



TEST REPORT

Report Number : R13255054-E1

Applicant : Dynetics
1002 Explorer Boulevard
Huntsville, AL 35806

Model : GA3360

FCC ID : QFS001-10064785

EUT Description : Ground Radar

Test Standard(s) : FCC CFR47 PART 90.103

Date of Issue:

2020-09-01

Prepared by:

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REVISION HISTORY

Ver.	Issue Date	Revisions	Revised By
1	2020-08-12	Initial Release	Brian T. Kiewra
2	2020-08-24	Corrected Header on p. 37.	Brian T. Kiewra
3	2020-09-01	Revised antenna gain.	Brian T. Kiewra

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Ground Radar

MODEL: GA3360

SERIAL NUMBER: E2

DATE TESTED: 2020-04-15 to 2020-05-28

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.

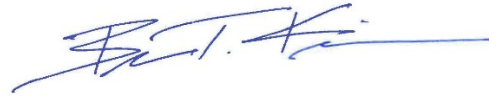
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. government.

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For UL LLC by:



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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.

12 Laboratory Dr.	2800 Perimeter Park Dr.
☐ Chamber A RTP	☒ North Chamber
☒ Chamber C RTP	☒ South Chamber

The above test sites and facilities are covered under FCC Test Firm Registration # 703469.

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0

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
Occupied Channel Bandwidth	2.00%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Antenna Port Emissions, conducted	1.94 dB
All emissions, radiated	5.17 dB
Temperature	2.26°C
Humidity	6.79%
DC Supply voltages	1.70%
Time	3.39%

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)

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) +

LISN Insertion Loss.

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

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	42.47	42.31	42.38
Middle Channel	43.23	43.17	43.23
High Channel	42.42	42.31	42.36

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna type is a custom wheel antenna. The maximum antenna gain is 7.07 dBi. The antenna connector type is SMA.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 9361.

The EUT software installed during testing was 3360-0528.

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 except for frequency stability where the middle channel of Mode 1 was evaluated.

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
3148.4375	1,2,3	Low
3195.3125	1,2,3	Mid
3226.5625	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

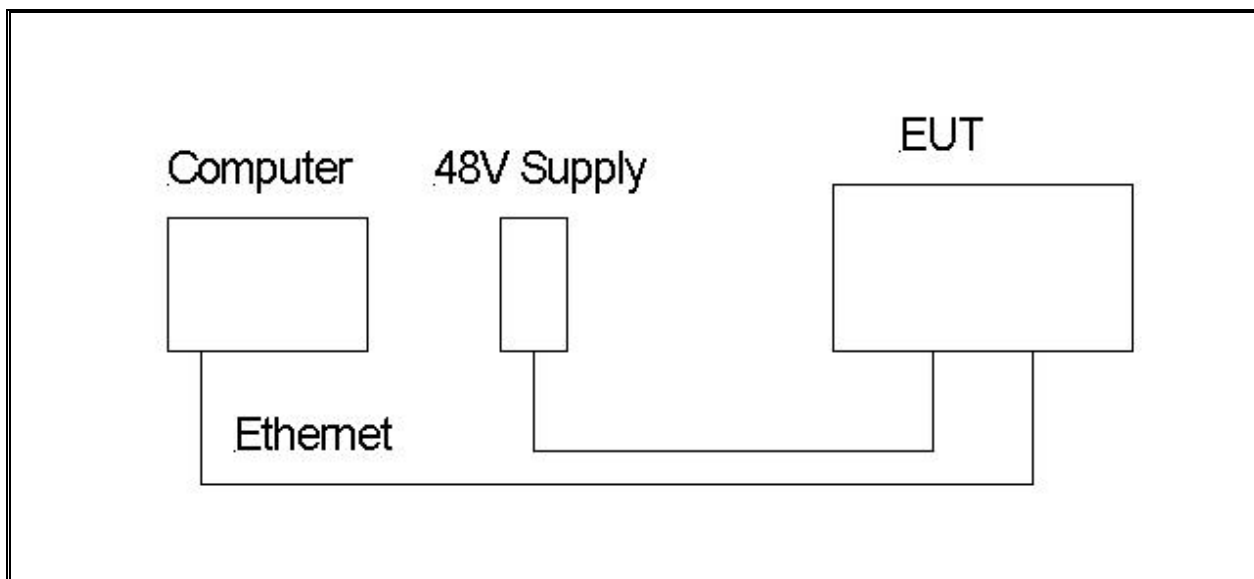
CONDUCTED and RADIATED TESTS SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	E6440	CYBM32	NA
48V Power supply	Mean Well	SDR-120-38	NA	NA

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	ENET	1	RJ45	ENET	>3m	Connects to test laptop
2	Mains	1	Terminal	DC Mains	>3m	Connects to 48V DC.

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 - Radiated Disturbance Emissions – Chamber C

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0081	Hybrid Broadband Antenna	Sunar RF Motion	JB3	2019-11-20	2020-11-20
AT0062	HORN Antenna	ETS-Lindgren	3117	2020-01-30	2021-01-30
C-SAC01	Gain-loss string: 0.009-1000MHz	Various	Various	2020-03-03	2021-03-03
C-SAC02	Gain-loss string: 1-18GHz	Various	Various	2020-03-03	2021-03-03
C-SAC02 Path 7	Gain-loss string 1-7GHz	Various	Various	2020-04-03	2021-04-03
SA0018	Spectrum Analyzer	Agilent	PXA (N9030A)	2020-03-02	2021-03-02
SOFTEMI	EMI Software	UL	Version 9.5 (2019-06-12)		
HI0085	Temp/Humid/Pressure Meter	EXTECH	SD700	2019-04-08, 2020-04-20	2020-04-08, 2021-04-20
HPF012	Filter	Micro-Tronics	HPM18129	2020-02-19	2021-01-19

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2019-08-08	2020-08-08
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2020-04-23	2021-04-23
SA0027	Spectrum Analyzer	Agilent	N9030A	2019-05-15	2020-05-31
SOFTEMI	EMI Software	UL	Version 9.5 (2019-06-12)		
s/n 181474409	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2019-11-07	2020-11-07
AT0077	Horn Antenna, 26-40GHz	ARA	MWH-2640/B	2019-11-07	2020-11-07
N-SAC04	Gain-loss string: 18-40GHz	Various	Various	2020-03-22	2021-03-22
SA0025	Spectrum Analyzer	Agilent	N9030A	2020-03-17	2021-03-17
SOFTEMI	EMI Software	UL	Version 9.5 (2019-06-12)		
s/n 181474341	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27
HPF016	18GHz high-pass filter, 2W, $F_{high}=40GHz$	Micro-Tronics	HPS19367	2020-02-19	2021-02-19

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA0018	Spectrum Analyzer	Agilent	N9030A	2020-03-18	2021-03-18
N/A	Cable, Coaxial	Unknown	Unknown	2020-04-14	2021-04-14
N/A	Cable, Coaxial	Unknown	Unknown	2020-04-14	2021-04-14
N/A	30dB, 100W Attenuator	Pasternack	PE7214-30	2020-04-14	2021-04-14
BK9446	30dB, 100W Attenuator	Wienschel	48-30-43	2020-04-16	2021-04-16
MM0130	Multimeter	Fluke	21 III	2019-07-27	2021-07-27
9945B1018	Power supply	Sorenson	DCS60-18	N/A	N/A
EC0226	Environmental Chamber	Thermotron	EC0226	2019-10-01	2020-10-31
SOFTEMI	EMI Software	UL	Version 9.5 (2019-06-12)		

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 $\geq$ 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.

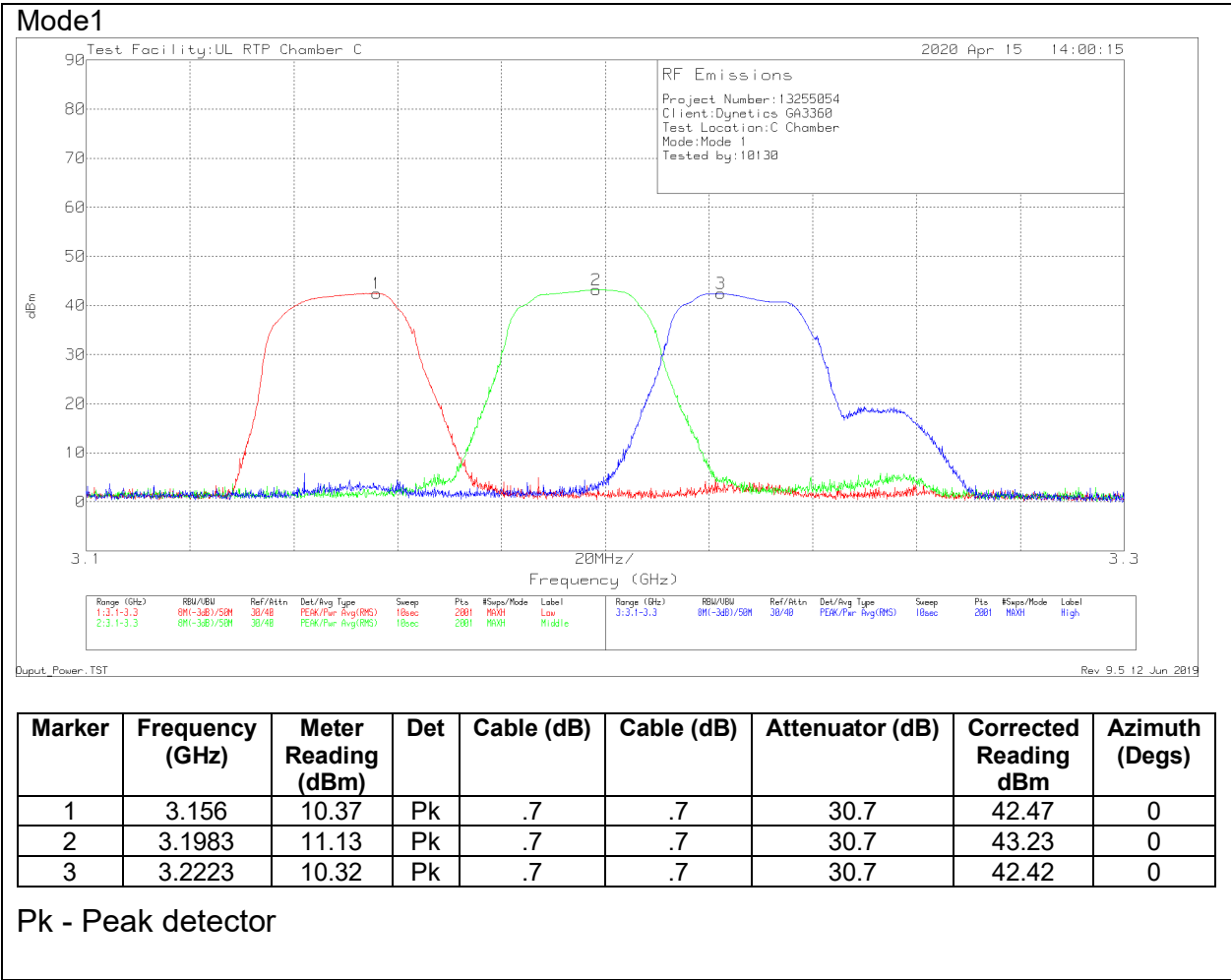
TABULAR RESULTS

Channel	Mode 1 Peak power (dBm)	Mode 2 Peak Power (dBm)	Mode 3 Peak Power (dBm)
Low Channel	42.47	42.31	42.38
Middle Channel	43.23	43.17	43.23
High Channel	42.42	42.31	42.36

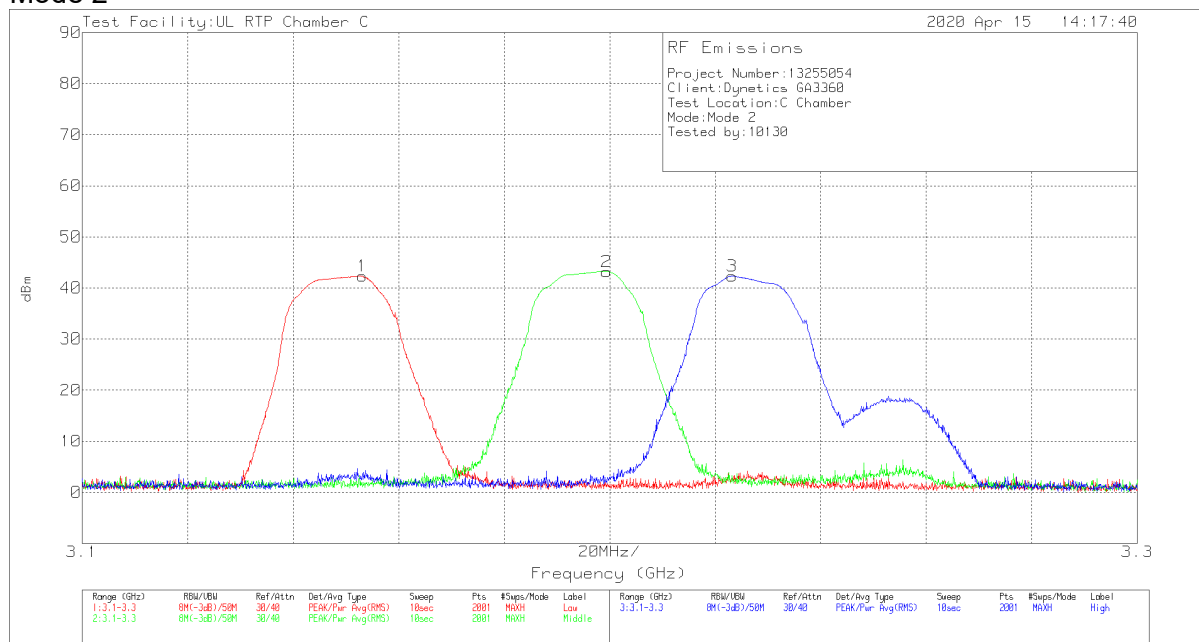
* The maximum power was derived from exported numeric trace data.

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

GRAPHICAL RESULTS



Mode 2

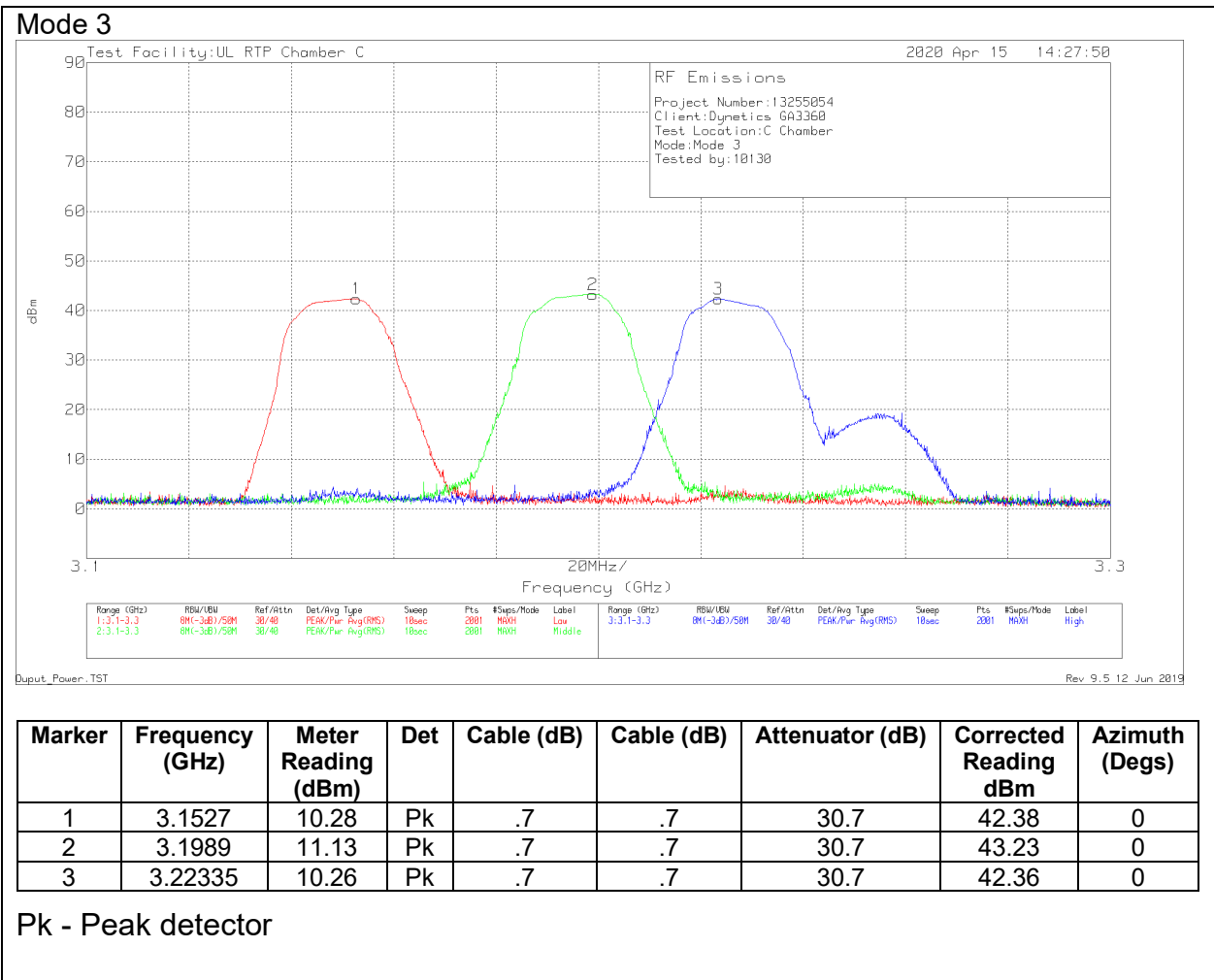


Output_Power.TST

Rev 9.5.12 Jun 2019

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	Azimuth (Degs)
1	3.1531	10.21	Pk	.7	.7	30.7	42.31	0
2	3.1994	11.07	Pk	.7	.7	30.7	43.17	0
3	3.2232	10.21	Pk	.7	.7	30.7	42.31	0

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:

²Bandwidths 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	16.786	8.9648	8.9758
Middle Channel	16.749	8.8851	8.8843
High Channel	16.932	8.8665	8.8597

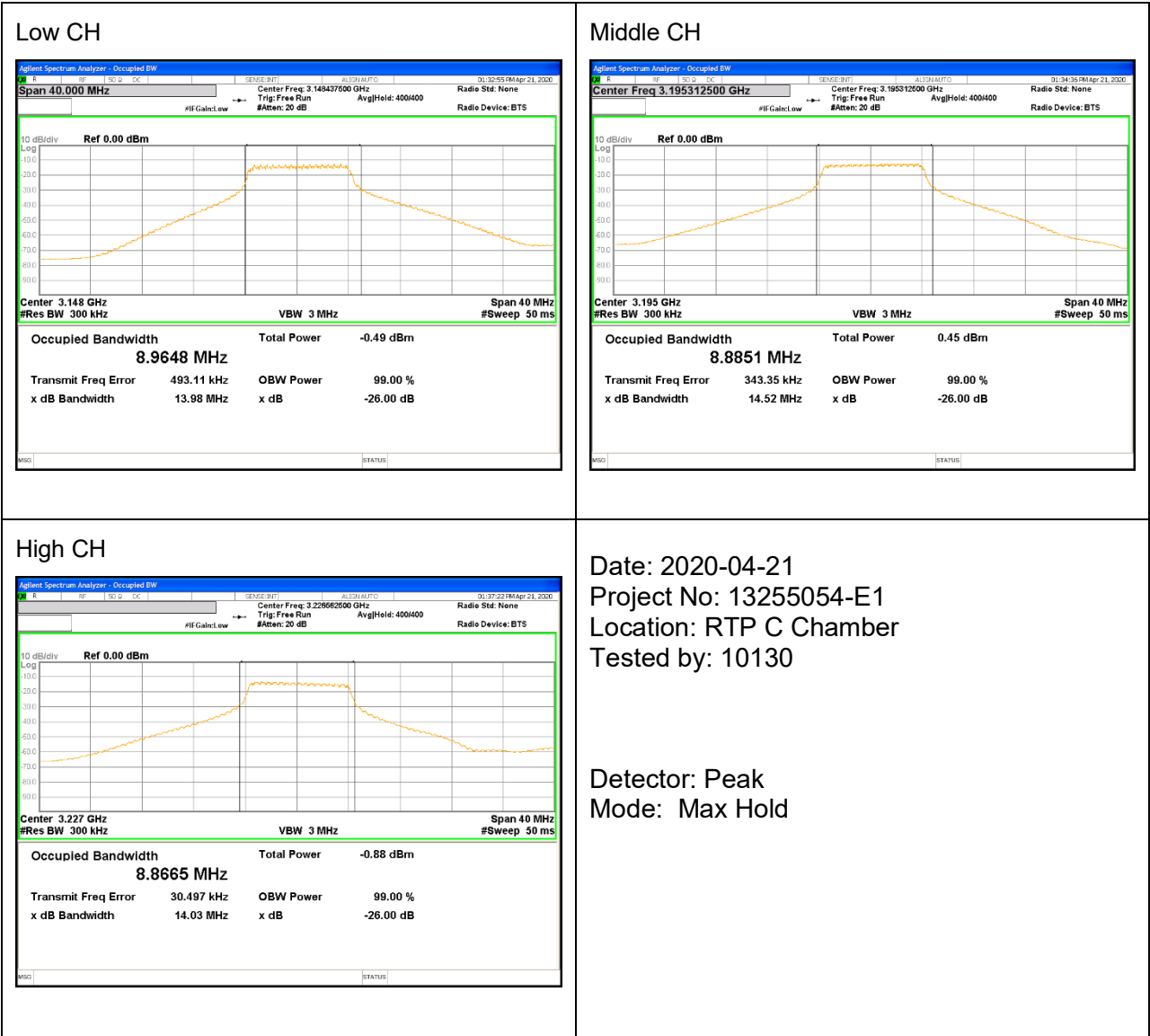
Note: Post-transmitter filtering affects the lowest and highest channels of Mode 1 and the lowest channel of Mode 2.

GRAPHICAL RESULTS

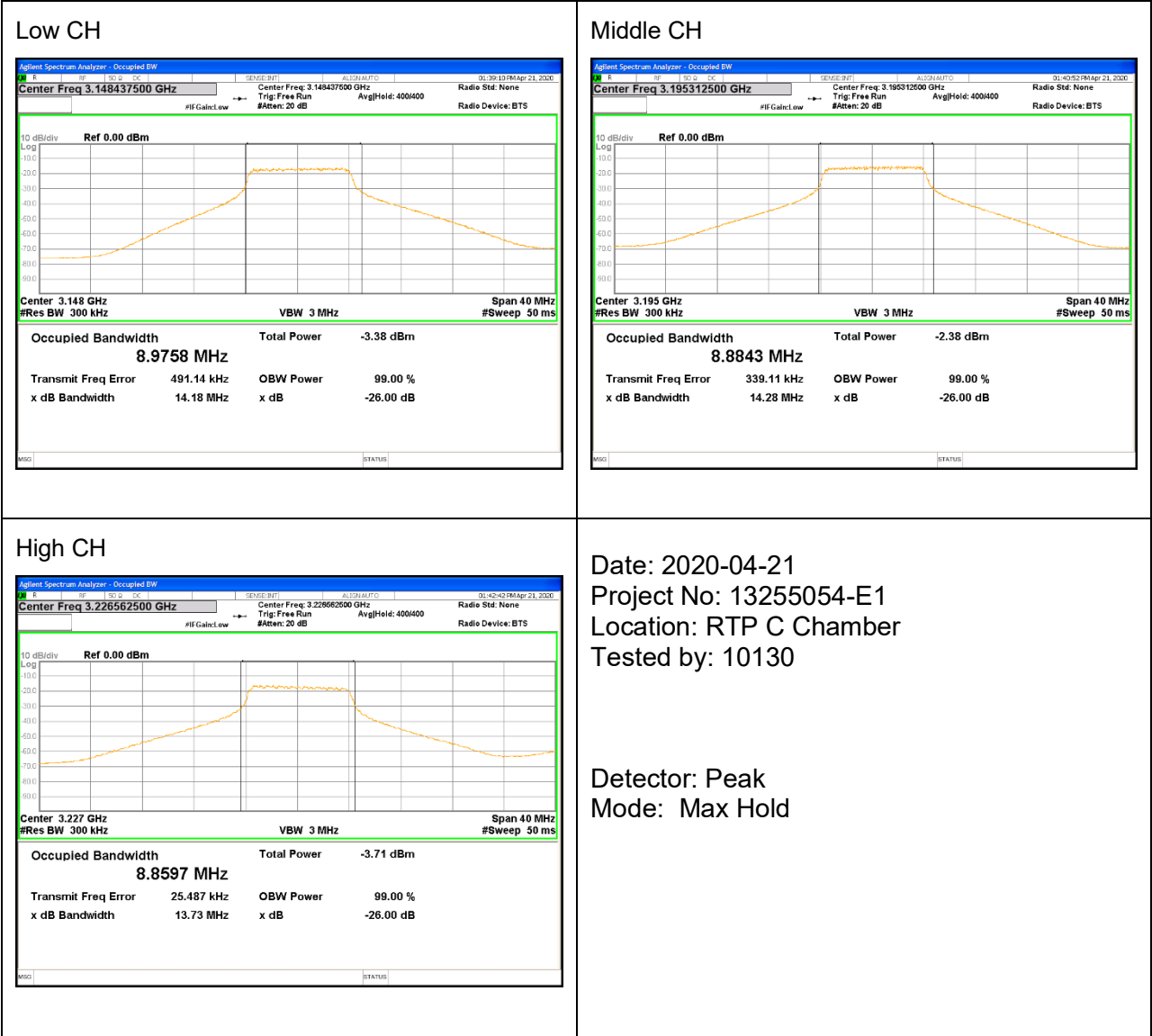
MODE 1



MODE 2



MODE 3



8.2. BAND EDGE

RULE PART(S)

§2.1051 Measurements required: Spurious emissions at antenna terminals. (At the band edges [3100 to 3300 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)

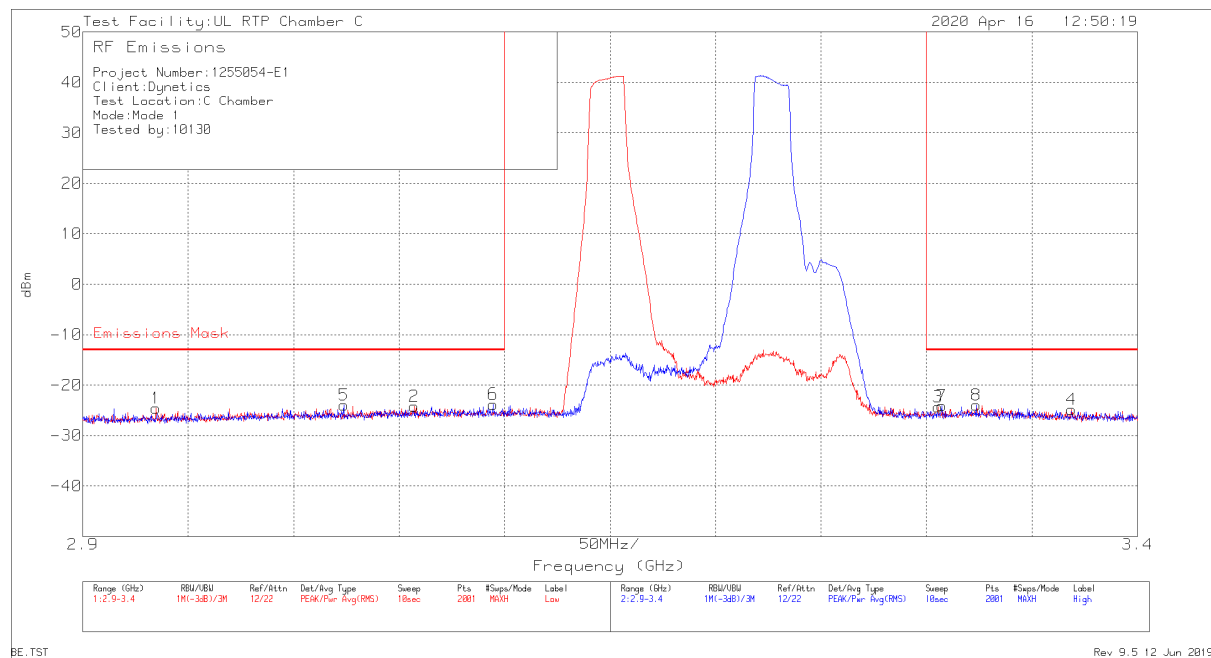
TEST PROCEDURE

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.

