FCC CFR47 PART 15 SUBPART C
ISED CANADA RSS-210 ISSUE 10

CERTIFICATION TEST REPORT

FOR

WIRELESS WINDOW/DOOR CONTACT

MODEL NUMBER: TWC 319.5R

FCC ID: 2AUTX-TWC
IC: 25828-TWC

REPORT NUMBER: R13144321-E3

ISSUE DATE: 2020-02-14

Prepared for
TANE ALARM PRODUCTS
906 JERICHO TURNPIKE
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Prepared by
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TESTING

NVLAP LAB CODE 200246-0

REVISION HISTORY

Ver.	Issue Date	Revisions	Revised By
1	2020-01-31	Initial Issue	Brian T. Kiewra
2	2020-02-14	Updated FCC/ISED information	Lariah Ijames

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Tane Alarm Products
906 Jericho Turnpike
New Hyde Park, NY 11040, USA

EUT DESCRIPTION: Wireless Window/Door Contact

MODEL: TWC 319.5R

SERIAL NUMBER: 1124

DATE TESTED: 2020-01-10 to 2020-01-31

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Complies
ISED CANADA RSS-210 Issue 10, Annex A	Complies
ISED CANADA RSS-GEN Issue 5	Complies

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

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

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

Approved & Released
For UL LLC By:

Jeffrey Moser
Operations Leader
UL – Consumer Technology Division

Prepared By:

Brian T. Kiewra
Project Engineer
UL – Consumer Technology Division

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 5, and RSS-210 Issue 10.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, NC 27709, USA and 2800 Perimeter Park Dr., Suite B, Morrisville, NC 27560, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

12 Laboratory Dr.	2800 Perimeter Park Dr.
Site Code: 2180C	
☐ Chamber A	☐ Chamber North
☐ Chamber C	☒ Chamber South

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. 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

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

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

36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

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)
RF output power, radiated (SAC)	4.52 dB
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	3.05 dB
All emissions, radiated	4.88 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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a wireless window/door contact. Model tested was TWC 319.5R. This report is also to cover model TWC 319.5T. The only difference is the activation sensor. The TWC 319.5R uses a reed switch and the TWC 319.5T uses a solid state TMR switch for activation.

5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a loop antenna, with a maximum gain of -25 dBi.

5.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Interlogix-1.0.hex, Rev1.0.

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT fundamental was investigated in three orientations, X, Y, and Z. It was determined that X-Axis was worst-case orientation. Therefore, all radiated testing was performed with the EUT in the X-Axis.

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
None				

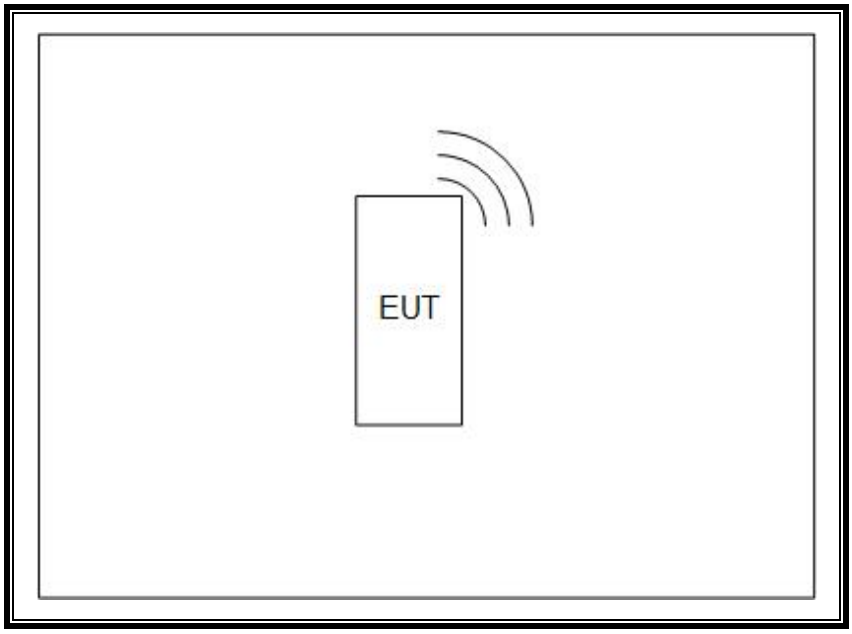
I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
None						

TEST SETUP

The EUT is installed as a standalone device

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz (Loop Ant.)					
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2019-08-08	2020-08-08
30-1000 MHz					
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2019-07-16	2020-07-16
1-18 GHz					
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2019-04-22	2020-04-22
Gain-Loss Chains					
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2019-05-02	2020-05-02
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2019-05-02	2020-05-02
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2019-03-13	2020-03-13
Receiver & Software					
SA0025	Spectrum Analyzer	Agilent	N9030A	2019-02-28	2020-02-28
SOFTEMI	EMI Software	UL	Version 9.5 (2019-06-12)		
Additional Equipment used					
s/n 181474409	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27
HPF012	1.2GHz High Pass Filter	Micro-Tronics	HPM18129	2019-06-14	2020-06-14

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
Conducted Room 1					
SA0027	Spectrum Analyzer	Agilent Technologies	E9030A	2019-05-15	2020-05-15
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2019-06-17	2020-06-17
MM0168	Multi-meter	Agilent	U1232A	2019-08-23	2020-08-23

7. ANTENNA PORT TEST RESULTS

7.1. 20 dB AND 99% BW

LIMITS

FCC §15.231 (c)
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RSS-210 A1.3
The 99% bandwidth of momentarily operated devices shall be less or equal to 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the 99% bandwidth shall be less or equal to 0.5% of the center frequency.

TEST PROCEDURE

99% BW: Per ANSI C63.10, Section 6.9.3

The transmitter output is coupled to the spectrum analyzer via an antenna connected to the spectrum analyzer.

The RBW is set to 1% to 5% of the 99 % bandwidth. The VBW is set to approximately 3 times the RBW. The sweep time is coupled. The detection mode is set to peak and the trace mode to max hold as allowed by the RSS-Gen standard for devices that do not transmit continuously. The spectrum analyzer's internal 99% bandwidth function is utilized.

20dB BW: Per ANSI C63.10, Section 6.9.2

The transmitter output is coupled to the spectrum analyzer via an antenna connected to the spectrum analyzer.

The RBW is set to 1% to 5% of the 20dB bandwidth. The VBW is set to approximately 3 times the RBW. The sweep time is coupled. The detection mode is set to peak and the trace mode to max hold. The spectrum analyzer's internal 20dB bandwidth function is utilized.

20dB Bandwidth

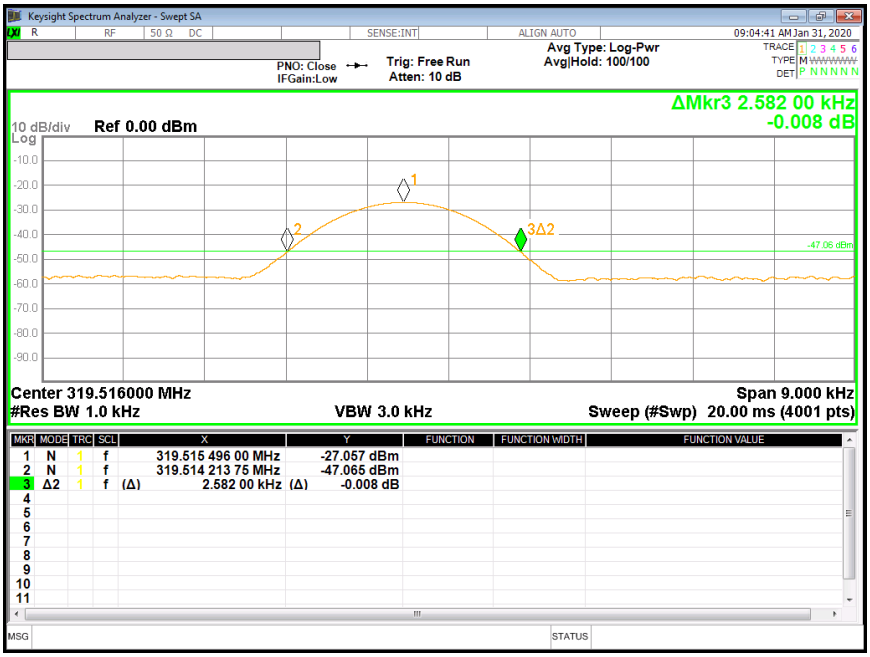
Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
319.5	2.582	798.75	-796.168

