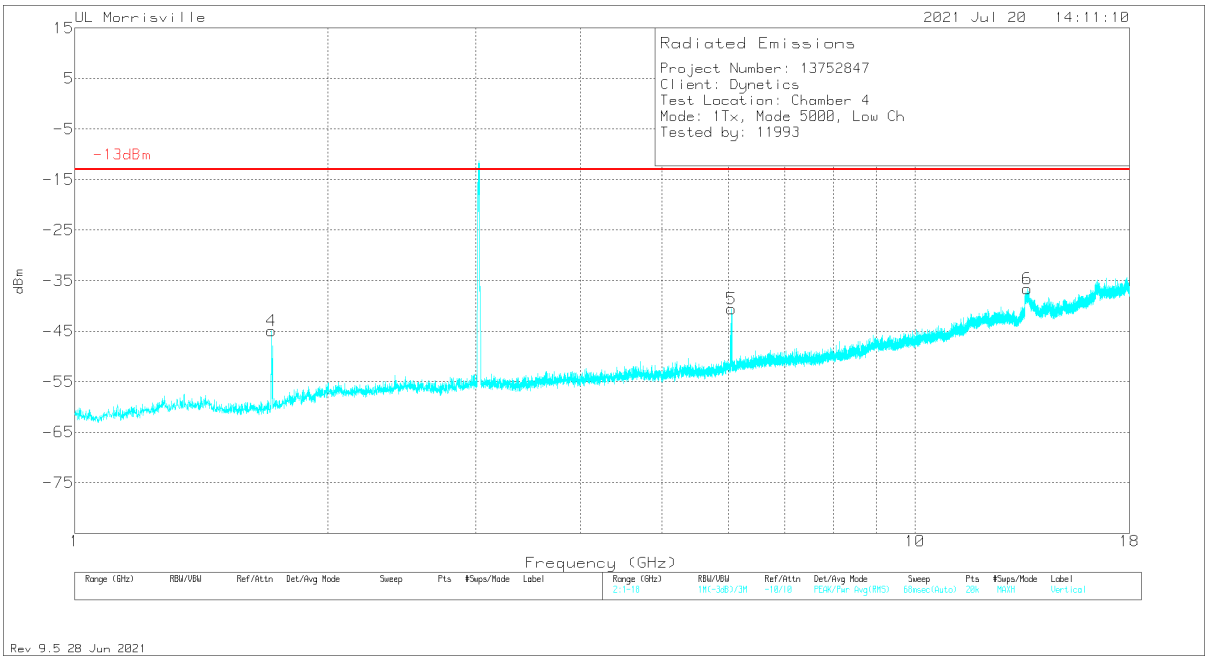
Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	1.71396	-49.63	Pk	28.7	-36.6	11.8	-45.73	-13	-32.73	0-360	200	V
1	1.71821	-56.86	Pk	28.8	-36.6	11.8	-52.86	-13	-39.86	0-360	200	H
5	6.1261	-54.27	Pk	35.3	-30.8	11.8	-37.97	-13	-24.97	0-360	200	V
2	6.1533	-58.72	Pk	35.3	-30.6	11.8	-42.22	-13	-29.22	0-360	100	H
6	13.56153	-63.77	Pk	38.7	-23.6	11.8	-36.87	-13	-23.87	0-360	200	V
3	13.59723	-63.87	Pk	38.6	-23.6	11.8	-37.07	-13	-24.07	0-360	200	H