Note – All plots in section 8.2 should have a project reference of 13255054 as opposed to 1255054

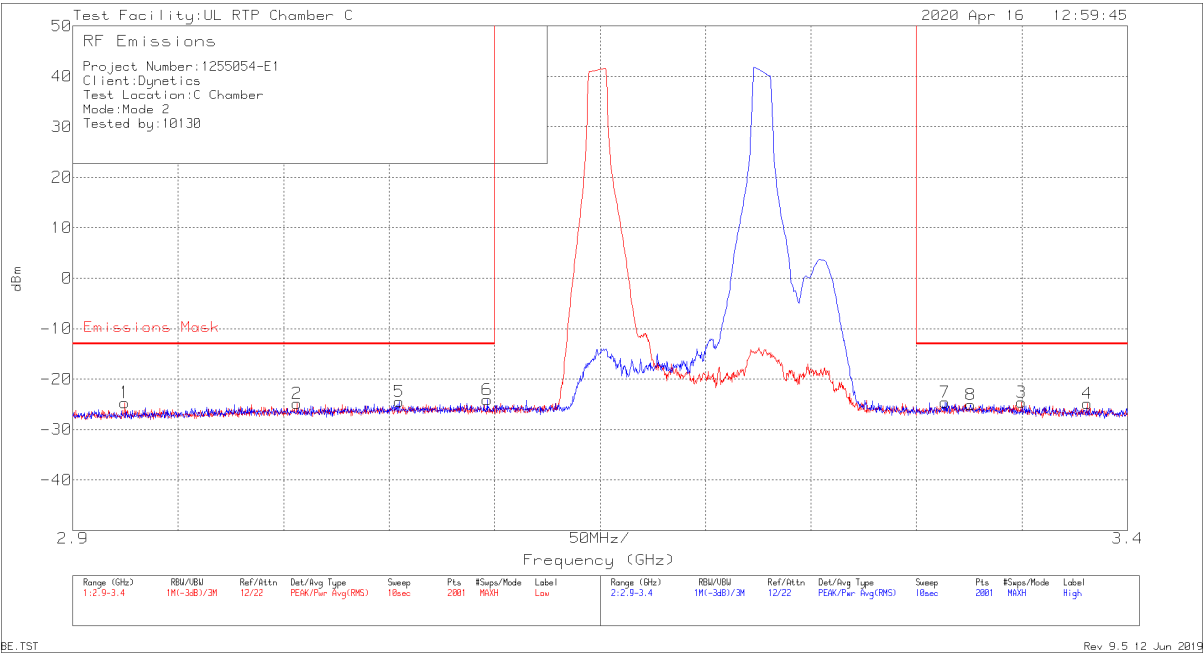
MODE 1



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	Emissions Mask	PK Margin (dB)
1	2.93475	-56.53	Pk	.6	.6	30.7	-24.63	-13	-11.63
5	3.02375	-55.77	Pk	.6	.6	30.6	-23.97	-13	-10.97
2	3.05725	-56.24	Pk	.7	.6	30.7	-24.24	-13	-11.24
6	3.0945	-55.68	Pk	.6	.6	30.7	-23.78	-13	-10.78
3	3.3055	-56.25	Pk	.6	.6	30.7	-24.35	-13	-11.35
7	3.30725	-56.09	Pk	.6	.6	30.8	-24.09	-13	-11.09
8	3.3235	-56.19	Pk	.7	.7	30.8	-23.99	-13	-10.99
4	3.36875	-56.9	Pk	.7	.7	30.7	-24.8	-13	-11.8

Pk - Peak detector

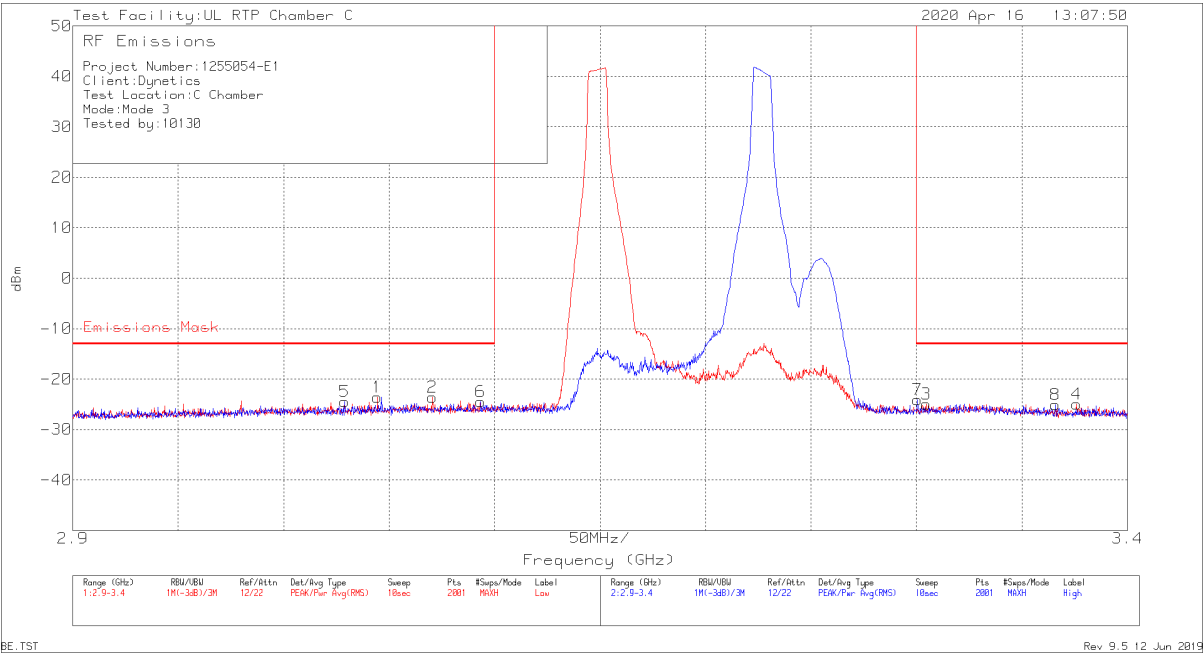
MODE 2



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	Emissions Mask	PK Margin (dB)
1	2.92475	-56.55	Pk	.6	.6	30.7	-24.65	-13	-11.65
2	3.00625	-56.78	Pk	.6	.6	30.7	-24.88	-13	-11.88
5	3.05475	-56.42	Pk	.7	.6	30.7	-24.42	-13	-11.42
6	3.0965	-56.04	Pk	.6	.6	30.7	-24.14	-13	-11.14
7	3.3135	-56.69	Pk	.7	.6	30.8	-24.59	-13	-11.59
8	3.32575	-57.27	Pk	.7	.7	30.8	-25.07	-13	-12.07
3	3.34975	-56.72	Pk	.7	.7	30.7	-24.62	-13	-11.62
4	3.381	-57.01	Pk	.7	.7	30.8	-24.81	-13	-11.81

Pk - Peak detector

MODE 3



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	Emissions Mask	PK Margin (dB)
5	3.029	-56.21	Pk	.6	.6	30.6	-24.41	-13	-11.41
1	3.0445	-55.57	Pk	.7	.6	30.7	-23.57	-13	-10.57
2	3.0705	-55.61	Pk	.6	.6	30.8	-23.61	-13	-10.61
6	3.0935	-56.37	Pk	.6	.6	30.7	-24.47	-13	-11.47
7	3.3005	-56.03	Pk	.6	.6	30.7	-24.13	-13	-11.13
3	3.3045	-56.85	Pk	.6	.6	30.7	-24.95	-13	-11.95
8	3.36575	-57.13	Pk	.7	.7	30.7	-25.03	-13	-12.03
4	3.376	-56.99	Pk	.7	.6	30.7	-24.99	-13	-11.99

Pk - Peak detector

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

$$(1) \text{ EIRP} = E - 95.2 \text{ (At a measurement distance of 3m.)}$$

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

$$(3) V \text{ (dBuV)} = W \text{ (dBm)} + 107\text{dB}$$

Combine all the above and get the following:

$$\text{EIRP} = (AF + V + G/L) - 95.2 = (AF + (W + 107) + G/L) - 95.2$$

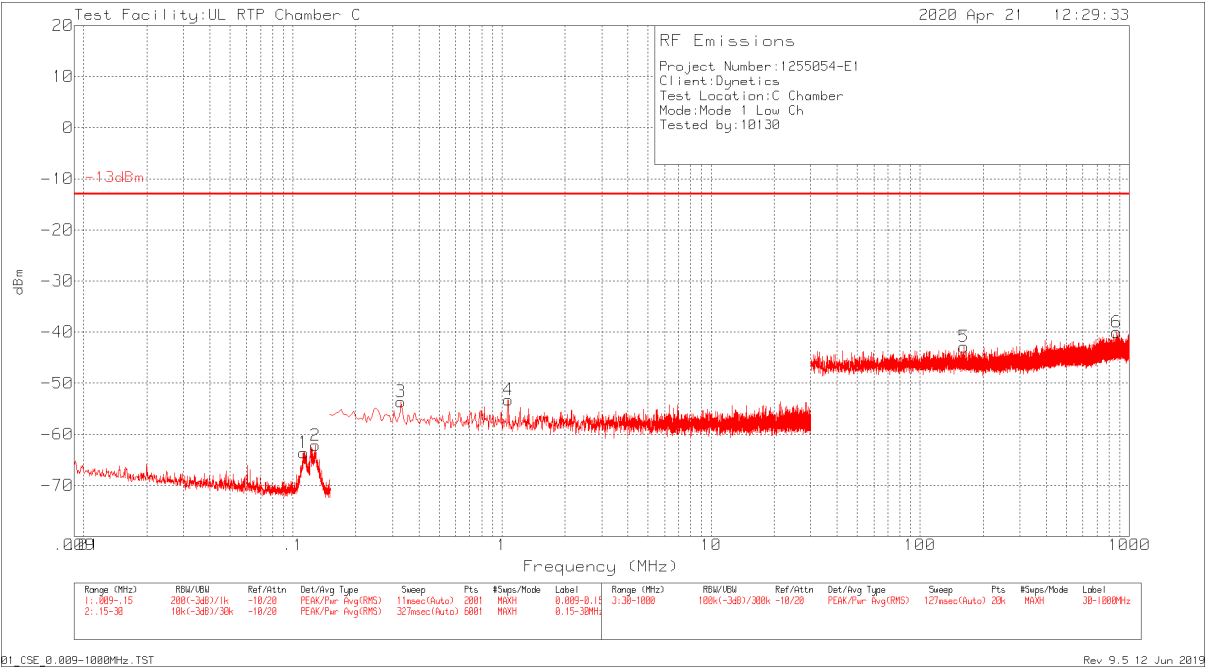
$$\text{EIRP} = AF + V + G/L + 11.8$$

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

8.3.1. ANTENNA PORT OUT OF BAND EMISSIONS

Note – All plots in section 8.3.1 should have a project reference of 13255054 as opposed to 1255054.

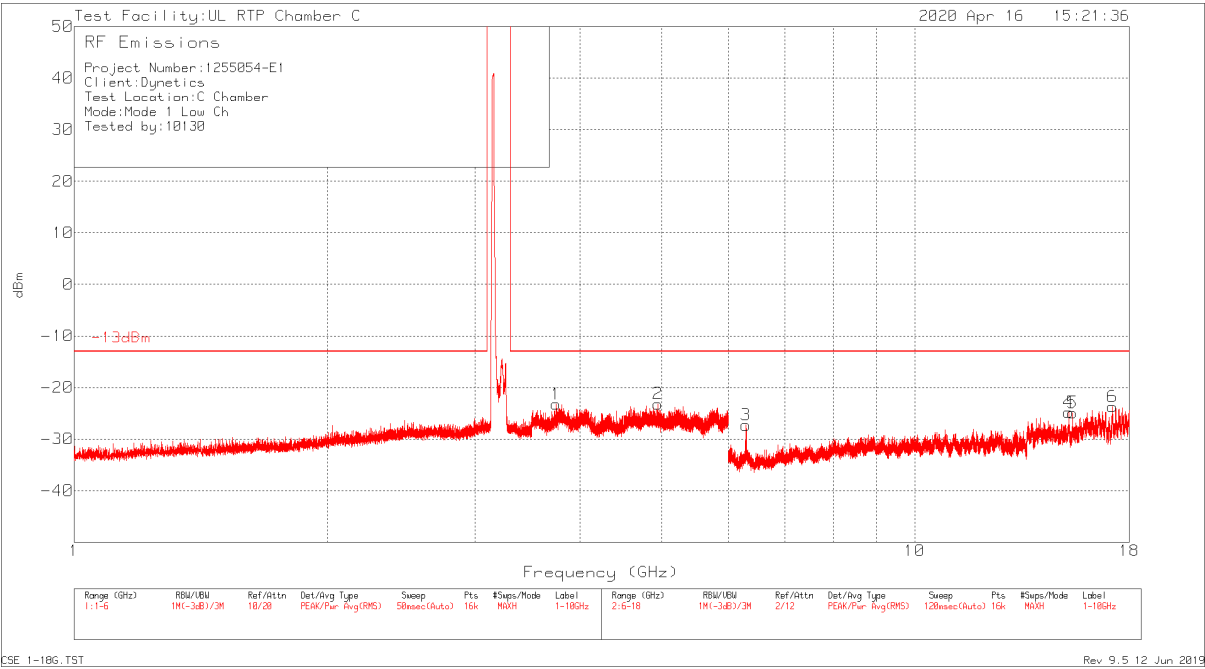
MODE 1 LOW CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.11273	-93.92	Pk	-.1	-.1	30.5	-63.62	-13	-50.62
2	.12849	-92.47	Pk	-.1	-.1	30.5	-62.17	-13	-49.17
3	.3291	-83.92	Pk	-.1	-.1	30.5	-53.62	-13	-40.62
4	1.07038	-83.57	Pk	-.1	-.1	30.5	-53.27	-13	-40.27
5	161.5805	-73.67	Pk	.1	.1	30.6	-42.87	-13	-29.87
6	870.4565	-71.43	Pk	.3	.3	30.8	-40.03	-13	-27.03

Pk - Peak detector

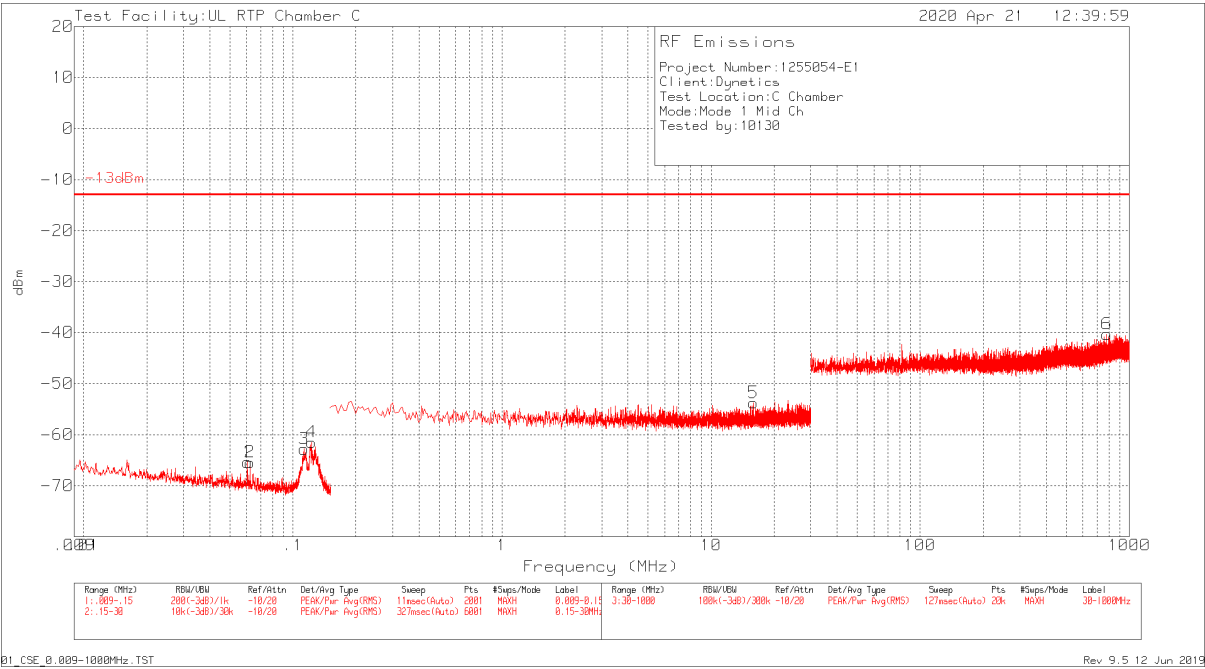
MODE 1 LOW CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Attenuator (dB)	Cable (dB)	Cable (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	3.74174	-55.65	Pk	31	.7	.7	-23.25	-13	-10.25
2	4.94557	-55.66	Pk	30.9	.8	.8	-23.16	-13	-10.16
3	6.29548	-60.08	Pk	31	.9	.9	-27.28	-13	-14.28
4	15.24242	-59.7	Pk	30.8	2	2.1	-24.8	-13	-11.8
5	15.41041	-60	Pk	31	2.1	2	-24.9	-13	-11.9
6	17.1908	-60.52	Pk	30.7	3.1	3	-23.72	-13	-10.72

Pk - Peak detector

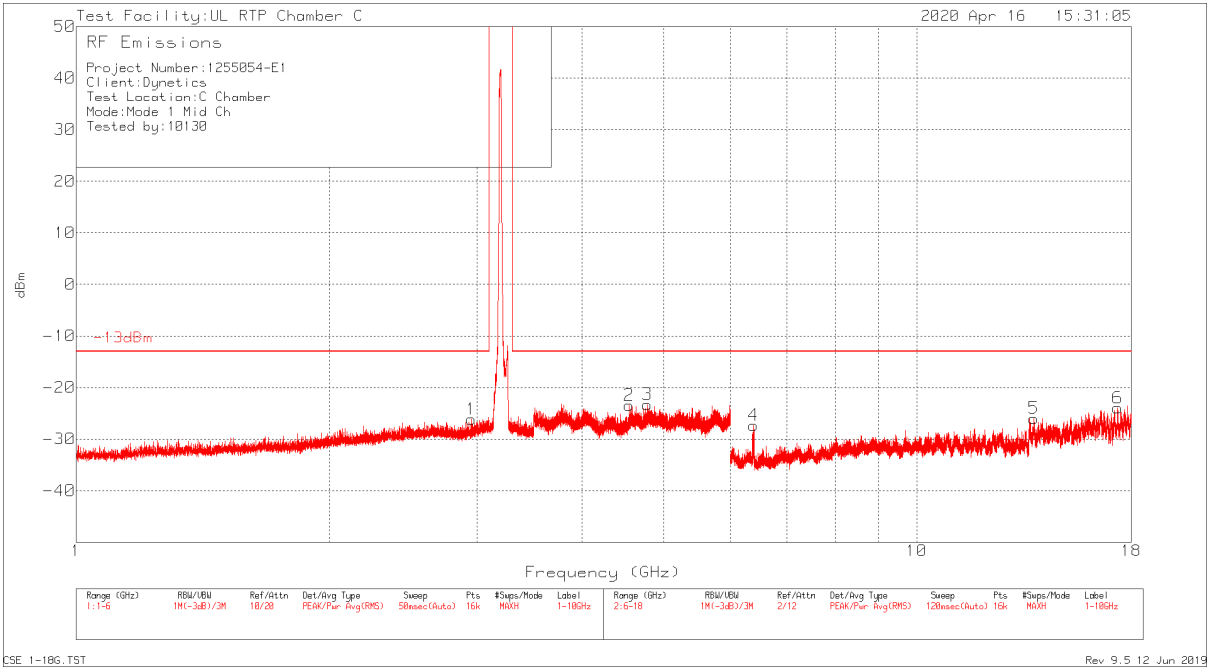
MODE 1 MIDDLE CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.06062	-95.71	Pk	-.1	-.1	30.5	-65.41	-13	-52.41
2	.06239	-95.72	Pk	-.1	-.1	30.5	-65.42	-13	-52.42
3	.1133	-93.11	Pk	-.1	-.1	30.5	-62.81	-13	-49.81
4	.1231	-91.78	Pk	-.1	-.1	30.5	-61.48	-13	-48.48
5	15.94563	-84.07	Pk	-.1	-.1	30.5	-53.77	-13	-40.77
6	781.265	-71.69	Pk	.3	.3	30.8	-40.29	-13	-27.29

Pk - Peak detector

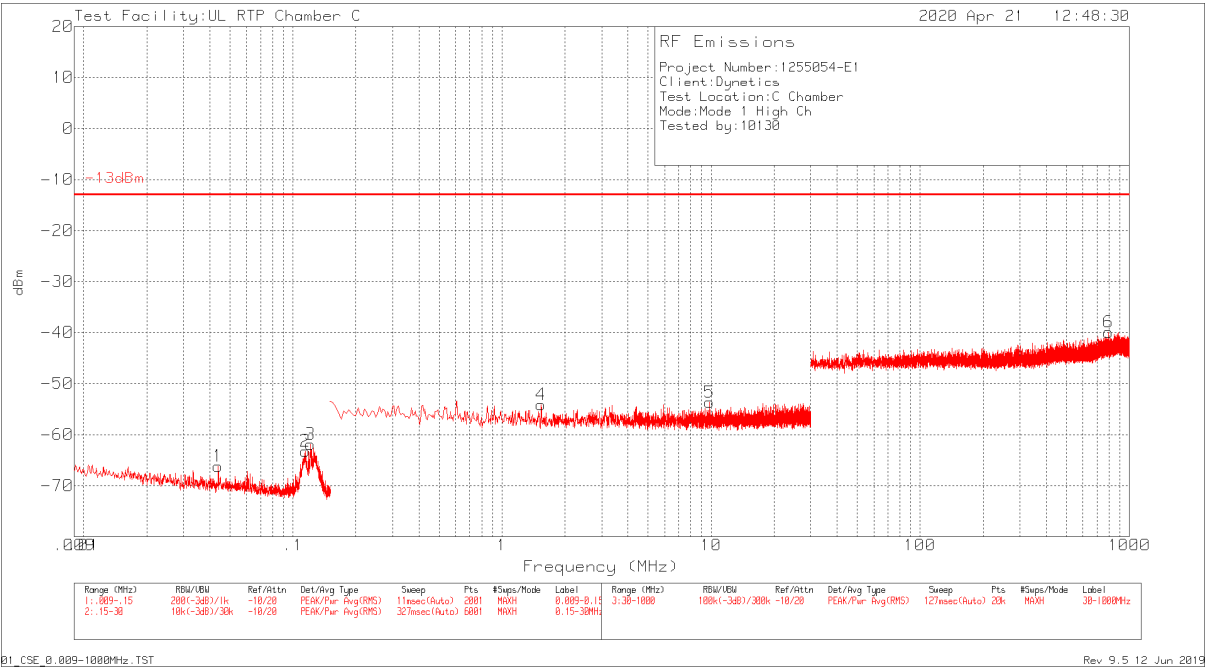
MODE 1 MIDDLE CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Attenuator (dB)	Cable (dB)	Cable (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	2.95325	-58.36	Pk	31	.6	.6	-26.16	-13	-13.16
2	4.54867	-56.04	Pk	31	.8	.8	-23.44	-13	-10.44
3	4.78368	-55.8	Pk	30.9	.8	.8	-23.3	-13	-10.3
4	6.39898	-60.05	Pk	30.9	.9	.9	-27.35	-13	-14.35
5	13.78676	-61.29	Pk	30.9	2.2	2.2	-25.99	-13	-12.99
6	17.34154	-61.57	Pk	30.6	3.5	3.5	-23.97	-13	-10.97

Pk - Peak detector

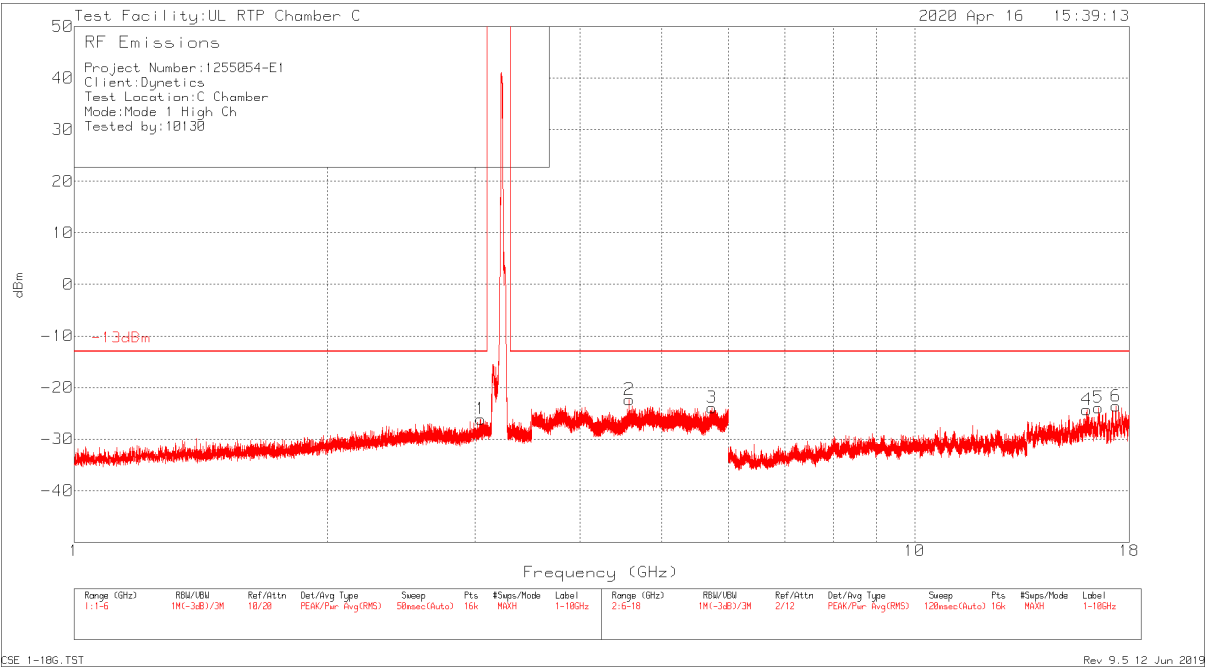
MODE 1 HIGH CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.04393	-96.48	Pk	-.1	-.1	30.5	-66.18	-13	-53.18
2	.11493	-93.55	Pk	-.1	-.1	30.5	-63.25	-13	-50.25
3	.12111	-92.2	Pk	-.1	-.1	30.5	-61.9	-13	-48.9
4	1.53803	-84.43	Pk	-.1	-.1	30.5	-54.13	-13	-41.13
5	9.8413	-83.99	Pk	-.1	-.1	30.5	-53.69	-13	-40.69
6	794.166	-71.32	Pk	.3	.3	30.8	-39.92	-13	-26.92

Pk - Peak detector

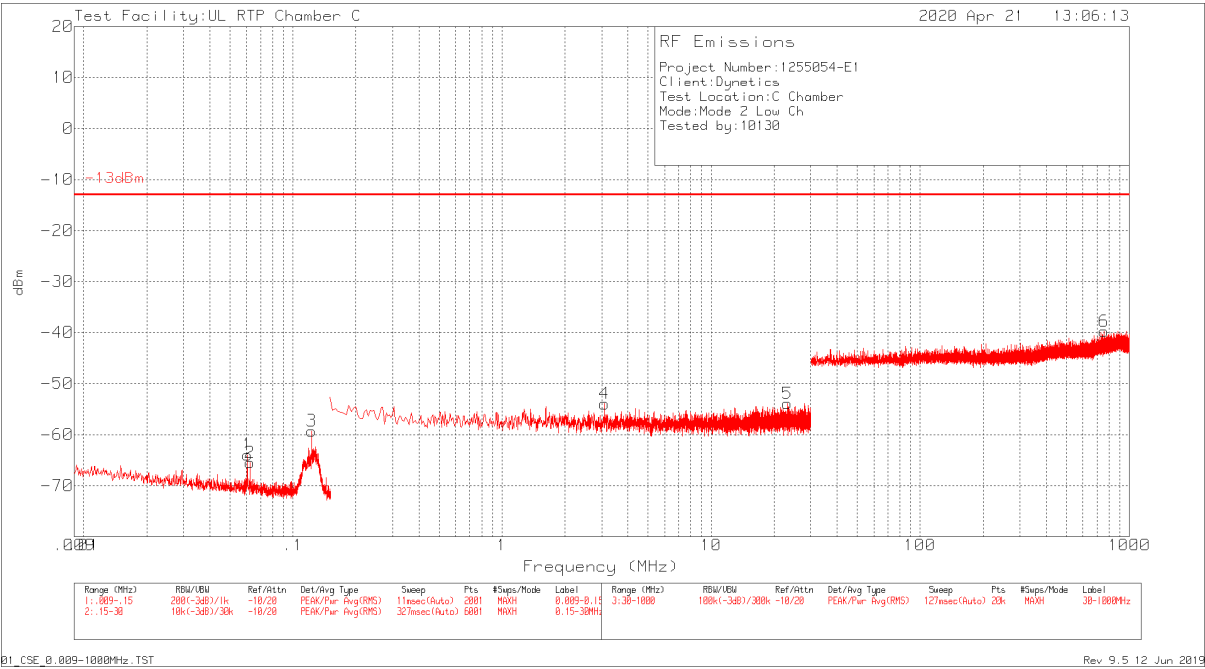
MODE 1 HIGH CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Attenuator (dB)	Cable (dB)	Cable (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	3.04669	-58.38	Pk	31	.7	.6	-26.08	-13	-13.08
2	4.57492	-54.93	Pk	31	.8	.8	-22.33	-13	-9.33
3	5.74062	-56.6	Pk	30.9	.9	.9	-23.9	-13	-10.9
4	16.02462	-60.68	Pk	31.1	2.6	2.7	-24.28	-13	-11.28
5	16.53984	-60.5	Pk	31.1	2.7	2.8	-23.9	-13	-10.9
6	17.35054	-61.09	Pk	30.8	3.4	3.3	-23.59	-13	-10.59