99% Bandwidth

Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
319.5	778.54	798.75	-20.21

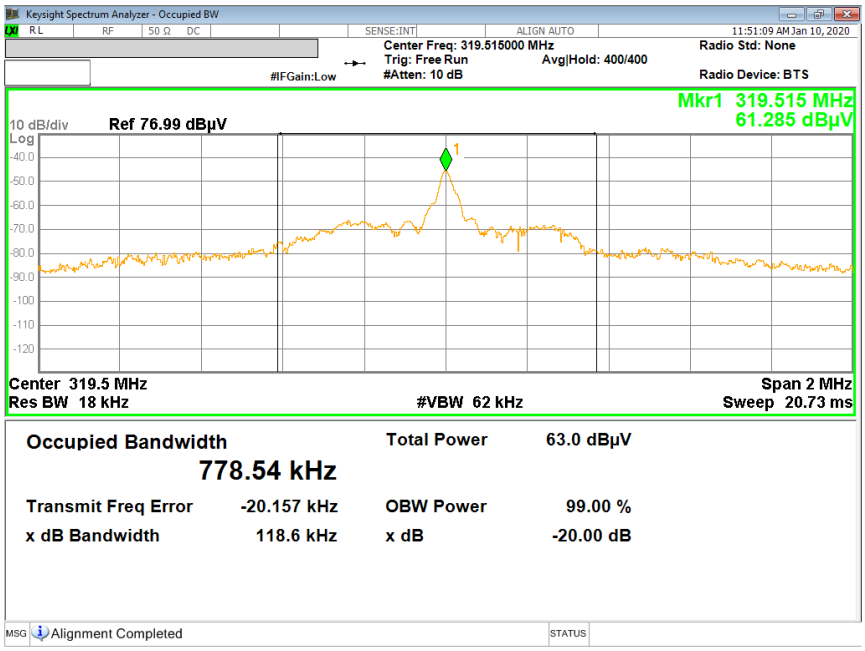
20dB/99% BANDWIDTH

20dB BANDWIDTH



Note: Because the measured signal is CW or CW-like adjusting the RBW per C63.10 would not be practical since the measured bandwidth will always follow the RBW and the result will be approximately twice the RBW. See 99% OBW plot for 20 dB BW measurement relative to the RBW.

20dB/99% BANDWIDTH



Test Information

Test Date: 2020-01-10 and 2020-01-31
Tested By: 46722

7.2. DUTY CYCLE

LIMITS

FCC §15.35 (c)
The measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer or radiated field strength. 1MHz/3MHz was used for RBW and VBW. These values were used to ensure RBW was greater than OBW. The sweep time is coupled and the span is set to 0 Hz. The number of pulses is measured and calculated in a 100 ms scan.

CALCULATION

Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is (# of long pulses * long pulse width) + (# of short pulses * short pulse width) / 100 or T

RESULTS

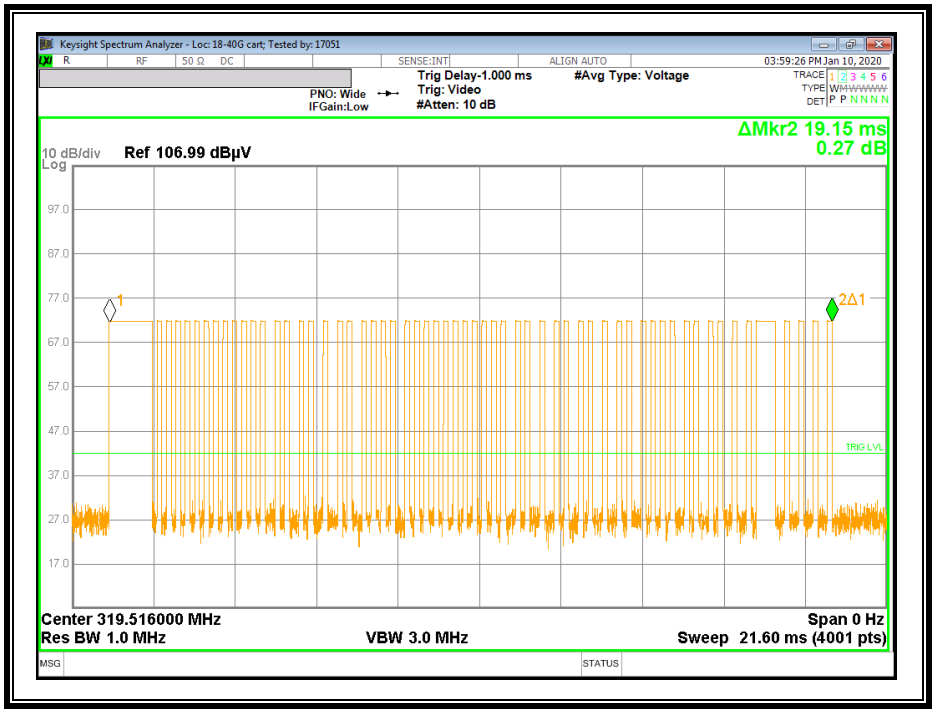
No non-compliance noted:

Mode	One Period (ms)	Widest Leading Pulse Width (ms)	Wide Pulse Width (ms)	# of Wide Pulses	Narrow Width (ms)	# of Narrow Pulses	Duty Cycle	20*Log Duty Cycle (dB)
Installing Cover	140	1.134	0.5011	1	0.1209	58	0.0865	-21.26
Removing Cove	172.2	1.134	0.5012	1	0.1209	58	0.0865	-21.26
Magnet Toward	226.2	1.136	0.5016	1	0.1210	58	0.0866	-21.25
Magnet Away	127.5	1.135	0.5013	1	0.1210	58	0.0865	-21.25
Low Voltage	153	1.136	0.5015	1	0.1204	58	0.0862	-21.28

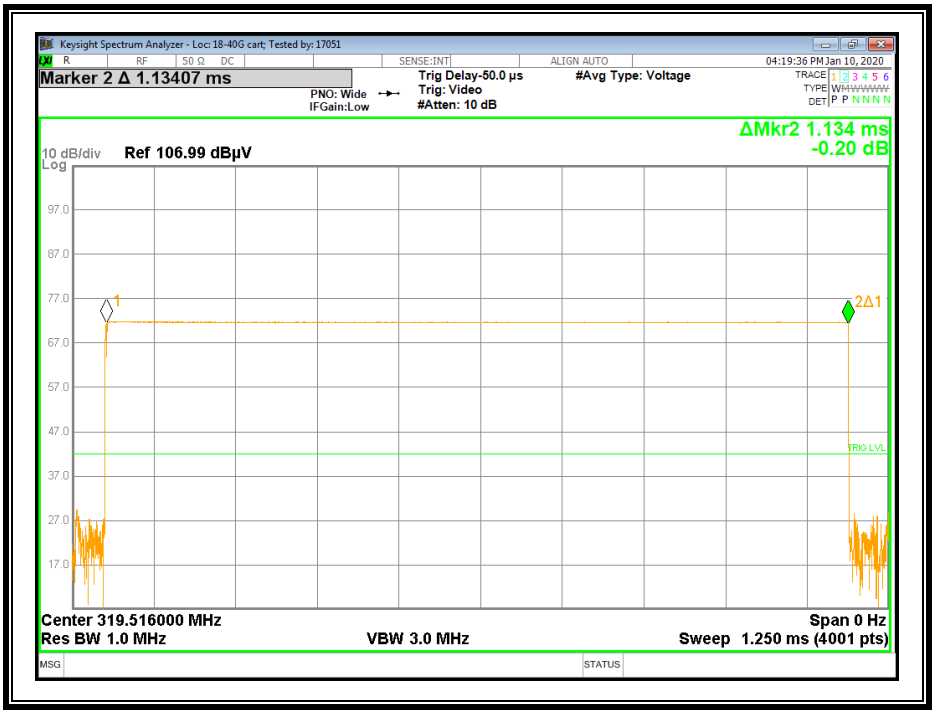
Note: Worst-case duty cycle correction of -21.25 used in all radiated down corrections.