Pk - Peak detector

MODE 3 LOW CHANNEL 1-18GHz



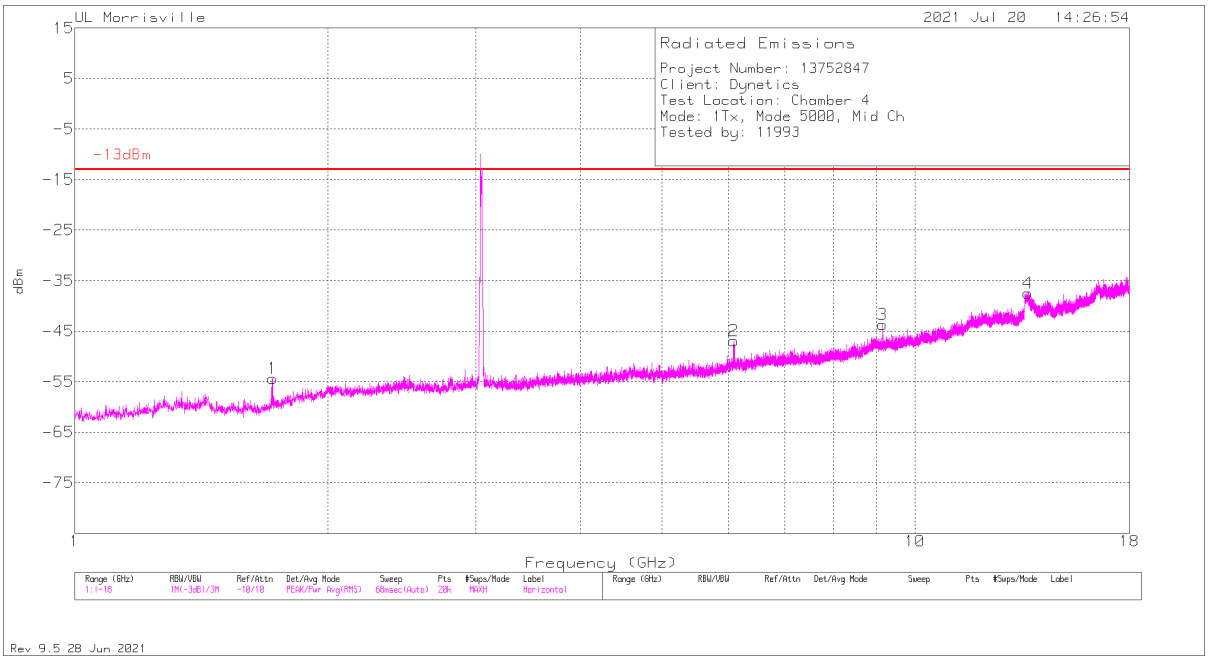


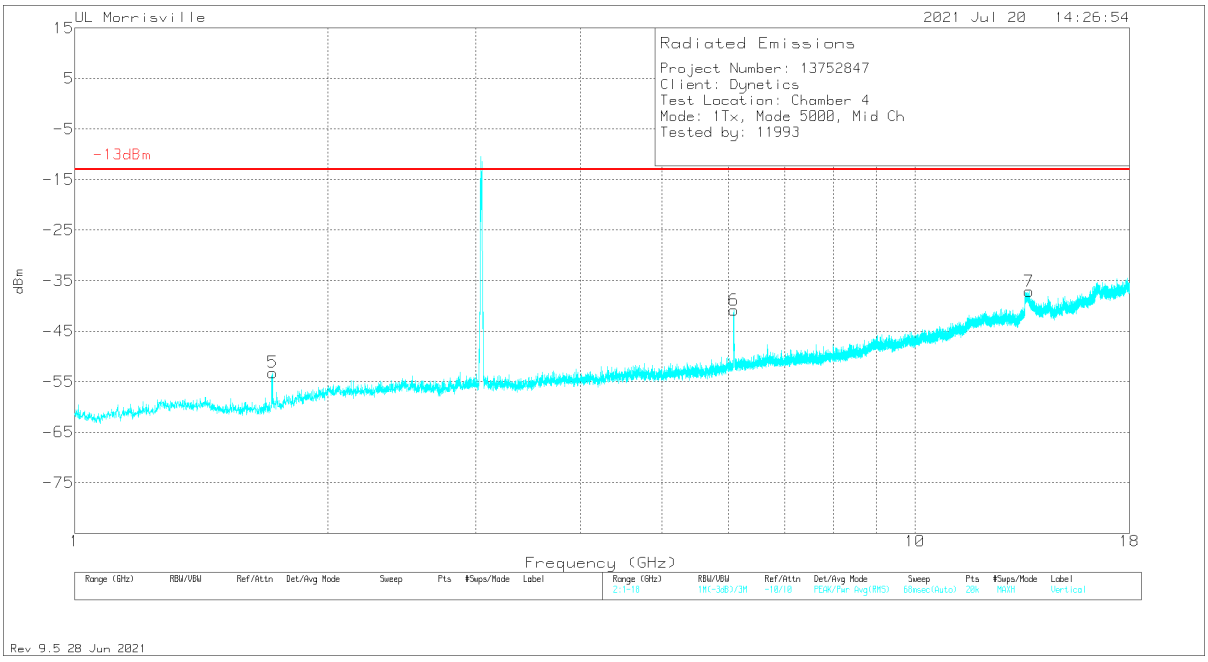
Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	1.71396	-48.83	Pk	28.7	-36.6	11.8	-44.93	-13	-31.93	0-360	200	V
1	1.71821	-54.52	Pk	28.8	-36.6	11.8	-50.52	-13	-37.52	0-360	100	H
5	6.05045	-56.55	Pk	35.2	-31	11.8	-40.55	-13	-27.55	0-360	200	V
2	6.053	-59.98	Pk	35.2	-31	11.8	-43.98	-13	-30.98	0-360	100	H
6	13.61508	-63.67	Pk	38.7	-23.5	11.8	-36.67	-13	-23.67	0-360	200	V
3	13.62783	-63.88	Pk	38.7	-23.4	11.8	-36.78	-13	-23.78	0-360	100	H

