FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

Gimbal Proximty Beacon

MODEL NUMBER: 900-0007-000

FCC ID: R6CGS22
IC: 10756A-GS22

REPORT NUMBER: 11032370A-2

ISSUE DATE: Feburary 24, 2016
Revision Date: March 2, 2016

Prepared for
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San Diego, CA 92121, USA

Prepared by
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Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/24/16	Initial Issue	M.Ferrer
1	03/01/16	Updated Fundamental and Bandedge	M.Ferrer
2	03/02/16	Implement DCCF for AV limit	M.Ferrer

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Gimbal Inc
11010 Roselle St., Suite 150
San Dieago, CA, 92121, USA

EUT DESCRIPTION: Gimbal Proximty Beacon

MODEL: 900-0007-000

SERIAL NUMBER: N/A

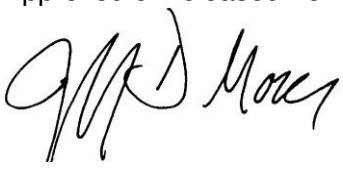
DATE TESTED: Febraury 16, 2016 – March 1, 2016

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex A2.9	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL By:



Jeff Moser
Program Manager
UL LLC

Tested By:

MICHAEL FERRER
Program Manager
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-210 Issue 8.

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.

12 Laboratory Dr., RTP, NC 27709
☐ Chamber A
☒ Chamber C

The onsite chambers (A & C) are covered under Industry Canada company address code 2180C with site numbers 2180C -1 through 2180C-2, respectively.

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Disturbance, 30 to 1000 MHz	+/-5.36
Radiated Emissions, 1-18 GHz	+/-4.32
Radiated Emissions,18-26 GHz	+/-4.45

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a BLE device. EUT transmit only, no RX mode

The radio module is manufactured by Texas Instruments.

5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

The transmitter has a maximum output peak E-field as follows:

Frequency Range (GHz)	Mode	Output AV E-field Strength (dBuV/m)
2.4-2.4835	BLE	52.86

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Dipole or Patch antenna, with a maximum gain of 2.7 and 2.1 dBi respectively.

5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations, X, Y, Z. It was determined that for the Patch antenna the worst-case orientation was X and for the Omni-directional antenna the worst-case orientation was Y. Therefore all final radiated emissions testing were performed with the EUT in these orientations with the noted antenna.

Highest emissions was found during Horizontal polarity of the antenna.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	**Manufacturer**	**Model**	**Serial Number**
EUT	Gimbal	900-0007-00	-

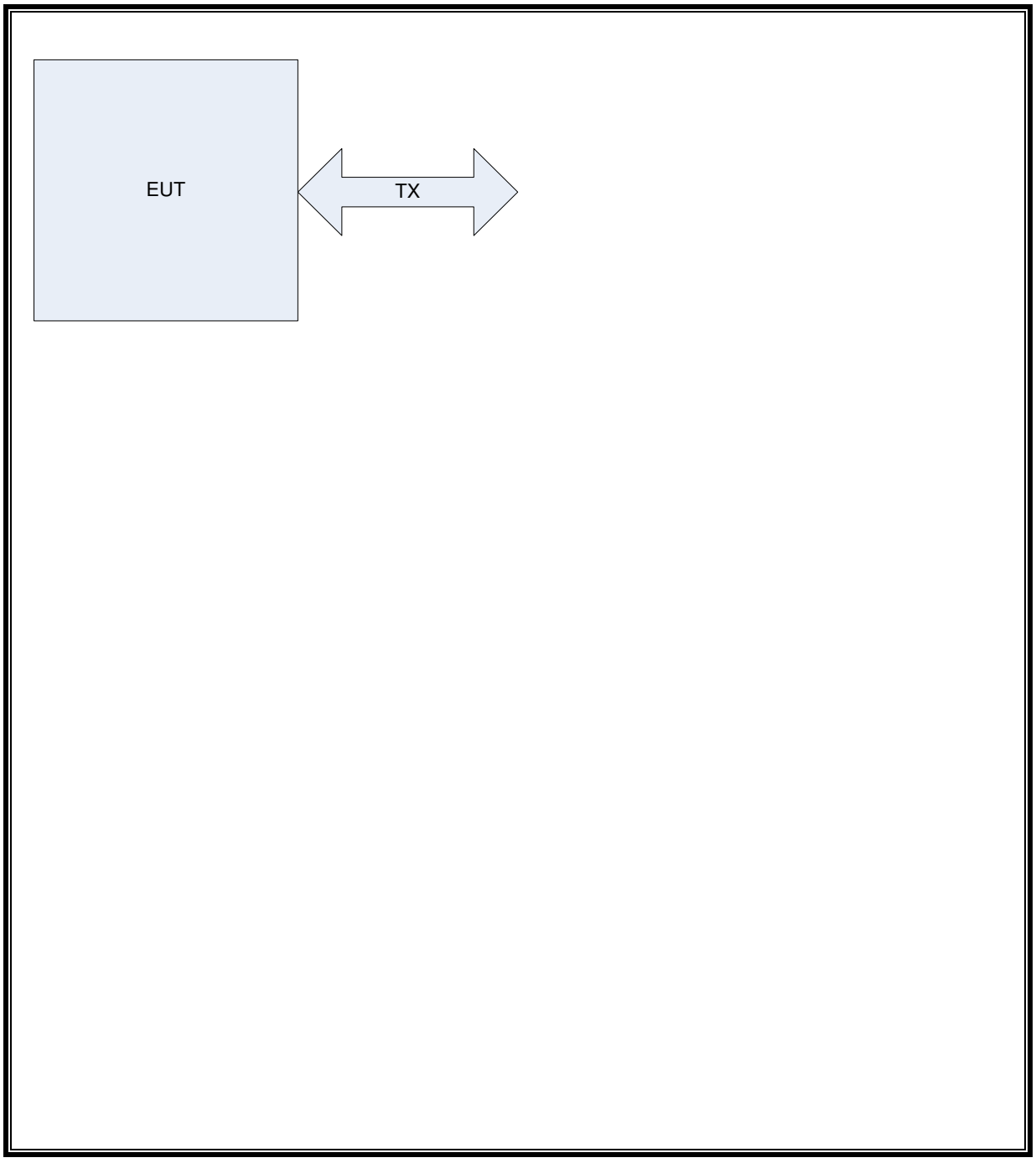
I/O CABLES

None

TEST SETUP

EUT is battery powered and programmed to transmit continuously.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	30-1000 MHz Range				
AT0075	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2015-06-10	2016-06-30
	1-18 GHz				
AT0062	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2015-08-25	2016-08-31
	18-40GHz				
AT0063	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2015-08-27	2016-08-31
	Gain-Loss Chains				
C-SAC01	Gain-loss string: 0.009-1000MHz	Various	Various	2016-01-26	2017-01-31
C-SAC02	Gain-loss string: 1-18GHz	Various	Various	2016-01-28	2017-01-31
C-SAC03	Gain-loss string: 18-40GHz	Various	Various	2015-09-27	2016-09-30
	Receiver & Software				
SA0016	Spectrum Analyzer	Agilent	PXA N9030A	2015-08-26	2016-08-31
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
HI0034	Temp/Humid/Pressure Meter	Cole-Parmer	99760-00	2015-03-23	2016-03-31

7. TEST RESULTS

7.1. 20dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

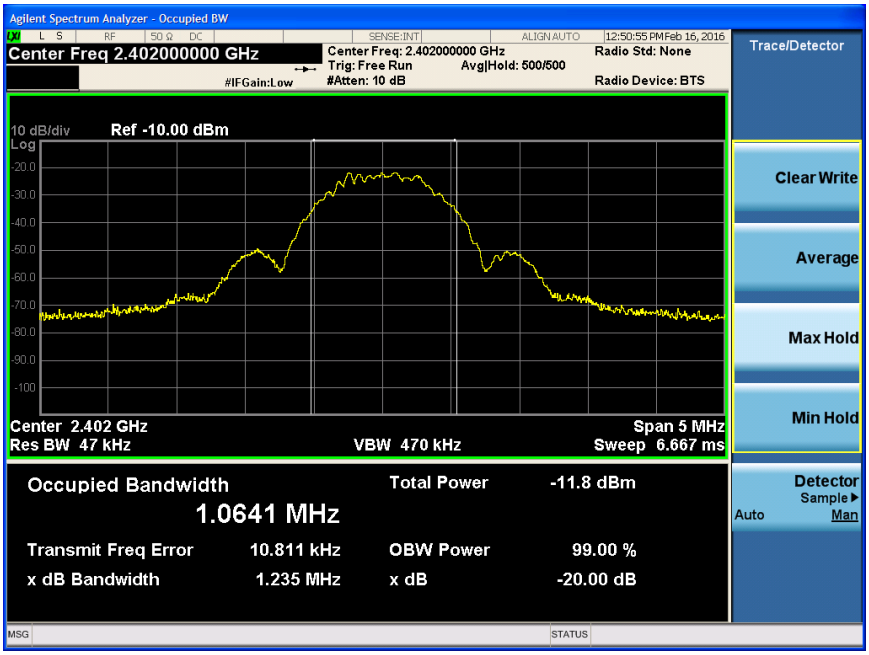
The transmitter output is connected to the spectrum analyzer. The RBW is set to approximately 1% to 5% of the 99 % bandwidth. The VBW is set to at least 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

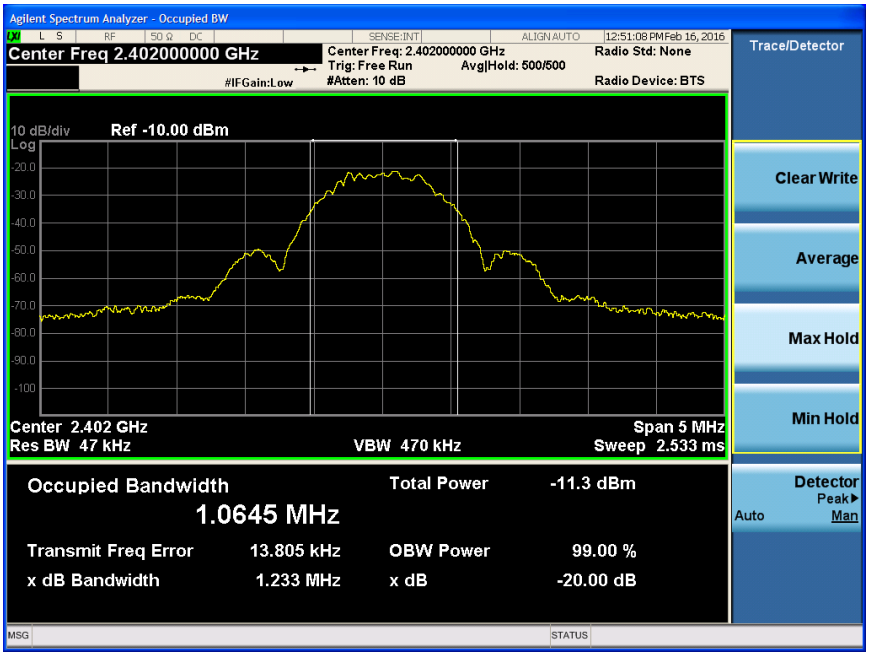
Channel	Frequency (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)
Low	2402	1.0641	1.233
Middle	2426	1.0628	1.226
High	2480	1.077	1.241