Pk - Peak detector

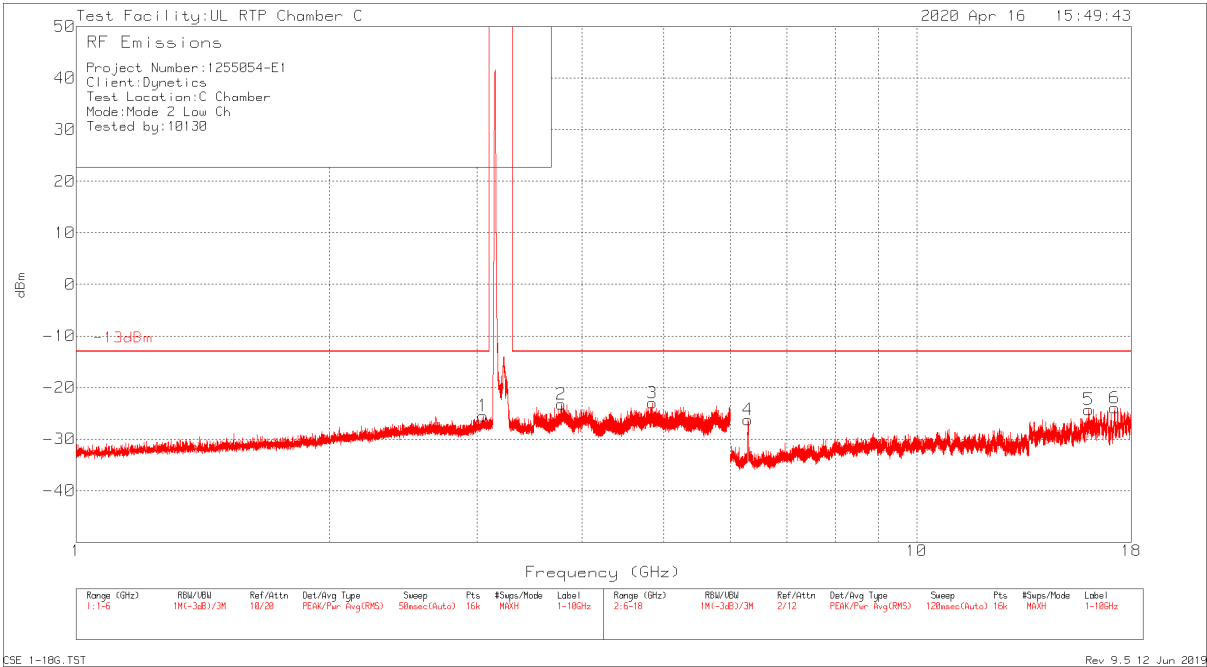
MODE 2 LOW CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.06062	-94.29	Pk	-.1	-.1	30.5	-63.99	-13	-50.99
2	.06239	-95.8	Pk	-.1	-.1	30.5	-65.5	-13	-52.5
3	.1231	-89.58	Pk	-.1	-.1	30.5	-59.28	-13	-46.28
4	3.0952	-84.25	Pk	-.1	-.1	30.5	-53.95	-13	-40.95
5	23.1544	-84.41	Pk	0	0	30.5	-53.91	-13	-40.91
6	756.8695	-71.17	Pk	.3	.3	30.8	-39.77	-13	-26.77

Pk - Peak detector

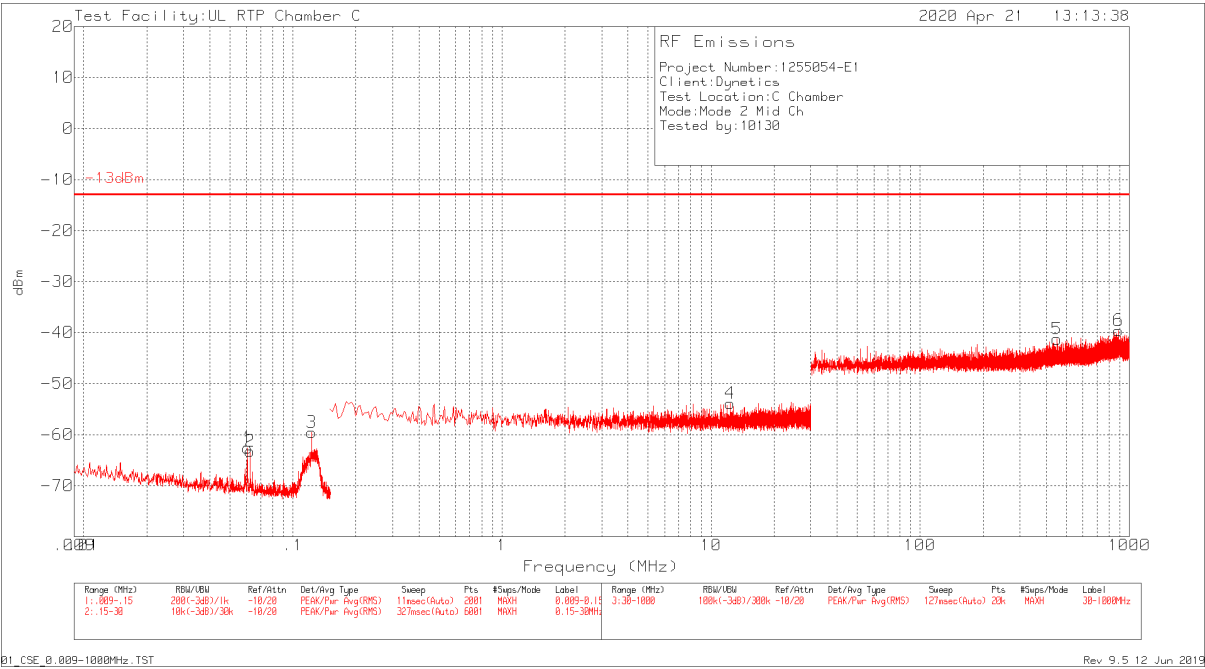
MODE 2 LOW CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Attenuator (dB)	Cable (dB)	Cable (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	3.04794	-57.8	Pk	31	.7	.6	-25.5	-13	-12.5
2	3.77643	-55.54	Pk	30.9	.7	.7	-23.24	-13	-10.24
3	4.84712	-55.58	Pk	31	.8	.8	-22.98	-13	-9.98
4	6.29848	-58.95	Pk	30.9	.9	.9	-26.25	-13	-13.25
5	16.02087	-60.89	Pk	31.3	2.6	2.7	-24.29	-13	-11.29
6	17.19605	-60.48	Pk	30.7	3	2.8	-23.98	-13	-10.98

Pk - Peak detector

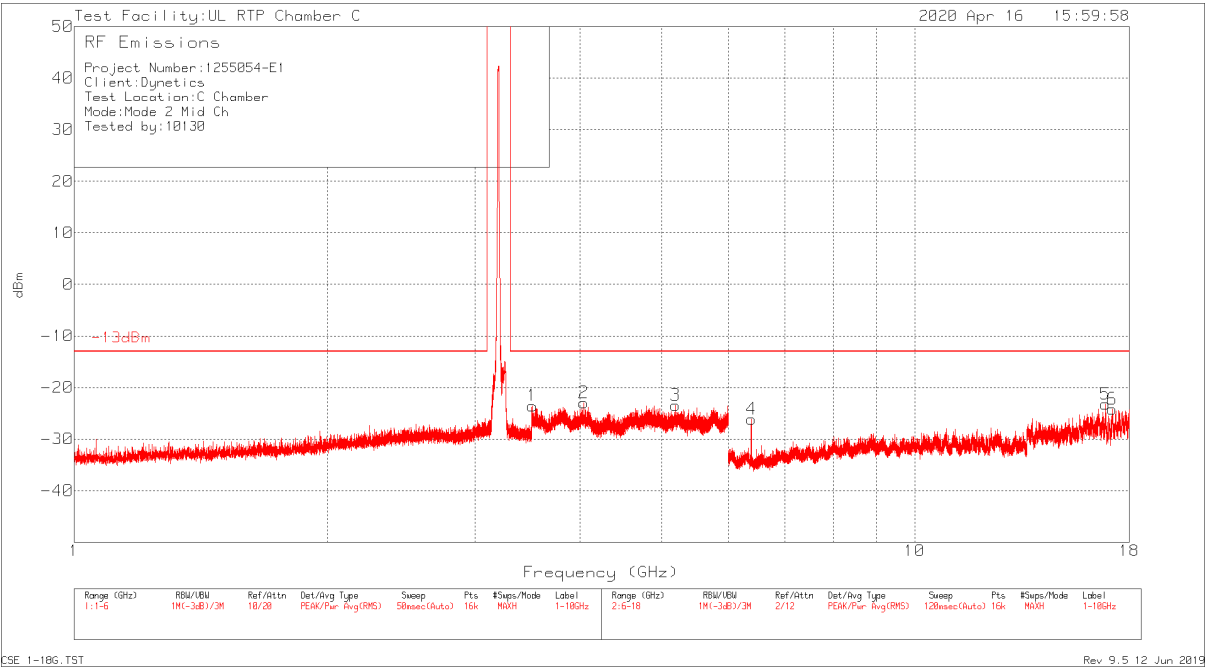
MODE 2 MIDDLE CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.06062	-92.88	Pk	-.1	-.1	30.5	-62.58	-13	-49.58
2	.06239	-93.56	Pk	-.1	-.1	30.5	-63.26	-13	-50.26
3	.1231	-89.86	Pk	-.1	-.1	30.5	-59.56	-13	-46.56
4	12.3686	-84.17	Pk	-.1	-.1	30.5	-53.87	-13	-40.87
5	451.077	-72.46	Pk	.2	.2	30.8	-41.26	-13	-28.26
6	888.935	-70.98	Pk	.3	.3	30.8	-39.58	-13	-26.58

Pk - Peak detector

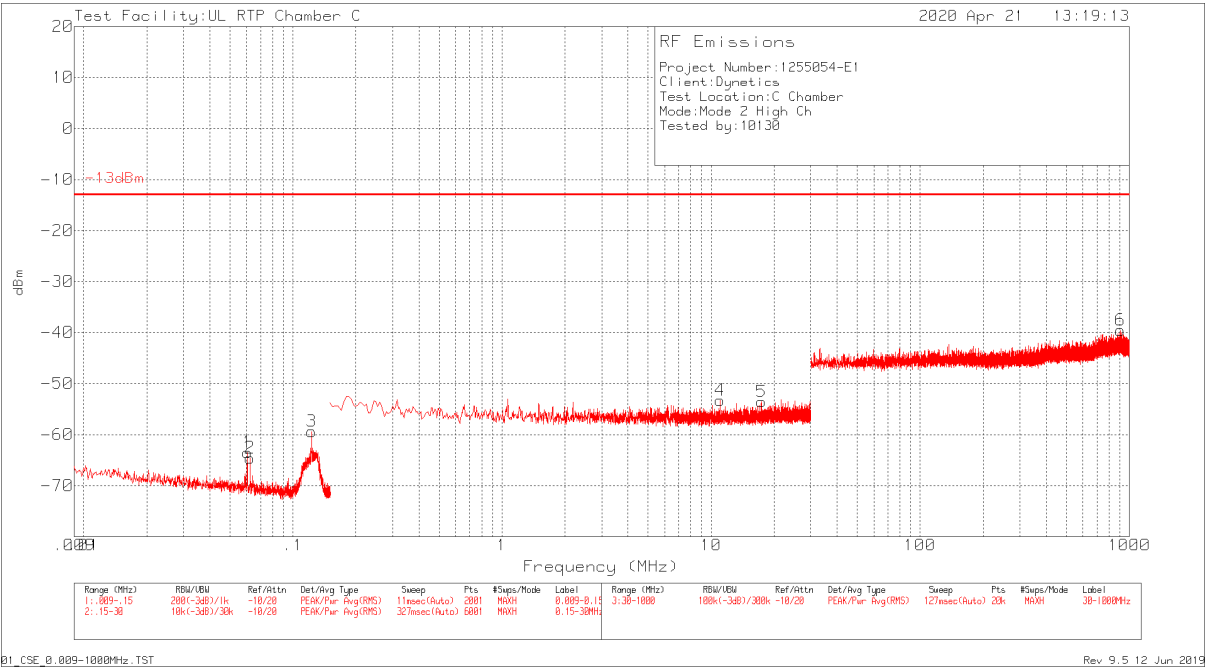
MODE 2 MIDDLE CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Attenuator (dB)	Cable (dB)	Cable (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	3.50922	-55.83	Pk	31	.6	.7	-23.53	-13	-10.53
2	4.03801	-55.44	Pk	31.1	.7	.7	-22.94	-13	-9.94
3	5.19246	-55.93	Pk	30.9	.8	.8	-23.43	-13	-10.43
4	6.39823	-58.83	Pk	30.9	.9	.9	-26.13	-13	-13.13
5	16.86382	-60.83	Pk	30.8	3.4	3.4	-23.23	-13	-10.23
6	17.17805	-61.18	Pk	30.8	3.1	3.1	-24.18	-13	-11.18

Pk - Peak detector

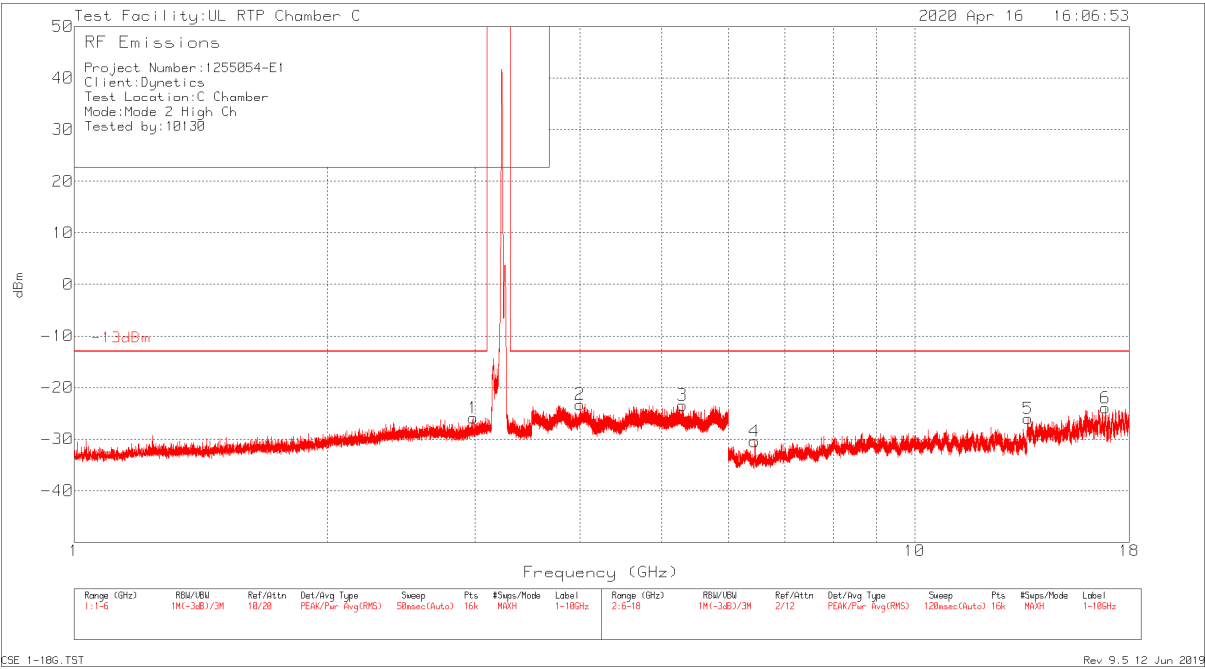
MODE 2 HIGH CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.06062	-93.79	Pk	-.1	-.1	30.5	-63.49	-13	-50.49
2	.06239	-94.89	Pk	-.1	-.1	30.5	-64.59	-13	-51.59
3	.1231	-89.68	Pk	-.1	-.1	30.5	-59.38	-13	-46.38
4	11.04525	-83.58	Pk	-.1	-.1	30.5	-53.28	-13	-40.28
5	17.41823	-84.06	Pk	0	0	30.5	-53.56	-13	-40.56
6	905.716	-71.05	Pk	.3	.3	30.9	-39.55	-13	-26.55

Pk - Peak detector

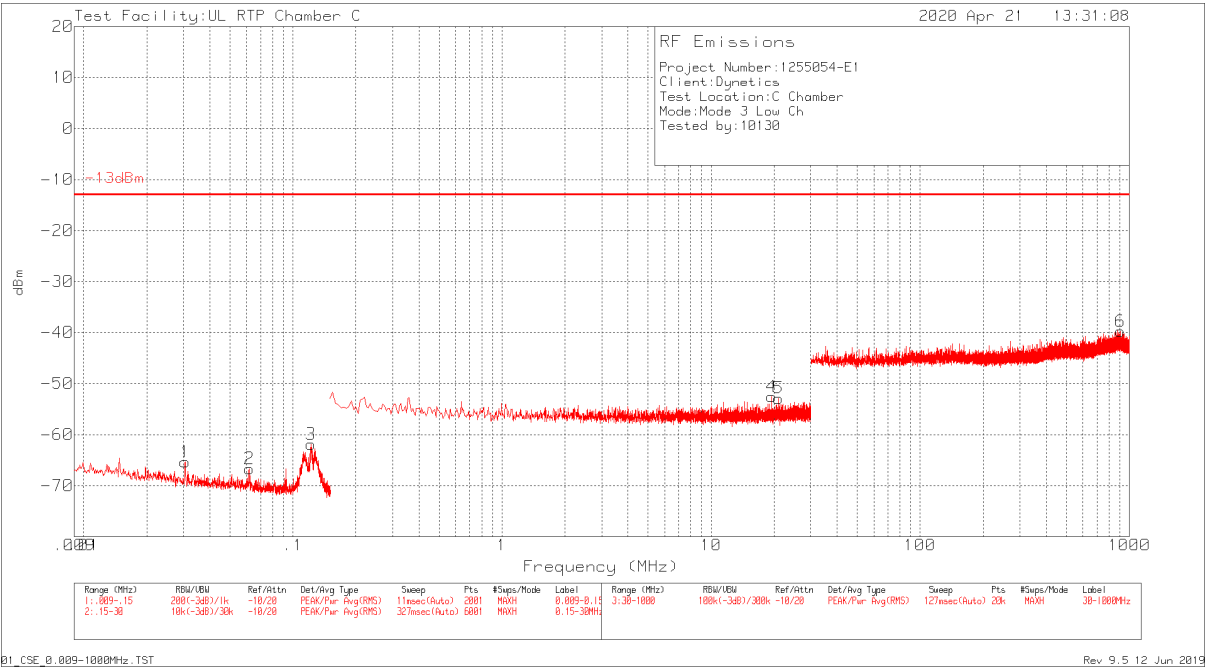
MODE 2 HIGH CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Attenuator (dB)	Cable (dB)	Cable (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	2.98106	-58.23	Pk	31.1	.6	.6	-25.93	-13	-12.93
2	3.99707	-55.7	Pk	31	.7	.7	-23.3	-13	-10.3
3	5.29184	-55.92	Pk	30.9	.8	.8	-23.42	-13	-10.42
4	6.44622	-63.24	Pk	31	.9	.9	-30.44	-13	-17.44
5	13.64352	-61.03	Pk	30.9	2.1	2	-26.03	-13	-13.03
6	16.86082	-61.26	Pk	30.7	3.3	3.3	-23.96	-13	-10.96

Pk - Peak detector

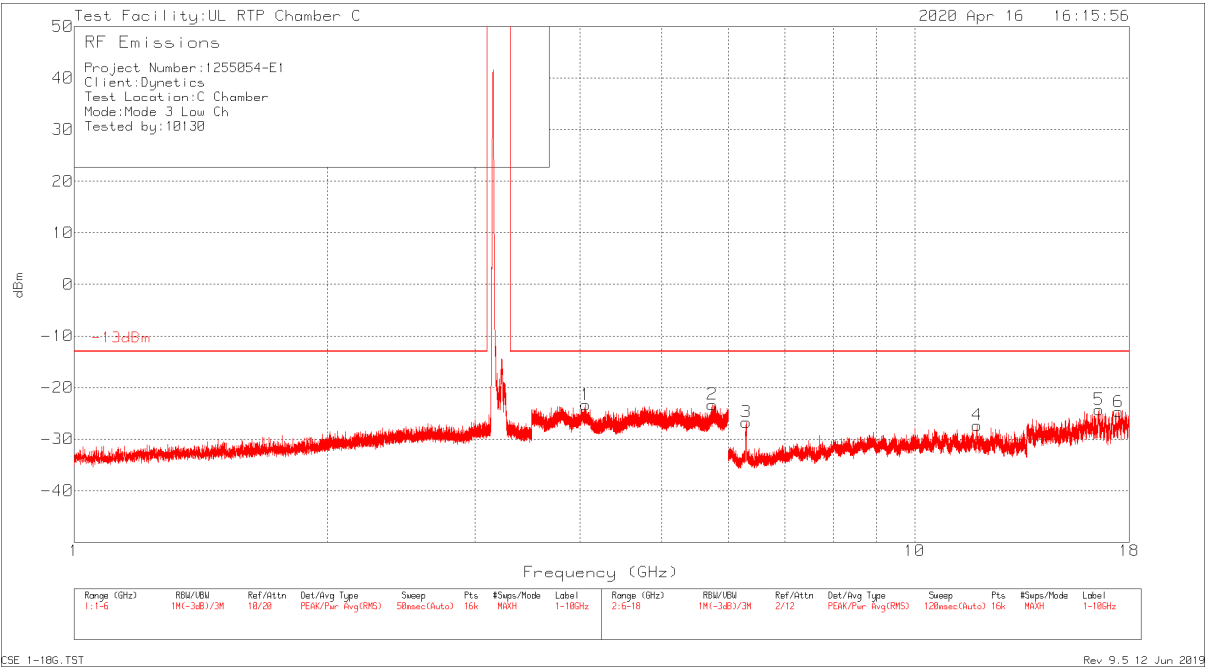
MODE 3 LOW CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.03051	-95.69	Pk	-.1	-.1	30.5	-65.39	-13	-52.39
2	.0619	-96.99	Pk	-.1	-.1	30.5	-66.69	-13	-53.69
3	.1221	-92.19	Pk	-.1	-.1	30.5	-61.89	-13	-48.89
4	19.51768	-83.07	Pk	0	0	30.5	-52.57	-13	-39.57
5	21.04003	-83.36	Pk	0	0	30.5	-52.86	-13	-39.86
6	908.7715	-71.26	Pk	.3	.3	30.9	-39.76	-13	-26.76

Pk - Peak detector

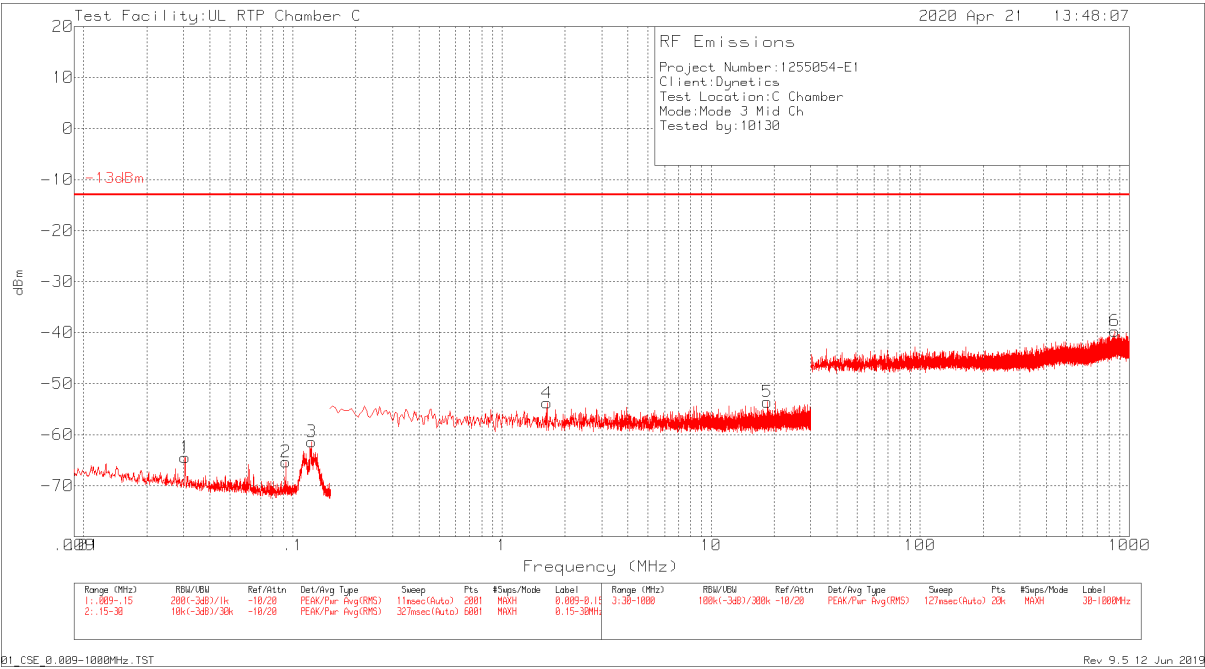
MODE 3 LOW CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Attenuator (dB)	Cable (dB)	Cable (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	4.06145	-55.76	Pk	31	.7	.7	-23.36	-13	-10.36
2	5.74405	-56.08	Pk	31	.9	.9	-23.28	-13	-10.28
3	6.30223	-59.5	Pk	31	.9	.9	-26.7	-13	-13.7
4	11.85788	-62.21	Pk	30.7	2.1	2.1	-27.31	-13	-14.31
5	16.57509	-60.5	Pk	31	2.7	2.5	-24.3	-13	-11.3
6	17.48178	-61.68	Pk	30.8	3	3.2	-24.68	-13	-11.68