Pk - Peak detector

MODE 3 MID CHANNEL 1-18GHz

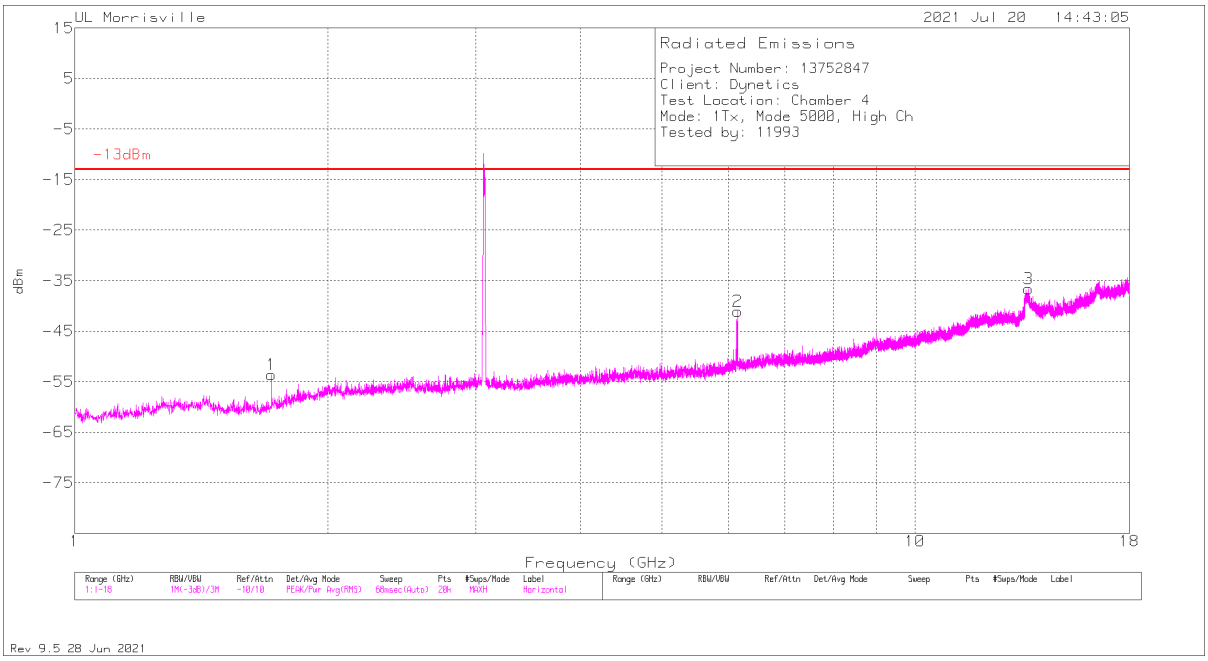


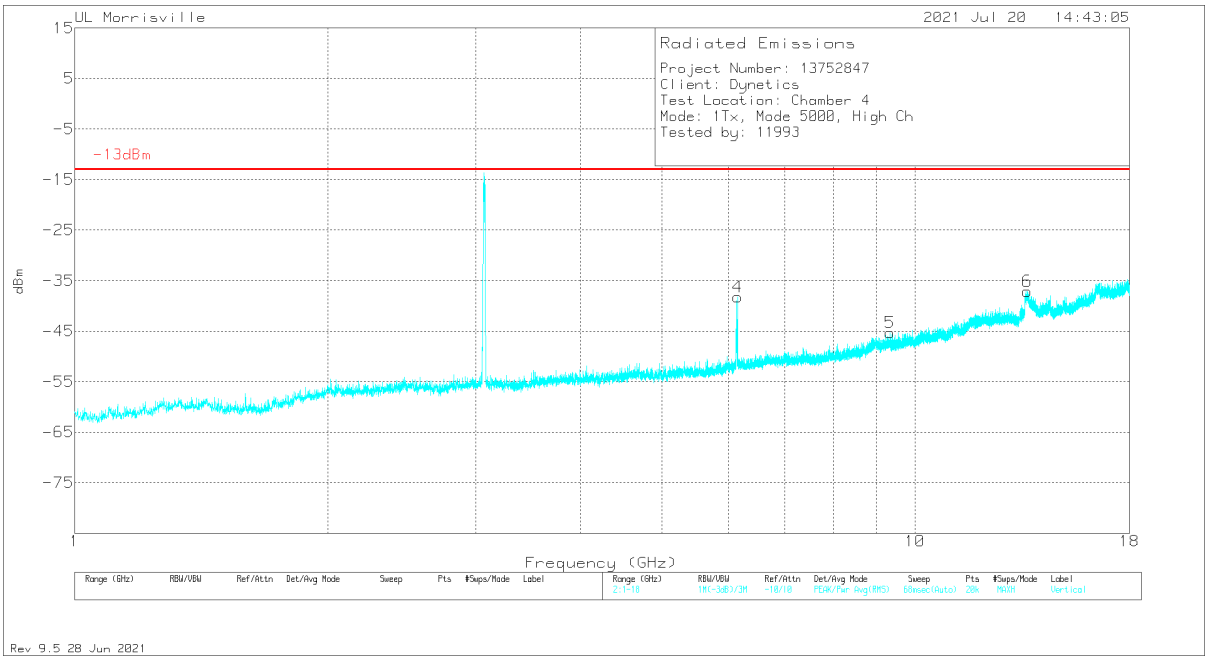


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.71906	-58.38	Pk	28.8	-36.6	11.8	-54.38	-13	-41.38	0-360	100	H
5	1.71906	-57.19	Pk	28.8	-36.6	11.8	-53.19	-13	-40.19	0-360	300	V
2	6.08445	-62.97	Pk	35.2	-30.9	11.8	-46.87	-13	-33.87	0-360	100	H
6	6.0887	-56.88	Pk	35.2	-30.9	11.8	-40.78	-13	-27.78	0-360	300	V
3	9.1562	-64.83	Pk	36.2	-26.9	11.8	-43.73	-13	-30.73	0-360	100	H
4	13.63378	-64.63	Pk	38.7	-23.4	11.8	-37.53	-13	-24.53	0-360	200	H

Pk - Peak detector

MODE 3 HIGH CHANNEL 1-18GHz





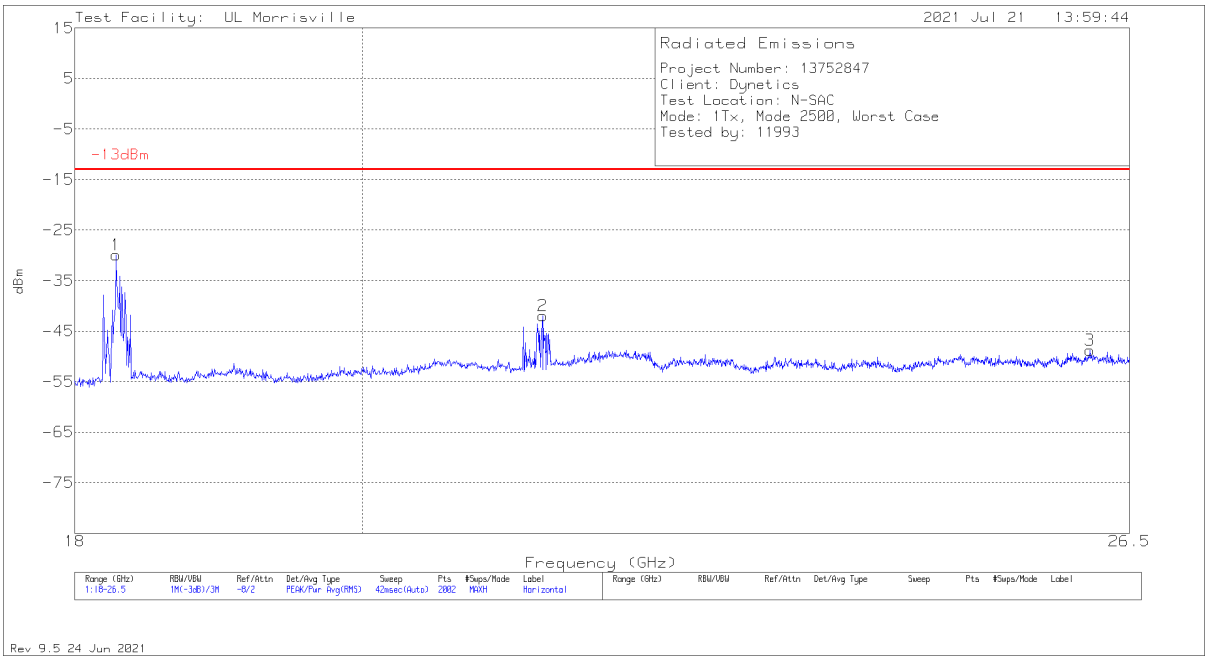
Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.71481	-57.55	Pk	28.7	-36.6	11.8	-53.65	-13	-40.65	0-360	100	H
4	6.155	-54.69	Pk	35.3	-30.6	11.8	-38.19	-13	-25.19	0-360	300	V
2	6.15585	-57.6	Pk	35.3	-30.6	11.8	-41.1	-13	-28.1	0-360	100	H
5	9.34574	-66.95	Pk	36.4	-26.6	11.8	-45.35	-13	-32.35	0-360	300	V
6	13.59383	-63.98	Pk	38.7	-23.6	11.8	-37.08	-13	-24.08	0-360	200	V
3	13.64908	-63.7	Pk	38.7	-23.4	11.8	-36.6	-13	-23.6	0-360	100	H