99% BANDWIDTH

BANDWIDTH LOW CH
99%

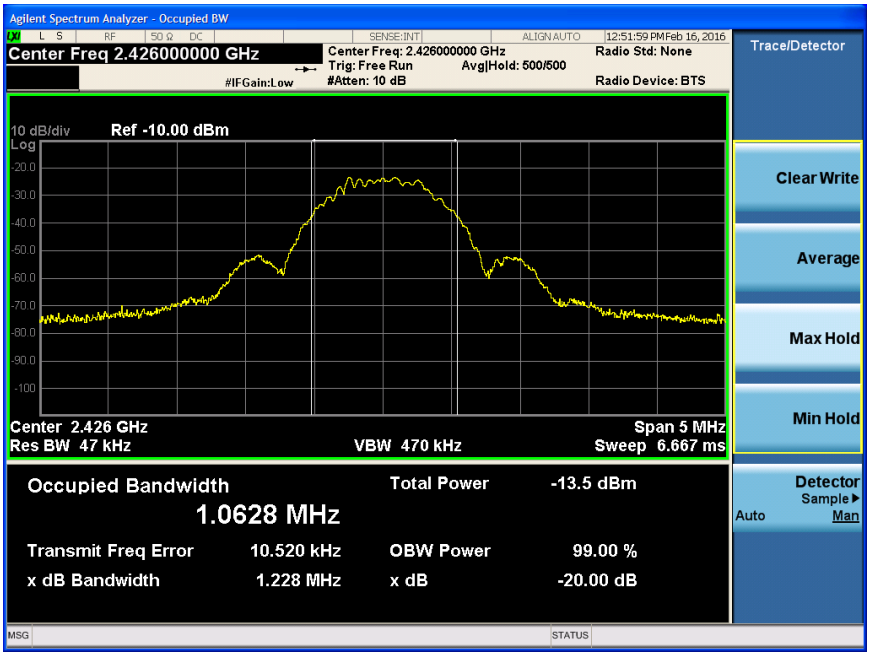


20dB

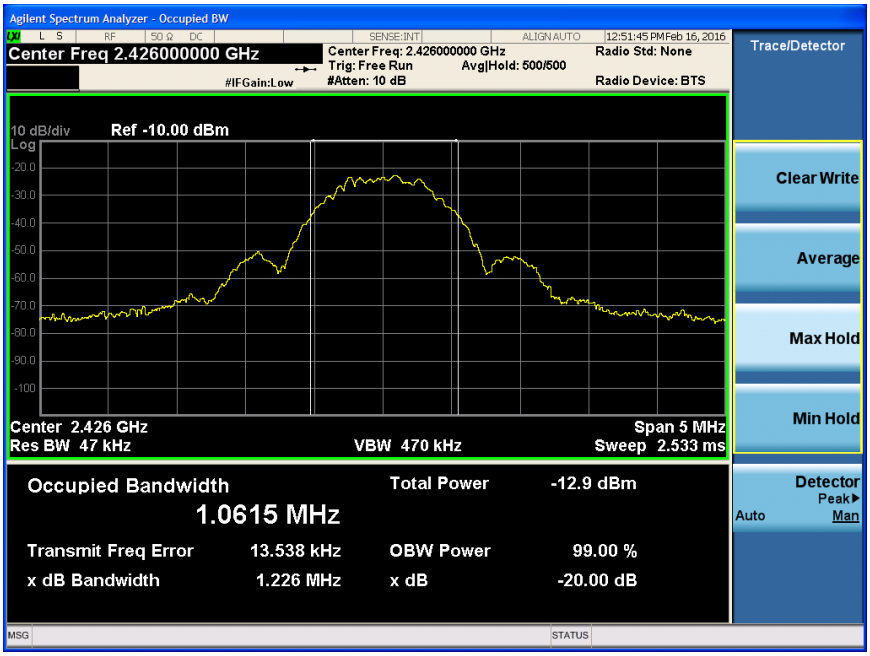


BANDWIDTH MID CH

99%

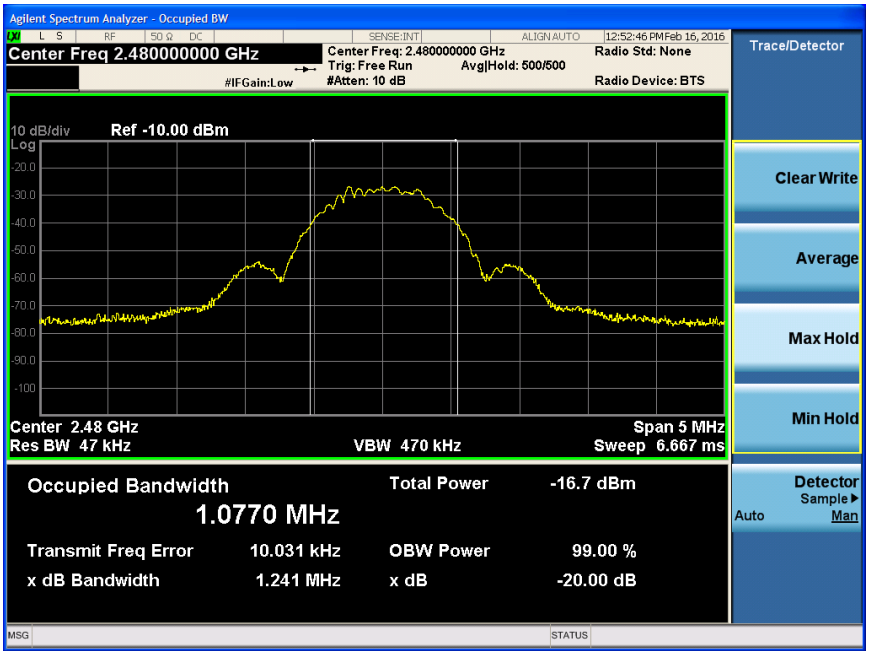


20dB

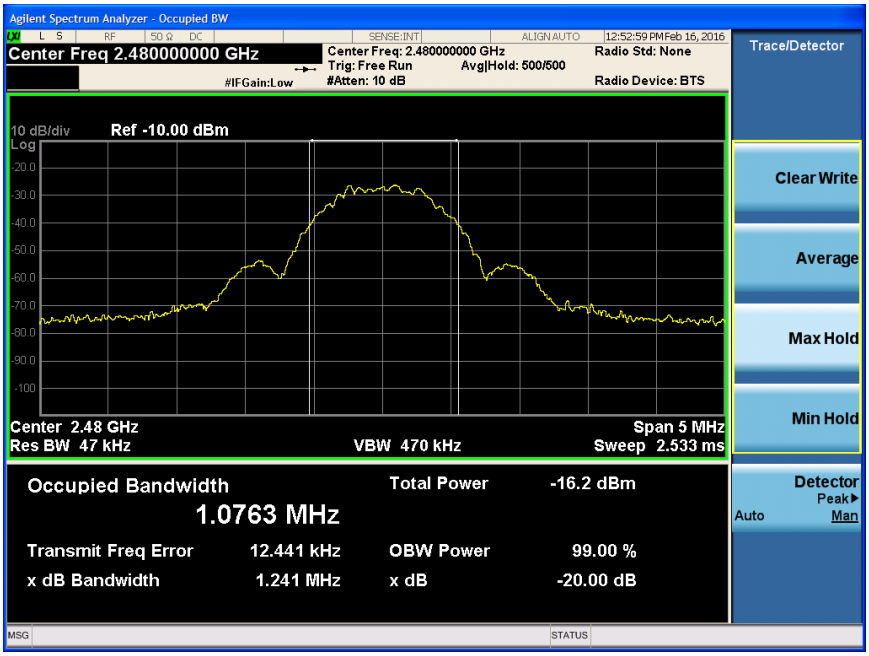


BANDWIDTH HIGH CH

99%



20dB



7.2. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

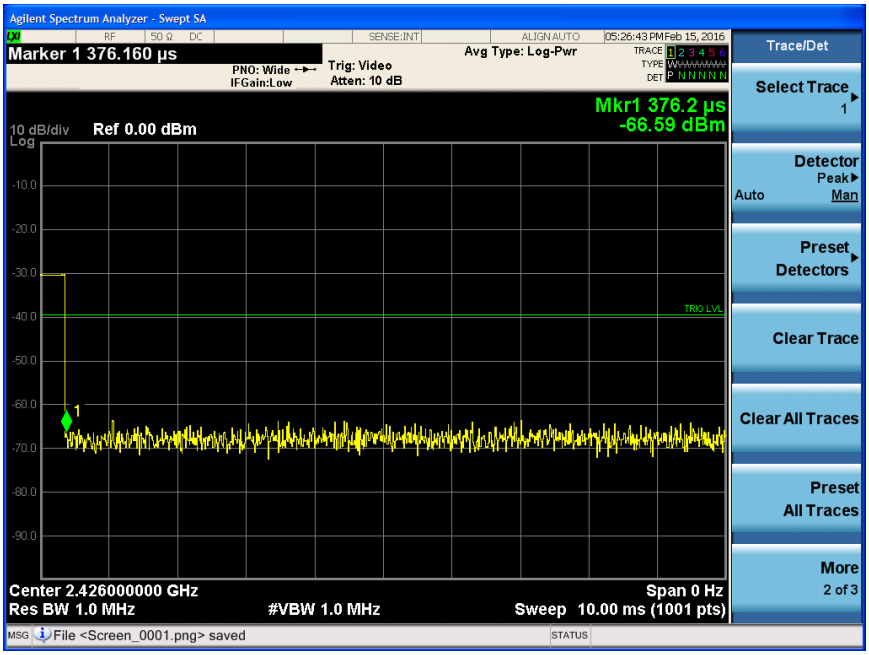
KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

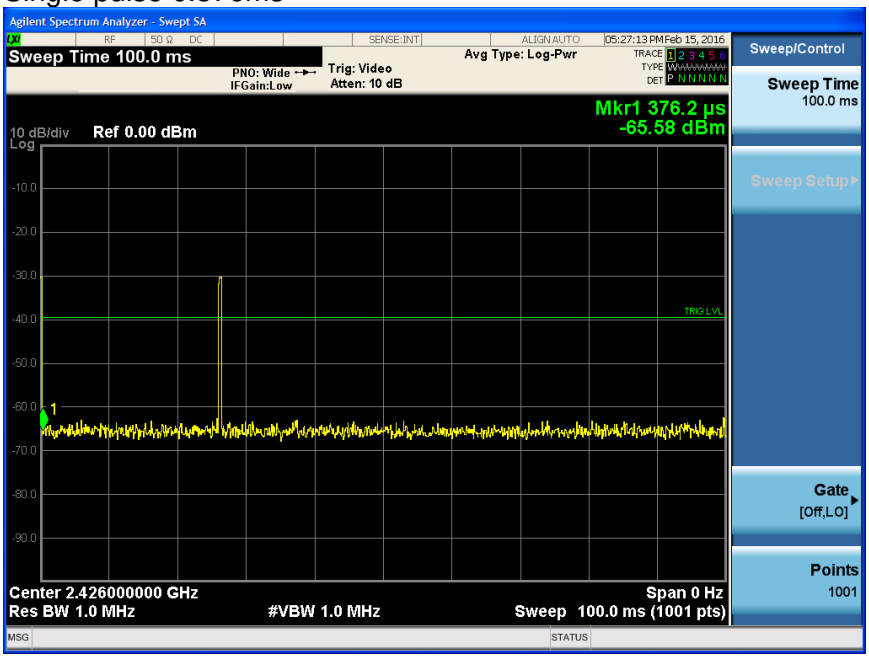
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
BLE	0.752	100.000	0.008	0.75%	42.47

DUTY CYCLE PLOTS

DUTY CYCLE BLE MODE



Single pulse 0.376ms



Worst case, 2 pulses within 100ms, total time 0.752

7.3. RADIATED EMISSIONS

LIMIT

IC RSS-210, A2.9
FCC 15.249

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHZ, and 24.0–24.25 GHz.
(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

PK measurement RBW/VBW 1MHz/3MHz

AV measurement RBW/VBW 1MHz/10Hz

RESULTS

7.3.1. FUNDAMENTAL FREQUENCY RADIATED EMISSION

Dipole Antenna

Radiated Emission Data

Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal 1 - 3MHz										
2.402	90.03dBuV Pk	32.1	-26.8	95.33(52.86)*	-	-	114	94	-	-
Azimuth: 197	Height:104 Horz			Margin (dB):	-	-	-18.67	-41.14	-	-
2.426	89.19dBuV Pk	32.2	-26.7	94.69(52.22)*	-	-	114	94	-	-
Azimuth: 202	Height:100 Horz			Margin (dB):	-	-	-19.31	-41.78	-	-
2.48	88.06dBuV Pk	32.5	-26.6	93.96(51.49)*	-	-	114	94	-	-
Azimuth: 203	Height:108 Horz			Margin (dB):	-	-	-20.04	-42.51	-	-

LIMIT 3: FUNDAMENTAL Peak Limit
LIMIT 4: FUNDAMENTAL Average limit
*duty cycle correction factor included with PK measurement, AV value in ()