ONE PERIOD – INSTALLING COVER

NUMBER OF PULSES – INSTALLING COVER



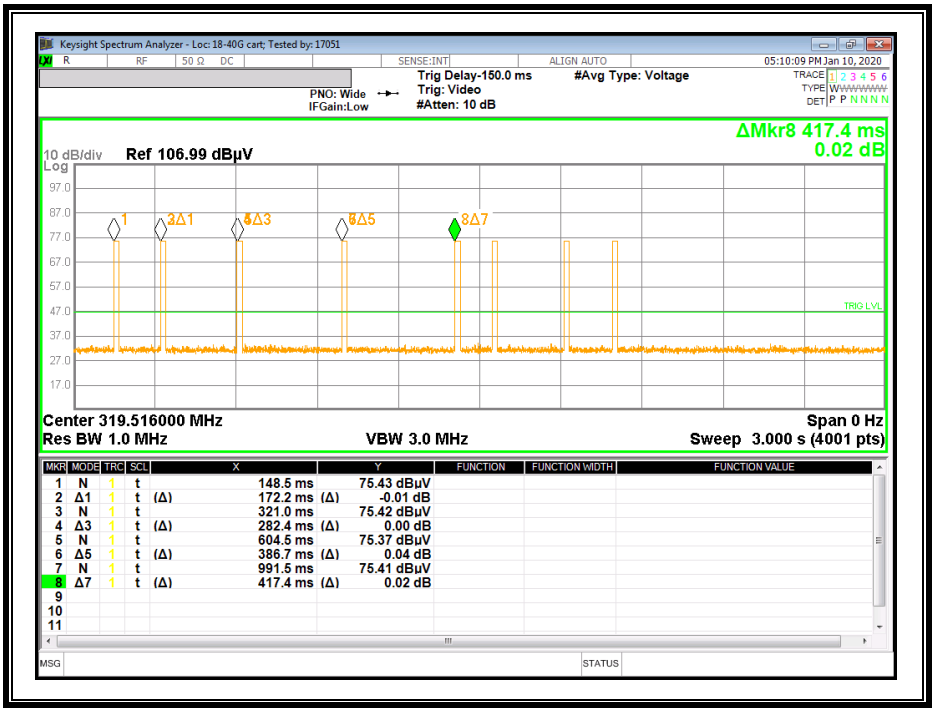
WIDEST LEADING PULSE – INSTALLING COVER



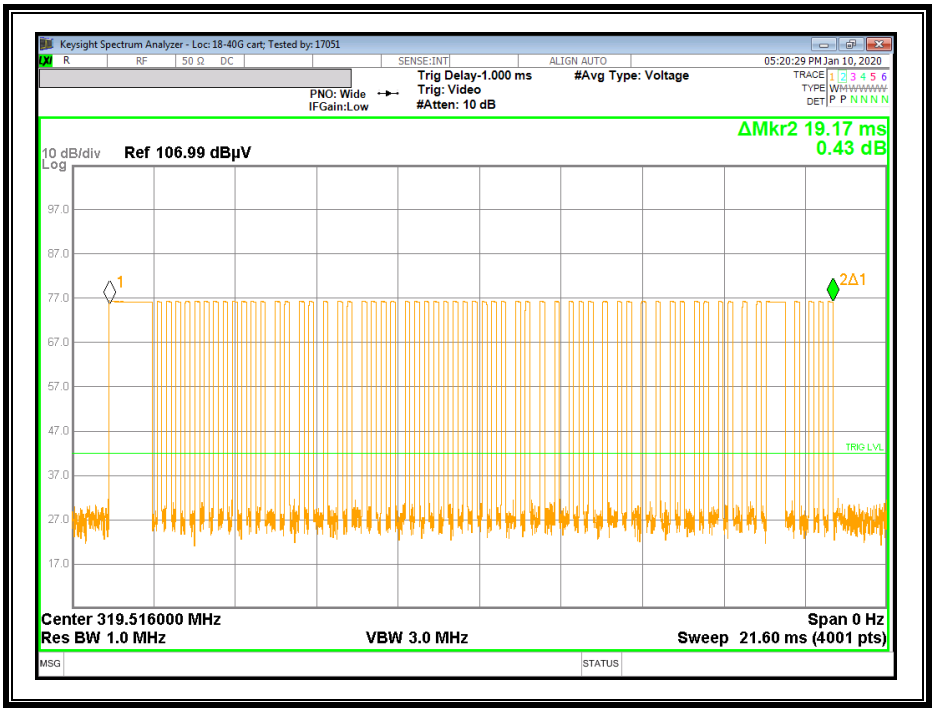
WIDE PULSE – INSTALLING COVER

NARROW PULSE (WORST-CASE) – INSTALLING COVER

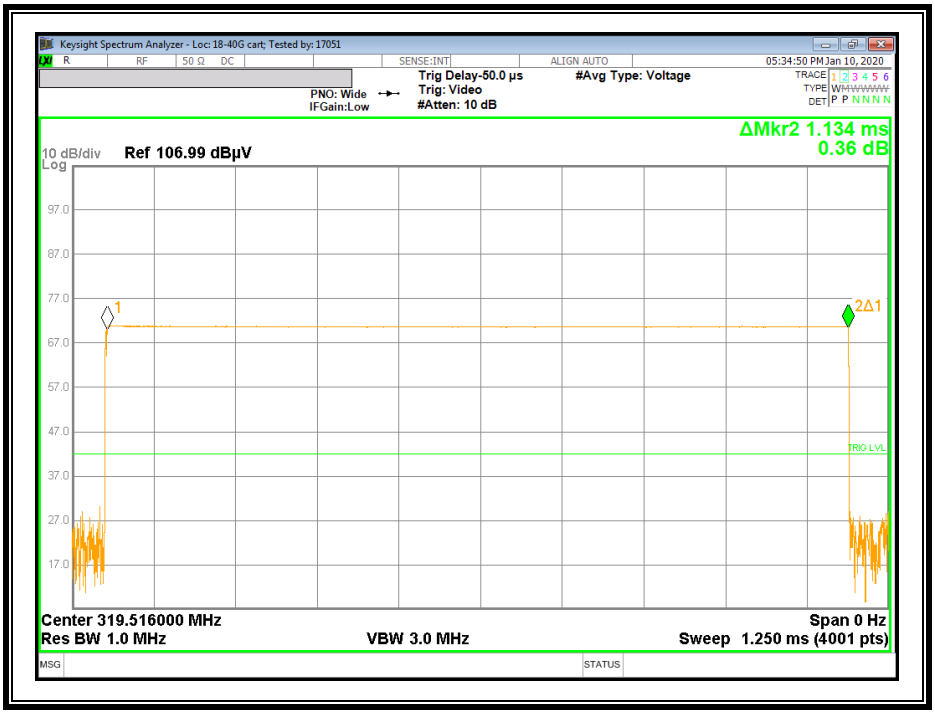
ONE PERIOD – REMOVING COVER



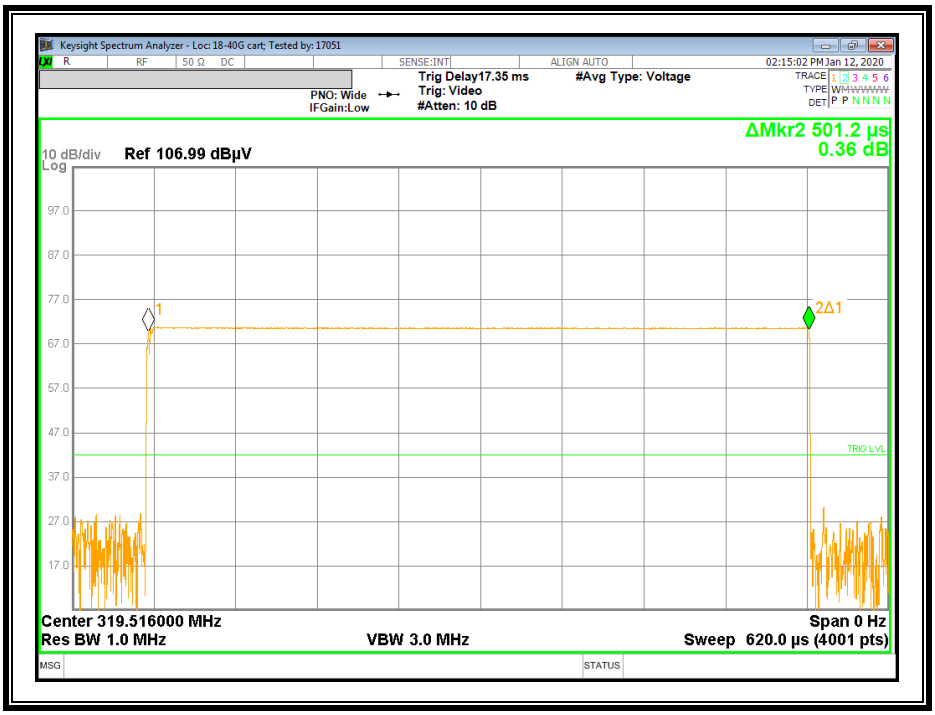
NUMBER OF PULSES – REMOVING COVER