Pk - Peak detector

MODE 1 WORST-CASE >18GHz

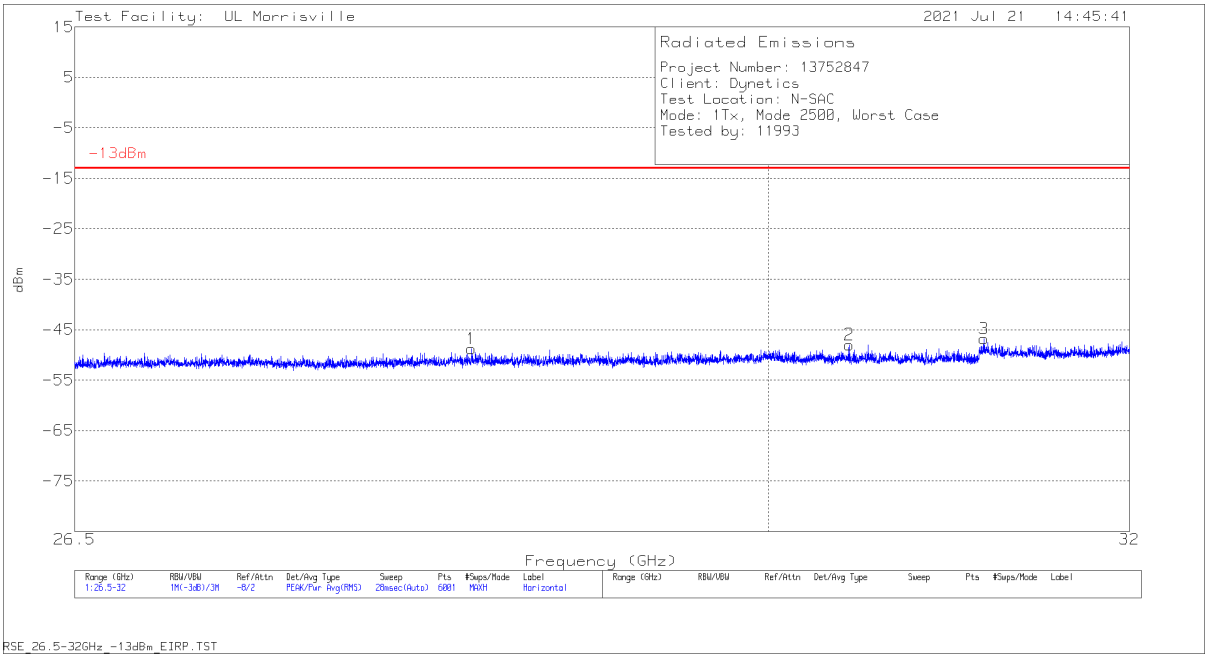
18 to 26 GHz

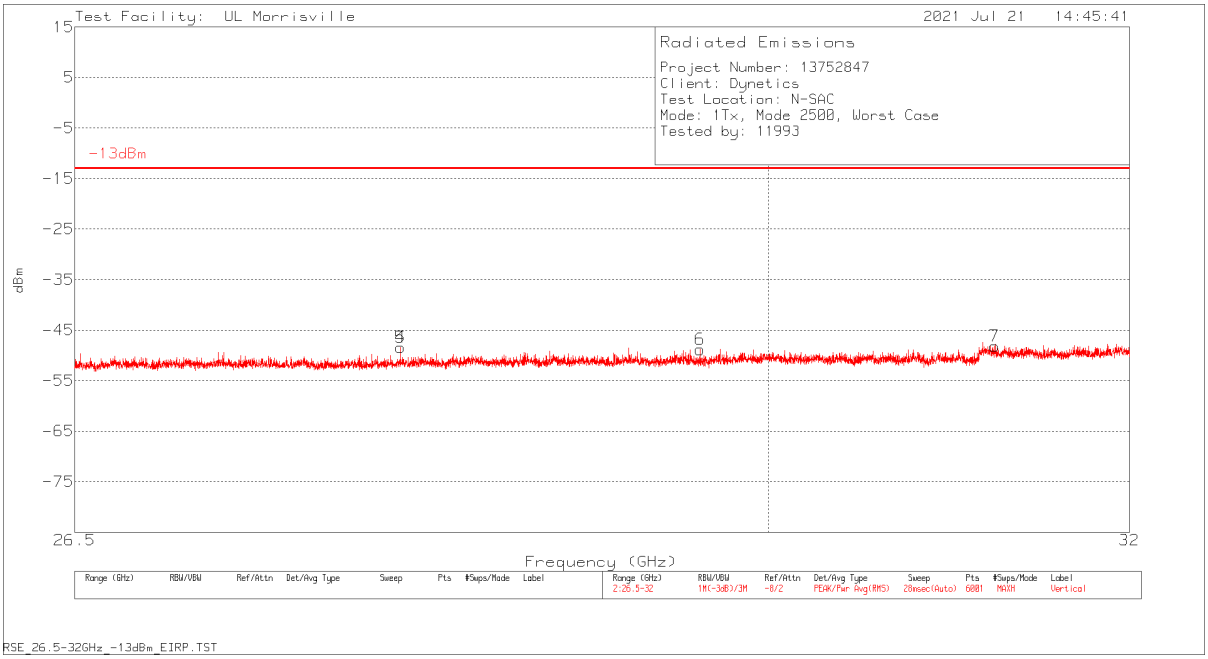


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0063 (dB/m)	Amp/Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	18.27186	-48.39	Pk	33.1	-40.3	11.8	-43.79	-13	-30.79	0-360	250	V
1	18.27611	-34.6	Pk	33.1	-40.2	11.8	-29.9	-13	-16.9	0-360	200	H
5	21.21989	-51.3	Pk	34.4	-41	11.8	-46.1	-13	-33.1	0-360	150	V
2	21.36857	-47.39	Pk	34.6	-41	11.8	-41.99	-13	-28.99	0-360	200	H
6	24.89855	-55.58	Pk	35.1	-40.2	11.8	-48.88	-13	-35.88	0-360	150	V
3	26.11769	-56.83	Pk	35.5	-39.2	11.8	-48.73	-13	-35.73	0-360	150	H