Patch Antenna

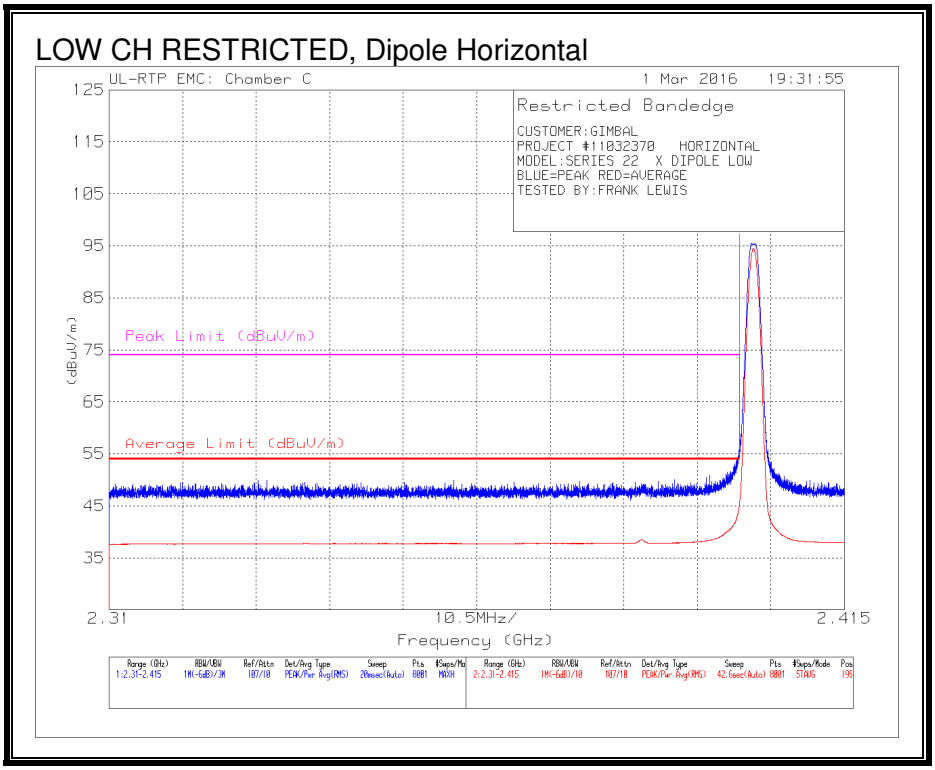
Radiated Emission Data

Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal 1 - 3MHz										
2.402	84.44dBuV Pk	32.1	-26.8	89.74(47.27)*	-	-	114	94	-	-
Azimuth: 233	Height:390 Horz			Margin (dB):	-	-	-24.26	-46.73	-	-
2.426	84.98dBuV Pk	32.2	-26.7	90.48(48.01)*	-	-	114	94	-	-
Azimuth: 60	Height:295 Horz			Margin (dB):	-	-	-23.52	-45.99	-	-
2.48	84.25dBuV Pk	32.5	-26.6	90.15(47.68)*	-	-	114	94	-	-
Azimuth: 242	Height:358 Horz			Margin (dB):	-	-	-23.85	-46.32	-	-

LIMIT 3: FUNDAMENTAL Peak Limit
LIMIT 4: FUNDAMENTAL Average limit
*duty cycle correction factor included with PK measurement, AV value in ()

7.3.2. TRANSMITTER RESTRICTED BAND EDGES

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

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Trace Markers
      Test        Meter       Transducer  Gain/Loss  Corrected  Limit:1   2       3       4       5       6
No. Frequency    Reading        Factor      Factor    Reading (dBuV/m)
    (GHz)                        (dB)        (dB)
=============================================================================================================
Range 1: Horizontal - Pk 2.31 - 2.415GHz ------------------------------------
1 2.402118      89.99dBuV Pk     32.1       -26.8    95.29(52.82)* -       -       -       -       -       -
                 Azimuth:195    Height:101 Horz      Margin (dB)   -       -       -       -       -       -
3 2.399998      49.77dBuV Pk     32.1       -26.8    55.07(12.6)*  54      74      -       -       -       -
                 Azimuth:195    Height:101 Horz      Margin (dB)   -41.4   -18.93  -       -       -       -

LIMIT 1: Average Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
*duty cycle correction factor included with PK measurement, AV value in ()
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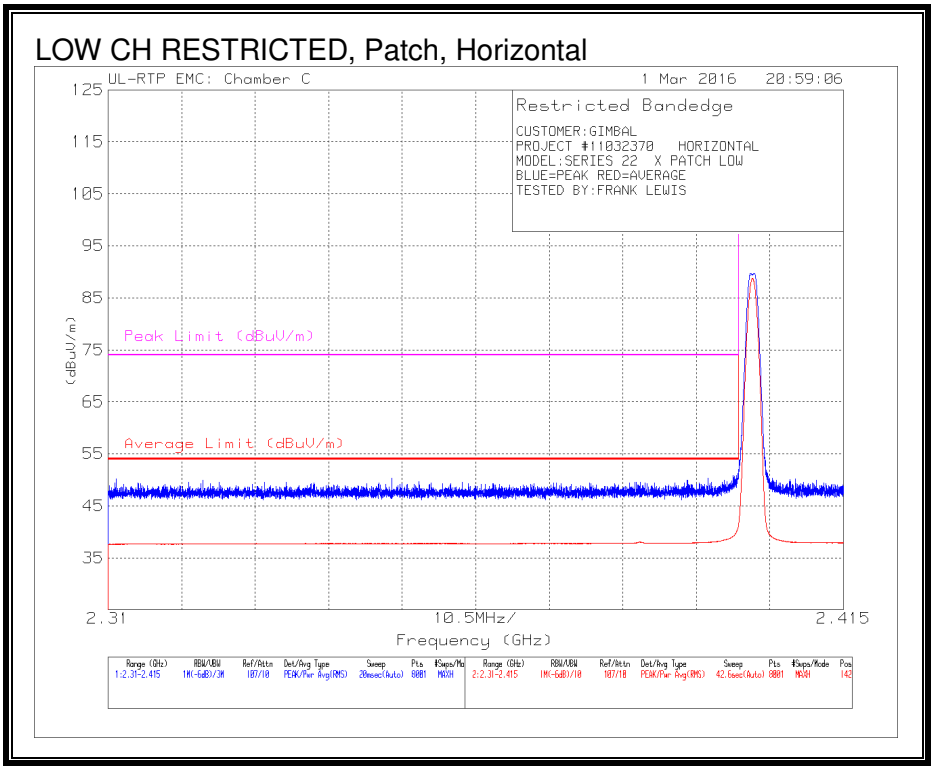
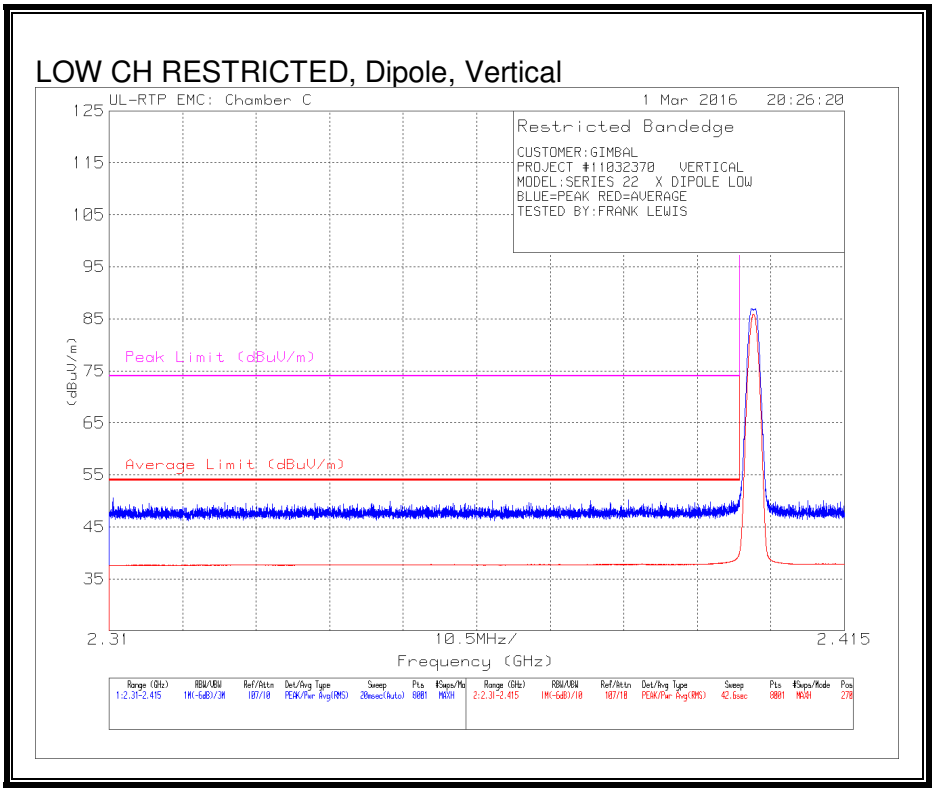


Trace Markers

No.	Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal - Pk 2.31 - 2.415GHz											
1	2.402019	84.1dBuV Pk	32.1	-26.8	89.4(46.93)*	-	-	-	-	-	-
		Azimuth:142	Height:398	Horz	Margin (dB)	-	-	-	-	-	-
3	2.399998	44.86dBuV Pk	32.1	-26.8	50.16(7369)*	54	74	-	-	-	-
		Azimuth:142	Height:398	Horz	Margin (dB)	-46.31	-23.84	-	-	-	-

LIMIT 1: Average Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
*duty cycle correction factor included with PK measurement, AV value in ()

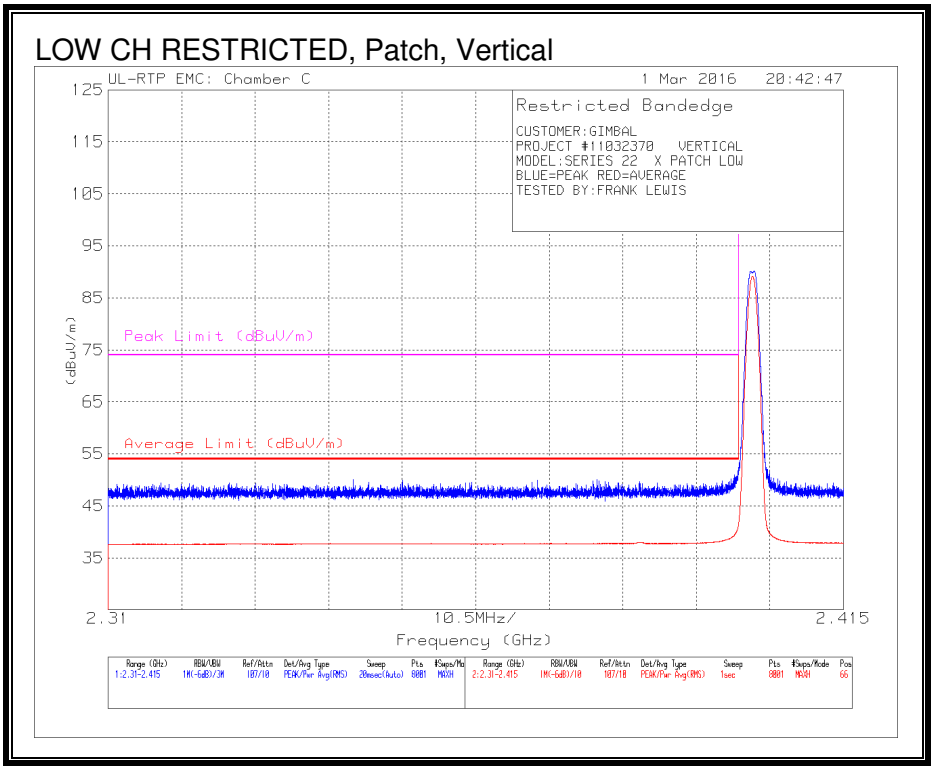
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Trace Markers

No.	Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal - Pk 2.31 - 2.415GHz											
1	2.402006	81.36dBuV Pk	32.1	-26.8	86.66(44.19)*	-	-	-	-	-	-
		Azimuth:270	Height:104 Vert		Margin (dB)	-	-	-	-	-	-
3	2.399998	44.89dBuV Pk	32.1	-26.8	50.19(7.92)*	5	74	-	-	-	-
		Azimuth:270	Height:104 Vert		Margin (dB)	-46.08	-23.81	-	-	-	-

LIMIT 1: Average Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
*duty cycle correction factor included with PK measurement, AV value in ()

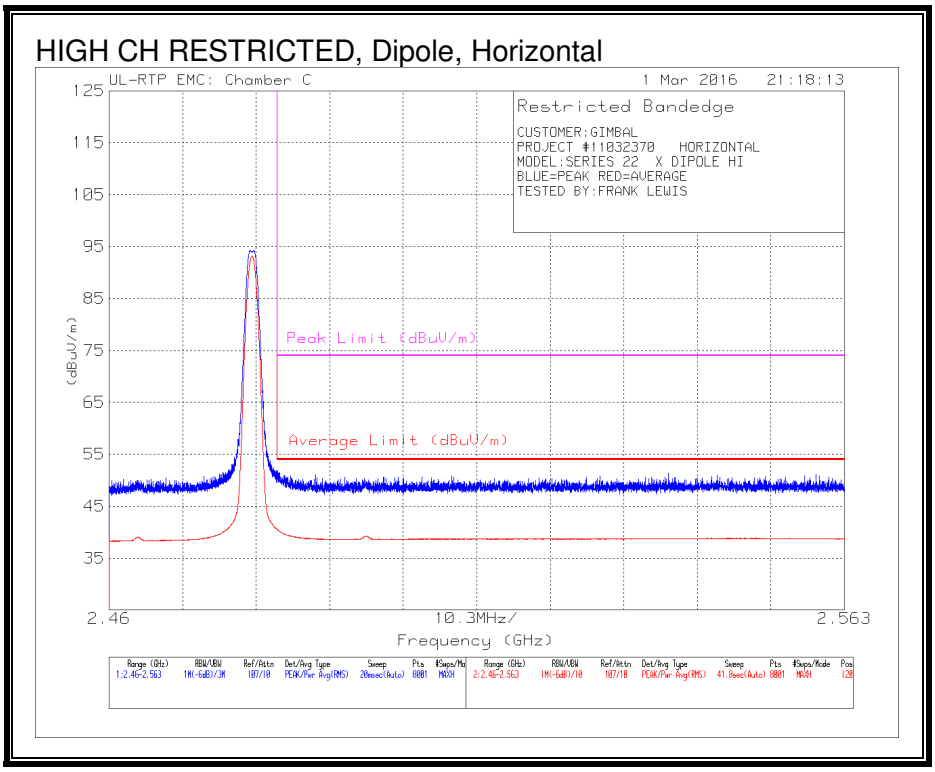


Trace Markers

No.	Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal - Pk 2.31 - 2.415GHz ----------											
1	2.402046	84.54dBuV Pk	32.1	-26.8	89.84(47.37)*	-	-	-	-	-	-
		Azimuth:66	Height:342 Vert		Margin (dB)	-	-	-	-	-	-
3	2.399998	46.72dBuV Pk	32.1	-26.8	52.02(9.55)*	54	74	-	-	-	-
		Azimuth:66	Height:342 Vert		Margin (dB)	-44.45	-21.98	-	-	-	-