Pk - Peak detector

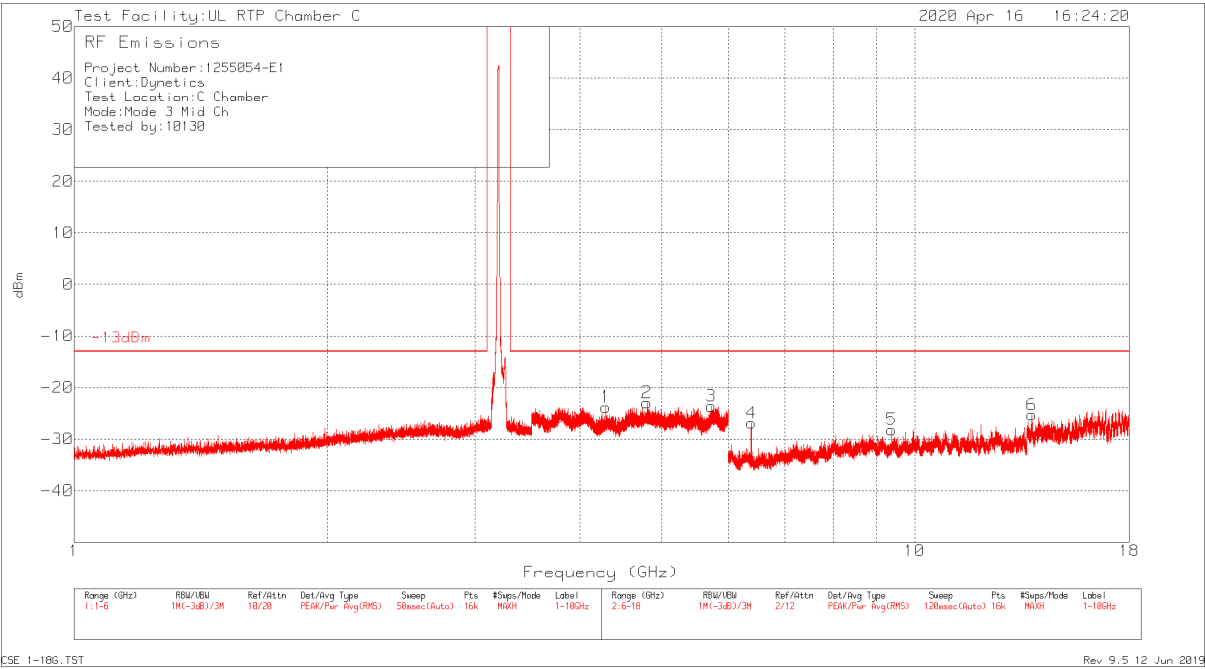
MODE 3 MIDDLE CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.03051	-94.77	Pk	-.1	-.1	30.5	-64.47	-13	-51.47
2	.09243	-95.64	Pk	-.1	-.1	30.5	-65.34	-13	-52.34
3	.12296	-91.67	Pk	-.1	-.1	30.5	-61.37	-13	-48.37
4	1.6425	-84.09	Pk	-.1	-.1	30.5	-53.79	-13	-40.79
5	18.57243	-84.08	Pk	0	0	30.5	-53.58	-13	-40.58
6	852.172	-71.18	Pk	.3	.3	30.9	-39.68	-13	-26.68

Pk - Peak detector

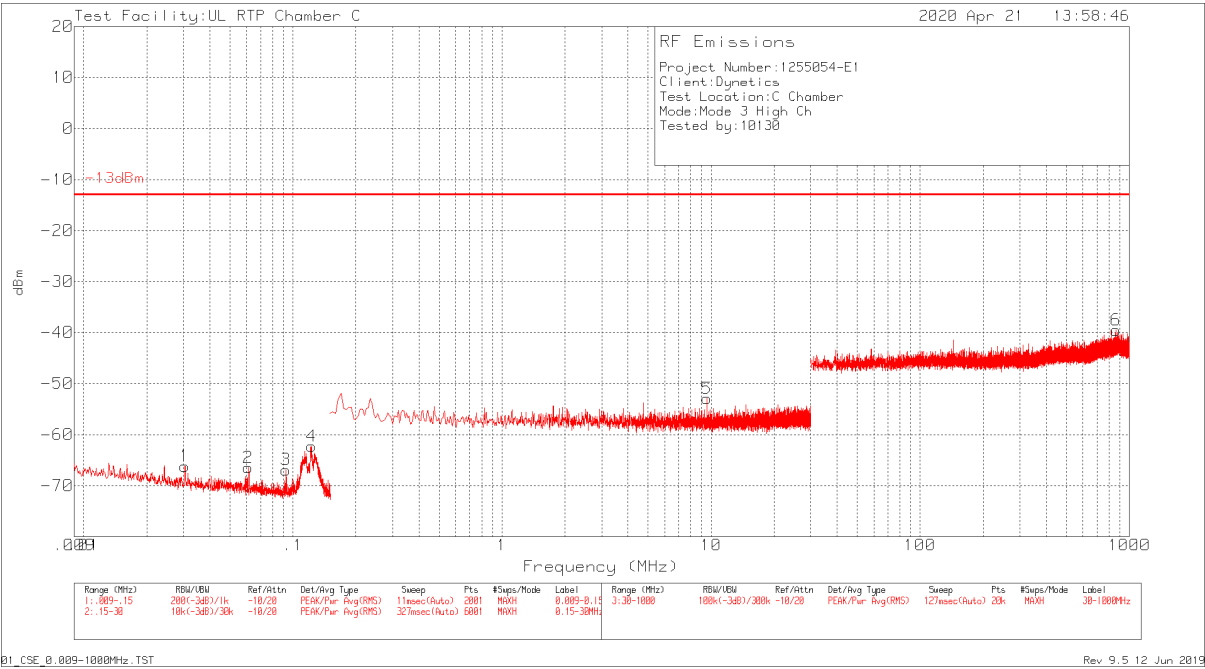
MODE 3 MIDDLE CHANNEL 1GHz - 18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Attenuator (dB)	Cable (dB)	Cable (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	4.29146	-56.31	Pk	31	.8	.7	-23.81	-13	-10.81
2	4.80118	-55.53	Pk	31	.8	.8	-22.93	-13	-9.93
3	5.73062	-56.23	Pk	30.8	.9	.9	-23.63	-13	-10.63
4	6.39448	-59.58	Pk	30.9	.9	.9	-26.88	-13	-13.88
5	9.39054	-61.66	Pk	31.1	1.2	1.2	-28.16	-13	-15.16
6	13.78676	-60.62	Pk	30.9	2.2	2.2	-25.32	-13	-12.32

Pk - Peak detector

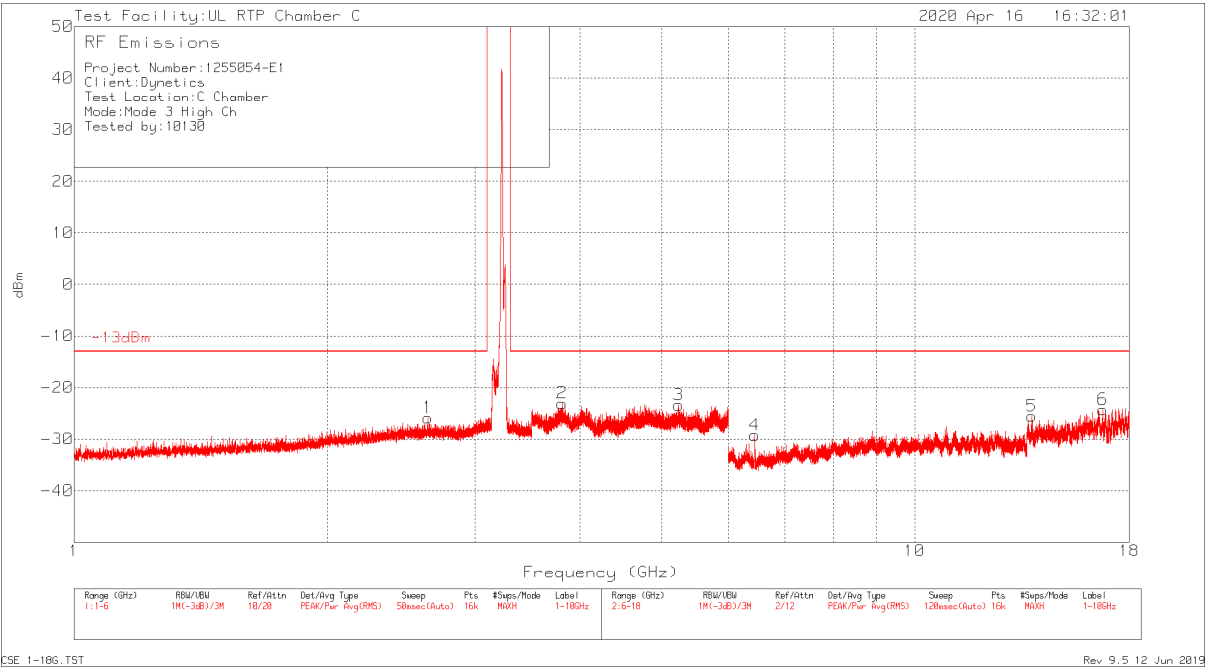
MODE 3 HIGH CHANNEL 9kHz – 1000MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Cable (dB)	Cable (dB)	Attenuator (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	.03044	-96.5	Pk	-.1	-.1	30.5	-66.2	-13	-53.2
2	.06104	-96.79	Pk	-.1	-.1	30.5	-66.49	-13	-53.49
3	.09243	-97.2	Pk	-.1	-.1	30.5	-66.9	-13	-53.9
4	.12296	-92.59	Pk	-.1	-.1	30.5	-62.29	-13	-49.29
5	9.54778	-83.22	Pk	-.1	-.1	30.5	-52.92	-13	-39.92
6	865.17	-70.94	Pk	.3	.3	30.8	-39.54	-13	-26.54

Pk - Peak detector

MODE 3 HIGH CHANNEL 1GHz - 18GHz



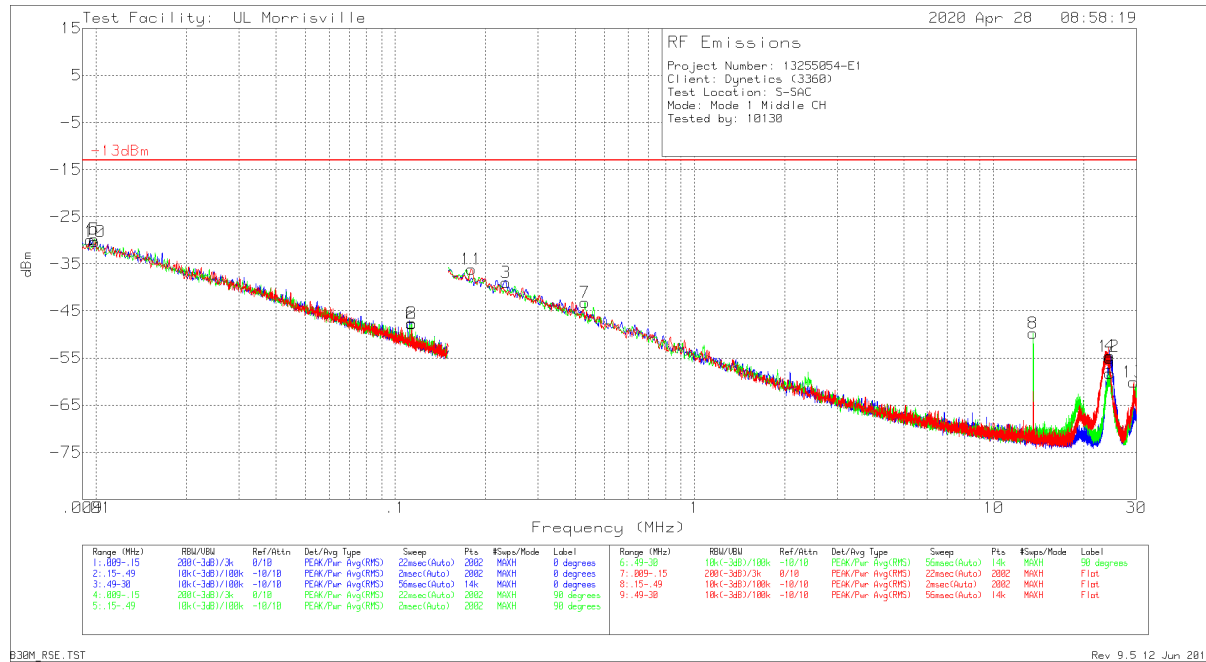
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	Attenuator (dB)	Cable (dB)	Cable (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)
1	2.63573	-58.06	Pk	31	.6	.6	-25.86	-13	-12.86
2	3.80581	-55.44	Pk	31	.7	.7	-23.04	-13	-10.04
3	5.23683	-56.09	Pk	30.9	.9	.9	-23.39	-13	-10.39
4	6.44997	-61.94	Pk	30.9	.9	.9	-29.24	-13	-16.24
5	13.78976	-61.14	Pk	31.1	2.3	2.2	-25.54	-13	-12.54
6	16.74233	-60.57	Pk	31	2.8	2.5	-24.27	-13	-11.27

Pk - Peak detector

8.3.2. RADIATED ENCLOSURE PORT OUT OF BAND EMISSIONS

Note – All plots in section 8.3.2 should have a project reference of 13255054 as opposed to 1255054

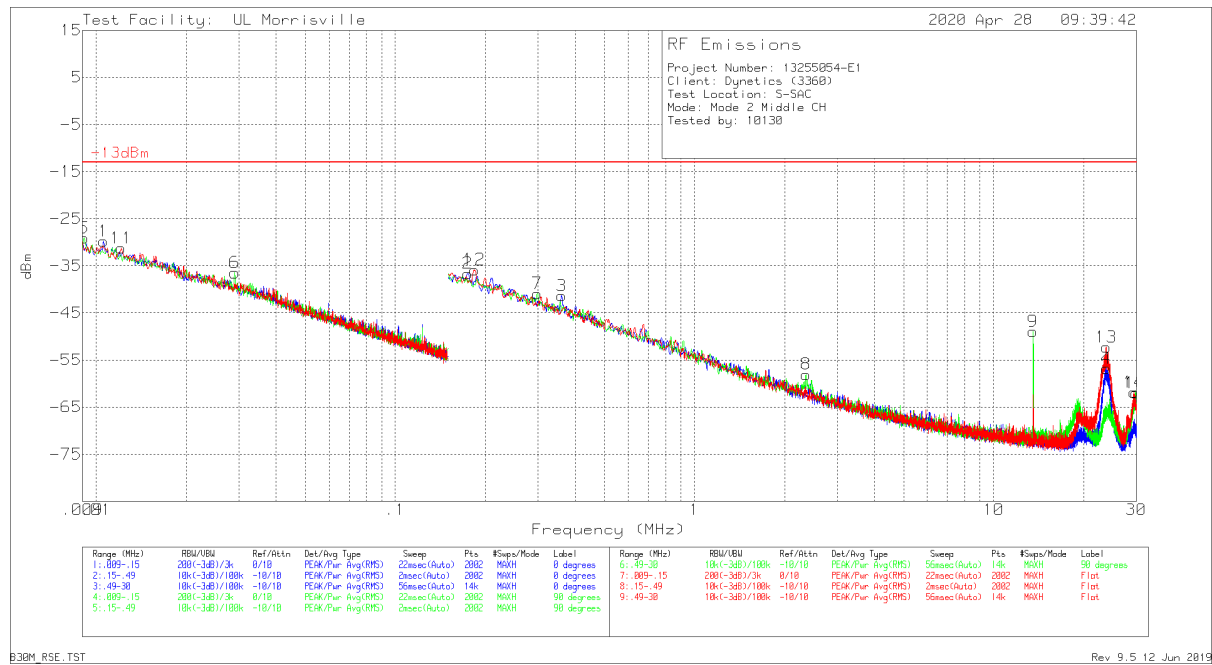
MODE 1 WORST-CASE <30MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0079 AF (dB/m)	Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)
Loop antenna @ 0 degrees										
1	.00956	-60.32	Pk	18.5	.1	11.8	-29.92	-13	-16.92	0-360
2	.11337	-70.65	Pk	11.1	.1	11.8	-47.65	-13	-34.65	0-360
3	.23466	-61.83	Pk	11	.1	11.8	-38.93	-13	-25.93	0-360
4	24.47904	-76.03	Pk	8.9	.8	11.8	-54.53	-13	-41.53	0-360
Loop antenna @ 90 degrees										
5	.00984	-60	Pk	18.3	.1	11.8	-29.8	-13	-16.8	0-360
6	.11337	-70.68	Pk	11.1	.1	11.8	-47.68	-13	-34.68	0-360
7	.43025	-66.09	Pk	11	.1	11.8	-43.19	-13	-30.19	0-360
8	13.56171	-72.12	Pk	10	.6	11.8	-49.72	-13	-36.72	0-360
9	24.4432	-79.79	Pk	8.9	.8	11.8	-58.29	-13	-45.29	0-360
Loop antenna flat										
10	.00991	-60.51	Pk	18.3	.1	11.8	-30.31	-13	-17.31	0-360
11	.1795	-59.05	Pk	11	.1	11.8	-36.15	-13	-23.15	0-360
12	24.22186	-76.22	Pk	8.9	.8	11.8	-54.72	-13	-41.72	0-360
13	29.35484	-80.9	Pk	8.1	.9	11.8	-60.1	-13	-47.1	0-360

Pk - Peak detector

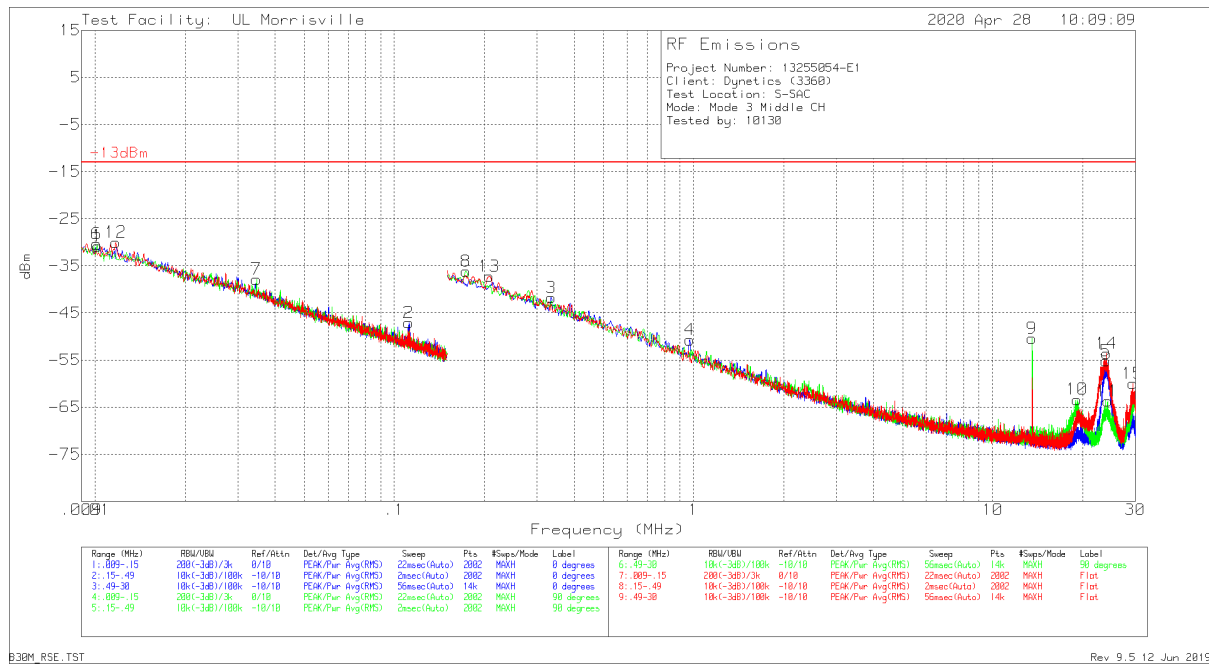
MODE 2 WORST-CASE <30MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0079 AF (dB/m)	Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)
1	.01061	-59.61	Pk	17.9	.1	11.8	-29.81	-13	-16.81	0-360
2	.17448	-59.53	Pk	11	.1	11.8	-36.63	-13	-23.63	0-360
3	.36012	-64.25	Pk	11	.1	11.8	-41.35	-13	-28.35	0-360
4	23.76864	-78.38	Pk	9	.8	11.8	-56.78	-13	-43.78	0-360
5	.00914	-59.88	Pk	18.9	.1	11.8	-29.08	-13	-16.08	0-360
6	.02909	-61.58	Pk	13.2	.1	11.8	-36.48	-13	-23.48	0-360
7	.29833	-63.81	Pk	11	.1	11.8	-40.91	-13	-27.91	0-360
8	2.35874	-81.26	Pk	11.2	.2	11.8	-58.06	-13	-45.06	0-360
9	13.56171	-71.35	Pk	10	.6	11.8	-48.95	-13	-35.95	0-360
10	29.8165	-82.67	Pk	8	.9	11.8	-61.97	-13	-48.97	0-360
11	.01215	-60.48	Pk	17.3	.1	11.8	-31.28	-13	-18.28	0-360
12	.18375	-58.76	Pk	11	.1	11.8	-35.86	-13	-22.86	0-360
13	23.8108	-73.84	Pk	9	.8	11.8	-52.24	-13	-39.24	0-360
14	29.38014	-82.64	Pk	8.1	.9	11.8	-61.84	-13	-48.84	0-360

Pk - Peak detector

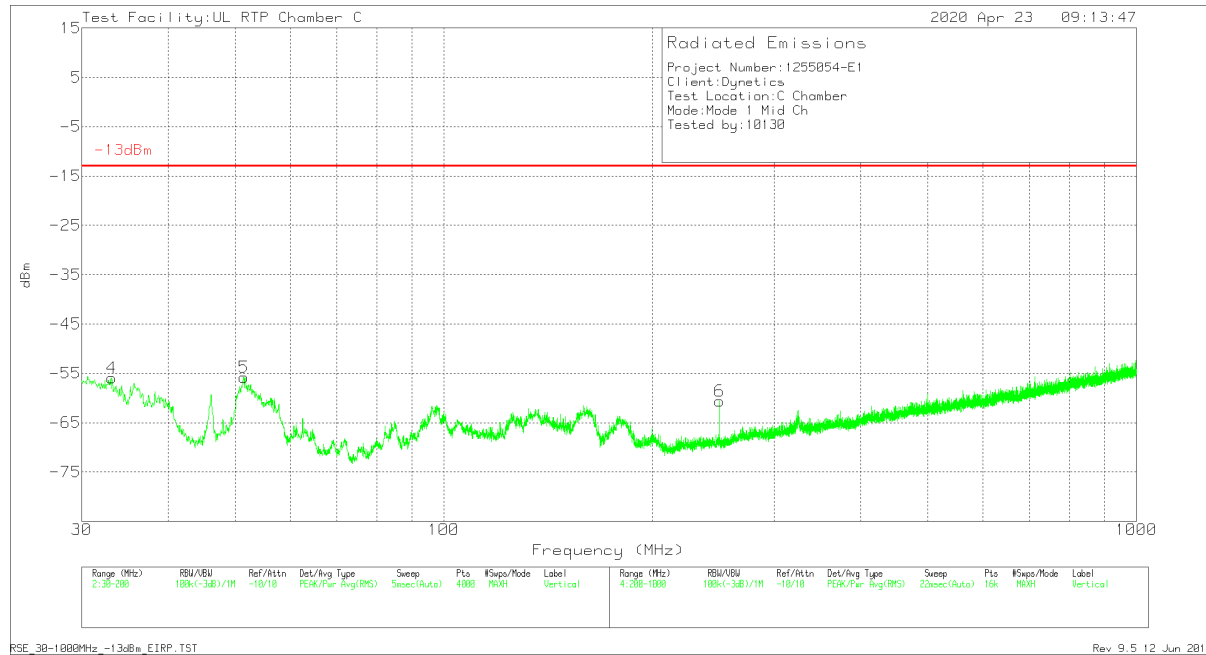
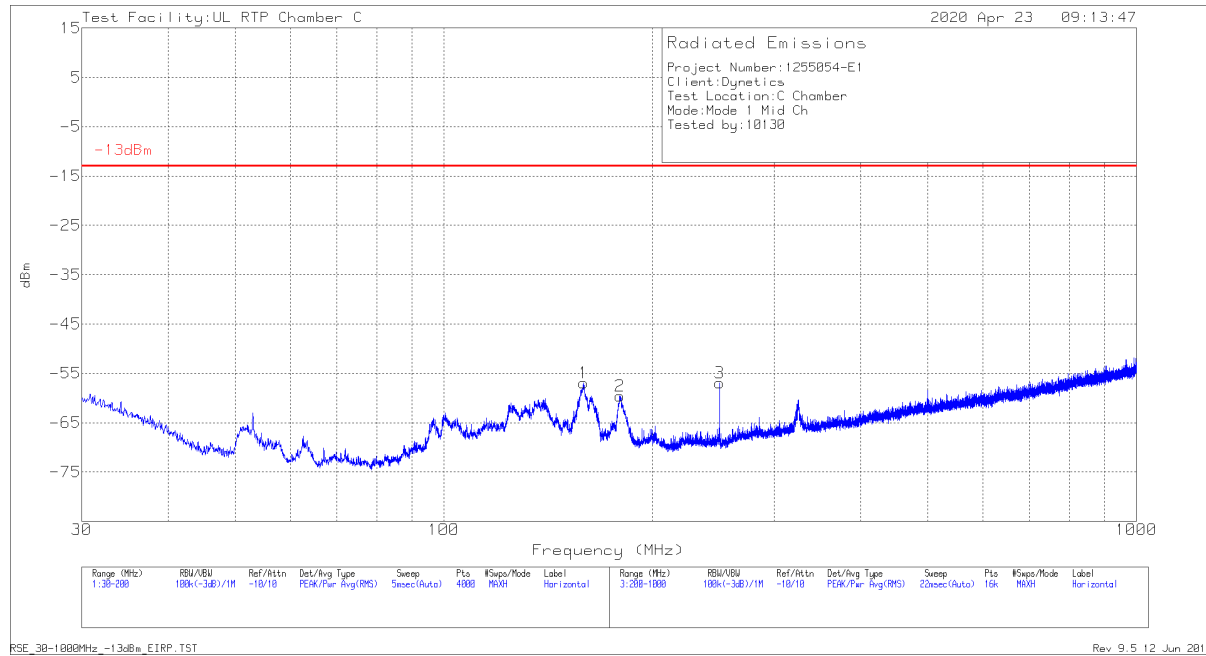
MODE 3 WORST-CASE <30MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0079 AF (dB/m)	Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)
Loop antenna @ 0 degrees										
1	.01019	-60.78	Pk	18.1	.1	11.8	-30.78	-13	-17.78	0-360
2	.11176	-70.11	Pk	11.1	.1	11.8	-47.11	-13	-34.11	0-360
3	.33437	-64.64	Pk	11	.1	11.8	-41.74	-13	-28.74	0-360
4	.97062	-73.72	Pk	11	.2	11.8	-50.72	-13	-37.72	0-360
5	23.88458	-76.74	Pk	8.9	.8	11.8	-55.24	-13	-42.24	0-360
Loop antenna @ 90 degrees										
6	.01012	-60.37	Pk	18.1	.1	11.8	-30.37	-13	-17.37	0-360
7	.03462	-62.54	Pk	12.8	.1	11.8	-37.84	-13	-24.84	0-360
8	.17372	-59.08	Pk	11	.1	11.8	-36.18	-13	-23.18	0-360
9	13.56171	-72.78	Pk	10	.6	11.8	-50.38	-13	-37.38	0-360
10	19.14369	-85.38	Pk	9.5	.7	11.8	-63.38	-13	-50.38	0-360
11	24.21765	-85.26	Pk	8.9	.8	11.8	-63.76	-13	-50.76	0-360
Loop antenna flat										
12	.01173	-59.41	Pk	17.5	.1	11.8	-30.01	-13	-17.01	0-360
13	.20772	-60.1	Pk	11	.1	11.8	-37.2	-13	-24.2	0-360
14	24.02793	-75.12	Pk	8.9	.8	11.8	-53.62	-13	-40.62	0-360
15	29.43495	-80.79	Pk	8.1	.9	11.8	-59.99	-13	-46.99	0-360