Pk - Peak detector

26 to 32 GHz



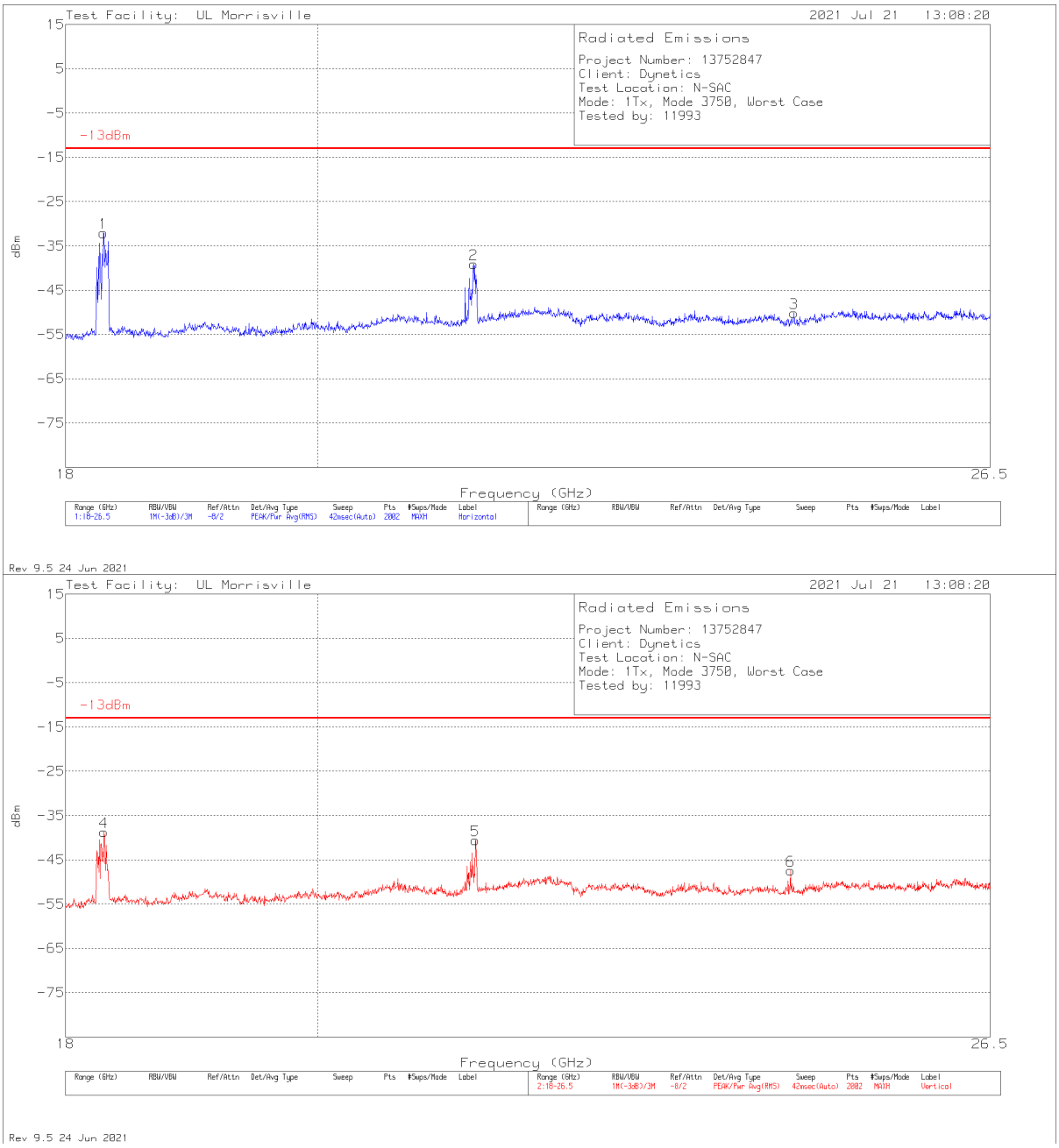


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0061 (dB/m)	Amp/Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	28.0895	-57.67	Pk	36.1	-38.6	11.8	-48.37	-13	-35.37	0-360	150	V
5	28.0895	-57.67	Pk	36.1	-38.6	11.8	-48.37	-13	-35.37	0-360	150	V
1	28.44883	-58.53	Pk	36.3	-38.4	11.8	-48.83	-13	-35.83	0-360	101	H
6	29.63408	-58.74	Pk	36.3	-38.2	11.8	-48.84	-13	-35.84	0-360	250	V
2	30.43708	-58.18	Pk	36.5	-38.1	11.8	-47.98	-13	-34.98	0-360	200	H
3	31.17959	-57.21	Pk	36.9	-38.3	11.8	-46.81	-13	-33.81	0-360	150	H
7	31.23734	-58.82	Pk	36.9	-38	11.8	-48.12	-13	-35.12	0-360	150	V