LIMIT 1: Average Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
*duty cycle correction factor included with PK measurement, AV value in ()

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

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Trace Markers
      Test        Meter       Transducer  Gain/Loss  Corrected  Limit:1   2       3       4       5       6
No. Frequency    Reading       Factor      Factor    Reading (dBuV/m)
    (GHz)                       (dB)        (dB)
=============================================================================================================
Range 1: Horizontal - Pk 2.46 - 2.563GHz ------------------------------------
1 2.480046      88.03dBuV Pk     32.5      -26.6    93.93(51.46)* -       -       -       -       -       -
                 Azimuth:120    Height:108 Horz     Margin (dB)   -       -       -       -       -       -
3 2.48351       44.81dBuV Pk     32.6      -26.6    50.81(8.34)*  54      74      -       -       -       -
                 Azimuth:120    Height:108 Horz     Margin (dB)   -45.66  -23.19  -       -       -       -


LIMIT 1: Average Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
*duty cycle correction factor included with PK measurement, AV value in ()
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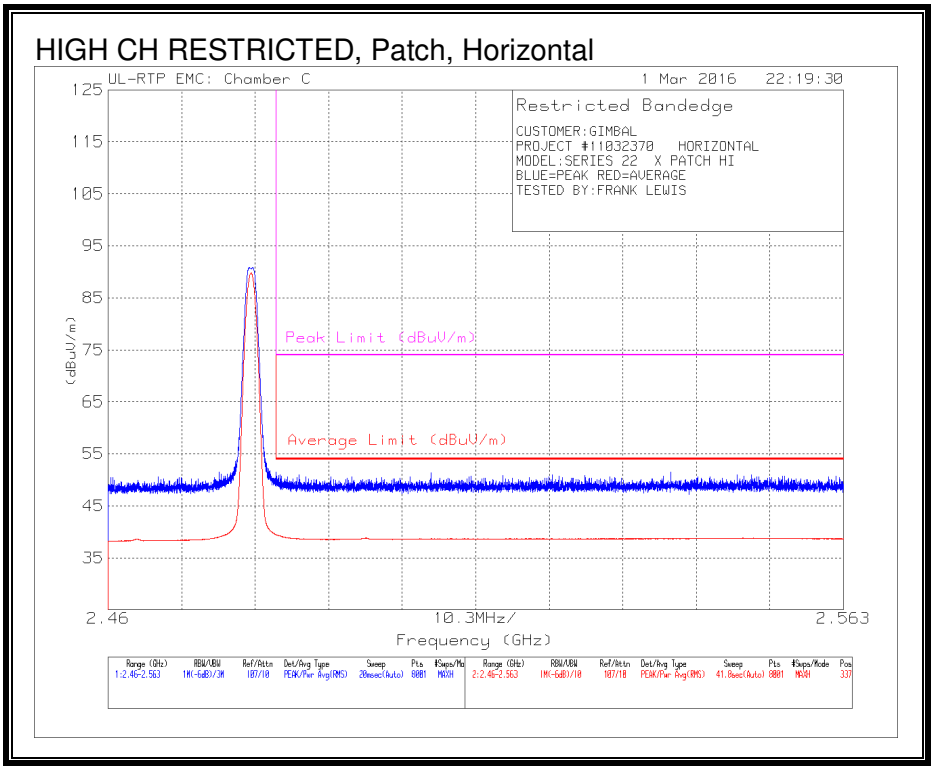
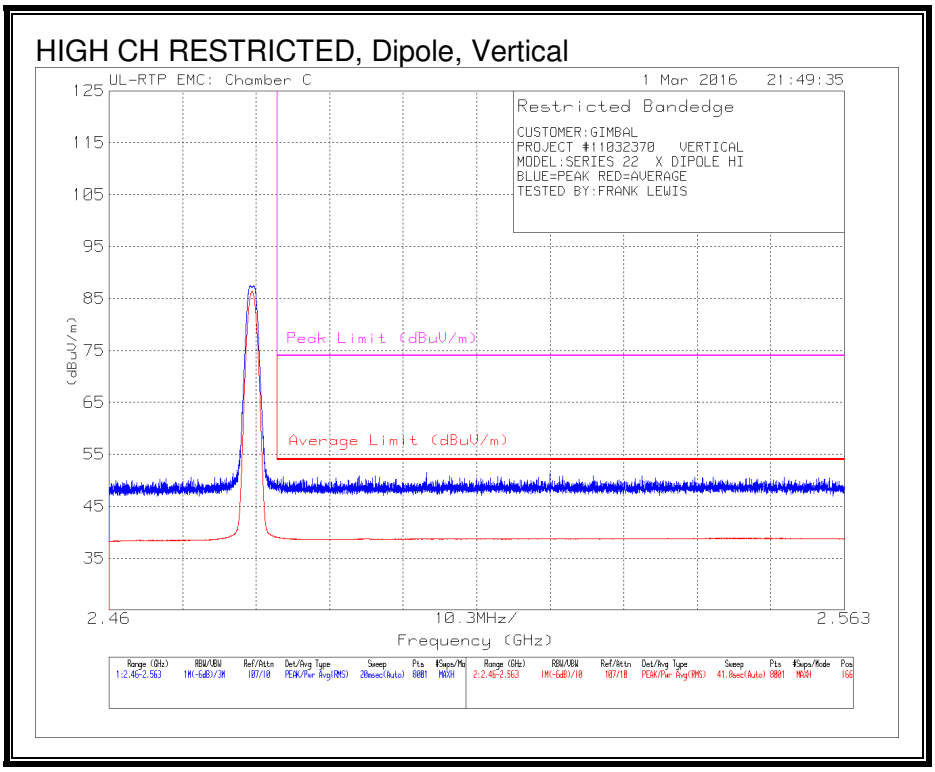


Trace Markers

No.	Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal - Pk 2.46 - 2.563GHz											
1	2.480034	84.63dBuV Pk	32.5	-26.6	90.53(48.06)*	-	-	-	-	-	-
		Azimuth:337	Height:358	Horz	Margin (dB)	-	-	-	-	-	-
3	2.48351	44.46dBuV Pk	32.6	-26.6	50.46(7.99)*	54	74	-	-	-	-
		Azimuth:337	Height:358	Horz	Margin (dB)	-46.01	-23.54	-	-	-	-

LIMIT 1: Average Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
*duty cycle correction factor included with PK measurement, AV value in ()

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

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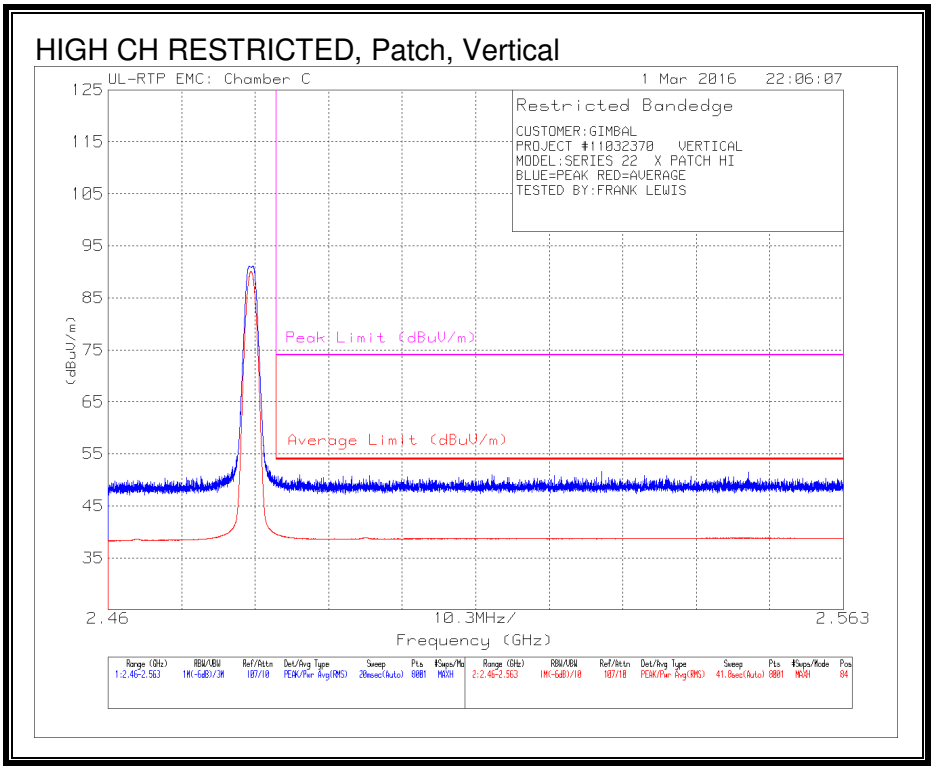
Trace Markers
      Test        Meter       Transducer  Gain/Loss  Corrected  Limit:1   2       3       4       5       6
No. Frequency    Reading       Factor      Factor    Reading (dBuV/m)
    (GHz)                       (dB)        (dB)
=============================================================================================================
Range 1: Horizontal - Pk 2.46 - 2.563GHz -------------------------------------
1 2.480021      81.21dBuV Pk     32.5      -26.6    87.11(44.84)* -       -       -       -       -       -
                 Azimuth:166    Height:396 Vert     Margin (dB)   -       -       -       -       -       -
3 2.48351       42.23dBuV Pk     32.6      -26.6    48.23(5.76)*  54      74      -       -       -       -
                 Azimuth:166    Height:396 Vert     Margin (dB)   -48.24  -25.77  -       -       -       -