Pk - Peak detector

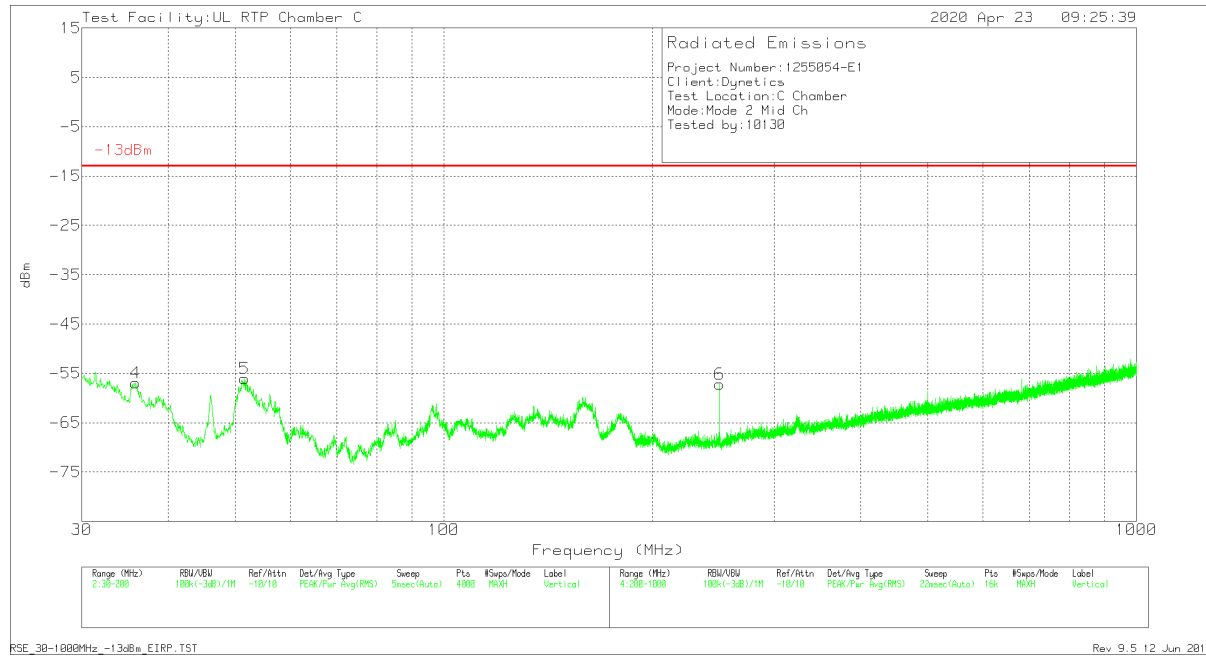
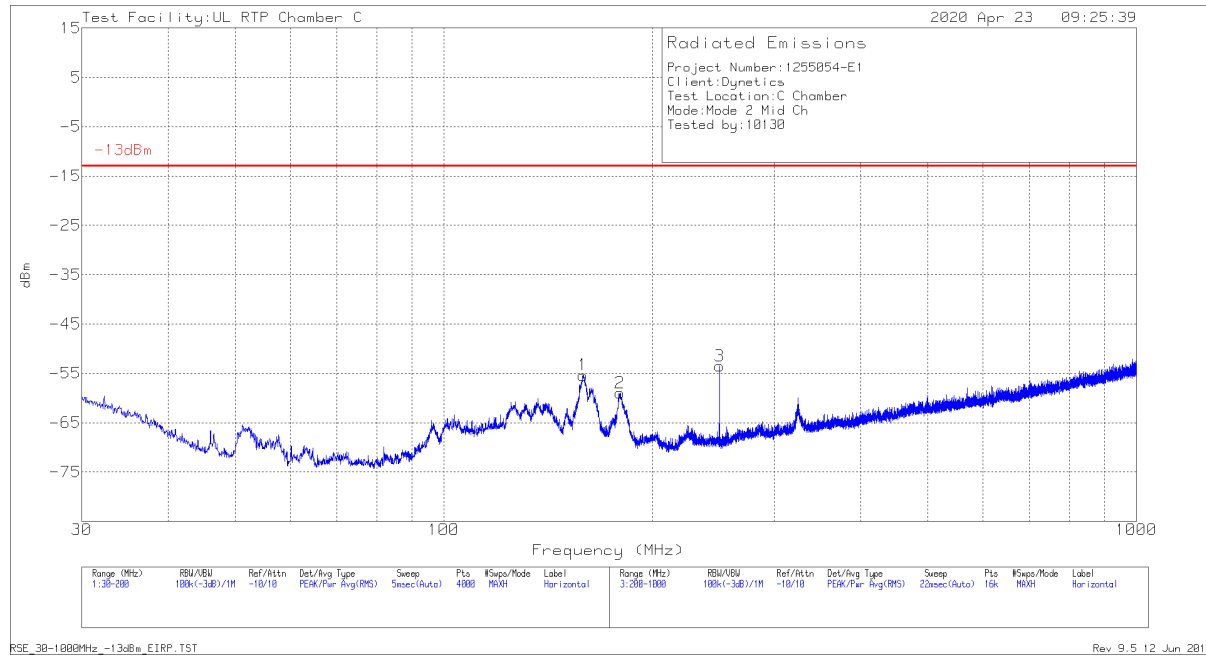
MODE 1 WORST-CASE 30-1000 MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0081 (dB/m)	Amp/Cbl/ Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	159.276	-66.81	Pk	18.8	-20.7	11.8	-56.91	-13	-43.91	0-360	198	H
2	179.6387	-68.56	Pk	17.6	-20.4	11.8	-59.56	-13	-46.56	0-360	198	H
3	250	-66.93	Pk	18.3	-20.1	11.8	-56.93	-13	-43.93	0-360	102	H
4	33.1458	-72.18	Pk	26.1	-21.6	11.8	-55.88	-13	-42.88	0-360	102	V
5	51.4255	-60.36	Pk	14.4	-21.6	11.8	-55.76	-13	-42.76	0-360	102	V
6	250	-70.63	Pk	18.3	-20.1	11.8	-60.63	-13	-47.63	0-360	102	V

Pk - Peak detector

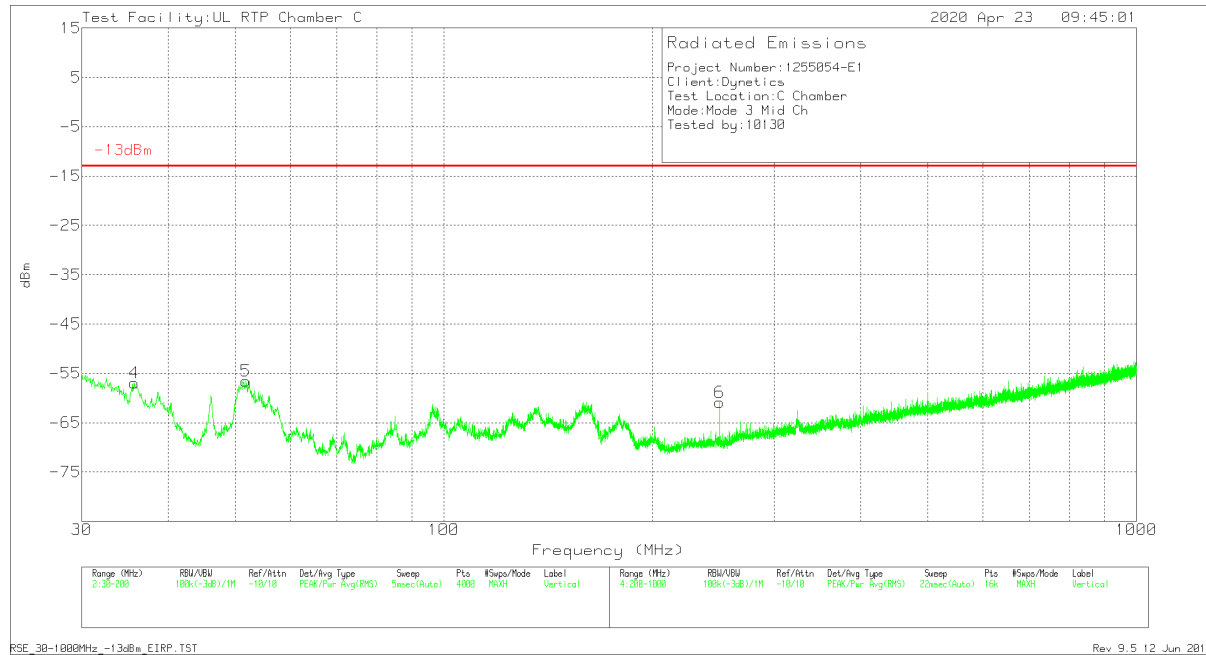
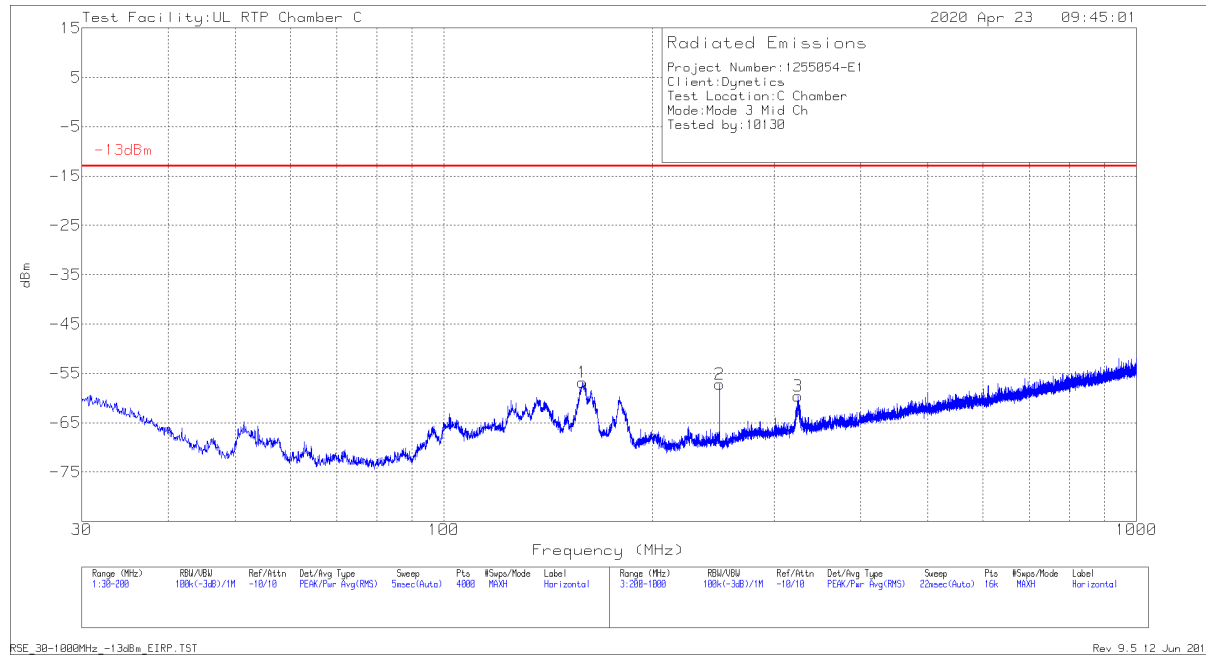
MODE 2 WORST-CASE 30-1000 MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0081 (dB/m)	Amp/Cbl/ Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	158.9784	-65.35	Pk	18.8	-20.6	11.8	-55.35	-13	-42.35	0-360	198	H
2	179.6387	-68	Pk	17.6	-20.4	11.8	-59	-13	-46	0-360	198	H
3	250	-63.51	Pk	18.3	-20.1	11.8	-53.51	-13	-40.51	0-360	102	H
4	35.8665	-71.35	Pk	24.1	-21.5	11.8	-56.95	-13	-43.95	0-360	102	V
5	51.5956	-60.61	Pk	14.3	-21.5	11.8	-56.01	-13	-43.01	0-360	102	V
6	250	-67.21	Pk	18.3	-20.1	11.8	-57.21	-13	-44.21	0-360	102	V

Pk - Peak detector

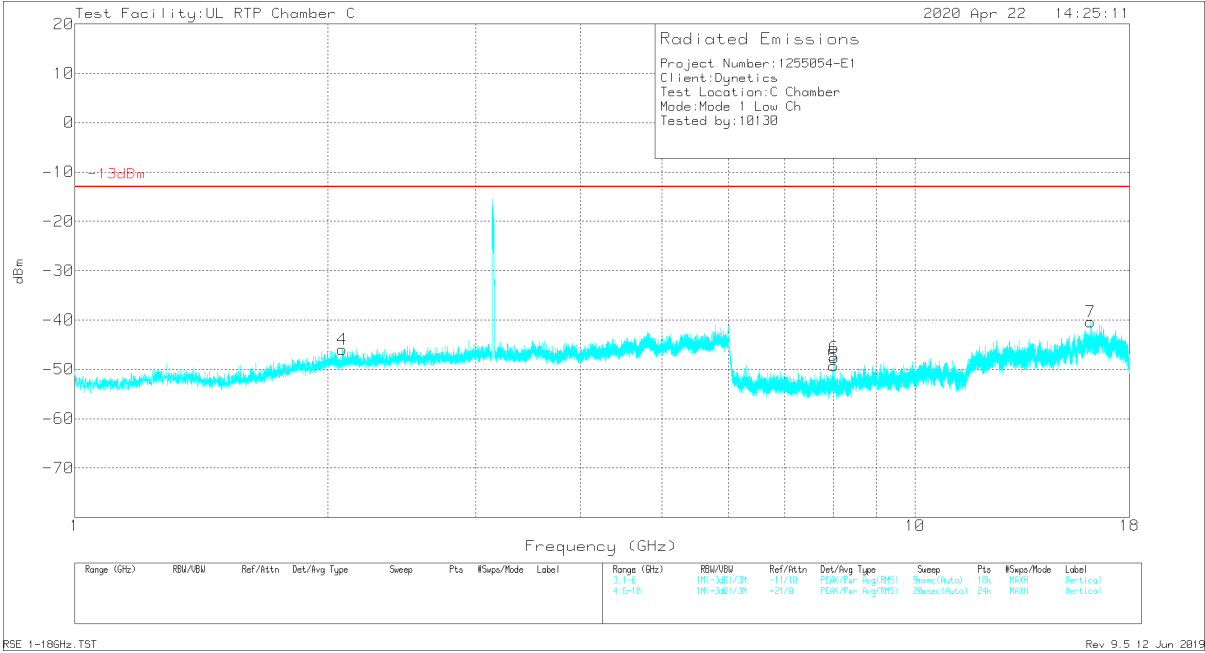
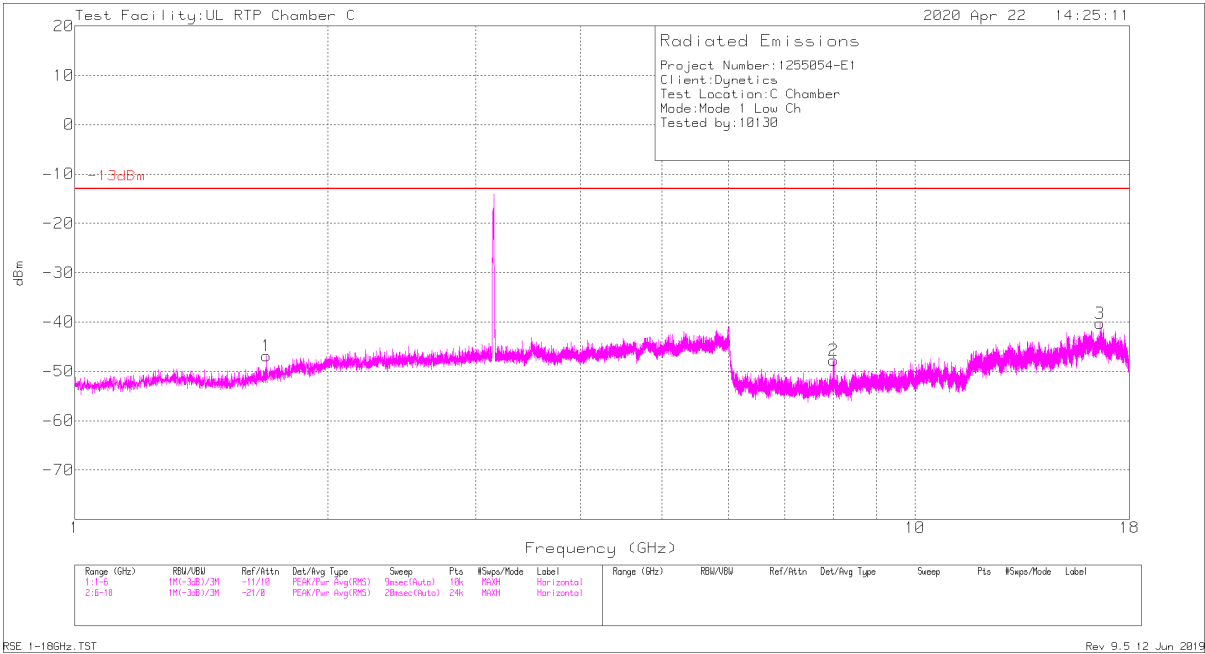
MODE 3 WORST-CASE 30-1000 MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0081 (dB/m)	Amp/Cbl/P ad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	158.4682	-66.83	Pk	18.8	-20.6	11.8	-56.83	-13	-43.83	0-360	198	H
2	250	-67.15	Pk	18.3	-20.1	11.8	-57.15	-13	-44.15	0-360	102	H
3	324.65	-72.42	Pk	20.7	-19.7	11.8	-59.62	-13	-46.62	0-360	102	H
4	35.739	-71.38	Pk	24.2	-21.5	11.8	-56.88	-13	-43.88	0-360	102	V
5	51.7656	-61.1	Pk	14.3	-21.5	11.8	-56.5	-13	-43.5	0-360	102	V
6	250	-70.85	Pk	18.3	-20.1	11.8	-60.85	-13	-47.85	0-360	102	V

Pk - Peak detector

MODE 1 LOW CHANNEL 1-18GHz

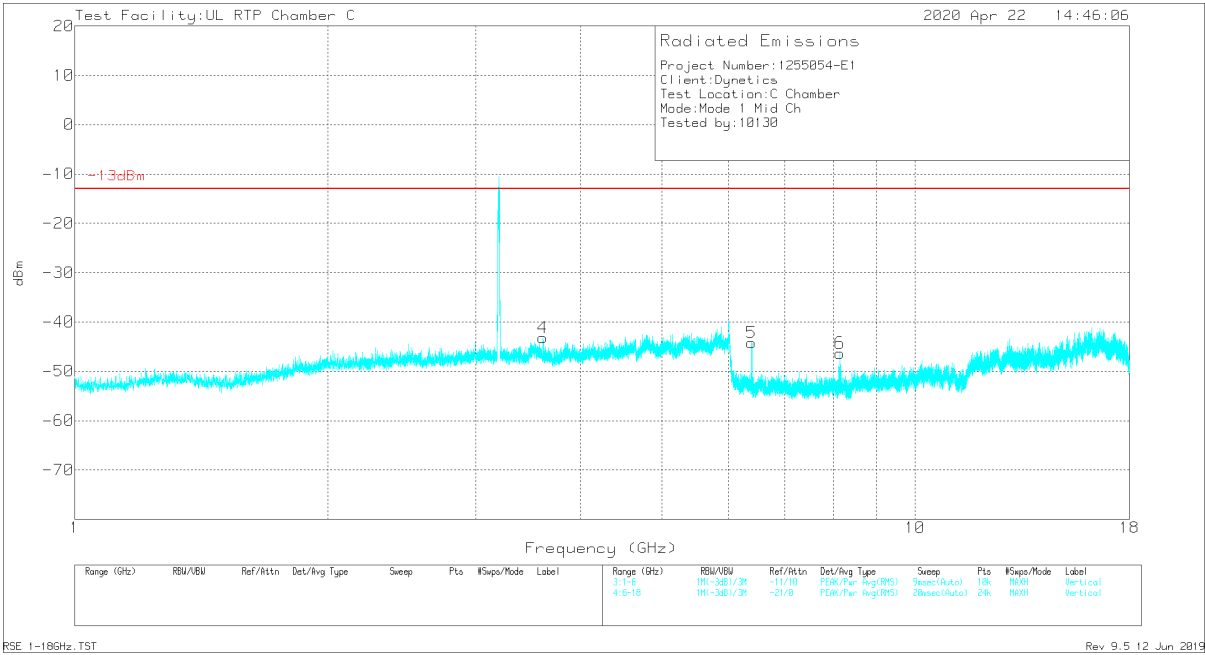
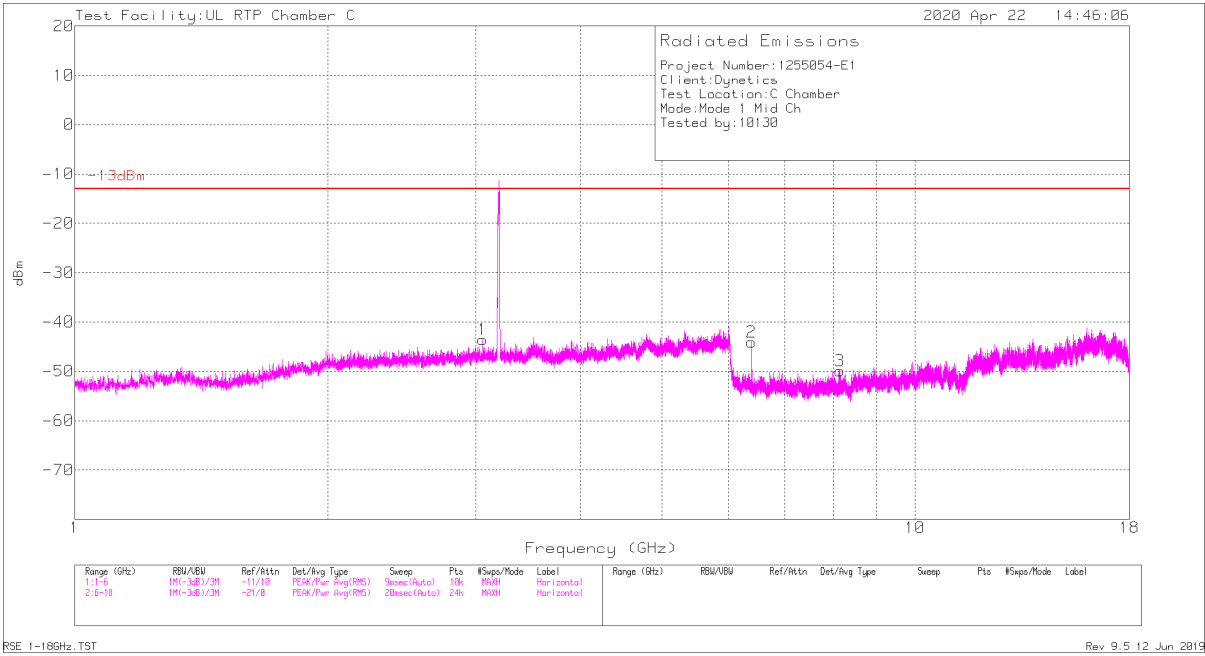


Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0062 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.69	-42.91	Pk	29	-44.7	11.8	-46.81	-13	-33.81	0-360	98	H
2	8.00792	-48.73	Pk	35.8	-46.6	11.8	-47.73	-13	-34.73	0-360	198	H
3	16.59906	-56.91	Pk	42.1	-37.3	11.8	-40.31	-13	-27.31	0-360	198	H
4	2.083	-45.28	Pk	31.6	-44.1	11.8	-45.98	-13	-32.98	0-360	198	V
5	7.99742	-49.8	Pk	35.8	-47.1	11.8	-49.3	-13	-36.3	0-360	102	V
6	8.01392	-48.87	Pk	35.8	-46.4	11.8	-47.67	-13	-34.67	0-360	198	V
7	16.17507	-54.44	Pk	41.3	-39.1	11.8	-40.44	-13	-27.44	0-360	198	V

Pk - Peak detector

MODE 1 MID CHANNEL 1-18GHz

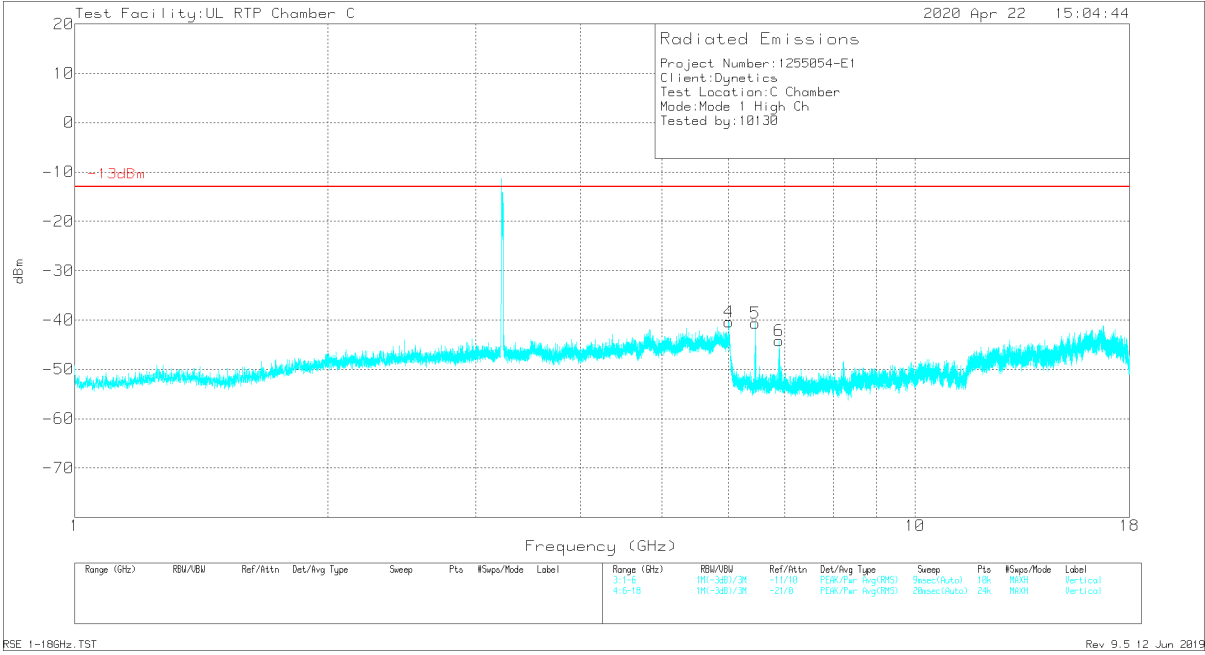
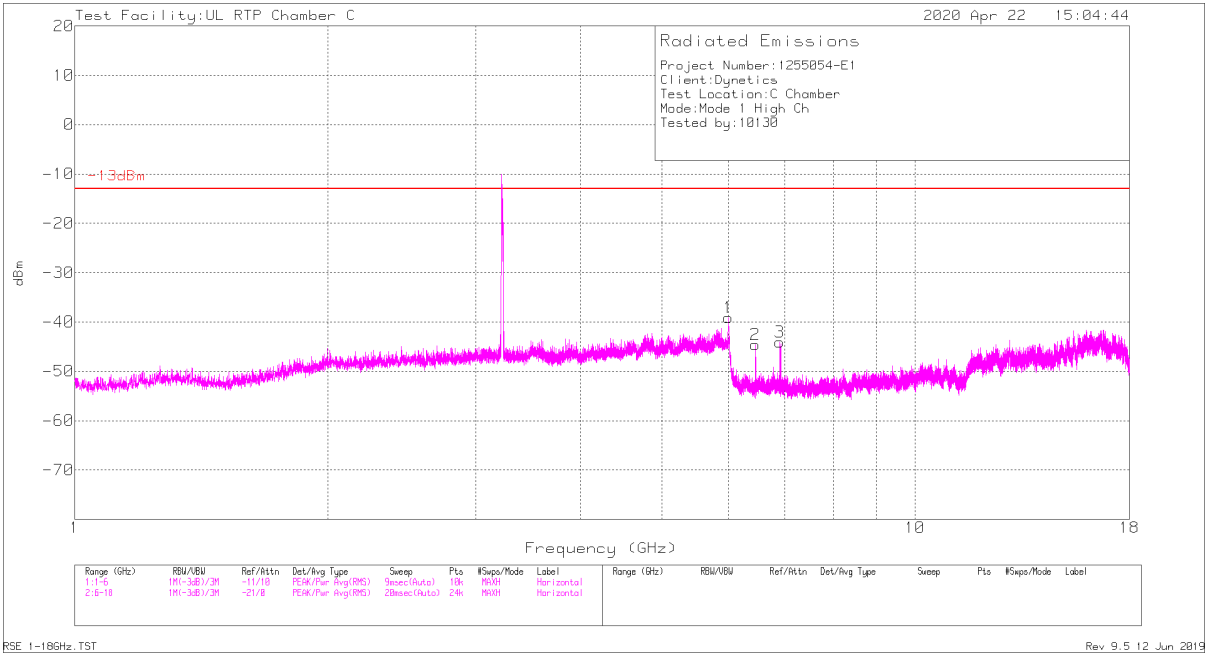


Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0062 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.0585	-46.32	Pk	33	-42	11.8	-43.52	-13	-30.52	0-360	198	H
2	6.39048	-42.6	Pk	35.5	-48.8	11.8	-44.1	-13	-31.1	0-360	198	H
3	8.14591	-50.52	Pk	35.8	-47	11.8	-49.92	-13	-36.92	0-360	198	H
4	3.6095	-47	Pk	33.1	-41.1	11.8	-43.2	-13	-30.2	0-360	102	V
5	6.39098	-42.75	Pk	35.5	-48.8	11.8	-44.25	-13	-31.25	0-360	198	V
6	8.14241	-46.89	Pk	35.8	-47	11.8	-46.29	-13	-33.29	0-360	198	V