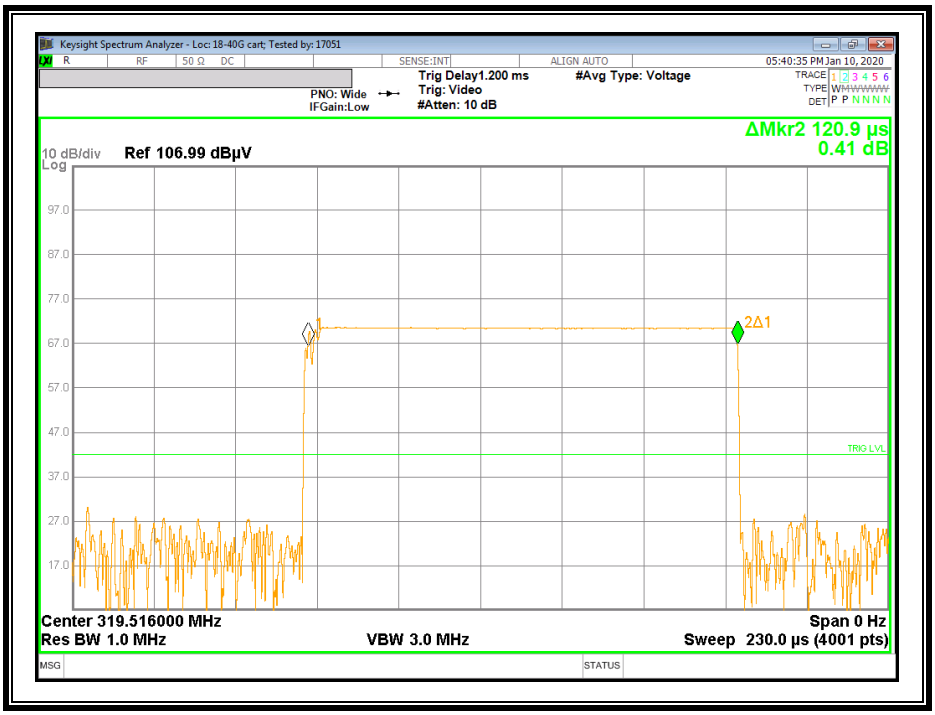
WIDEST LEADING PULSE – REMOVING COVER



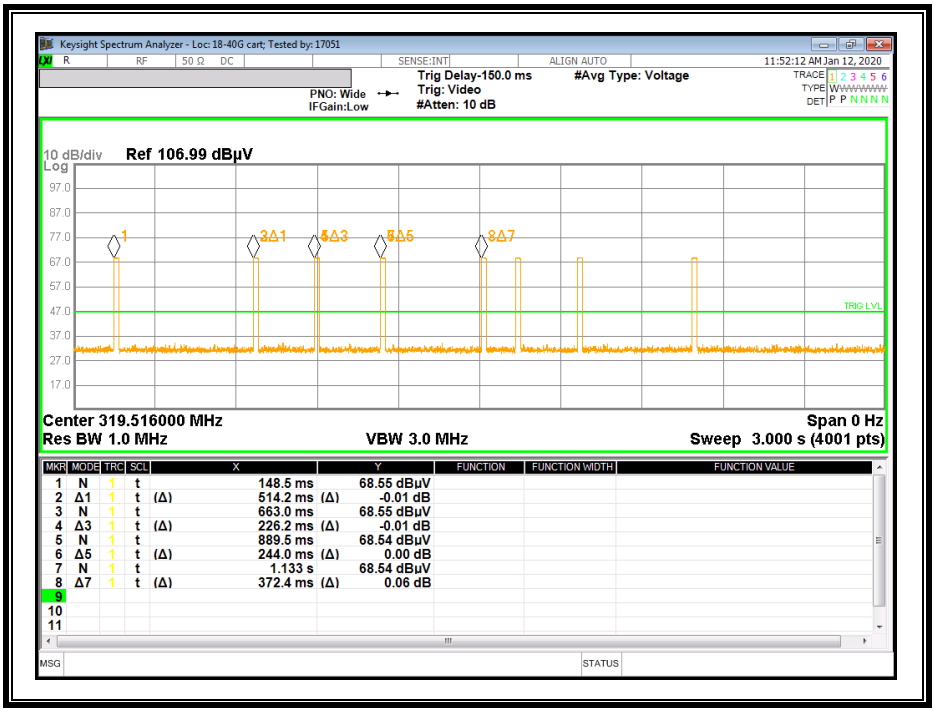
WIDE PULSE – REMOVING COVER



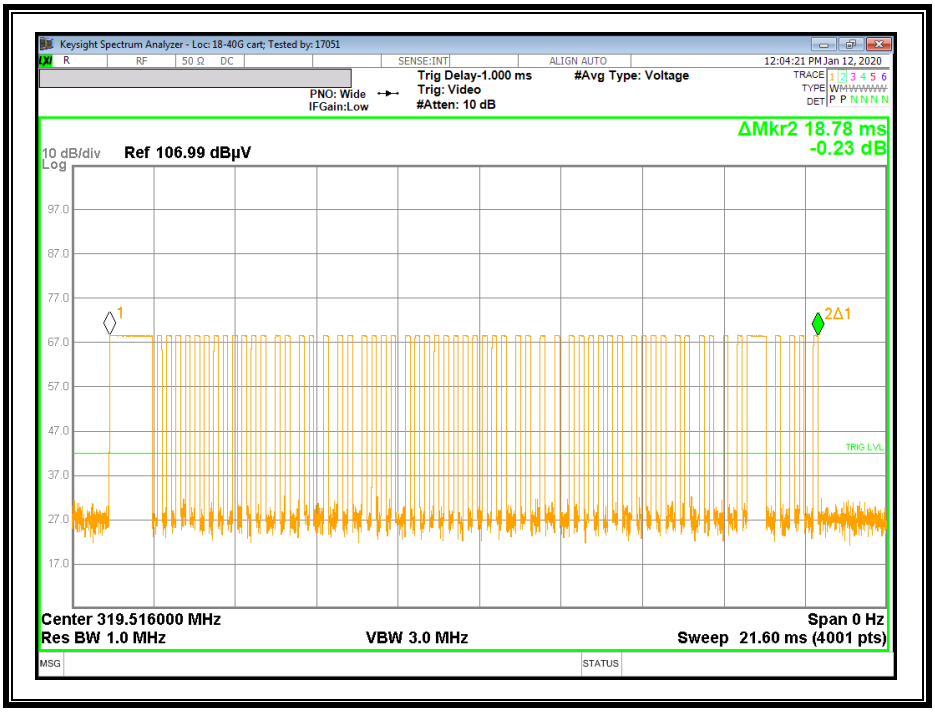
NARROW PULSE (WORST-CASE) – REMOVING COVER



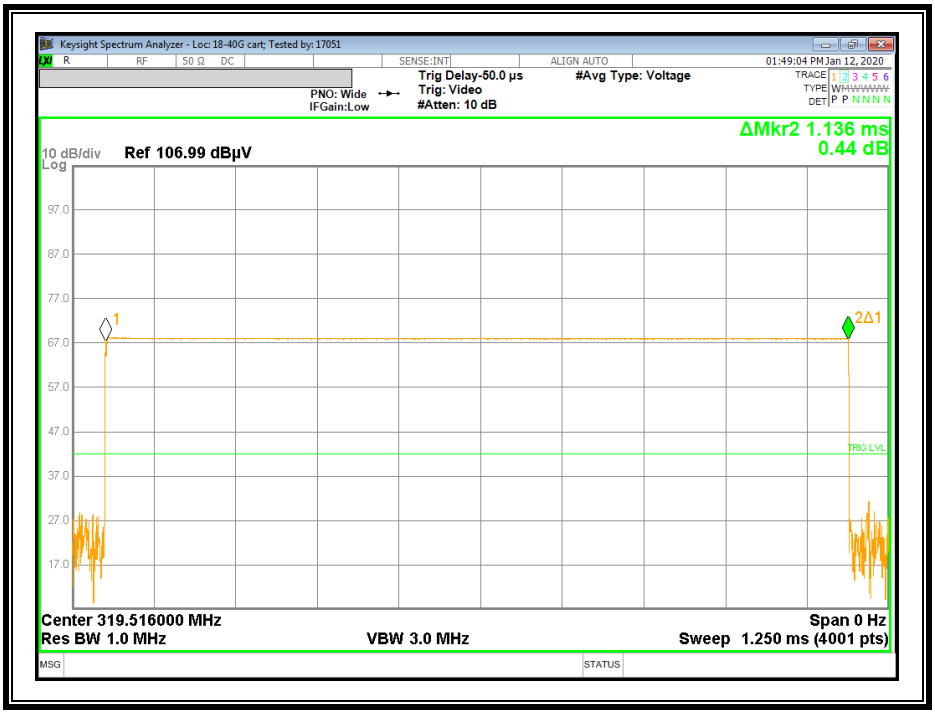
ONE PERIOD – MAGNET MOVING TOWARDS EUT



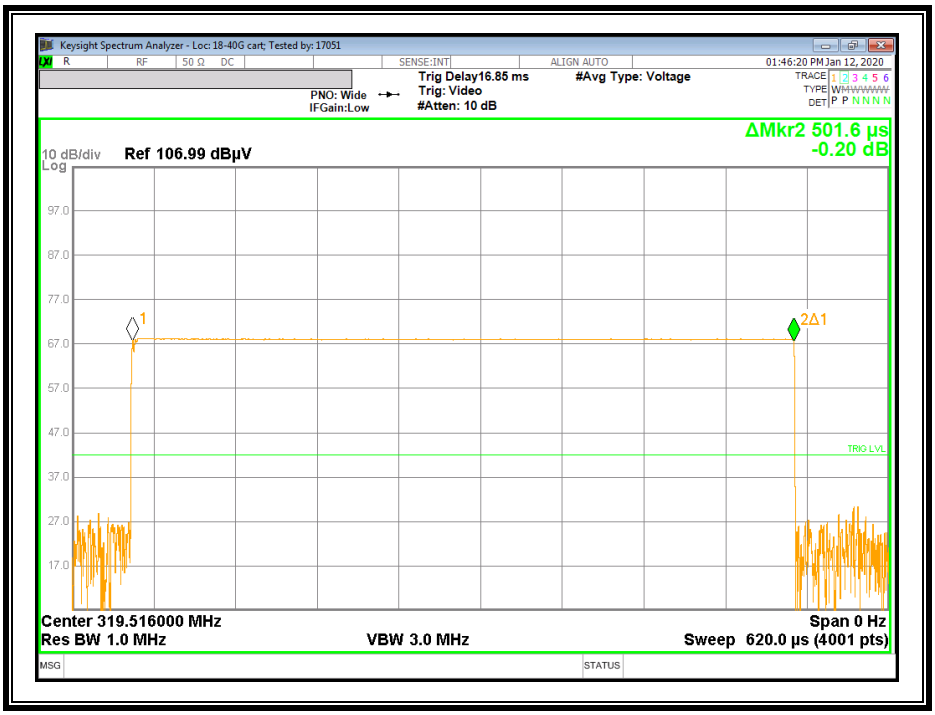
NUMBER OF PULSES – MAGNET MOVING TOWARDS EUT