LIMIT 1: Average Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
*duty cycle correction factor included with PK measurement, AV value in ()
```

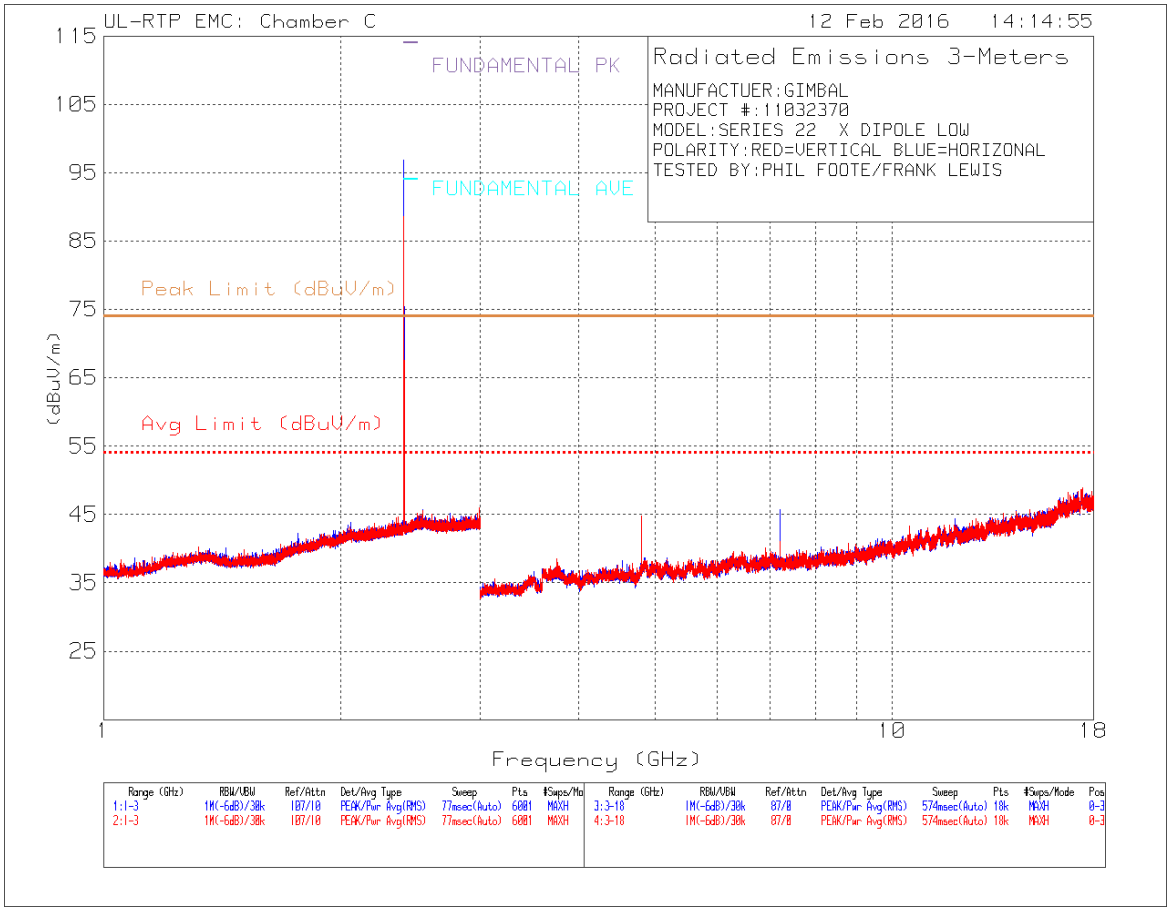


Trace Markers

No.	Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal - Pk 2.46 - 2.563GHz ----------											
1	2.480034	84.92dBuV Pk	32.5	-26.6	90.82(48.35)*	-	-	-	-	-	-
		Azimuth:84	Height:400	Vert	Margin (dB)	-	-	-	-	-	-
3	2.48351	44.57dBuV Pk	32.6	-26.6	50.57(8.1)*	54	74	-	-	-	-
		Azimuth:84	Height:400	Vert	Margin (dB)	-45.9	-23.43	-	-	-	-

LIMIT 1: Average Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
*duty cycle correction factor included with PK measurement, AV value in ()

7.3.3. HARMONICS AND SPURIOUS EMISSIONS 1-18 GHz



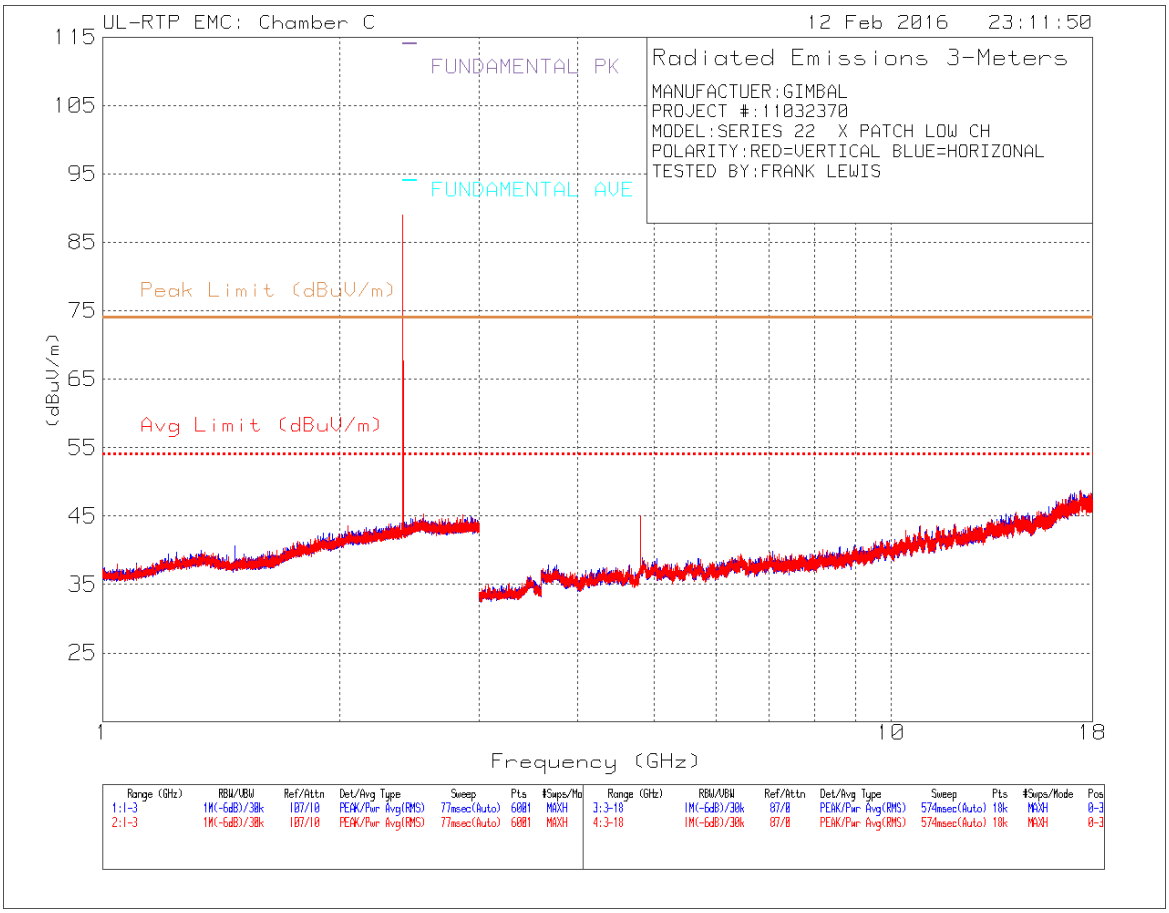
All PK Harmonic emissions were found compliant below both PK and AV limit

Radiated Emission Data

Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 3: Horizontal 3 - 18MHz										
4.8037	47.27dBuV Pk	34.3	-33.1	48.47	54	74	-	-	-	-
Azimuth: 213	Height:225 Horz			Margin (dB): -5.53		-25.53	-	-	-	-
7.2053	43.89dBuV Pk	35.7	-29.1	50.49	54	74	-	-	-	-
Azimuth: 198	Height:212 Horz			Margin (dB): -3.51		-23.51	-	-	-	-
17.6388	30.32dBuV Pk	41.5	-20.3	51.52	54	74	-	-	-	-
Azimuth: 74	Height:295 Horz			Margin (dB): -2.48		-22.48	-	-	-	-
17.6388	19.93dBuV Av	41.5	-20.3	41.13	54	-	-	-	-	-
Azimuth: 74	Height:295 Horz			Margin (dB): -12.87		-	-	-	-	-
Range 4: Vertical 3 - 18MHz										
4.8045	44.38dBuV Pk	34.3	-33.1	45.58	54	74	-	-	-	-
Azimuth: 291	Height:273 Vert			Margin (dB): -8.42		-28.42	-	-	-	-
7.2067	37.83dBuV Pk	35.7	-29.1	44.43	54	74	-	-	-	-
Azimuth: 303	Height:101 Vert			Margin (dB): -9.57		-29.57	-	-	-	-
17.4187	29.94dBuV Pk	41.7	-20.3	51.34	54	74	-	-	-	-
Azimuth: 27	Height:153 Vert			Margin (dB): -2.66		-22.66	-	-	-	-
17.4187	20.13dBuV Av	41.7	-20.3	41.53	54	-	-	-	-	-
Azimuth: 27	Height:153 Vert			Margin (dB): -12.47		-	-	-	-	-

LIMIT 1: Avg Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
LIMIT 3: FUNDAMENTAL PK
LIMIT 4: FUNDAMENTAL AVE

Pk - Peak detector
Av - Average detection



All PK Harmonic emissions were found compliant below both PK and AV limit

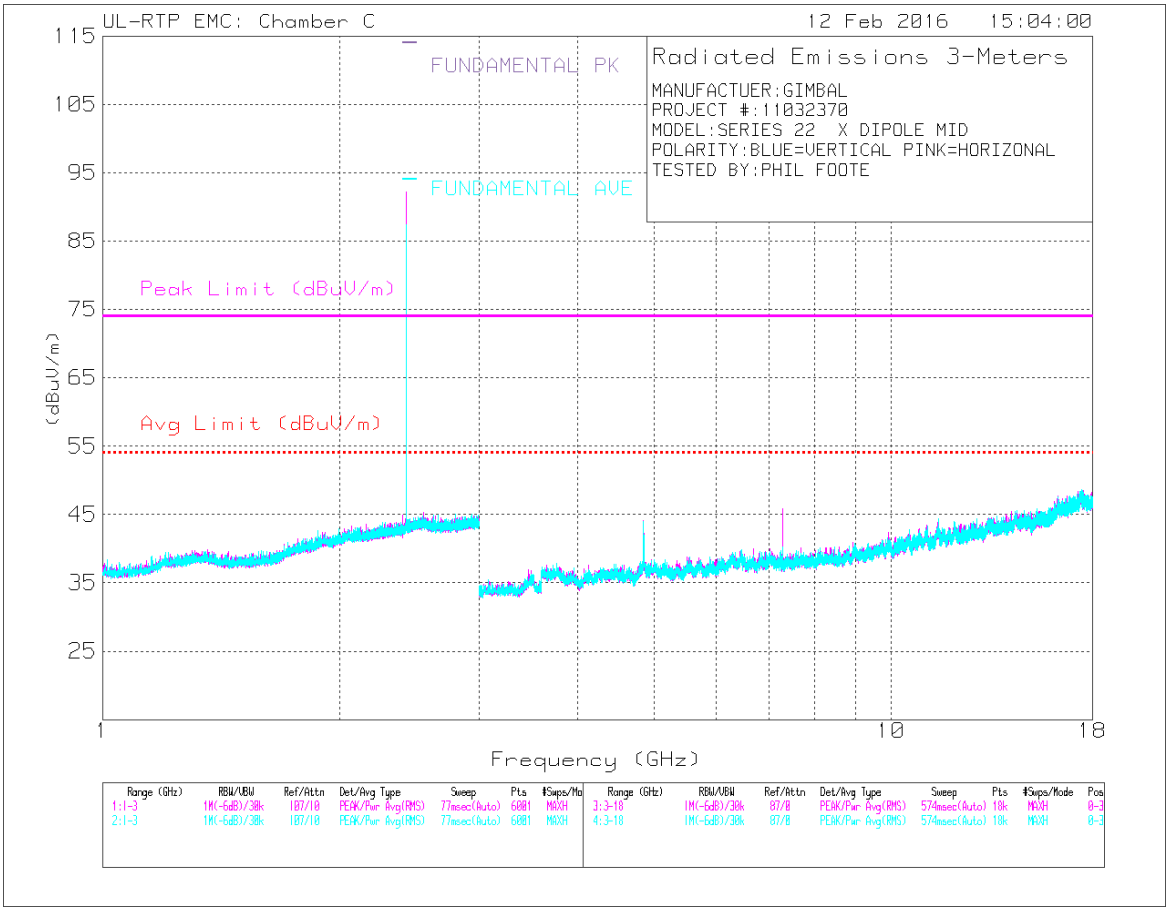
MANUFACTUER:GIMBAL
PROJECT #:11032370
MODEL:SERIES 22 X PATCH LOW CH
POLARITY:RED=VERTICAL BLUE=HORIZONAL
TESTED BY:FRANK LEWIS

Radiated Emission Data

Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 3: Horizontal 3 - 18MHz										
4.8037	42.66dBuV Pk	34.3	-33.1	43.86	-	74	-	-	-	-
Azimuth: 239	Height:310 Horz			Margin (dB):	-	-30.14	-	-	-	-
7.2063	38.72dBuV Pk	35.7	-29.1	45.32	-	74	-	-	-	-
Azimuth: 5	Height:244 Horz			Margin (dB):	-	-28.68	-	-	-	-
17.3707	32.58dBuV Pk	41.7	-20.1	54.18	-	74	-	-	-	-
Azimuth: 157	Height:135 Horz			Margin (dB):	-	-19.82	-	-	-	-
17.3707	20.08dBuV Av	41.7	-20.1	41.68	54	-	-	-	-	-
Azimuth: 157	Height:135 Horz			Margin (dB):	-12.32	-	-	-	-	-
Range 4: Vertical 3 - 18MHz										
4.8045	48.3dBuV Pk	34.3	-33.1	49.5	-	74	-	-	-	-
Azimuth: 114	Height:318 Vert			Margin (dB):	-	-24.5	-	-	-	-
7.2066	39.92dBuV Pk	35.7	-29.1	46.52	-	74	-	-	-	-
Azimuth: 189	Height:225 Vert			Margin (dB):	-	-27.48	-	-	-	-