Pk - Peak detector

MODE 2 WORST-CASE >18GHz

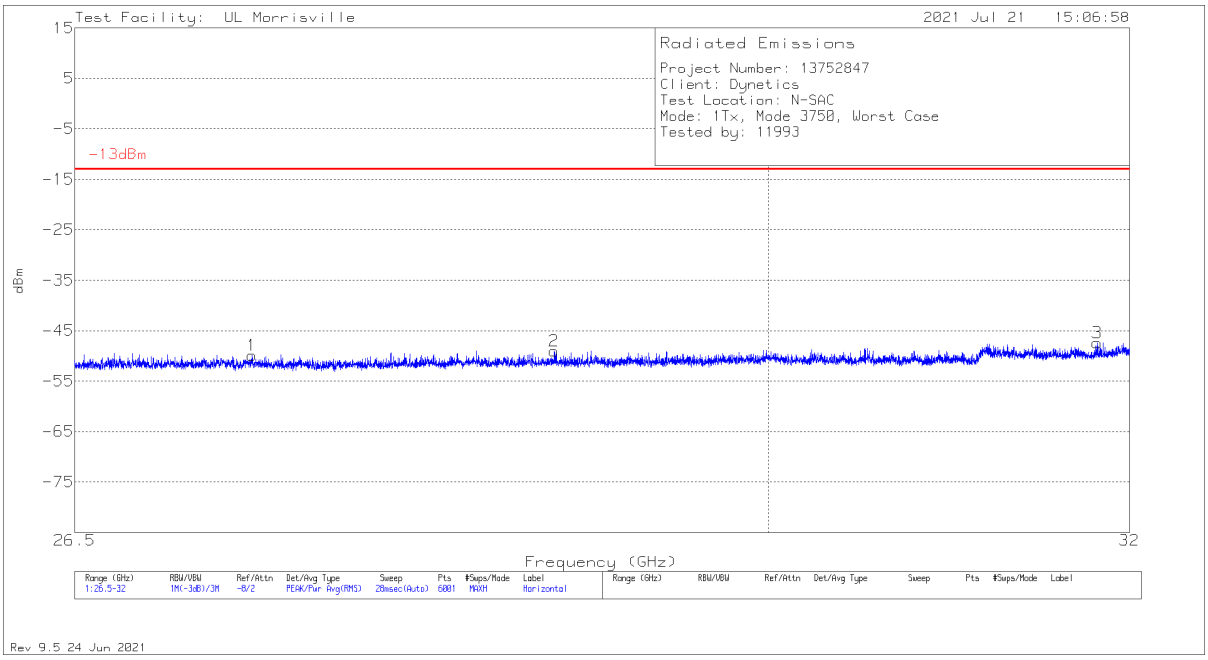
18 to 26 GHz

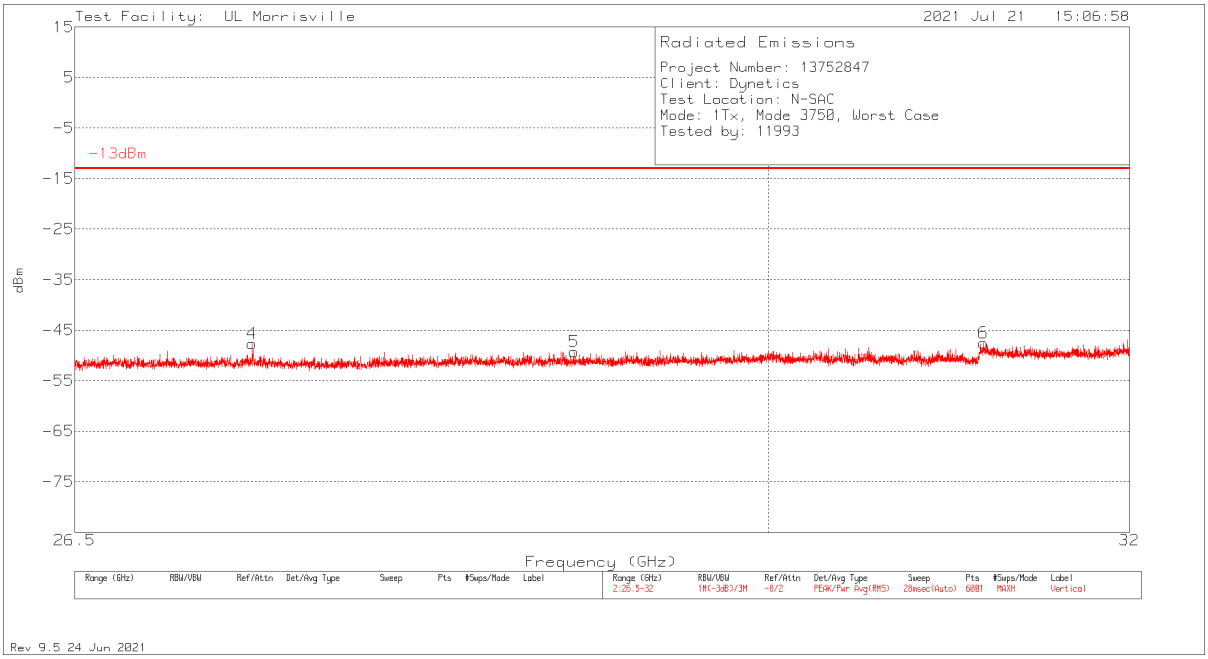


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0063 (dB/m)	Amp/Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	18.28886	-36.68	Pk	33.1	-40.3	11.8	-32.08	-13	-19.08	0-360	200	H
4	18.2931	-43.31	Pk	33.1	-40.3	11.8	-38.71	-13	-25.71	0-360	250	V
2	21.35157	-44.54	Pk	34.6	-41	11.8	-39.14	-13	-26.14	0-360	250	H
5	21.36432	-46.16	Pk	34.6	-40.8	11.8	-40.56	-13	-27.56	0-360	300	V
6	24.37606	-53.88	Pk	35	-40.3	11.8	-47.38	-13	-34.38	0-360	250	V
3	24.41429	-56.77	Pk	35	-40.2	11.8	-50.17	-13	-37.17	0-360	299	H