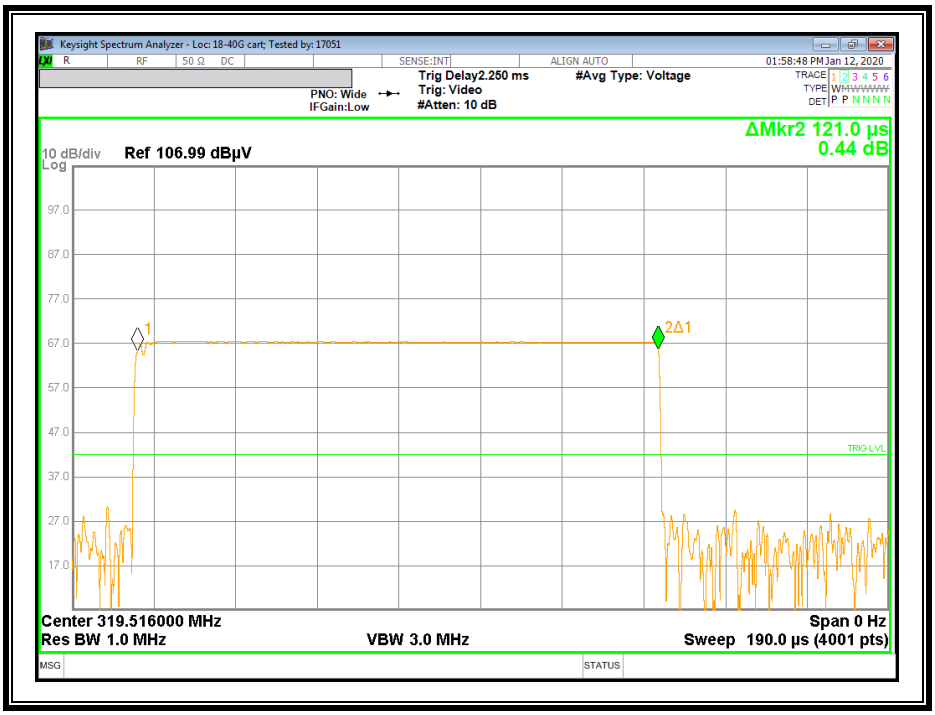
WIDEST LEADING PULSE – MAGNET TOWARDS



WIDE PULSE – MAGNET TOWARDS

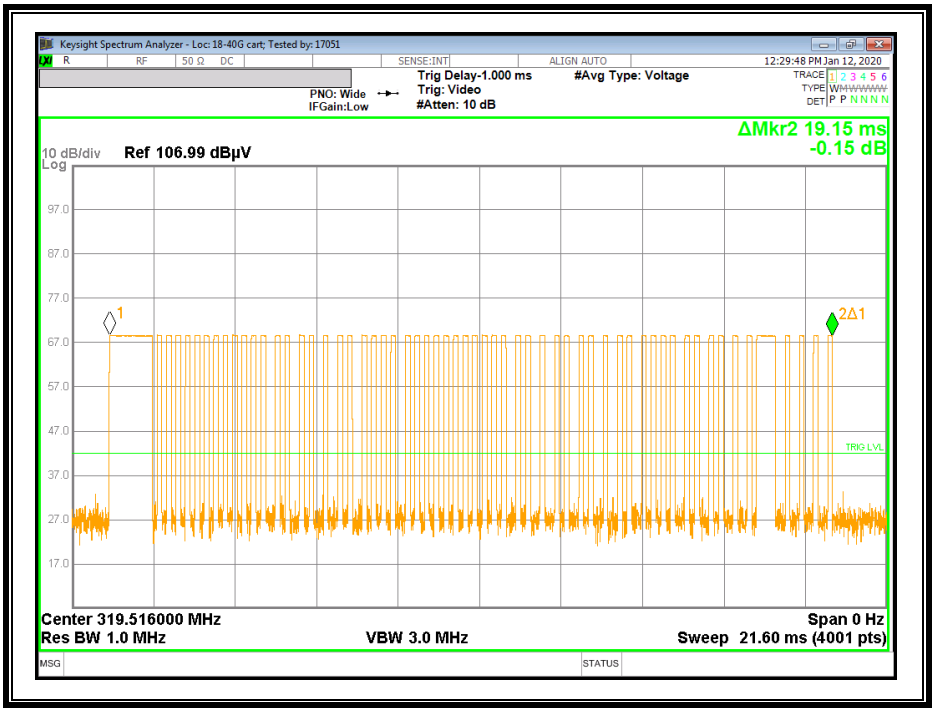


NARROW PULSE (WORST-CASE) – MAGNET TOWARDS

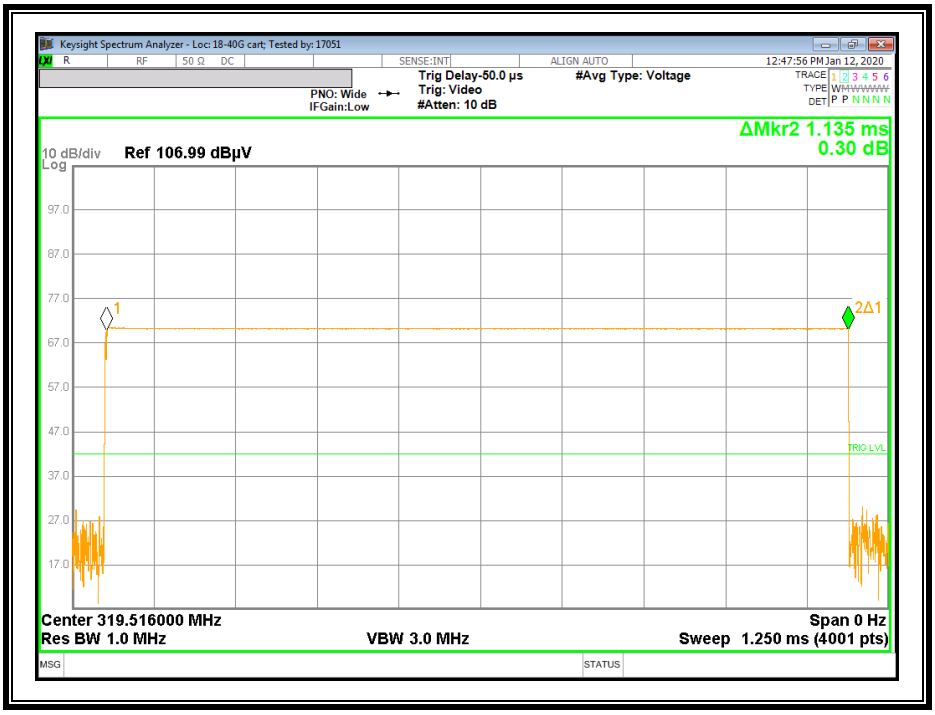


ONE PERIOD – MAGNET MOVING AWAY FROM EUT

NUMBER OF PULSES – MAGNET MOVING AWAY FROM EUT

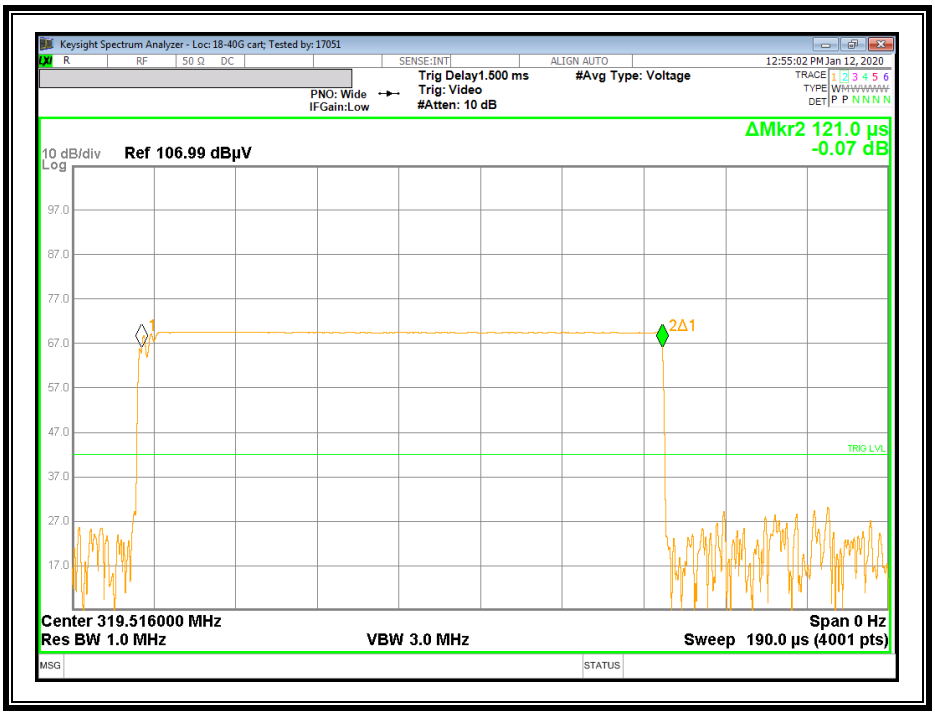


WIDEST LEADING PULSE – MAGNET AWAY

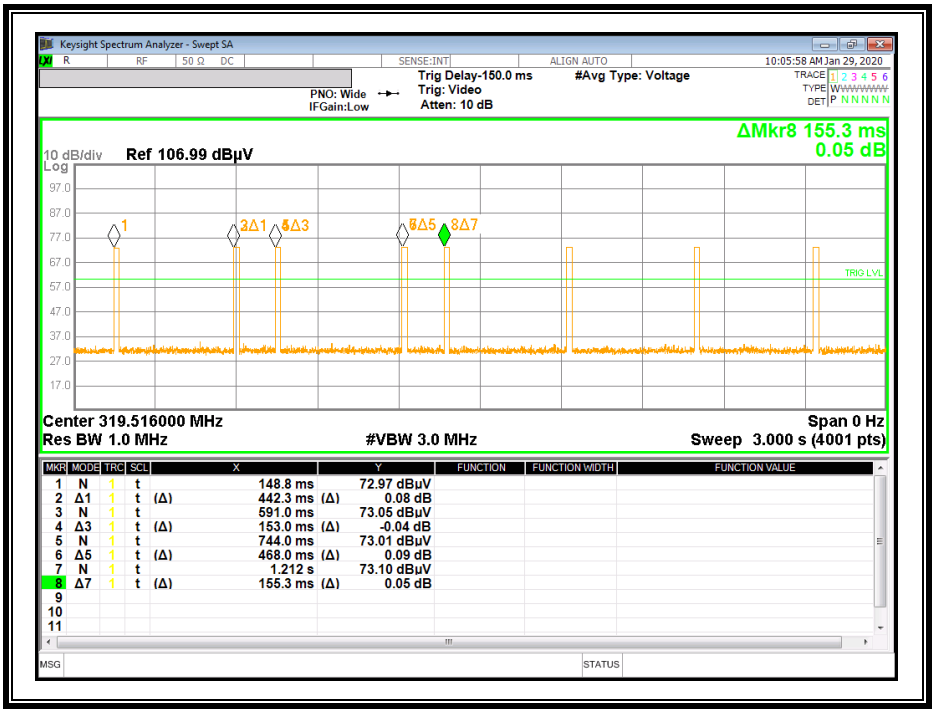


WIDE PULSE – MAGNET AWAY

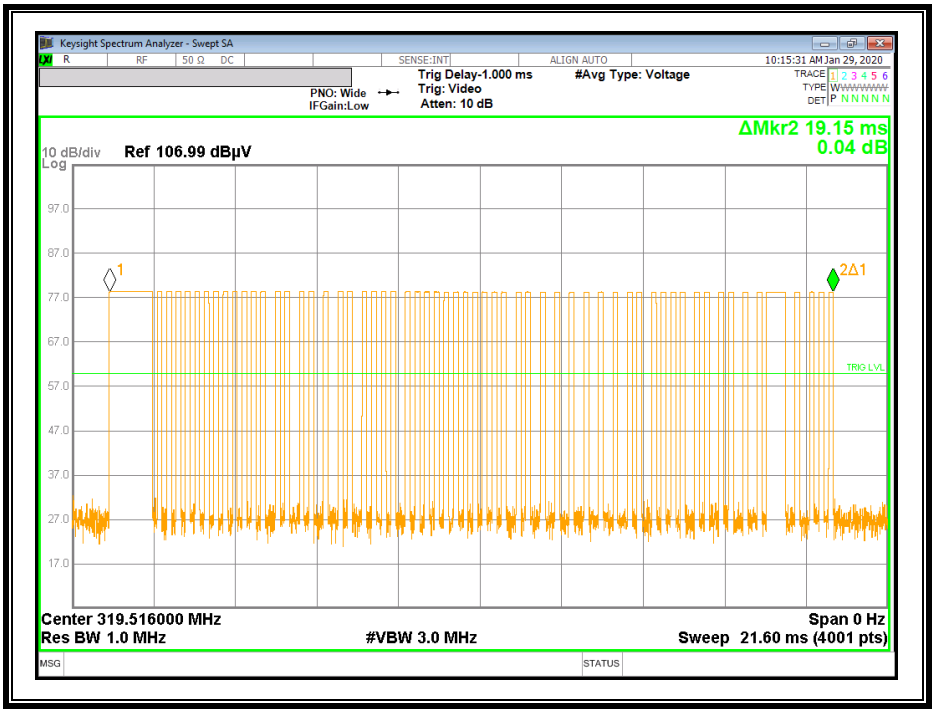
NARROW PULSE (WORST-CASE) – MAGNET AWAY



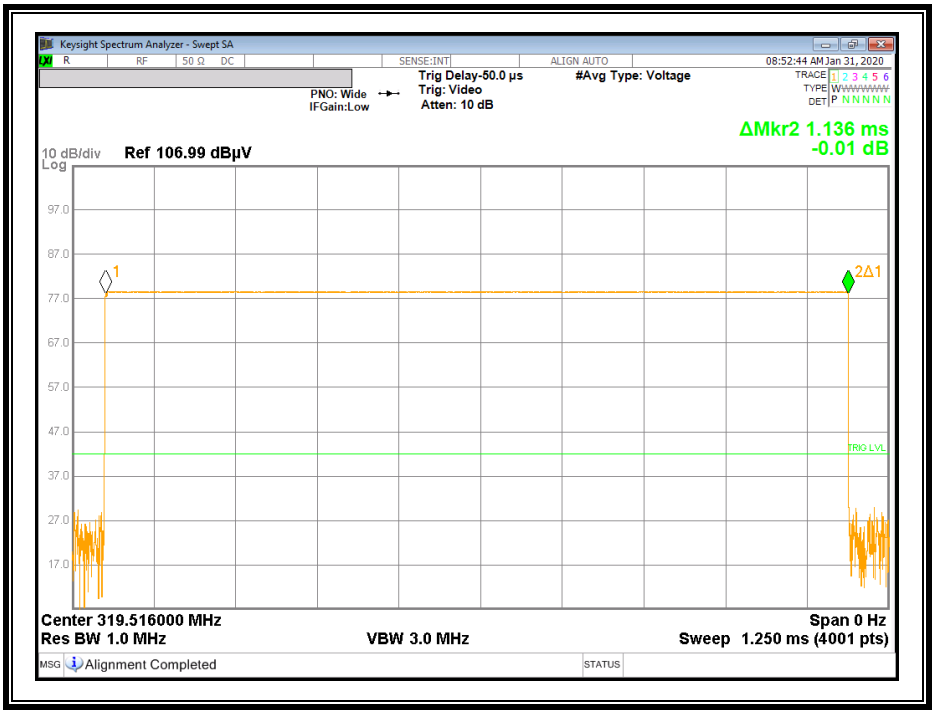
ONE PERIOD – LOW VOLTAGE TRIGGER



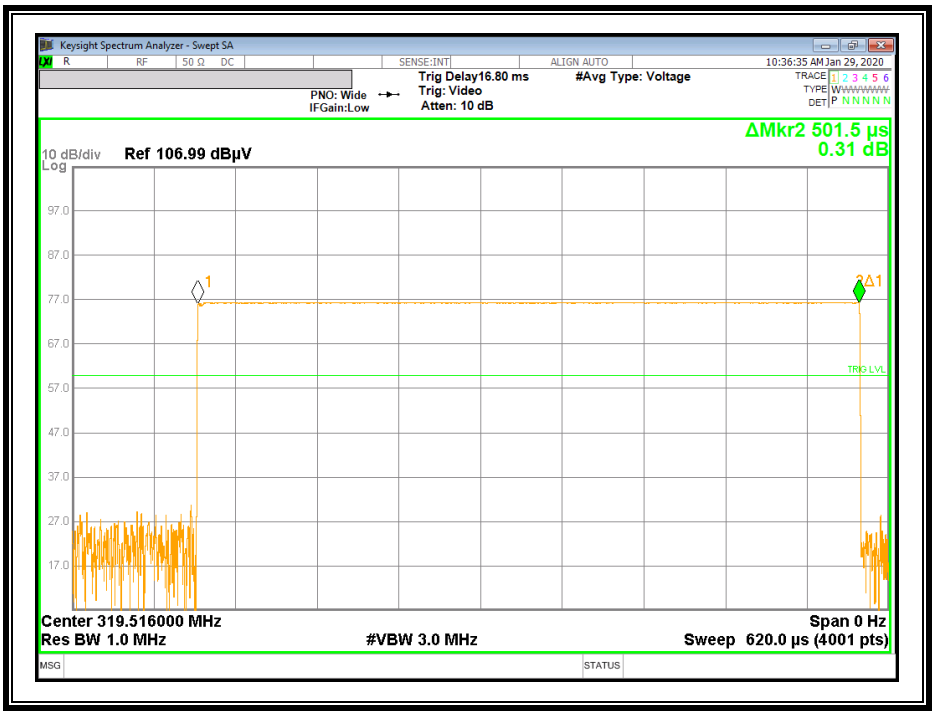
NUMBER OF PULSES – LOW VOLTAGE TRIGGER



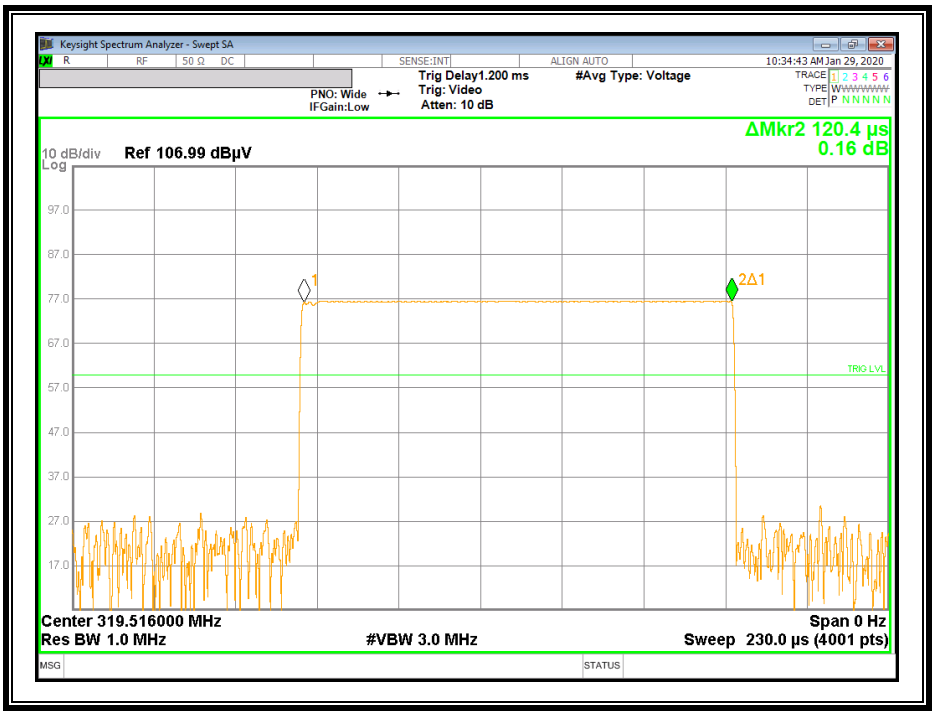