17.392	32.59dBuV Pk	41.8	-20.3	54.09	-	74	-	-	-	-
Azimuth: 151	Height:321 Vert			Margin (dB):	-	-19.91	-	-	-	-
17.392	20.17dBuV Av	41.8	-20.3	41.67	54	-	-	-	-	-
Azimuth: 151	Height:321 Vert			Margin (dB):	-12.33	-	-	-	-	-

LIMIT 1: Avg Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
LIMIT 3: FUNDAMENTAL PK
LIMIT 4: FUNDAMENTAL AVE

Pk - Peak detector
Av - Average detection



All PK Harmonic emissions were found compliant below both PK and AV limit

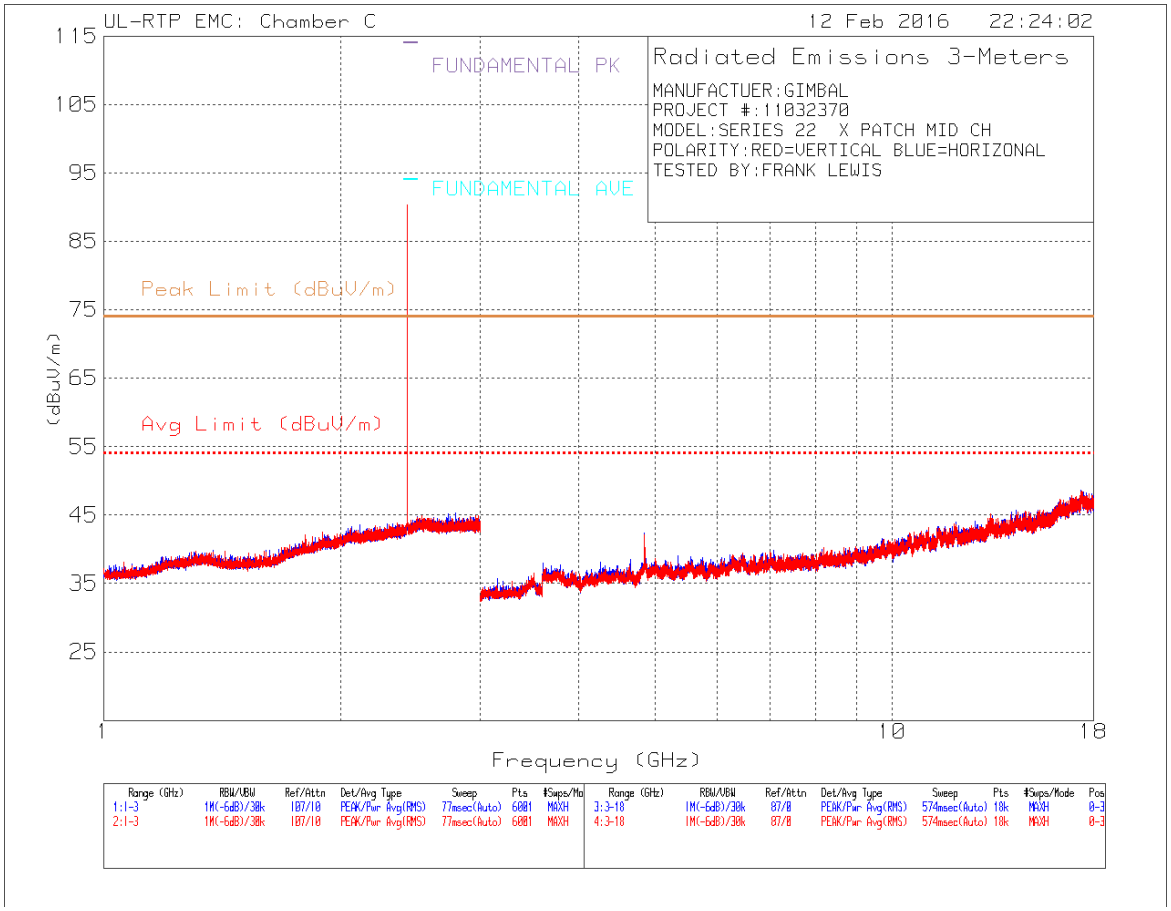
MANUFACTUER:GIMBAL
PROJECT #:11032370
MODEL:SERIES 22 X DIPOLE MID
POLARITY:BLUE=VERTICAL PINK=HORIZONAL
TESTED BY:PHIL FOOTE

Radiated Emission Data

Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 3: Horizontal 3 - 18MHz										
7.003	37.73dBuV Pk	35.7	-28.7	44.73	-	74	-	-	-	-
Azimuth: 200	Height:100 Horz			Margin (dB):	-	-29.27	-	-	-	-
7.2788	41.51dBuV Pk	35.7	-29.3	47.91	-	74	-	-	-	-
Azimuth: 200	Height:100 Horz			Margin (dB):	-	-26.09	-	-	-	-
7.2789	39.29dBuV Pk	35.7	-29.3	45.69	-	74	-	-	-	-
Azimuth: 0	Height:330 Horz			Margin (dB):	-	-28.31	-	-	-	-
4.85	42.12dBuV Pk	34.1	-33.1	43.12	-	74	-	-	-	-
Azimuth: 0	Height:247 Horz			Margin (dB):	-	-30.88	-	-	-	-
Range 4: Vertical 3 - 18MHz										
4.85	42.52dBuV Pk	34.1	-33.1	43.52	-	74	-	-	-	-
Azimuth: 222	Height:100 Vert			Margin (dB):	-	-30.48	-	-	-	-

LIMIT 1: Avg Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
LIMIT 3: FUNDAMENTAL PK
LIMIT 4: FUNDAMENTAL AVE

Pk - Peak detector
Av - Average detection



All PK Harmonic emissions were found compliant below both PK and AV limit

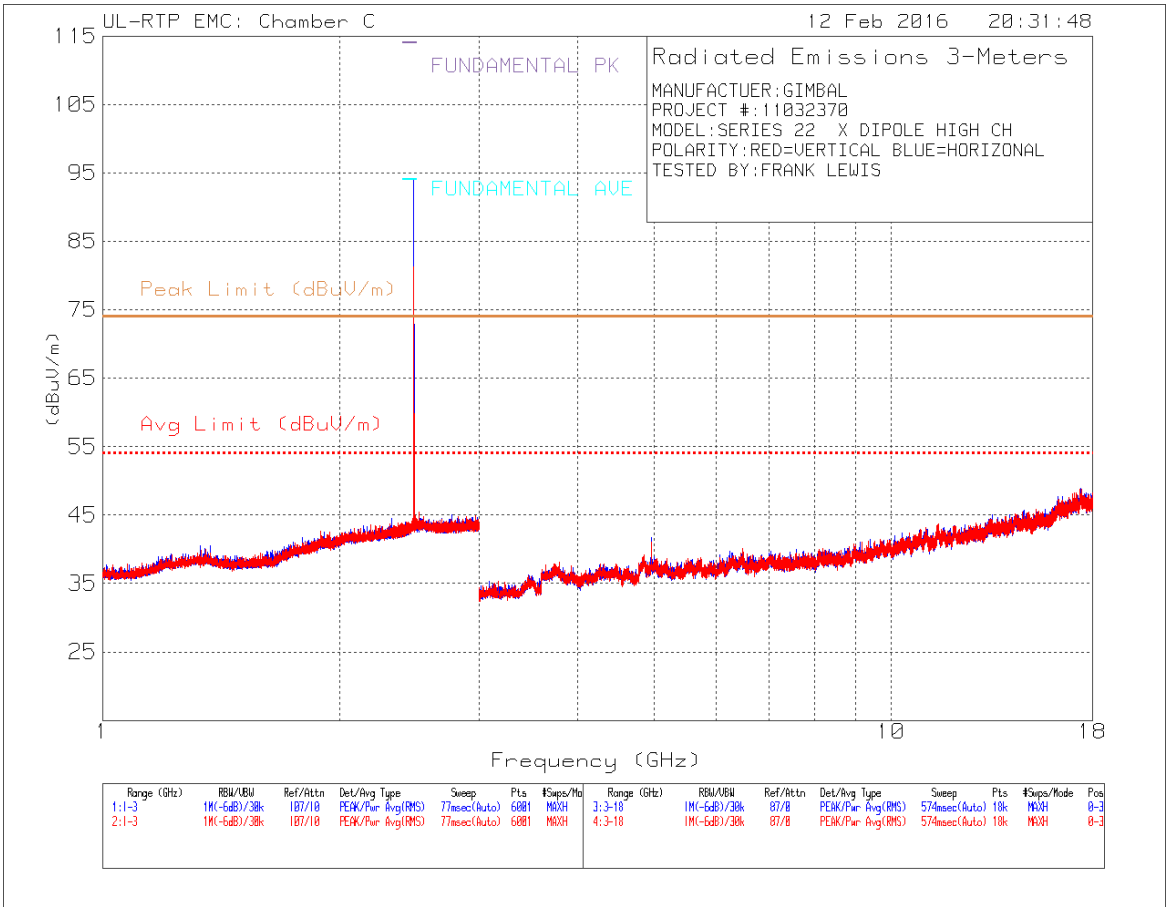
MANUFACTUER:GIMBAL
PROJECT #:11032370
MODEL:SERIES 22 X PATCH MID CH
POLARITY:RED=VERTICAL BLUE=HORIZONAL
TESTED BY:FRANK LEWIS

Radiated Emission Data

Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 3: Horizontal 3 - 18MHz										
4.852	45.38dBuV Pk	34.1	-33.1	46.38	-	74	-	-	-	-
Azimuth: 256	Height:317 Horz			Margin (dB):	-	-27.62	-	-	-	-
7.278	39.15dBuV Pk	35.7	-29.3	45.55	-	74	-	-	-	-
Azimuth: 298	Height:294 Horz			Margin (dB):	-	-28.45	-	-	-	-
17.3947	32.12dBuV Pk	41.8	-20.3	53.62	-	74	-	-	-	-
Azimuth: 282	Height:113 Horz			Margin (dB):	-	-20.38	-	-	-	-
17.3947	20.08dBuV Av	41.8	-20.3	41.58	54	-	-	-	-	-
Azimuth: 282	Height:113 Horz			Margin (dB):	-12.42	-	-	-	-	-
Range 4: Vertical 3 - 18MHz										
4.8525	46.94dBuV Pk	34.1	-33.1	47.94	-	74	-	-	-	-
Azimuth: 106	Height:301 Vert			Margin (dB):	-	-26.06	-	-	-	-
7.278	39.25dBuV Pk	35.7	-29.3	45.65	-	74	-	-	-	-
Azimuth: 165	Height:326 Vert			Margin (dB):	-	-28.35	-	-	-	-
17.4069	32.71dBuV Pk	41.8	-20.1	54.41	-	74	-	-	-	-
Azimuth: 224	Height:100 Vert			Margin (dB):	-	-19.59	-	-	-	-
17.4069	20.06dBuV Av	41.8	-20.1	41.76	54	-	-	-	-	-
Azimuth: 224	Height:100 Vert			Margin (dB):	-12.24	-	-	-	-	-

LIMIT 1: Avg Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
LIMIT 3: FUNDAMENTAL PK
LIMIT 4: FUNDAMENTAL AVE

Pk - Peak detector
Av - Average detection



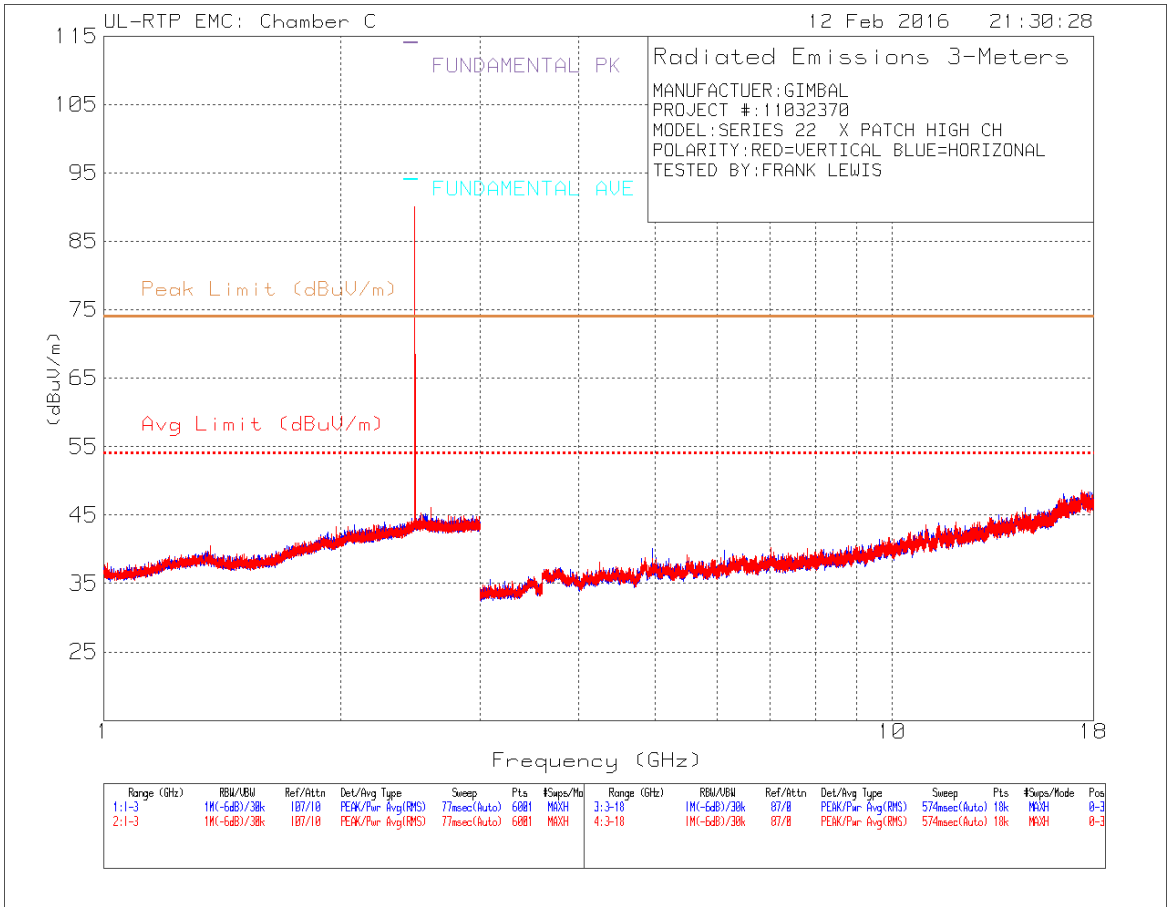
All PK Harmonic emissions were found compliant below both PK and AV limit

Radiated Emission Data

Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 3: Horizontal 3 - 18MHz										