Pk - Peak detector

26 to 32 GHz



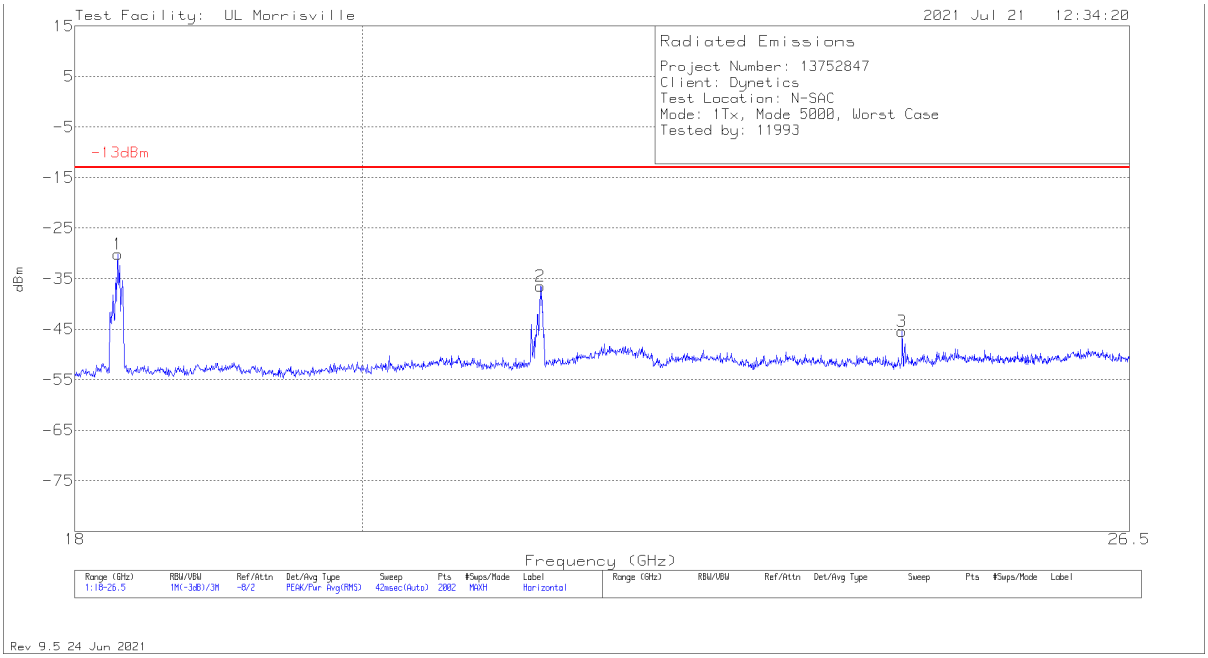


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0061 (dB/m)	Amp/Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	27.3525	-59.02	Pk	36.1	-38.8	11.8	-49.92	-13	-36.92	0-360	101	H
4	27.35342	-56.67	Pk	36.1	-38.9	11.8	-47.67	-13	-34.67	0-360	101	V
2	28.87233	-58.79	Pk	36.3	-38.3	11.8	-48.99	-13	-35.99	0-360	200	H
5	28.97408	-58.83	Pk	36.2	-38.4	11.8	-49.23	-13	-36.23	0-360	101	V
6	31.175	-57.8	Pk	36.8	-38.3	11.8	-47.5	-13	-34.5	0-360	200	V
3	31.81575	-57.69	Pk	36.8	-38.3	11.8	-47.39	-13	-34.39	0-360	251	H

Pk - Peak detector

MODE 3 WORST-CASE >18GHz

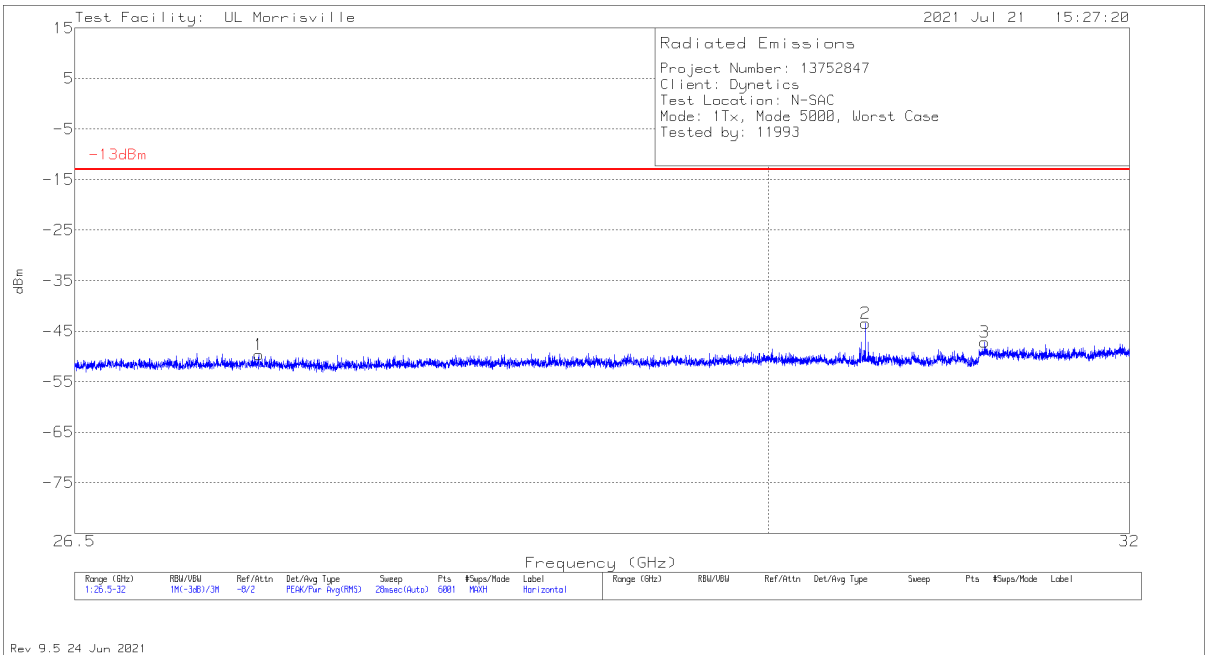
18 to 26 GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0063 (dB/m)	Amp/Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	18.28886	-34.77	Pk	33.1	-40.3	11.8	-30.17	-13	-17.17	0-360	300	H
4	18.2931	-41.61	Pk	33.1	-40.3	11.8	-37.01	-13	-24.01	0-360	300	V
2	21.35157	-41.87	Pk	34.6	-41	11.8	-36.47	-13	-23.47	0-360	300	H
5	21.36432	-43.79	Pk	34.6	-40.8	11.8	-38.19	-13	-25.19	0-360	300	V
6	24.37181	-50.51	Pk	35	-40.4	11.8	-44.11	-13	-31.11	0-360	250	V
3	24.38031	-51.86	Pk	35	-40.4	11.8	-45.46	-13	-32.46	0-360	249	H

Pk - Peak detector

26 to 32 GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0061 (dB/m)	Amp/Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	27.35433	-56.54	Pk	36.1	-38.9	11.8	-47.54	-13	-34.54	0-360	300	V
1	27.38642	-58.9	Pk	36.2	-38.7	11.8	-49.6	-13	-36.6	0-360	200	H
5	30.515	-57.06	Pk	36.5	-38.3	11.8	-47.06	-13	-34.06	0-360	300	V
2	30.52508	-53.48	Pk	36.5	-38.3	11.8	-43.48	-13	-30.48	0-360	101	H
6	31.16309	-57.53	Pk	36.8	-38.3	11.8	-47.23	-13	-34.23	0-360	199	V
3	31.18325	-57.69	Pk	36.9	-38.2	11.8	-47.19	-13	-34.19	0-360	200	H

Pk - Peak detector

9. FREQUENCY STABILITY

RULE PART(S)

§2.1055 Measurements required: Frequency stability.