WIDEST LEADING PULSE – LOW VOLTAGE



WIDE PULSE – LOW VOLTAGE



NARROW PULSE (WORST-CASE) – LOW VOLTAGE



7.3. TRANSMISSION TIME

LIMITS

FCC §15.231 (a) (2)

ISED RSS-210 A1.1

A transmitter activated automatically shall cease transmission within 5 seconds after activation.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer or radiated field strength. 1MHz/3MHz was used for RBW and VBW and these values were used to ensure RBW was greater than OBW. The sweep time is set to 10 seconds and the span is set to 0 Hz.

RESULTS

No non-compliance noted:

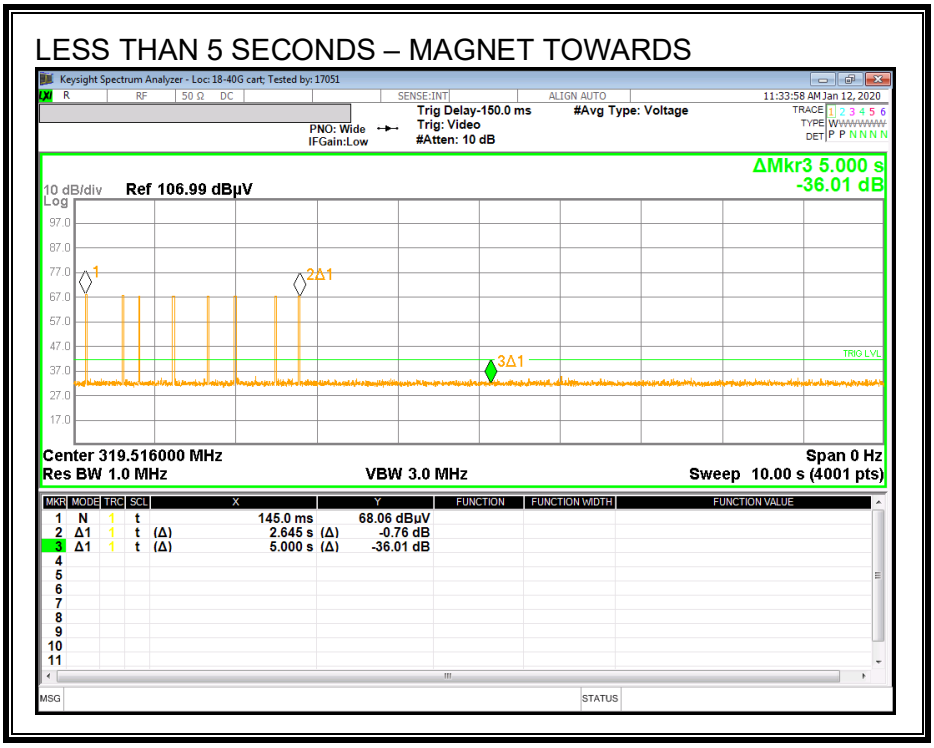
LESS THAN 5 SECONDS – INSTALLING COVER

Note: Tx stops at ~2.928s

LESS THAN 5 SECONDS – REMOVING COVER

Note: Tx stops at ~2.675s

LESS THAN 5 SECONDS – MAGNET TOWARDS

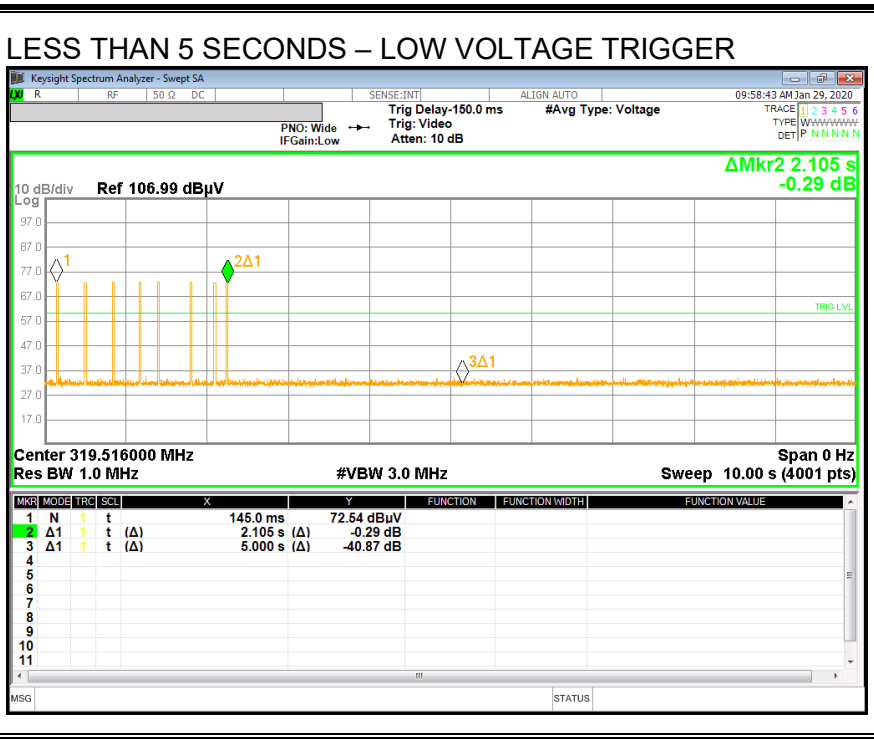


Note: Tx stops at ~2.645s

LESS THAN 5 SECONDS – MAGNET AWAY

Note: Tx stops at ~2.708s

LESS THAN 5 SECONDS – LOW VOLTAGE TRIGGER



Note: Tx stops at ~2.105s

7.4. POLLING TIME

LIMITS

FCC §15.231 (a) (3)
ISED RSS-210 A1.1.1 (c)

For safety and security devices allowed periodic transmissions at regular predetermined intervals, the total transmission time shall not exceed two seconds per hour.

TEST PROCEDURE

The transmitter output is coupled to a spectrum analyzer via an antenna connected to the input of the spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is set as needed to capture the event of interest and the span is set to 0 Hz. For pulse width, 1MHz/3MHz was used for RBW and VBW and these values were used to ensure RBW was greater than OBW.