Pk - Peak detector

MODE 1 HIGH CHANNEL 1-18GHz

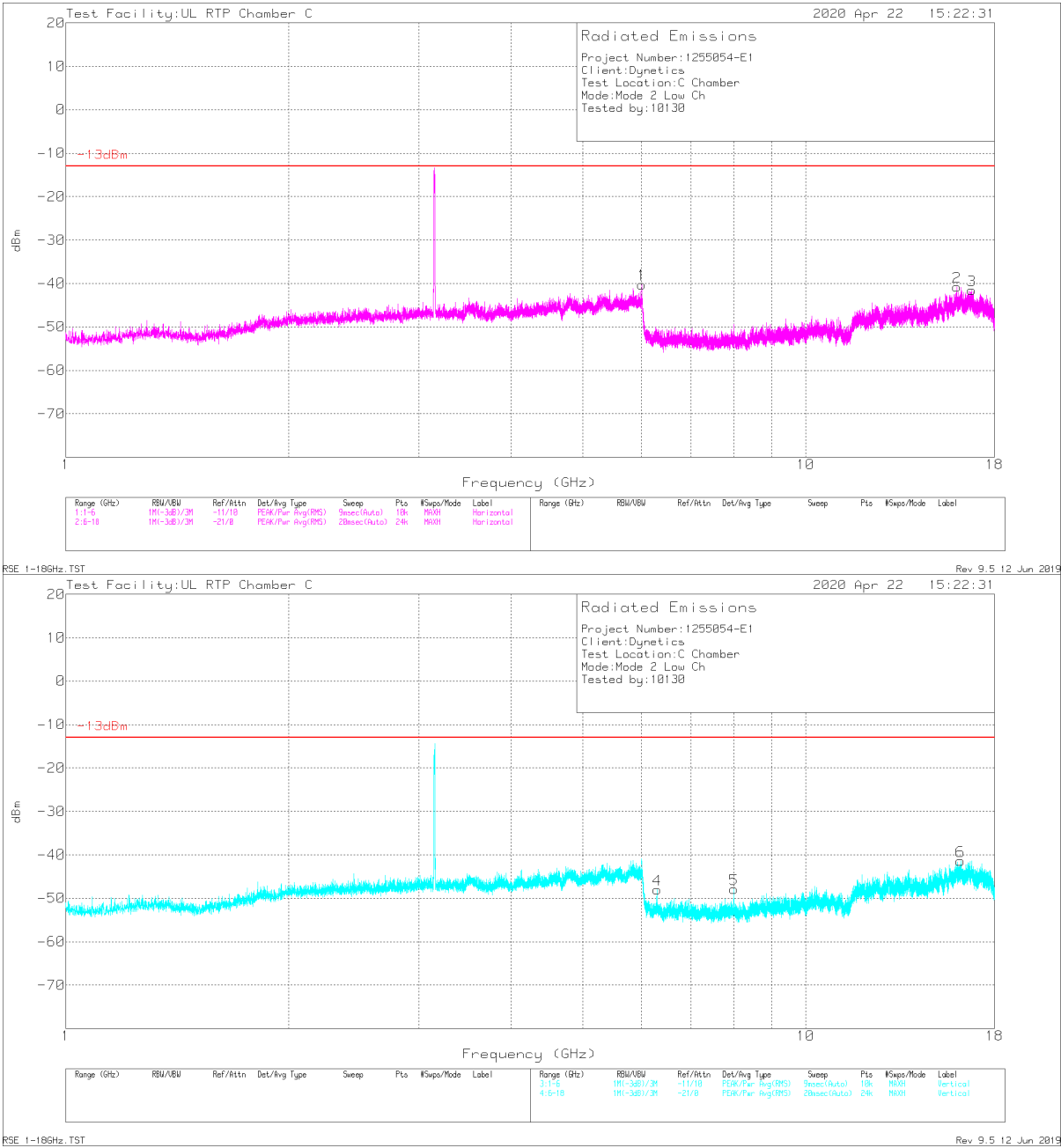


Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0062 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	6.0005	-52.32	Pk	35.2	-33.8	11.8	-39.12	-13	-26.12	0-360	198	H
2	6.45148	-43.33	Pk	35.6	-48.7	11.8	-44.63	-13	-31.63	0-360	198	H
3	6.90446	-43.72	Pk	35.7	-47.8	11.8	-44.02	-13	-31.02	0-360	198	H
4	6.002	-53.07	Pk	35.2	-34.3	11.8	-40.37	-13	-27.37	0-360	101	V
5	6.45898	-39.34	Pk	35.6	-48.7	11.8	-40.64	-13	-27.64	0-360	198	V
6	6.88546	-44.23	Pk	35.7	-47.5	11.8	-44.23	-13	-31.23	0-360	198	V

Pk - Peak detector

MODE 2 LOW CHANNEL 1-18GHz

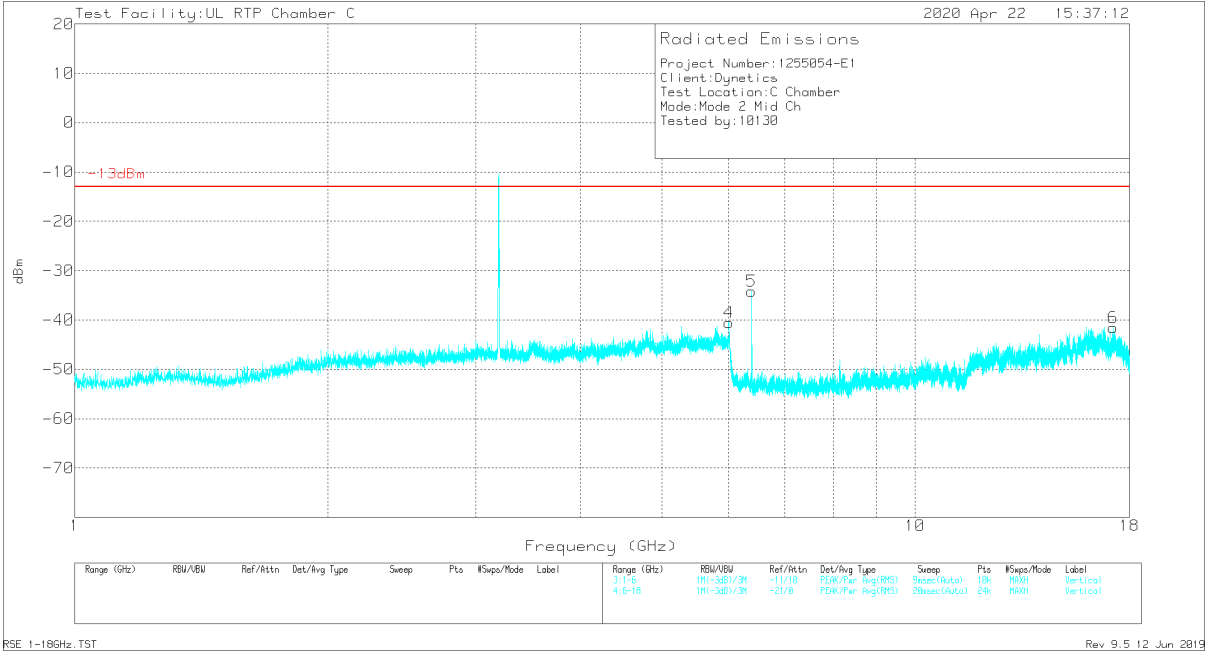
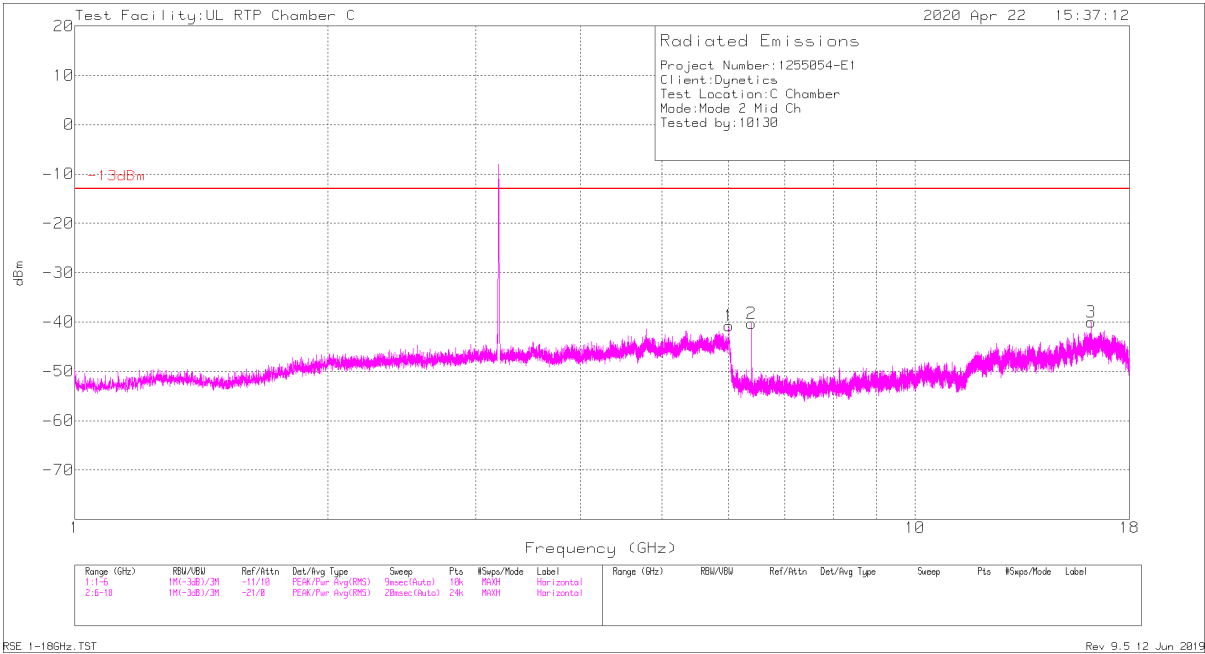


Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0062 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	6.004	-52.3	Pk	35.2	-34.9	11.8	-40.2	-13	-27.2	0-360	102	H
2	16.00658	-55.62	Pk	41.1	-38	11.8	-40.72	-13	-27.72	0-360	102	H
3	16.78605	-58.31	Pk	42.4	-37.4	11.8	-41.51	-13	-28.51	0-360	198	H
4	6.29999	-46.66	Pk	35.5	-48.7	11.8	-48.06	-13	-35.06	0-360	198	V
5	8.00242	-48.65	Pk	35.8	-46.8	11.8	-47.85	-13	-34.85	0-360	198	V
6	16.19457	-56.36	Pk	41.3	-38.1	11.8	-41.36	-13	-28.36	0-360	198	V

Pk - Peak detector

MODE 2 MID CHANNEL 1-18GHz

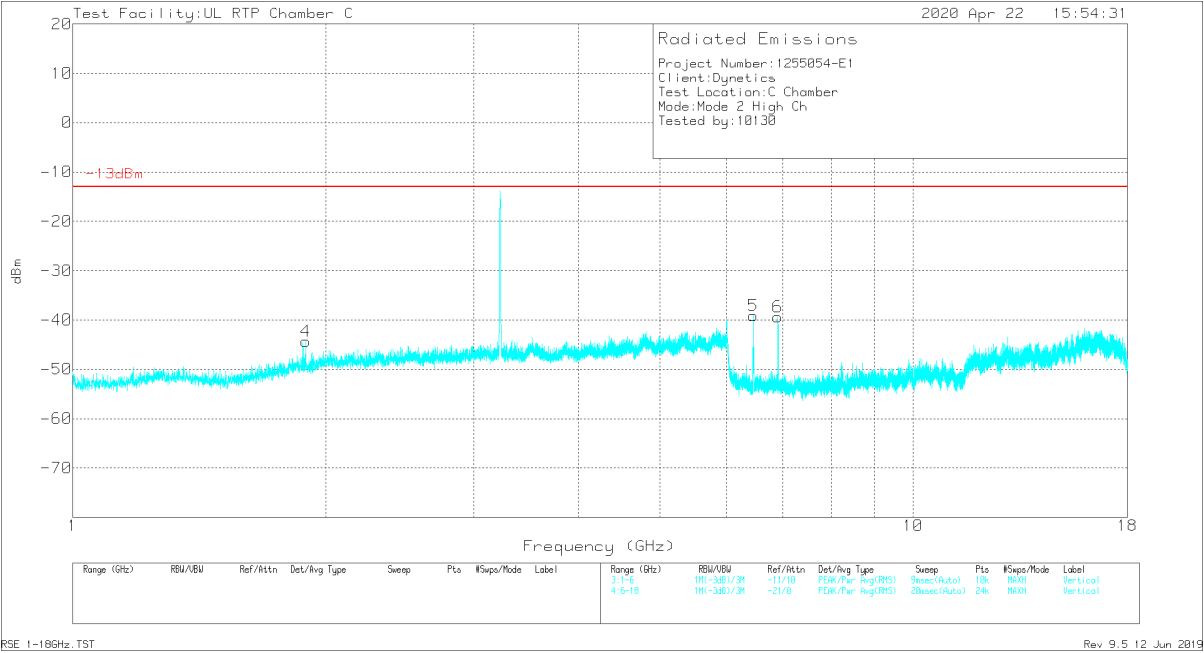
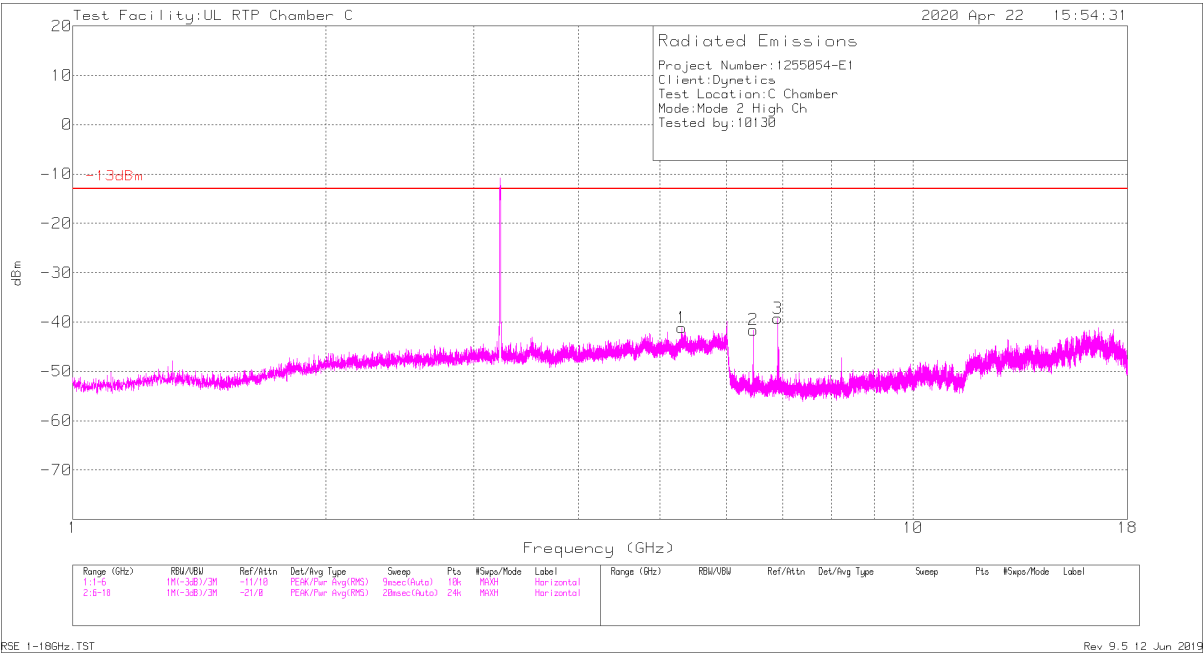


Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0062 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	6.0045	-52.72	Pk	35.2	-35	11.8	-40.72	-13	-27.72	0-360	102	H
2	6.39098	-38.81	Pk	35.5	-48.8	11.8	-40.31	-13	-27.31	0-360	102	H
3	16.20757	-55.63	Pk	41.3	-37.5	11.8	-40.03	-13	-27.03	0-360	102	H
4	6.005	-52.37	Pk	35.2	-35.1	11.8	-40.47	-13	-27.47	0-360	102	V
5	6.39048	-32.61	Pk	35.5	-48.8	11.8	-34.11	-13	-21.11	0-360	198	V
6	17.21853	-57.88	Pk	41.8	-37.2	11.8	-41.48	-13	-28.48	0-360	198	V

Pk - Peak detector

MODE 2 HIGH CHANNEL 1-18GHz

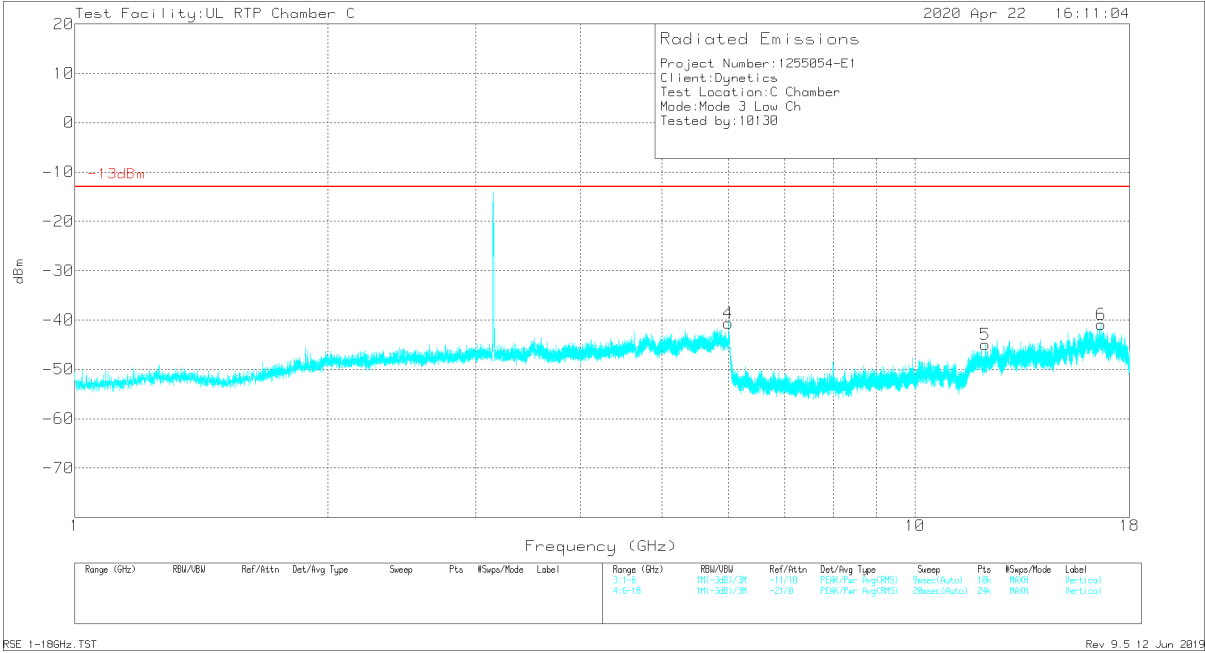
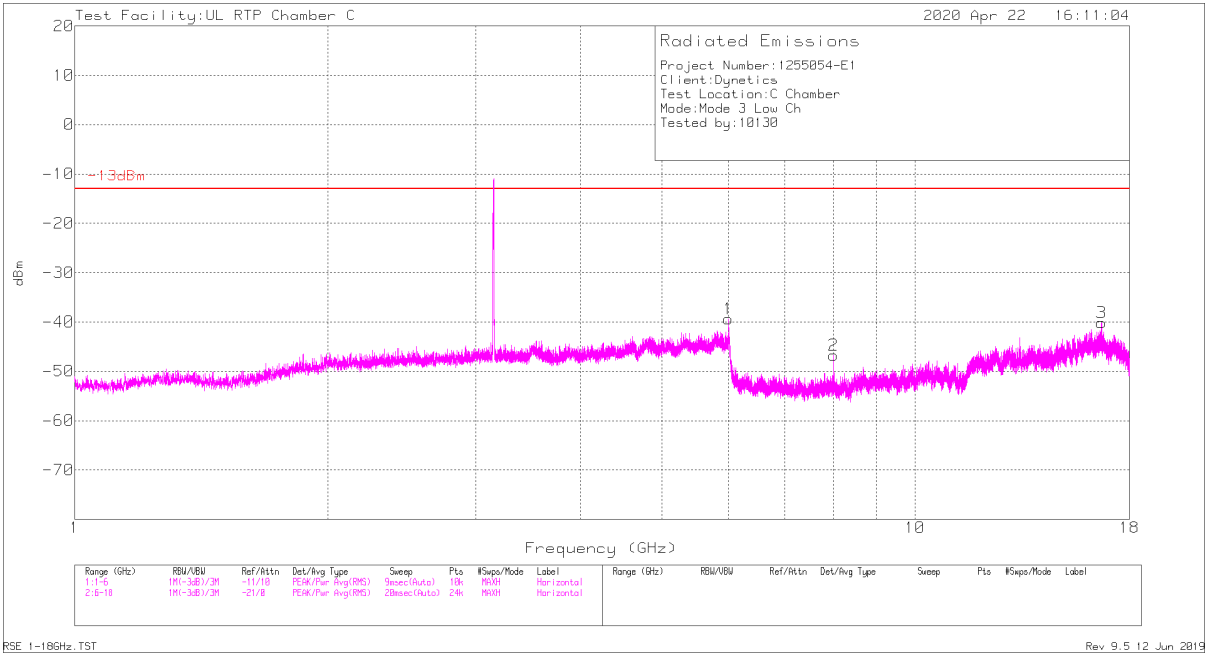


Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0062 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.304	-47.58	Pk	34.5	-39.9	11.8	-41.18	-13	-28.18	0-360	98	H
2	6.45598	-40.39	Pk	35.6	-48.6	11.8	-41.59	-13	-28.59	0-360	198	H
3	6.90696	-38.96	Pk	35.7	-47.8	11.8	-39.26	-13	-26.26	0-360	198	H
4	1.89275	-42.07	Pk	30.8	-44.8	11.8	-44.27	-13	-31.27	0-360	102	V
5	6.45798	-37.86	Pk	35.6	-48.6	11.8	-39.06	-13	-26.06	0-360	198	V
6	6.90496	-39.07	Pk	35.7	-47.8	11.8	-39.37	-13	-26.37	0-360	198	V

Pk - Peak detector

MODE 3 LOW CHANNEL 1-18GHz

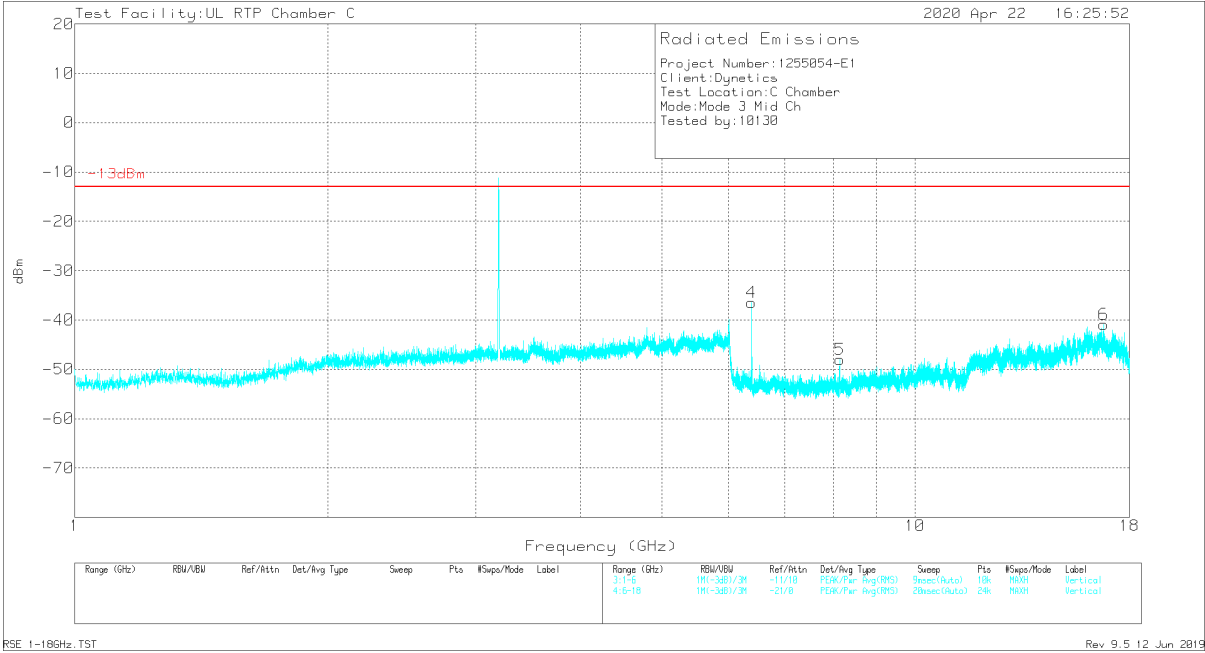
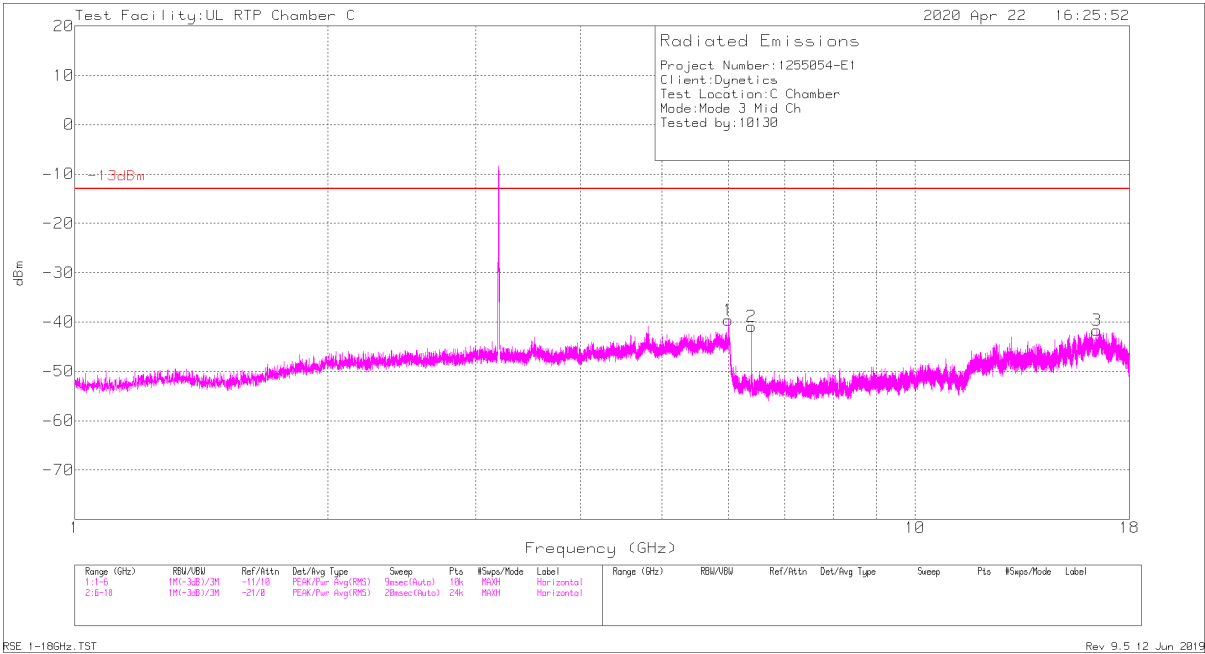


Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0062 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	6.0005	-52.61	Pk	35.2	-33.8	11.8	-39.41	-13	-26.41	0-360	102	H
2	8.00192	-47.52	Pk	35.8	-46.8	11.8	-46.72	-13	-33.72	0-360	198	H
3	16.67405	-56.93	Pk	42.3	-37.3	11.8	-40.13	-13	-27.13	0-360	198	H
4	6.0005	-53.8	Pk	35.2	-33.8	11.8	-40.6	-13	-27.6	0-360	102	V
5	12.12774	-54.6	Pk	38.9	-41	11.8	-44.9	-13	-31.9	0-360	102	V
6	16.67305	-57.64	Pk	42.3	-37.4	11.8	-40.94	-13	-27.94	0-360	102	V