§90.213 Frequency stability

Above 2450 MHz [10]

[10]Except for DSRCS equipment in the 5850-5925 MHz band, frequency stability is to be specified in the station authorization. Frequency stability for DSRCS equipment in the 5850-5925 MHz band is specified in subpart M of this part.

LIMITS

Device must remain operating in between 3000MHz to 3100MHz.

TEST PROCEDURE

Use spectrum analyzer to measure -6dBc points

- Temp. = −30° to +50°C
- Voltage = Nominal & Nominal +/-15%

Frequency Stability vs Temperature:
Frequency stability is tested at 10 °C intervals of temperatures between −30 °C and +50 °C at the manufacturer's rated supply voltage per **section 5.6.4 of ANSI C63.26-2015**.

Frequency Stability vs Voltage:
Frequency stability is tested at +20 °C temperature and ±15% supply voltage variations per **section 5.6.5 of ANSI C63.26-2015**.

The peak frequency error is recorded (worst-case).

RESULTS

Based on the band edge measurements and the frequency error data the device will operate in between the frequency range of 3000MHz - 3100MHz under the temperature and voltage variations described in the preceding test-procedure section.

Tabular Data - Mode 1

Freq @ T_{nom} & V_{nom} (MHz):		3046.800				
Limit		3000	3100	Freq (MHz) Center	Delta (MHz)	Frequency Stability (ppm)
Condition		F low @ -6dBc	F high @ -6dBc			
Temperature	Voltage (DC)	(MHz)	(MHz)			
Extreme (-30C)	48	3030.570	3062.920	3046.745	-0.055	-18.052
Extreme (-20C)		3030.520	3062.870	3046.695	-0.105	-34.462
Extreme (-10C)		3030.520	3062.970	3046.745	-0.055	-18.052
Extreme (0C)		3030.620	3062.920	3046.770	-0.030	-9.846
Extreme (10C)		3030.620	3062.970	3046.795	-0.005	-1.641
Nominal (20C)		***3030.620***	***3062.980***	***3046.800***	0.000	0.000
Extreme (30C)		3030.630	3062.950	3046.790	-0.010	-3.282
Extreme (40C)		3030.630	3062.940	3046.785	-0.015	-4.923
Extreme (50C)		3030.620	3062.950	3046.785	-0.015	-4.923
20C	40.8	3030.650	3062.990	3046.820	0.020	6.564
	48.0	3030.620	3062.980	3046.800	0.000	0.000
	55.2	3030.660	3062.990	3046.825	0.025	8.205

Date: 2021-07-19
Location: Conducted 1
Tested by: 40882

Tabular Data - Mode 2

Freq @ T_{nom} & V_{nom} (MHz):		3046.685				
Limit		3000	3100	Freq (MHz) Center	Delta (MHz)	Frequency Stability (ppm)
Condition		F low @ -6dBc	F high @ -6dBc			
Temperature	Voltage (DC)	(MHz)	(MHz)			
Extreme (-30C)	48	3038.520	3054.770	3046.645	-0.040	-13.129
Extreme (-20C)		3038.520	3054.720	3046.620	-0.065	-21.335
Extreme (-10C)		3038.520	3054.770	3046.645	-0.040	-13.129
Extreme (0C)		3038.570	3054.820	3046.695	0.010	3.282
Extreme (10C)		3038.570	3054.820	3046.695	0.010	3.282
Nominal (20C)		***3038.560***	***3054.810***	***3046.685***	0.000	0.000
Extreme (30C)		3038.570	3054.820	3046.695	0.010	3.282
Extreme (40C)		3038.570	3054.820	3046.695	0.010	3.282
Extreme (50C)		3038.560	3054.810	3046.685	0.000	0.000
20C	40.8	3038.540	3054.830	3046.685	0.000	0.000
	48.0	3038.560	3054.810	3046.685	0.000	0.000
	55.2	3038.570	3054.830	3046.700	0.015	4.923

Date: 2021-07-16
Location: Conducted 1
Tested by: 40882

Tabular Data - Mode 3

Freq @ T_{nom} & V_{nom} (MHz):		3046.800				
Limit		3000	3100	Freq (MHz) Center	Delta (MHz)	Frequency Stability (ppm)
Condition		F low @ -6dBc	F high @ -6dBc			
Temperature	Voltage (DC)	(MHz)	(MHz)			
Extreme (-30C)	48	3038.570	3054.770	3046.670	-0.130	-42.668
Extreme (-20C)		3038.620	3054.770	3046.695	-0.105	-34.462
Extreme (-10C)		3038.620	3055.020	3046.820	0.020	6.564
Extreme (0C)		3038.670	3054.820	3046.745	-0.055	-18.052
Extreme (10C)		3038.720	3054.870	3046.795	-0.005	-1.641
Nominal (20C)		***3038.730***	***3054.870***	***3046.800***	0.000	0.000
Extreme (30C)		3038.720	3054.880	3046.800	0.000	0.000
Extreme (40C)		3038.730	3054.890	3046.810	0.010	3.282
Extreme (50C)		3038.730	3054.870	3046.800	0.000	0.000
20C	40.8	3038.720	3054.880	3046.800	0.000	0.000
	48.0	3038.730	3054.870	3046.800	0.000	0.000
	55.2	3038.710	3054.880	3046.795	-0.005	-1.641

Date: 2021-07-16
Location: Conducted 1
Tested by: 40882