4.9605	44.74dBuV Pk	34.2	-32.7	46.24	-	74	-	-	-	-
Azimuth: 193	Height:230 Horz			Margin (dB):	-	-27.76	-	-	-	-
7.4396	38.72dBuV Pk	35.7	-28.9	45.52	-	74	-	-	-	-
Azimuth: 192	Height:249 Horz			Margin (dB):	-	-28.48	-	-	-	-
17.36	32.53dBuV Pk	41.6	-20.1	54.03	-	74	-	-	-	-
Azimuth: 44	Height:312 Horz			Margin (dB):	-	-19.97	-	-	-	-
17.36	20.13dBuV Av	41.6	-20.1	41.63	54	-	-	-	-	-
Azimuth: 44	Height:312 Horz			Margin (dB):	-12.37	-	-	-	-	-
Range 4: Vertical 3 - 18MHz										
4.9604	43.76dBuV Pk	34.2	-32.7	45.26	-	74	-	-	-	-
Azimuth: 105	Height:222 Vert			Margin (dB):	-	-28.74	-	-	-	-
7.4394	38.25dBuV Pk	35.7	-28.9	45.05	-	74	-	-	-	-
Azimuth: 270	Height:252 Vert			Margin (dB):	-	-28.95	-	-	-	-
17.455	33.65dBuV Pk	41.6	-21.2	54.05	-	74	-	-	-	-
Azimuth: 259	Height:224 Vert			Margin (dB):	-	-19.95	-	-	-	-
17.455	20.63dBuV Av	41.6	-21.2	41.03	54	-	-	-	-	-
Azimuth: 259	Height:224 Vert			Margin (dB):	-12.97	-	-	-	-	-

LIMIT 1: Avg Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
LIMIT 3: FUNDAMENTAL PK
LIMIT 4: FUNDAMENTAL AVE

Pk - Peak detector
Av - Average detection



All PK Harmonic emissions were found compliant below both PK and AV limit

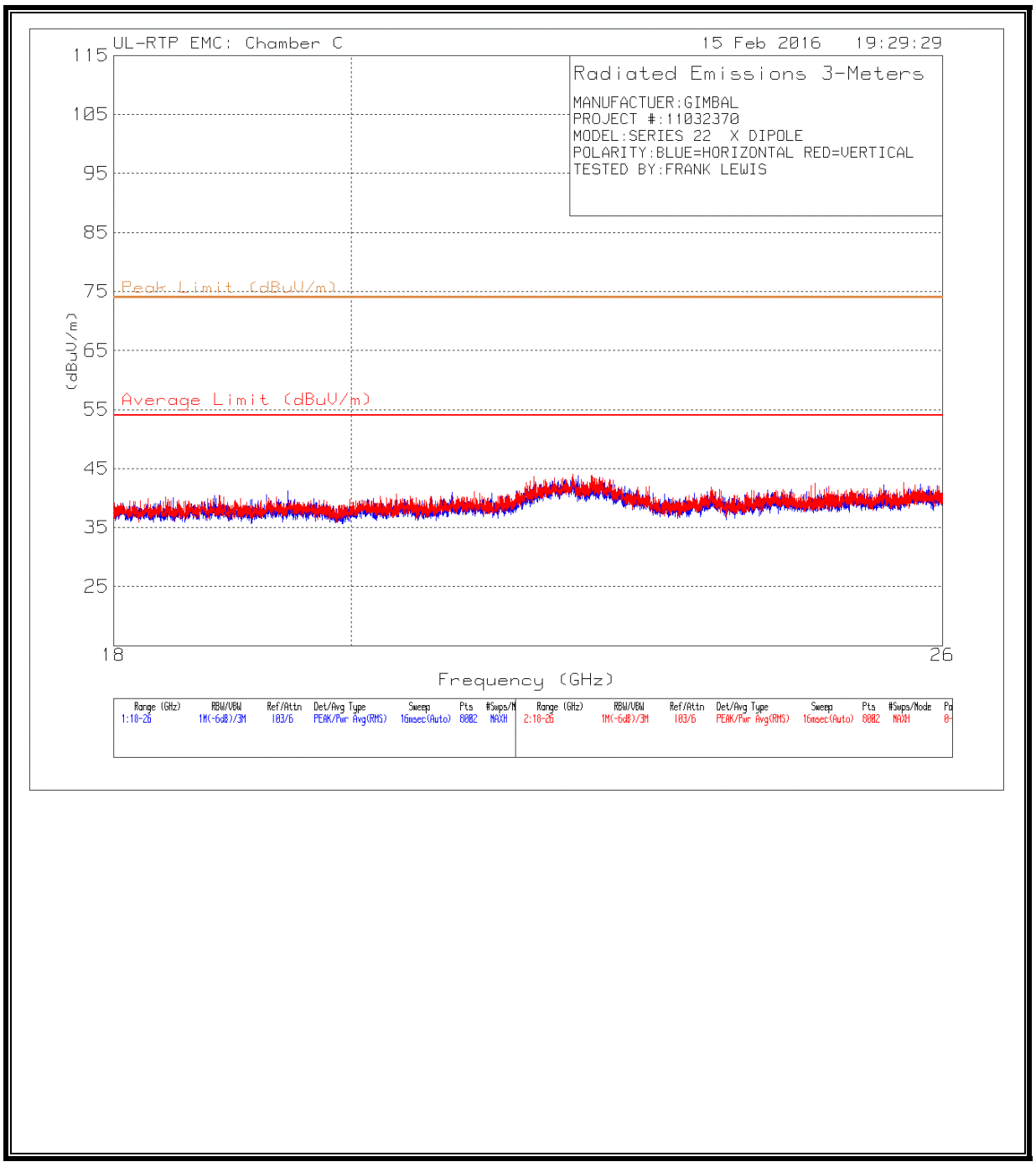
Radiated Emission Data

Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 3: Horizontal 3 - 18MHz										
4.9601	44.03dBuV Pk	34.2	-32.7	45.53	-	74	-	-	-	-
Azimuth: 241	Height:141 Horz			Margin (dB):	-	-28.47	-	-	-	-
7.4404	37.65dBuV Pk	35.7	-28.9	44.45	-	74	-	-	-	-
Azimuth: 145	Height:186 Horz			Margin (dB):	-	-29.55	-	-	-	-
17.3753	32.76dBuV Pk	41.7	-20.2	54.26	-	74	-	-	-	-
Azimuth: 289	Height:122 Horz			Margin (dB):	-	-19.74	-	-	-	-
17.3753	20.23dBuV Av	41.7	-20.2	41.73	54	-	-	-	-	-
Azimuth: 289	Height:122 Horz			Margin (dB):	-12.27	-	-	-	-	-
Range 4: Vertical 3 - 18MHz										
4.96	43.76dBuV Pk	34.2	-32.7	45.26	-	74	-	-	-	-
Azimuth: 28	Height:159 Vert			Margin (dB):	-	-28.74	-	-	-	-
7.44	37.9dBuV Pk	35.7	-28.9	44.7	-	74	-	-	-	-
Azimuth: 321	Height:257 Vert			Margin (dB):	-	-29.3	-	-	-	-
17.5233	33.44dBuV Pk	41.6	-20.7	54.34	-	74	-	-	-	-
Azimuth: 172	Height:255 Vert			Margin (dB):	-	-19.66	-	-	-	-

LIMIT 1: Avg Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)
LIMIT 3: FUNDAMENTAL PK
LIMIT 4: FUNDAMENTAL AVE

Pk - Peak detector
Av - Average detection

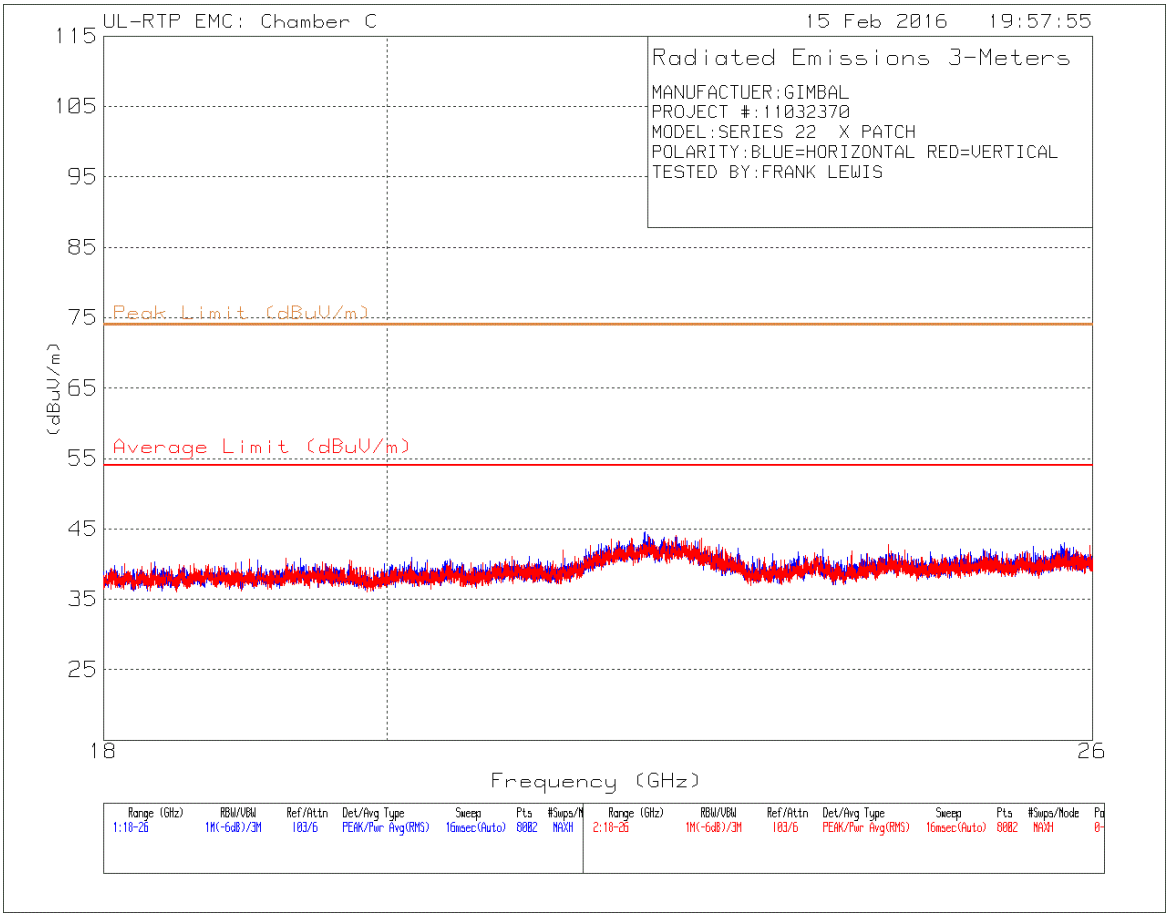
7.3.4. HARMONICS AND SPURIOUS EMISSIONS 18-26 GHz – WORST CASE



Trace Markers

No.	Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal 18 - 26GHz											
1	19.449819	49.42dBuV Pk	32.6	-40.8	41.22	54	74	-	-	-	-
		Azimuth:0-360	Height:200 Horz		Margin (dB)	-12.78	-32.78	-	-	-	-
2	22.116485	47.8dBuV Pk	36.5	-40.5	43.8	54	74	-	-	-	-
		Azimuth:0-360	Height:200 Horz		Margin (dB)	-10.2	-30.2	-	-	-	-
3	25.327084	46.47dBuV Pk	34.1	-38.3	42.27	54	74	-	-	-	-
		Azimuth:0-360	Height:150 Horz		Margin (dB)	-11.73	-31.73	-	-	-	-
Range 2: Vertical 18 - 26GHz											
4	18.866392	49.09dBuV Pk	32.4	-41.1	40.39	54	74	-	-	-	-
		Azimuth:0-360	Height:125 Vert		Margin (dB)	-13.61	-33.61	-	-	-	-
5	22.255468	48.16dBuV Pk	36.2	-40.5	43.86	54	74	-	-	-	-
		Azimuth:0-360	Height:200 Vert		Margin (dB)	-10.14	-30.14	-	-	-	-
6	25.552056	46.79dBuV Pk	33.7	-37.8	42.69	54	74	-	-	-	-