Pk - Peak detector

MODE 3 MID CHANNEL 1-18GHz

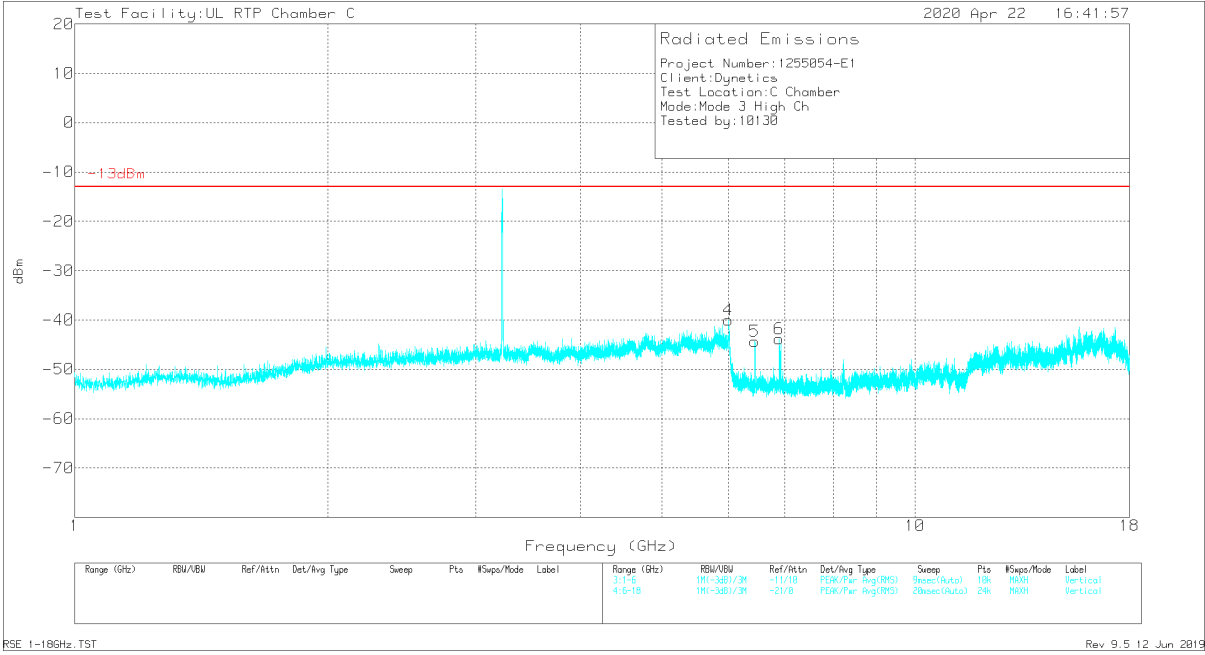
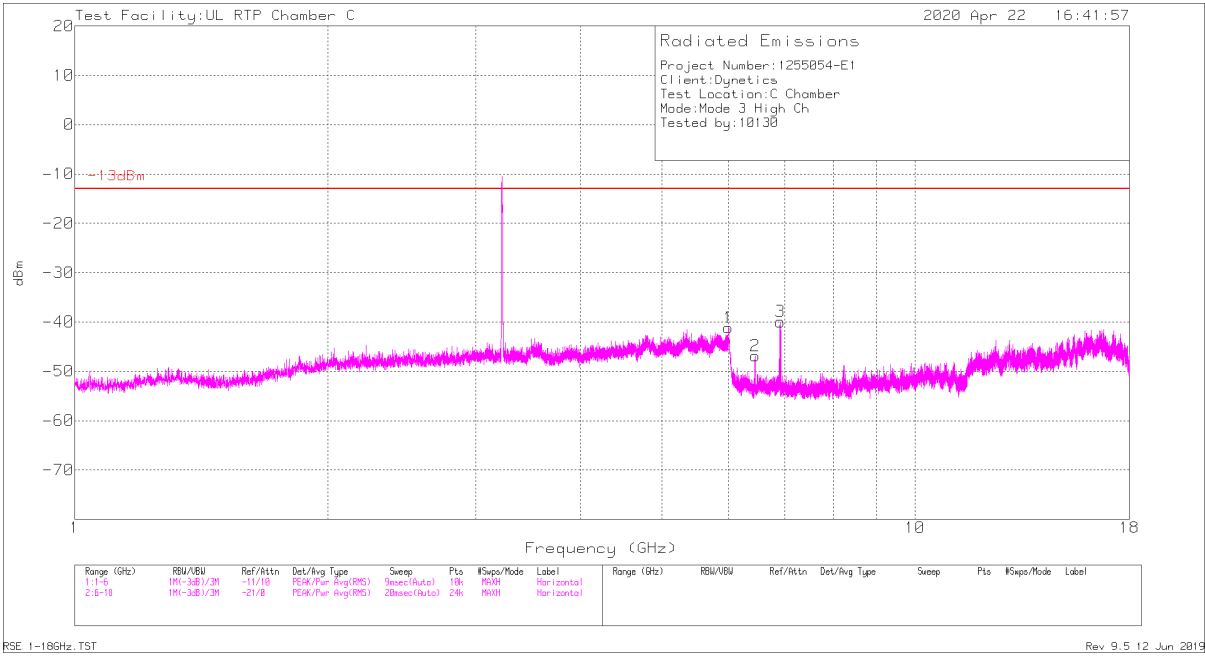


Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0062 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	6	-52.87	Pk	35.2	-33.7	11.8	-39.57	-13	-26.57	0-360	198	H
2	6.39198	-39.37	Pk	35.5	-48.8	11.8	-40.87	-13	-27.87	0-360	198	H
3	16.47356	-56.63	Pk	41.8	-38.6	11.8	-41.63	-13	-28.63	0-360	198	H
4	6.39098	-34.98	Pk	35.5	-48.8	11.8	-36.48	-13	-23.48	0-360	198	V
5	8.14241	-48.62	Pk	35.8	-47	11.8	-48.02	-13	-35.02	0-360	198	V
6	16.76205	-57.7	Pk	42.4	-37.4	11.8	-40.9	-13	-27.9	0-360	102	V

Pk - Peak detector

MODE 3 HIGH CHANNEL 1-18GHz

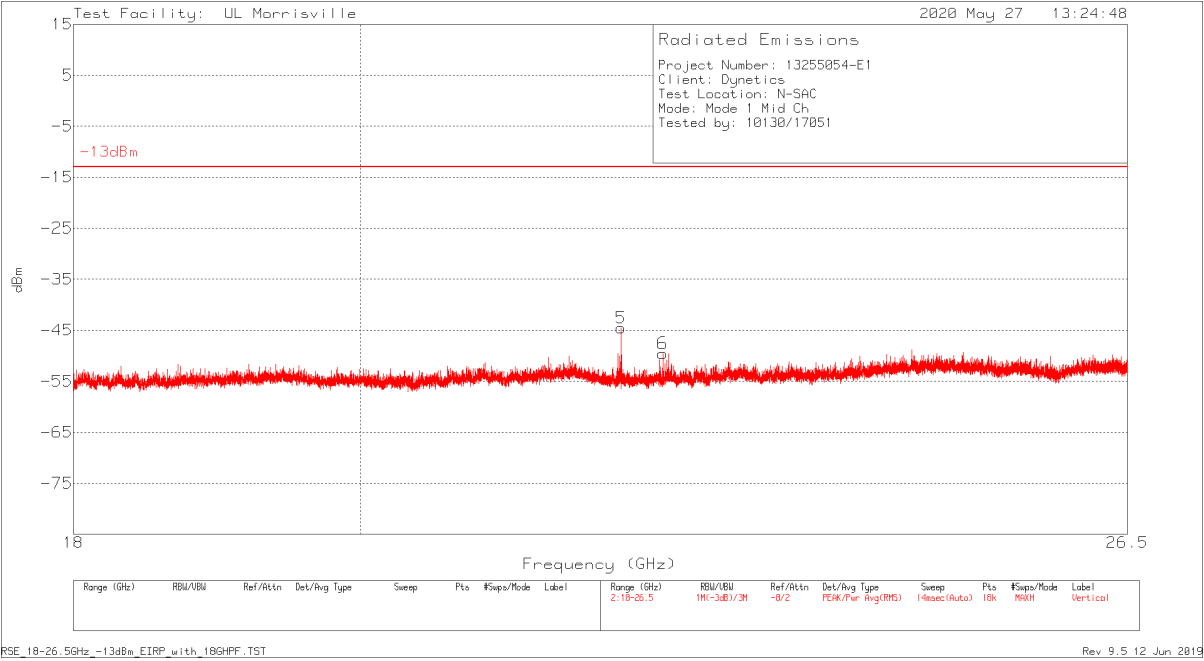
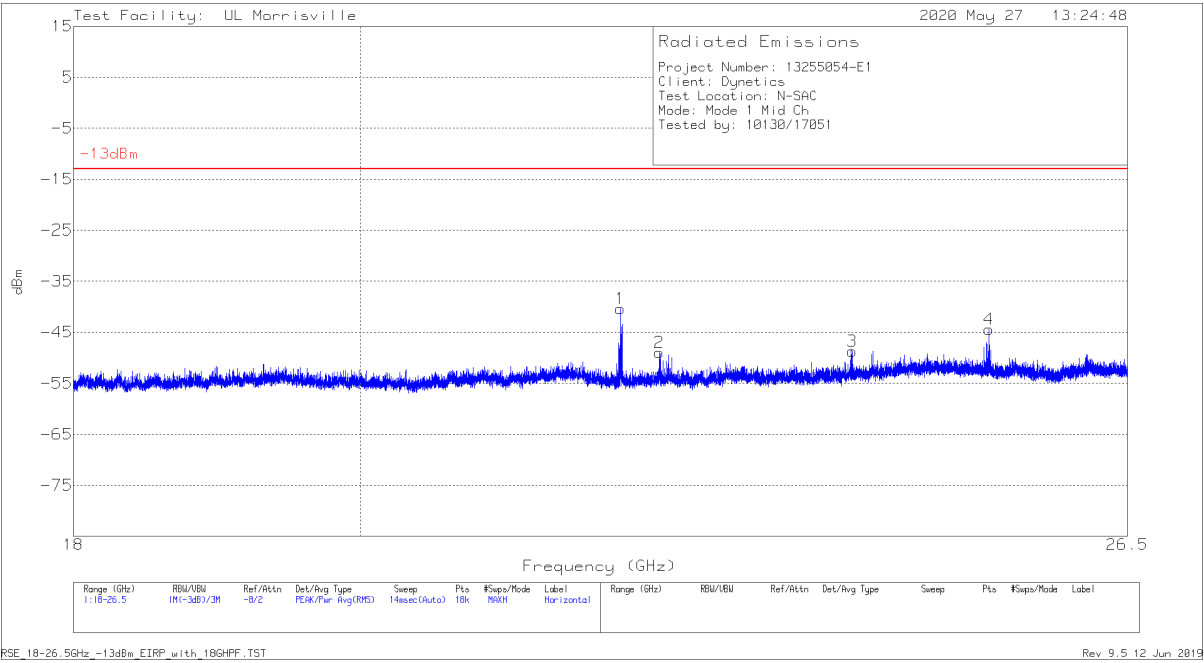


Note: The fundamental frequency of the transmitter is not marked as it is not applicable to the limit.

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0062 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Conversion Factor	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	6	-54.46	Pk	35.2	-33.7	11.8	-41.16	-13	-28.16	0-360	101	H
2	6.45948	-45.51	Pk	35.6	-48.7	11.8	-46.81	-13	-33.81	0-360	198	H
3	6.91946	-39.74	Pk	35.7	-47.7	11.8	-39.94	-13	-26.94	0-360	198	H
4	6.0005	-53.21	Pk	35.2	-33.8	11.8	-40.01	-13	-27.01	0-360	102	V
5	6.44898	-43	Pk	35.6	-48.7	11.8	-44.3	-13	-31.3	0-360	198	V
6	6.89496	-43.61	Pk	35.7	-47.7	11.8	-43.81	-13	-30.81	0-360	198	V

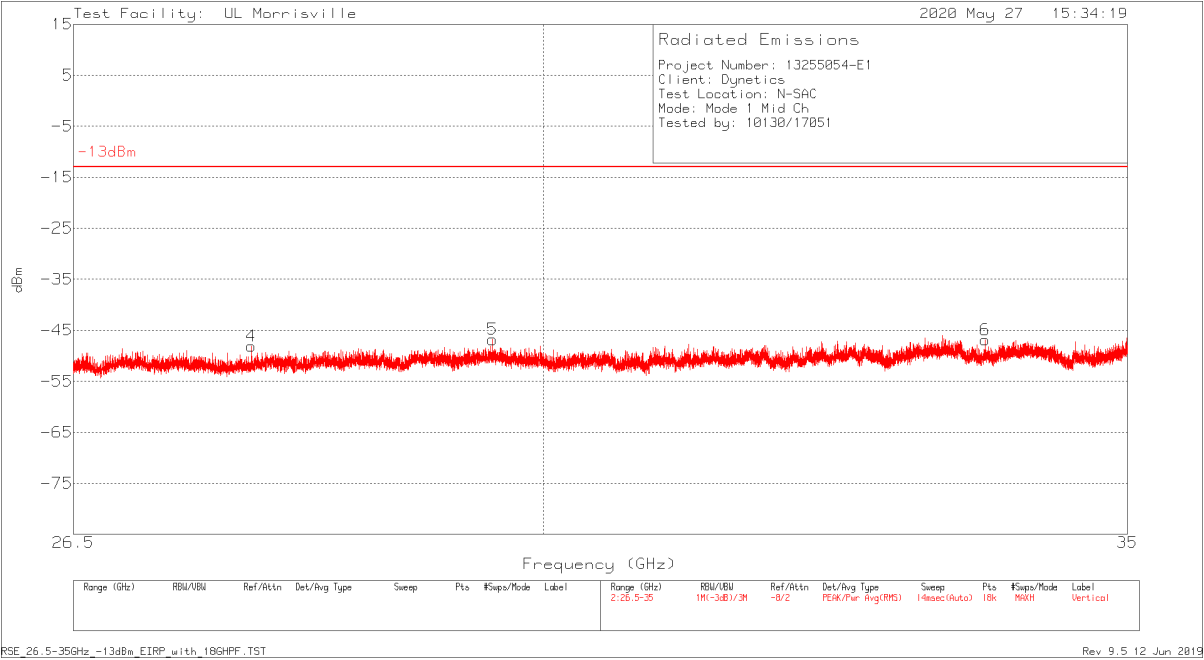
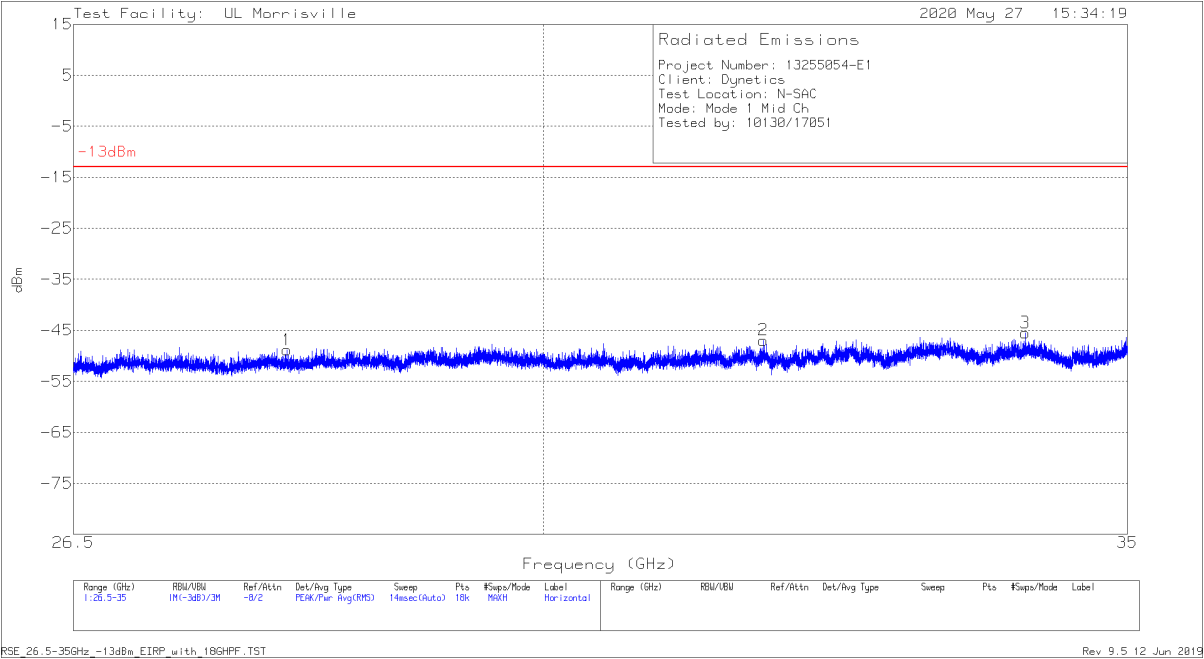
Pk - Peak detector

MODE 1 WORST-CASE >18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0076 AF (dB/m)	Amp/Cbl (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	22.00041	-47.33	Pk	33.5	-39.1	.8	11.8	-40.33	-13	-27.33	0-360	298	H
2	22.31587	-55.86	Pk	33.5	-39	.6	11.8	-48.96	-13	-35.96	0-360	298	H
3	23.95694	-56.72	Pk	34	-38.5	.7	11.8	-48.72	-13	-35.72	0-360	102	H
4	25.1862	-54.39	Pk	34.3	-38	1.9	11.8	-44.39	-13	-31.39	0-360	102	H
5	22.00797	-51.43	Pk	33.5	-39.2	.8	11.8	-44.53	-13	-31.53	0-360	298	V
6	22.34563	-56.14	Pk	33.5	-39.2	.5	11.8	-49.54	-13	-36.54	0-360	298	V

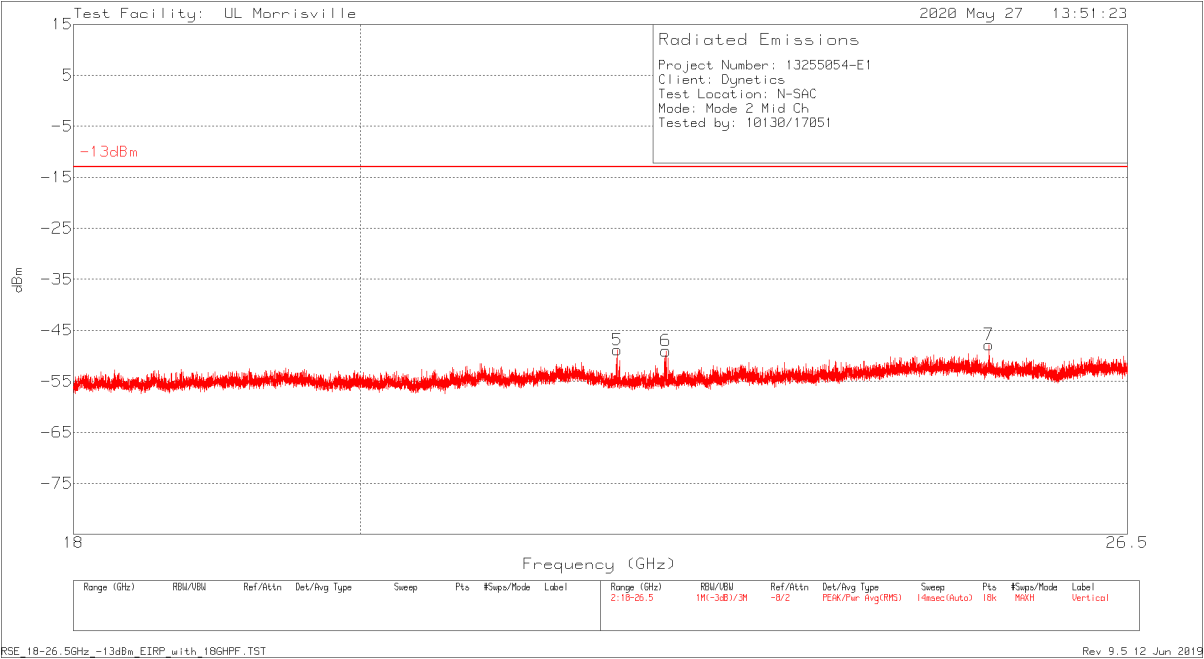
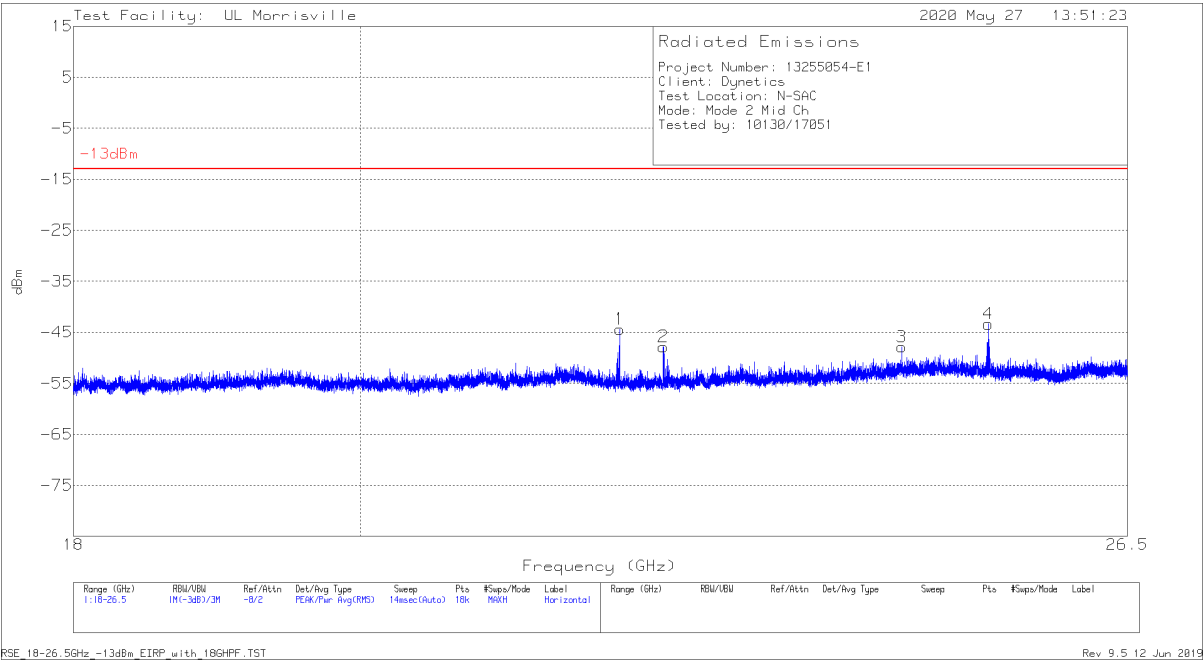
Pk - Peak detector



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0077 AF (dB/m)	Amp/Cbl (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	28.03605	-61.27	Pk	35.9	-36.5	1.2	11.8	-48.87	-13	-35.87	0-360	198	H
2	31.79332	-61.84	Pk	36.7	-34.5	.9	11.8	-46.94	-13	-33.94	0-360	148	H
3	34.06741	-59.49	Pk	37.3	-35.9	.8	11.8	-45.49	-13	-32.49	0-360	298	H
4	27.77493	-60.24	Pk	35.8	-36.6	1.1	11.8	-48.14	-13	-35.14	0-360	298	V
5	29.59855	-60.8	Pk	36.5	-35.8	1.5	11.8	-46.8	-13	-33.8	0-360	298	V
6	33.71091	-61.31	Pk	37	-35.3	.9	11.8	-46.91	-13	-33.91	0-360	102	V

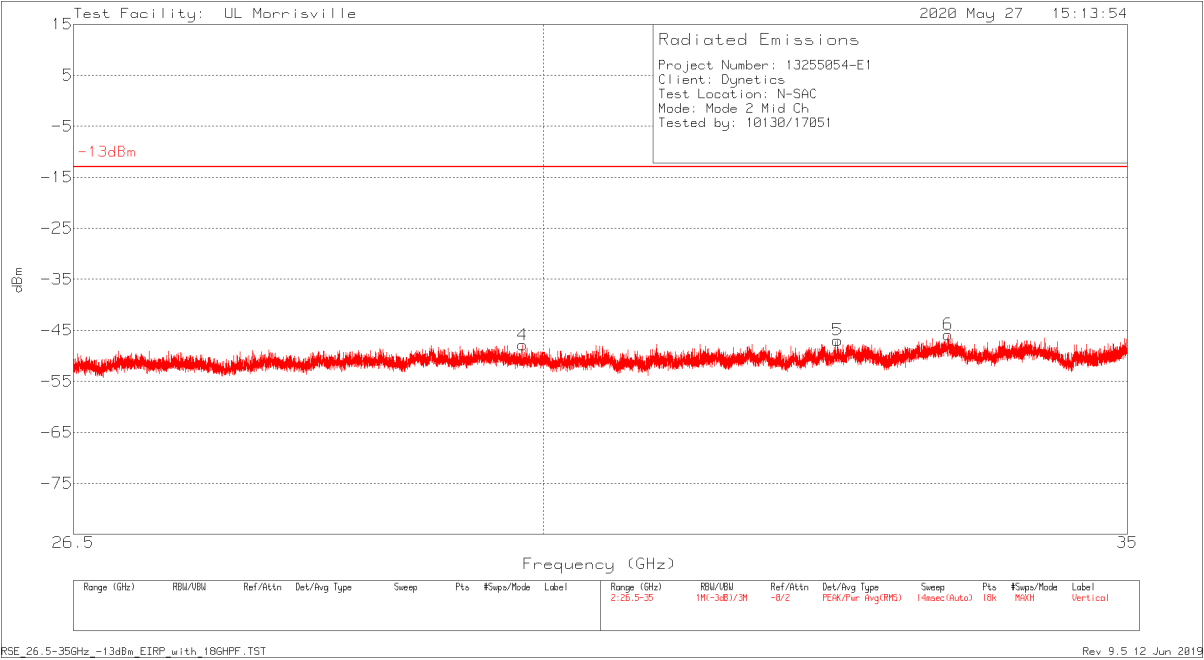
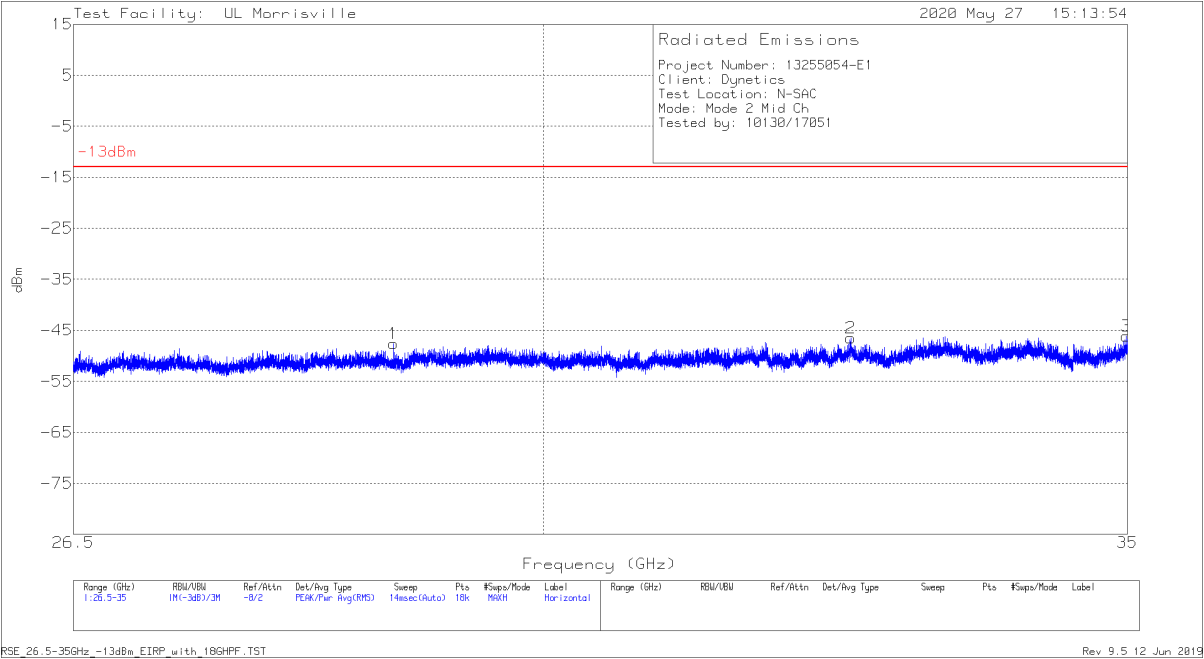
Pk - Peak detector

MODE 2 WORST-CASE >18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0076 AF (dB/m)	Amp/Cbl (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	21.99616	-51.36	Pk	33.5	-39.1	.8	11.8	-44.36	-13	-31.36	0-360	298	H
2	22.35082	-54.51	Pk	33.5	-39.2	.6	11.8	-47.81	-13	-34.81	0-360	248	H
3	24.39377	-57.07	Pk	34.2	-38.3	1.5	11.8	-47.87	-13	-34.87	0-360	248	H
4	25.18053	-53.26	Pk	34.3	-38.1	1.9	11.8	-43.36	-13	-30.36	0-360	102	H
5	21.97491	-55.64	Pk	33.5	-39.3	.8	11.8	-48.84	-13	-35.84	0-360	298	V
6	22.37113	-55.82	Pk	33.5	-39.1	.6	11.8	-49.02	-13	-36.02	0-360	298	V
7	25.18762	-57.81	Pk	34.3	-38	1.9	11.8	-47.81	-13	-34.81	0-360	298	V

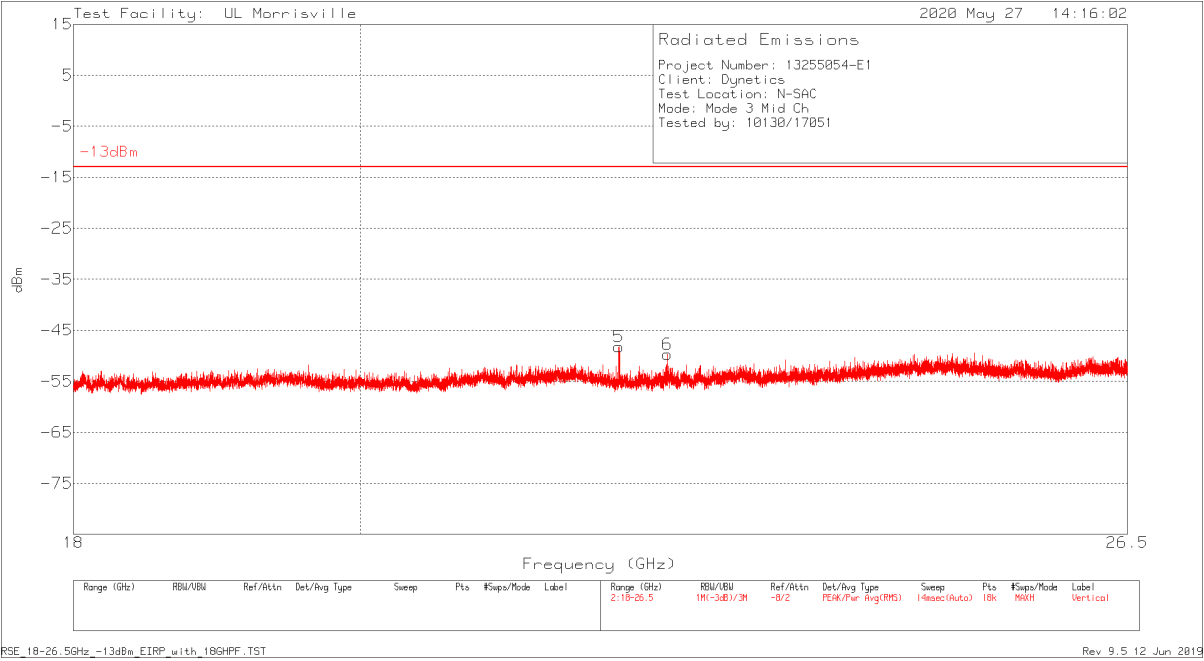
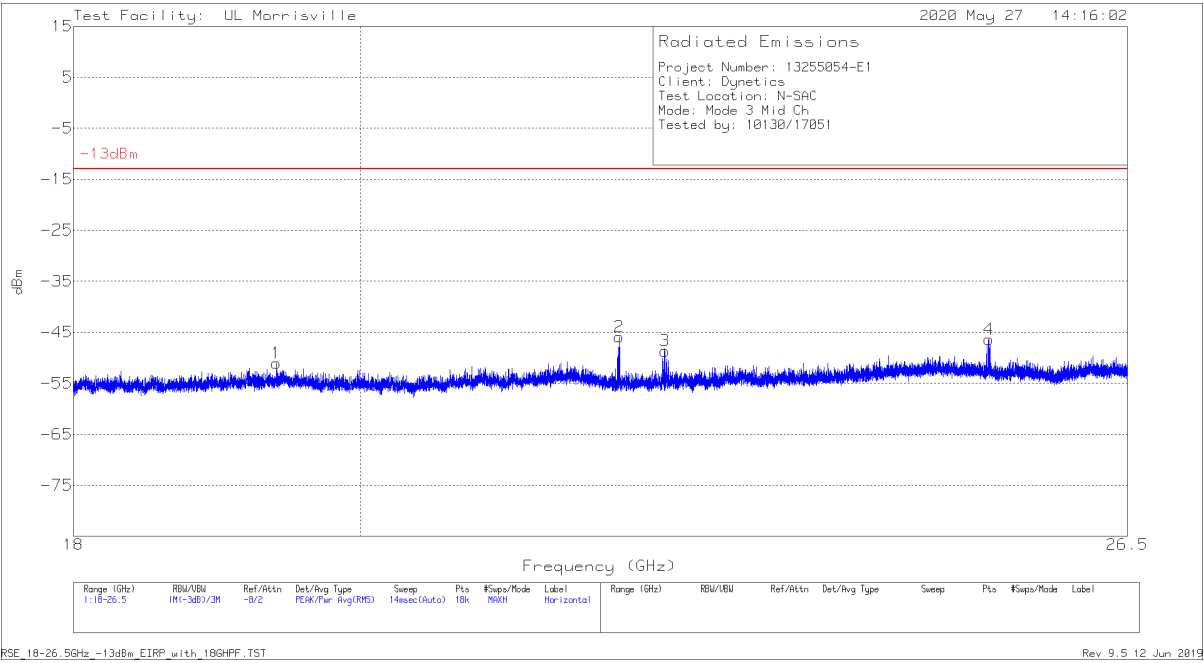
Pk - Peak detector



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0077 AF (dB/m)	Amp/Cbl (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	28.83784	-60.45	Pk	36	-36.2	1.2	11.8	-47.65	-13	-34.65	0-360	248	H
2	32.53514	-61.59	Pk	36.9	-34.7	1.1	11.8	-46.49	-13	-33.49	0-360	198	H
3	34.98725	-61.02	Pk	37.5	-35.8	1.4	11.8	-46.12	-13	-33.12	0-360	298	H
4	29.83748	-61.83	Pk	36.4	-35.8	1.6	11.8	-47.83	-13	-34.83	0-360	298	V
5	32.42181	-62.04	Pk	36.9	-34.6	1	11.8	-46.94	-13	-33.94	0-360	298	V
6	33.3832	-60.13	Pk	36.9	-35.4	1	11.8	-45.83	-13	-32.83	0-360	152	V

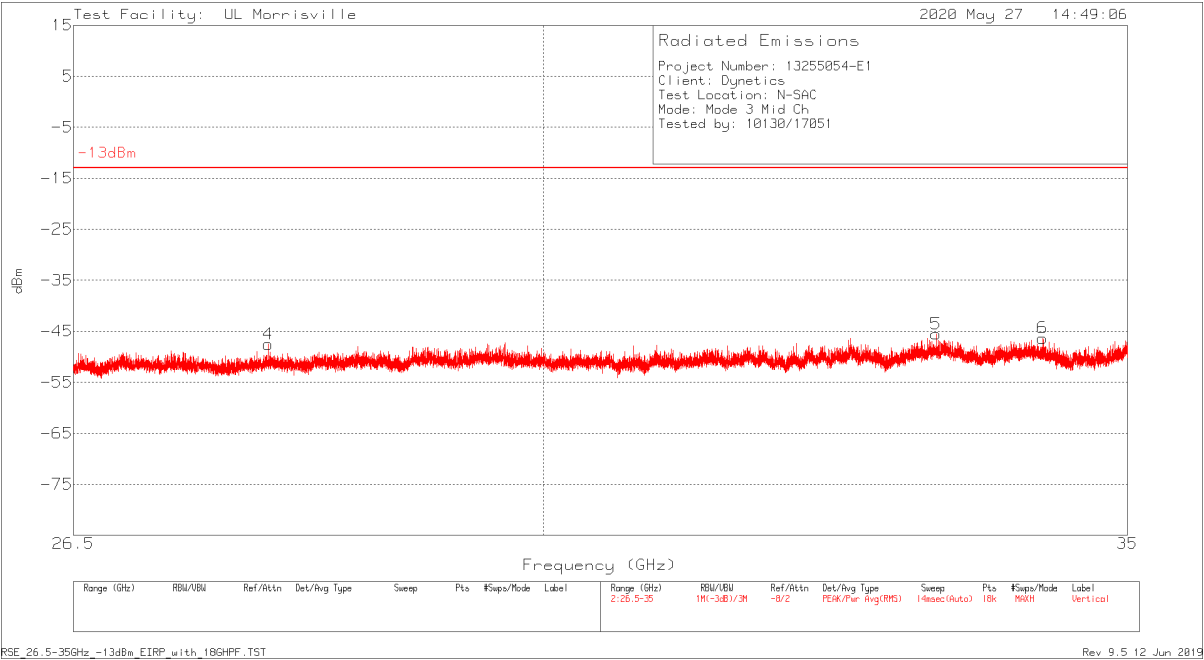
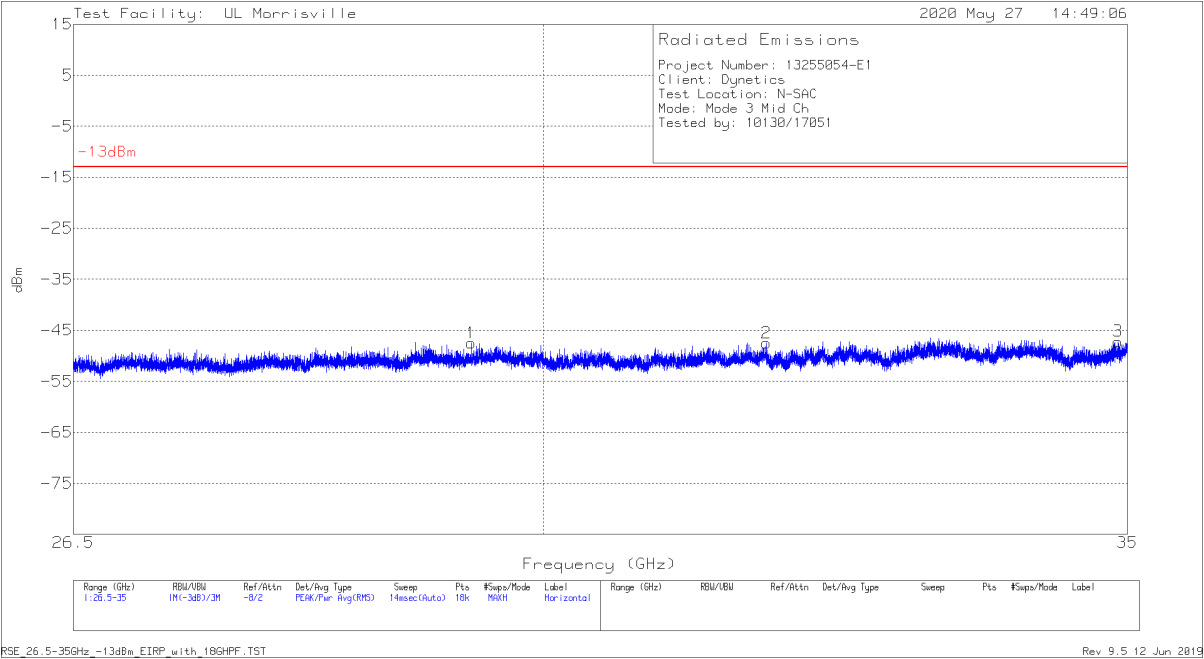
Pk - Peak detector

MODE 3 WORST-CASE >18GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0076 AF (dB/m)	Amp/Cbl (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	19.39219	-57.18	Pk	32.7	-39.4	1	11.8	-51.08	-13	-38.08	0-360	148	H
2	21.9905	-52.78	Pk	33.5	-39.2	.8	11.8	-45.88	-13	-32.88	0-360	298	H
3	22.36404	-55.55	Pk	33.5	-39	.6	11.8	-48.65	-13	-35.65	0-360	298	H
4	25.18762	-56.38	Pk	34.3	-38	1.9	11.8	-46.38	-13	-33.38	0-360	298	H
5	21.98861	-55.06	Pk	33.5	-39.3	.8	11.8	-48.26	-13	-35.26	0-360	298	V
6	22.38388	-56.5	Pk	33.5	-39.1	.6	11.8	-49.7	-13	-36.7	0-360	252	V

Pk - Peak detector



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0077 AF (dB/m)	Amp/Cbl (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	29.43564	-60.77	Pk	36.3	-36	1.2	11.8	-47.47	-13	-34.47	0-360	248	H
2	31.81976	-62.27	Pk	36.7	-34.6	.9	11.8	-47.47	-13	-34.47	0-360	198	H
3	34.9117	-61.48	Pk	37.3	-36	1.2	11.8	-47.18	-13	-34.18	0-360	298	H
4	27.89865	-59.74	Pk	35.8	-36.6	1.2	11.8	-47.54	-13	-34.54	0-360	202	V
5	33.27554	-60.23	Pk	37.1	-35.3	1.1	11.8	-45.53	-13	-32.53	0-360	298	V
6	34.22418	-60.62	Pk	37.3	-35.7	.9	11.8	-46.32	-13	-33.32	0-360	202	V

Pk - Peak detector

9. FREQUENCY STABILITY

RULE PART(S)

§2.1055 Measurements required: Frequency stability.

§90.213 Frequency stability

Above 2450 MHz ¹⁰

¹⁰Except 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 3100MHz to 3300MHz.

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

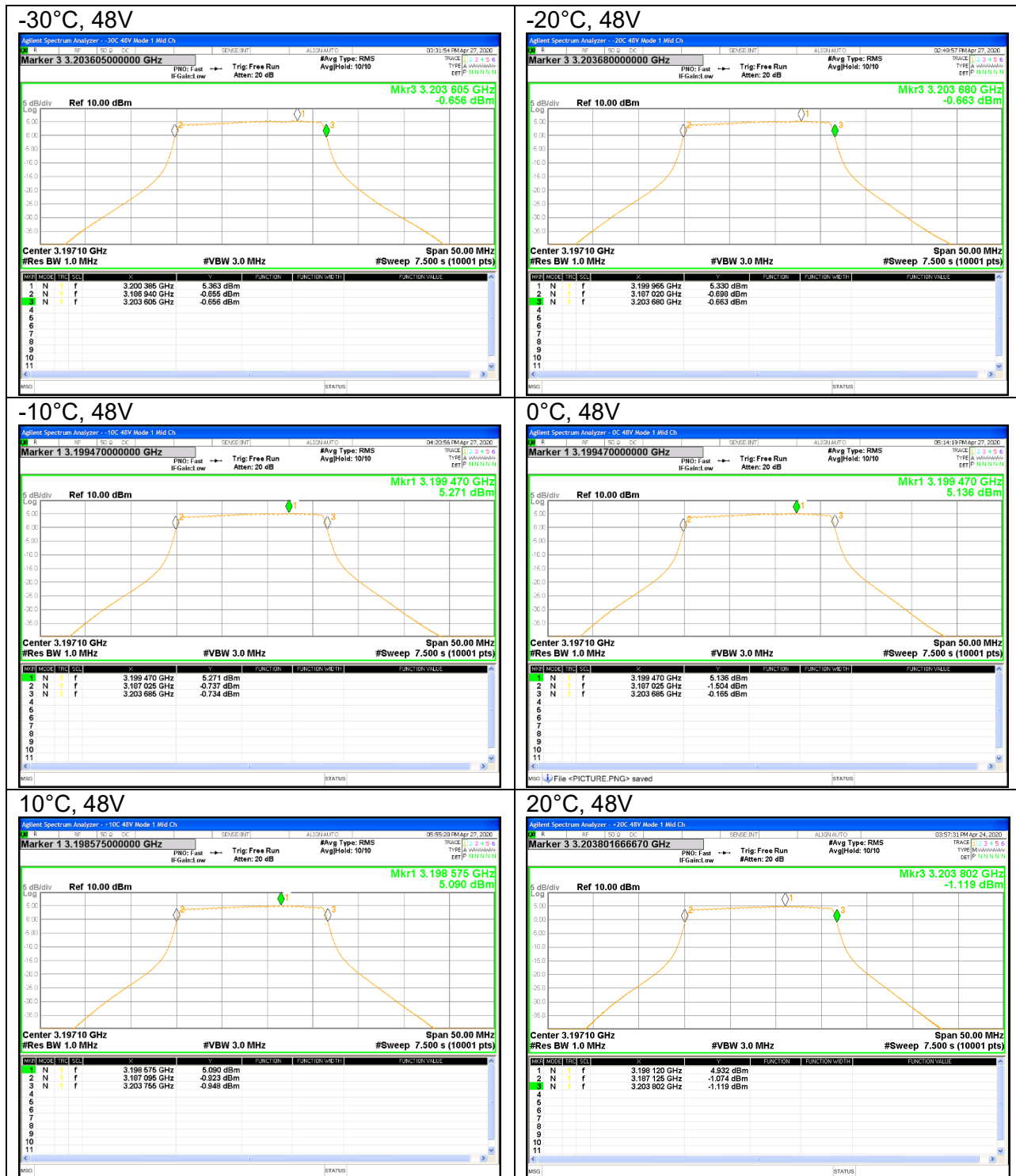
Based on the band edge measurements and the frequency error data the device will operate in between the frequency range of 3100MHz - 3300MHz under the temperature and voltage variations described in the preceding test-procedure section.

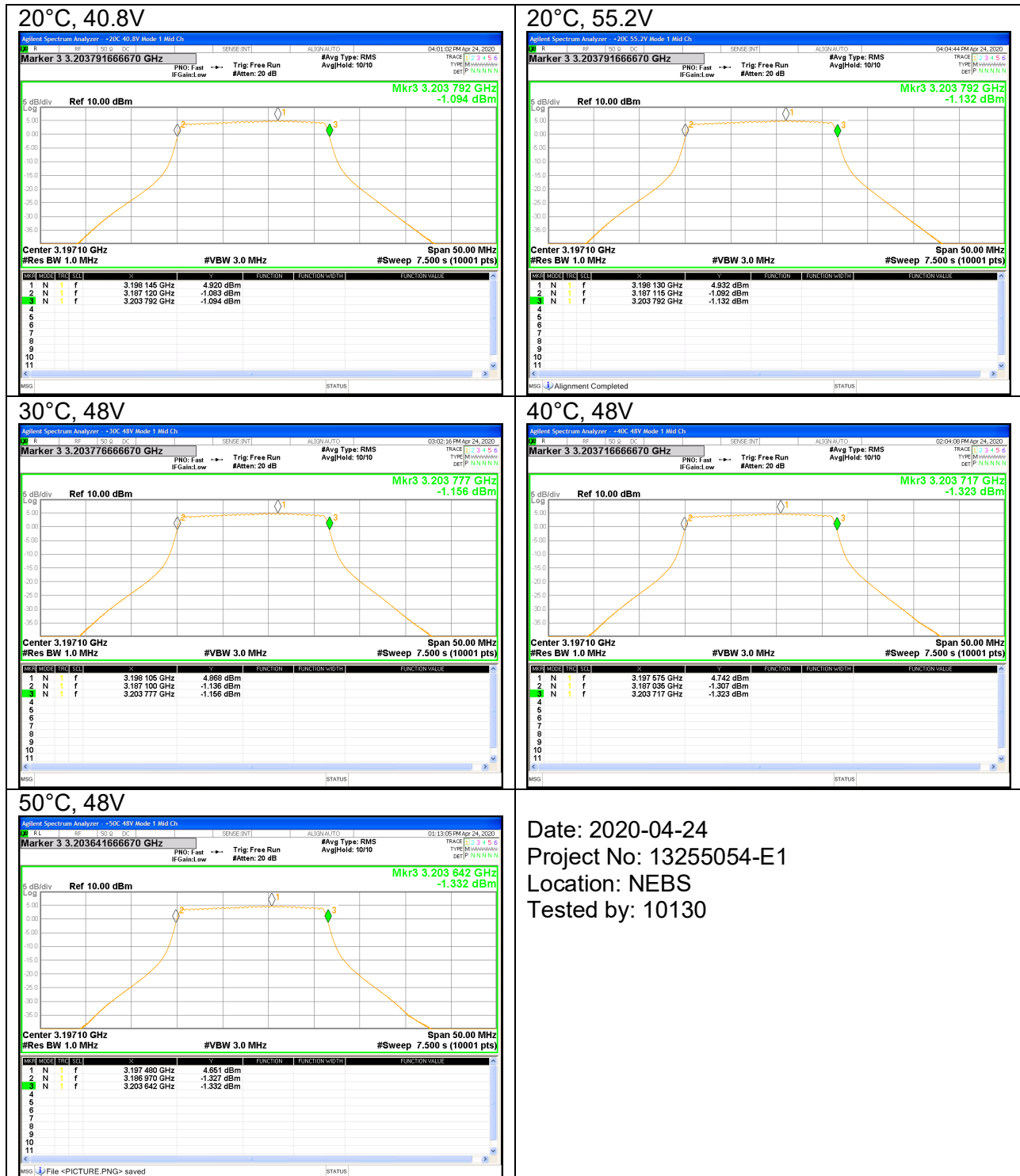
Tabular Data

Programmed Freq (MHz):		3195.3125				
Limit		3100	3300	Freq (MHz) Center	Delta (MHz)	Frequency Stability (ppm)
Condition		F low @ -6dBc	F high @ -6dBc			
Temperature	Voltage (DC)	(MHz)	(MHz)			
Extreme (-30C)	48	3186.940	3203.605	3195.273	-0.0400	-12.518
Extreme (-20C)		3187.020	3203.680	3195.350	0.0375	11.736
Extreme (-10C)		3187.025	3203.685	3195.355	0.0425	13.301
Extreme (0C)		3187.025	3203.685	3195.355	0.0425	13.301
Extreme (10C)		3187.095	3203.755	3195.425	0.1125	35.208
Nominal (20C)		3187.125	3203.802	3195.464	0.1510	47.257
Extreme (30C)		3187.100	3202.777	3194.939	-0.3740	-117.046
Extreme (40C)		3187.035	3202.717	3194.876	-0.4365	-136.606
Extreme (50C)		3186.970	3202.642	3194.806	-0.5065	-158.513
20C	40.8	3187.120	3203.792	3195.456	0.1435	44.910
	48.0	3187.125	3203.802	3195.464	0.1510	47.257
	55.2	3187.116	3202.792	3194.954	-0.3585	-112.196

Date: 2020-04-27
Project No: 13255054
Location: NEBS
Tested by: 10130

Graphical Data



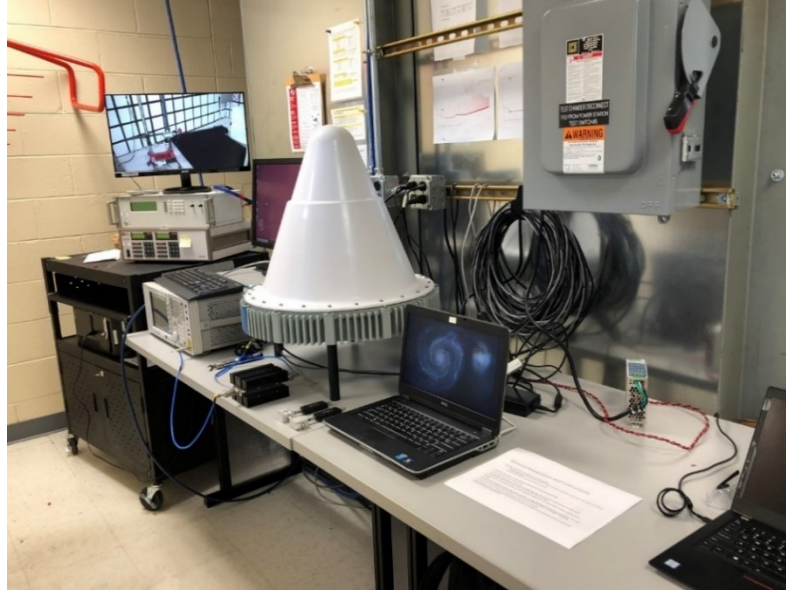


Date: 2020-04-24
Project No: 13255054-E1
Location: NEBS
Tested by: 10130

10. TEST SETUP PHOTOS

ANTENNA PORT CONDUCTED AND FREQUENCY STABILITY

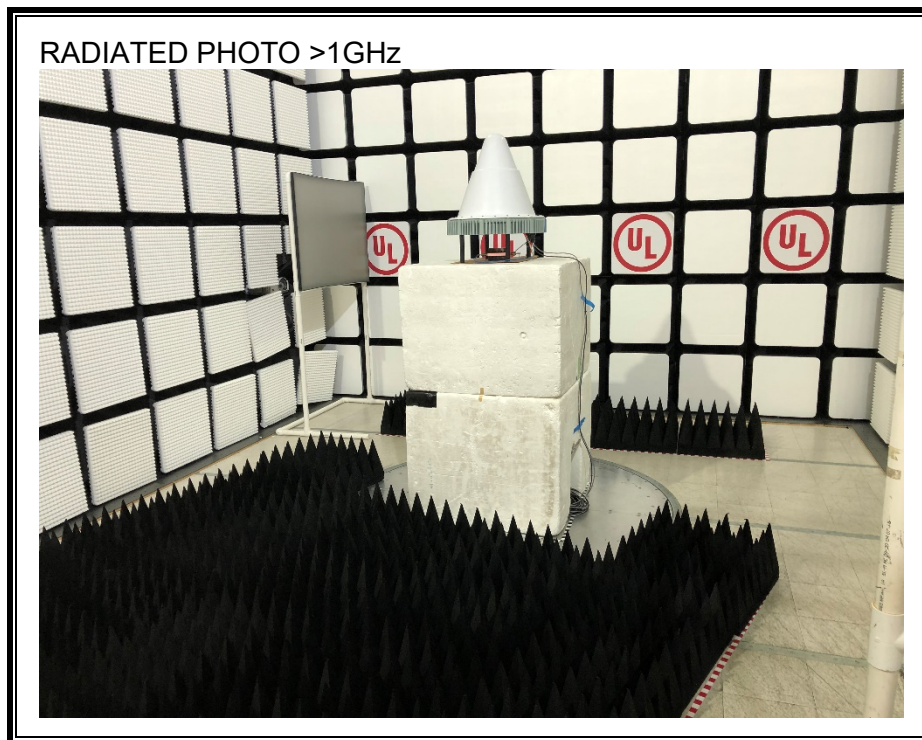
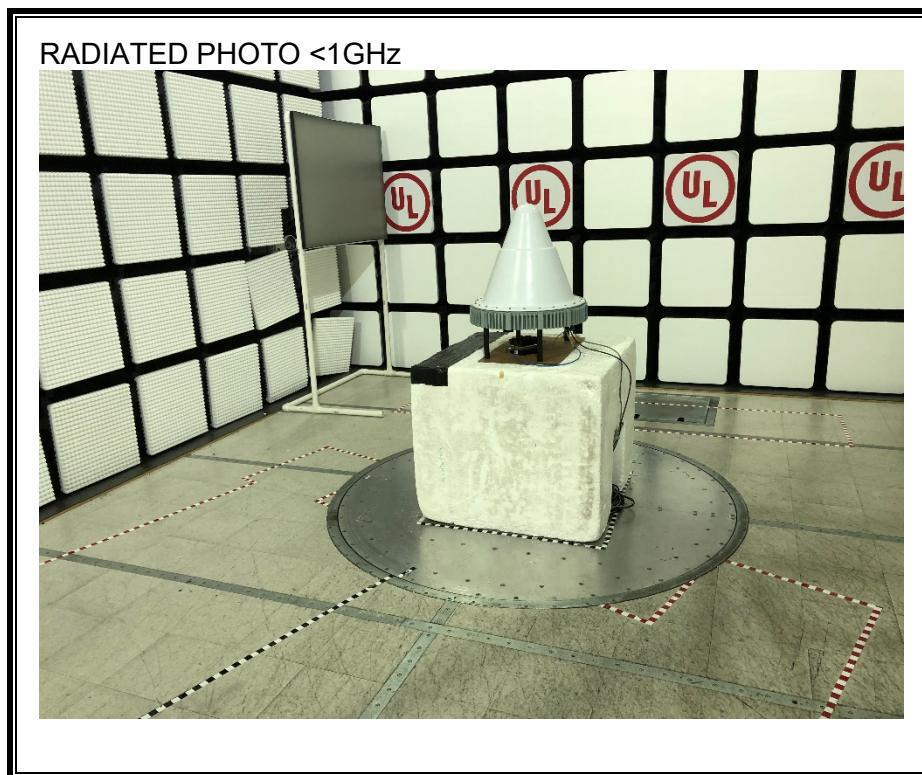
ANTENNA PORT CONDUCTED PHOTO



FREQUENCY STABILITY PHOTO



RADIATED EMISSIONS SETUP



END OF REPORT

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