		Azimuth:0-360	Height:200 Vert		Margin (dB)	-11.31	-31.31	-	-	-	-

LIMIT 1: Average Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)



Trace Markers

No.	Test Frequency (GHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal 18 - 26GHz											
1 *	20.185727	49.39dBuV Pk	32.7	-41.1	40.99	54	74	-	-	-	-
		Azimuth:0-360	Height:125	Horz	Margin (dB)	-13.01	-33.01	-	-	-	-
2 *	22.012498	48.37dBuV Pk	36.7	-40.5	44.57	54	74	-	-	-	-
		Azimuth:0-360	Height:200	Horz	Margin (dB)	-9.43	-29.43	-	-	-	-
3	25.728034	46.84dBuV Pk	34.1	-37.9	43.04	54	74	-	-	-	-
		Azimuth:0-360	Height:150	Horz	Margin (dB)	-10.96	-30.96	-	-	-	-
Range 2: Vertical 18 - 26GHz											
4	21.35658	49.03dBuV Pk	33.6	-40.6	42.03	54	74	-	-	-	-
		Azimuth:0-360	Height:101	Vert	Margin (dB)	-11.97	-31.97	-	-	-	-
5	22.268466	48.44dBuV Pk	36.2	-40.6	44.04	54	74	-	-	-	-
		Azimuth:0-360	Height:175	Vert	Margin (dB)	-9.96	-29.96	-	-	-	-
6	24.099238	48.83dBuV Pk	33.6	-39.7	42.73	54	74	-	-	-	-
		Azimuth:0-360	Height:175	Vert	Margin (dB)	-11.27	-31.27	-	-	-	-

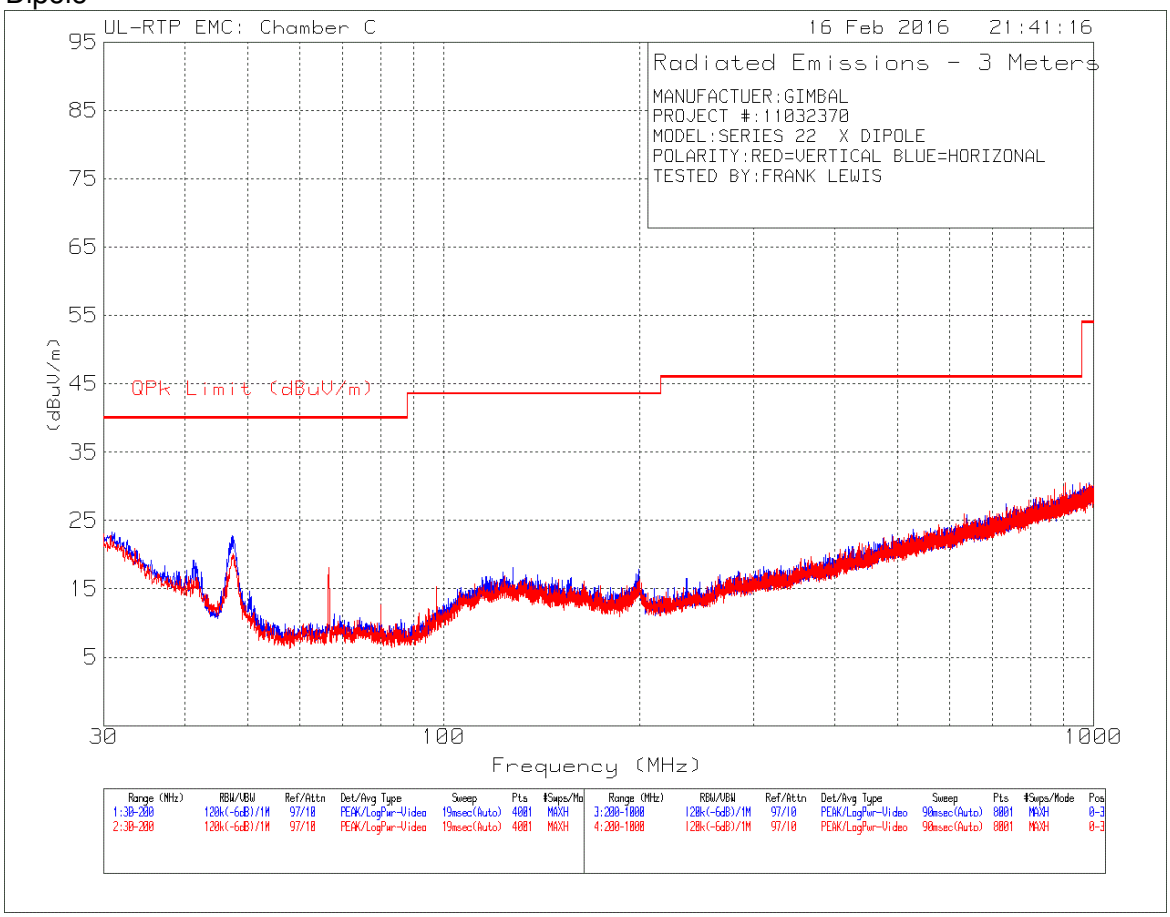
LIMIT 1: Average Limit (dBuV/m)
LIMIT 2: Peak Limit (dBuV/m)

Pk - Peak detector

7.3.5. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz

Dipole



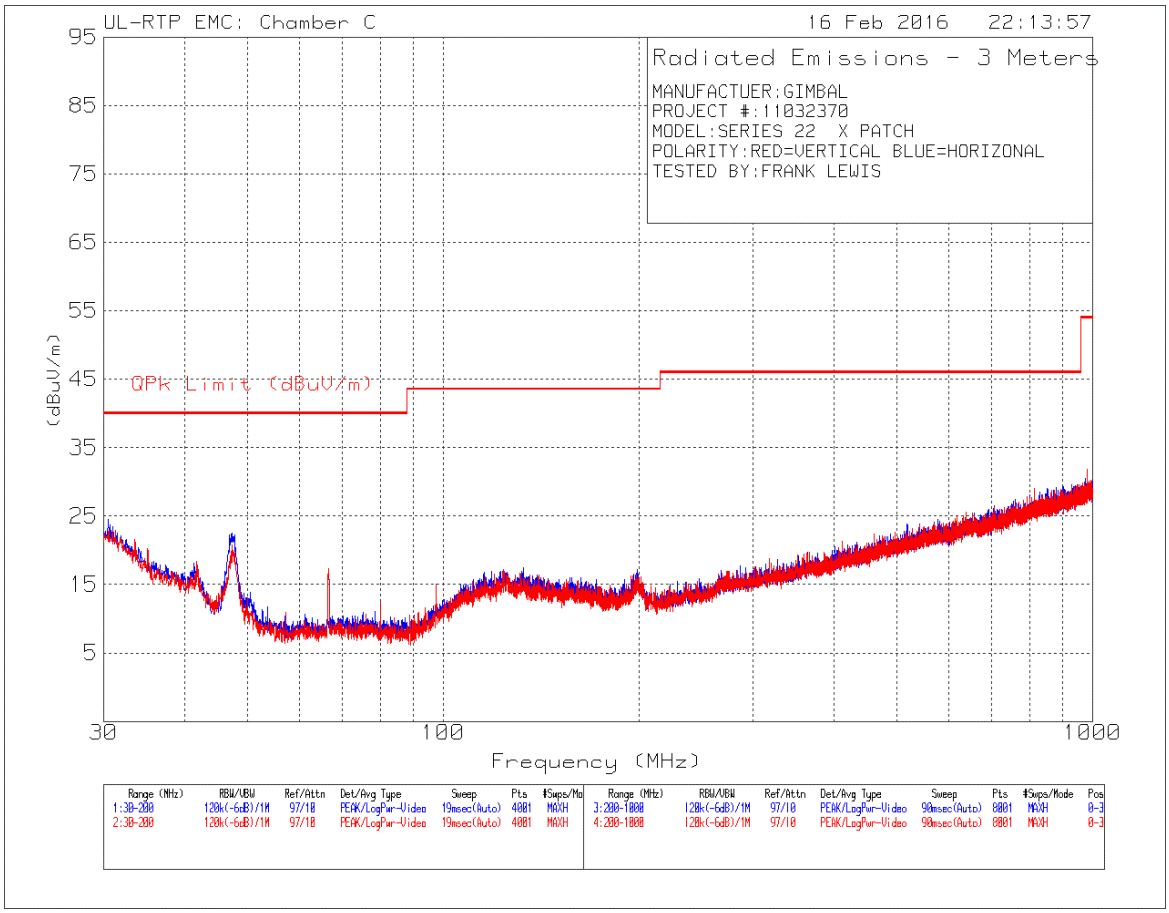
Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal 30 - 200MHz											
1	30.85	29.37dBuV Pk	25.5	-31.6	23.27	40	-	-	-	-	-
		Azimuth:0-360	Height:300	Horz	Margin (dB)	-16.73	-	-	-	-	-
2	47.255	40.26dBuV Pk	13.9	-31.4	22.76	40	-	-	-	-	-
		Azimuth:0-360	Height:200	Horz	Margin (dB)	-17.24	-	-	-	-	-
3	199.4475	30.28dBuV Pk	17.9	-30.3	17.88	43.52	-	-	-	-	-
		Azimuth:0-360	Height:300	Horz	Margin (dB)	-25.64	-	-	-	-	-
Range 2: Vertical 30 - 200MHz											
5	47.51	37.67dBuV Pk	13.8	-31.4	20.07	40	-	-	-	-	-
		Azimuth:0-360	Height:100	Vert	Margin (dB)	-19.93	-	-	-	-	-
6	66.5075	37.05dBuV Pk	12.3	-31.2	18.15	40	-	-	-	-	-
		Azimuth:0-360	Height:100	Vert	Margin (dB)	-21.85	-	-	-	-	-
Range 3: Horizontal 200 - 1000MHz											
4	929.4	29.9dBuV Pk	27.2	-26.9	30.2	46.02	-	-	-	-	-
		Azimuth:0-360	Height:300	Horz	Margin (dB)	-15.82	-	-	-	-	-

LIMIT 1: QPk Limit (dBuV/m)

Pk - Peak detector

Patch



Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dBuV/m)	Limit:1	2	3	4	5	6
Range 1: Horizontal 30 - 200MHz											
1	30.4675	30.31dBuV Pk	25.8	-31.6	24.51	40	-	-	-	-	-
		Azimuth:0-360	Height:200 Horz		Margin (dB)	-15.49	-	-	-	-	-
2	47.255	40.06dBuV Pk	13.9	-31.4	22.56	40	-	-	-	-	-
		Azimuth:0-360	Height:300 Horz		Margin (dB)	-17.44	-	-	-	-	-
Range 2: Vertical 30 - 200MHz											
4	47.34	38.25dBuV Pk	13.9	-31.4	20.75	40	-	-	-	-	-
		Azimuth:0-360	Height:101 Vert		Margin (dB)	-19.25	-	-	-	-	-
5	66.635	36.23dBuV Pk	12.3	-31.2	17.33	40	-	-	-	-	-
		Azimuth:0-360	Height:101 Vert		Margin (dB)	-22.67	-	-	-	-	-
Range 3: Horizontal 200 - 1000MHz											
3	901	29.58dBuV Pk	26.9	-27.2	29.28	46.02	-	-	-	-	-
		Azimuth:0-360	Height:200 Horz		Margin (dB)	-16.74	-	-	-	-	-
Range 4: Vertical 200 - 1000MHz											
6	980.7	30.29dBuV Pk	27.8	-26.3	31.79	53.97	-	-	-	-	-
		Azimuth:0-360	Height:300 Vert		Margin (dB)	-22.18	-	-	-	-	-

LIMIT 1: QPk Limit (dBuV/m)

Pk - Peak detector