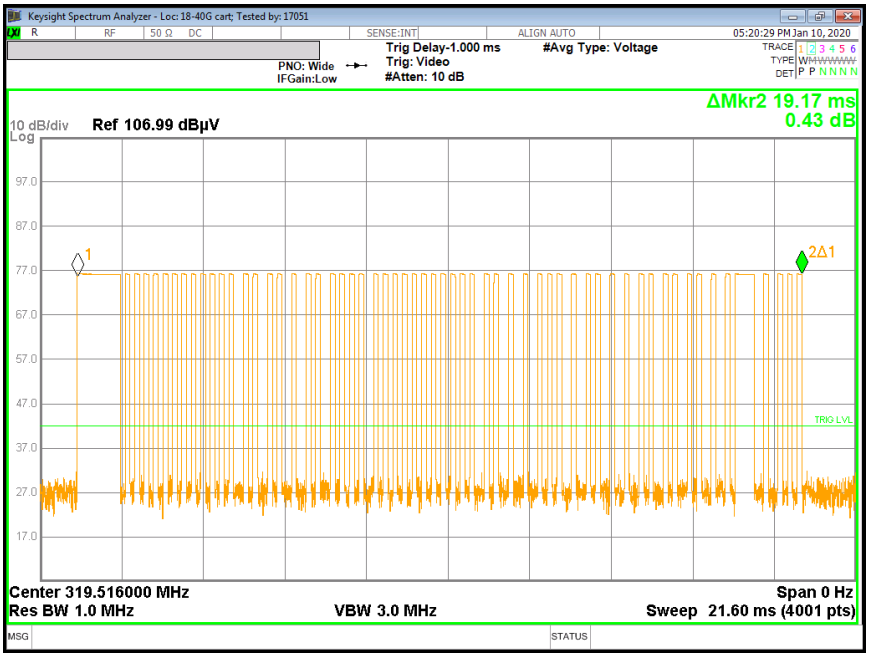
RESULTS

No non-compliance noted.
The device's polling period was as shown below.

POLLING PERIOD

Note: Marker 2 at 60min. One packet transmitted within 60min.

PACKET WITHIN A POLLING PERIOD



Note: Worst-case packet size is 19.17ms. Therefore EUT transmits 19.17ms within 60min.

8. RADIATED EMISSION TEST RESULTS

8.1. TX RADIATED SPURIOUS EMISSION

LIMITS

FCC §15.231 (b)
IC RSS 210 A.1.2

In addition to the provisions of § 15.205, the field strength of emissions from Intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental Frequency (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,750 [1]	125 to 375[1]
174 - 260	3,750	375
260 - 470	3,750 to 12,500[1]	375 to 1,250[1]
Above 470	12,500	1,250

[1] Linear interpolation

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	([2])
13.36 – 13.41	322 - 335.4		

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
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., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements and 1.5 meters above the ground plane for above 1 GHz measurements. The antenna to EUT distance is 3 meters.

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

For peak measurements above 1 GHz, the resolution bandwidth is set to 1 MHz and the video bandwidth is set to 3 MHz. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. For this test program, Average measurements of the fundamental and its associated harmonics were performed using a Peak detector and duty cycle correction by 20log(x) where 'x' is the duty cycle of 8.66%, as calculated in Section 7.2 of this report. For all other spurious emissions, voltage averaging was used.

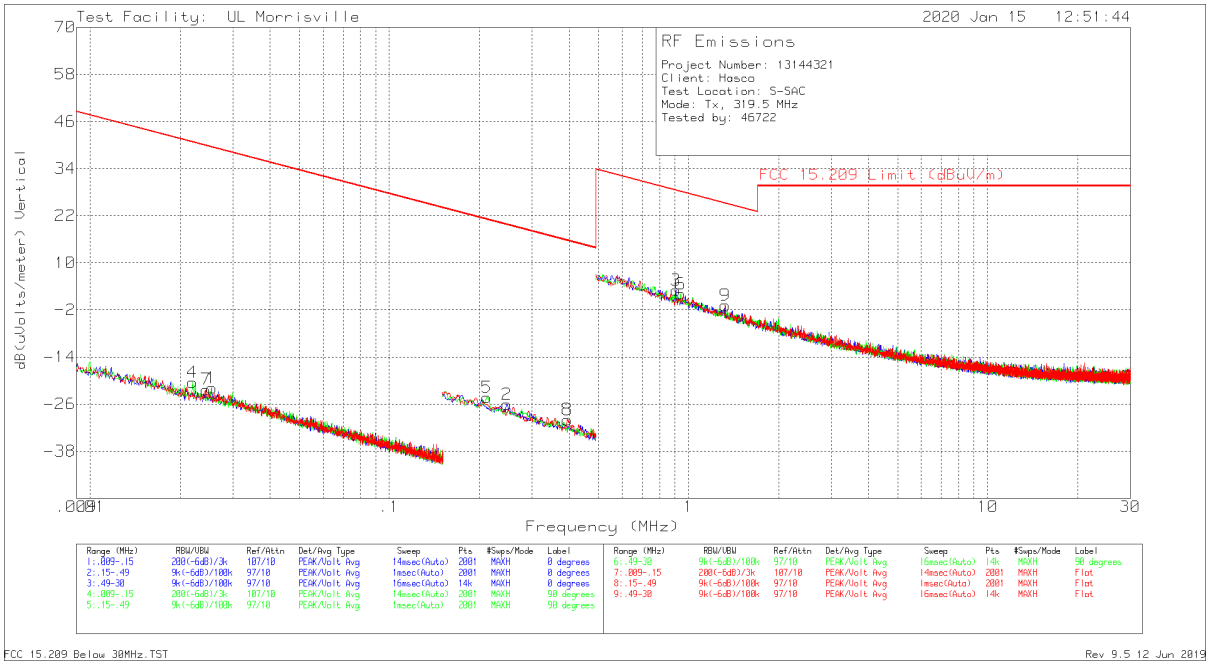
The spectrum from 9 kHz to 5 GHz was investigated with the transmitter on. The EUT only transmits on one frequency, therefore testing only performed on this frequency.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

8.1.1. TX SPURIOUS EMISSIONS (0.009-30MHz)

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

Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.



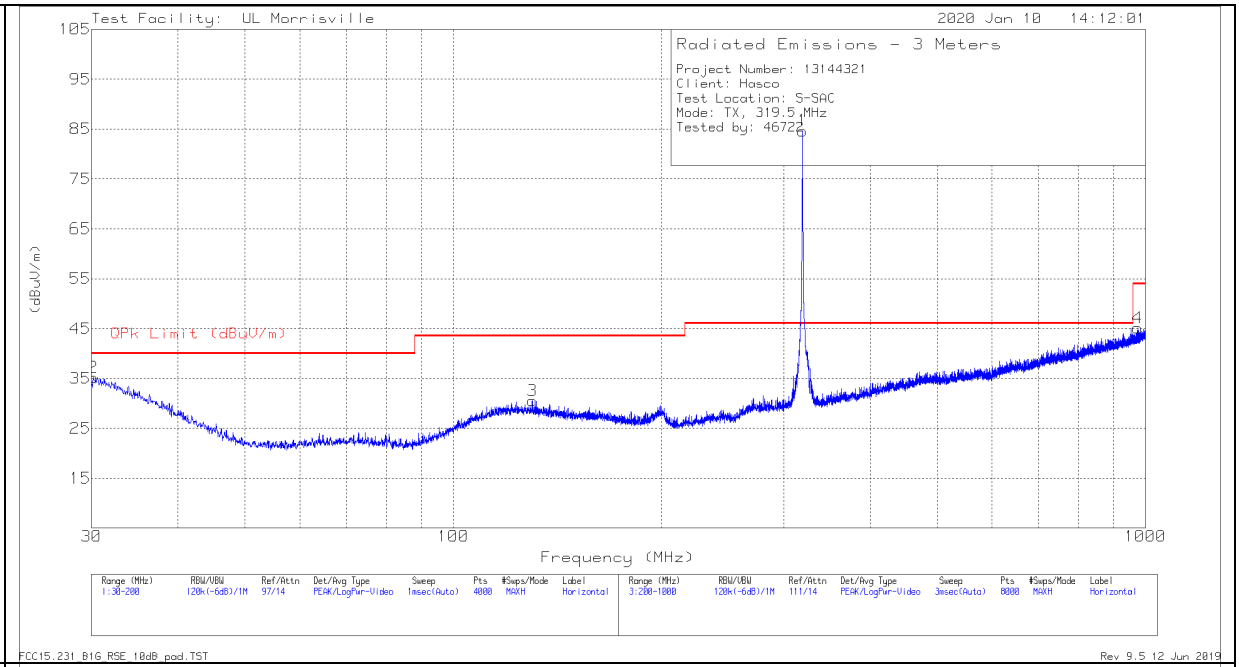
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 QP/AV Limit (dBuV/m)	FCC 15.209 PK Limit (dBuV/m)	Worst-Case Margin (dB)	Azimuth (Degs)
4	.02199	45.59	Pk	13.8	.1	-80	-20.51	40.76	60.76	-61.27	0-360
7	.02441	43.99	Pk	13.6	.1	-80	-22.31	39.85	59.85	-62.16	0-360
1	.02554	44.46	Pk	13.5	.1	-80	-21.94	39.46	59.46	-61.4	0-360
5	.21154	44.56	Pk	11	.1	-80	-24.34	21.1	41.1	-45.44	0-360
2	.24733	42.86	Pk	11	.1	-80	-26.04	19.74	39.74	-45.78	0-360
8	.39344	38.91	Pk	11	.1	-80	-29.99	15.71	35.71	-45.7	0-360
3	.90738	31.86	Pk	11	.1	-40	2.96	28.45	-	-25.49	0-360
6	.94217	30.99	Pk	11	.1	-40	2.09	28.12	-	-26.03	0-360
9	1.32688	27.81	Pk	11.1	.2	-40	-.89	25.15	-	-26.04	0-360

Pk - Peak detector

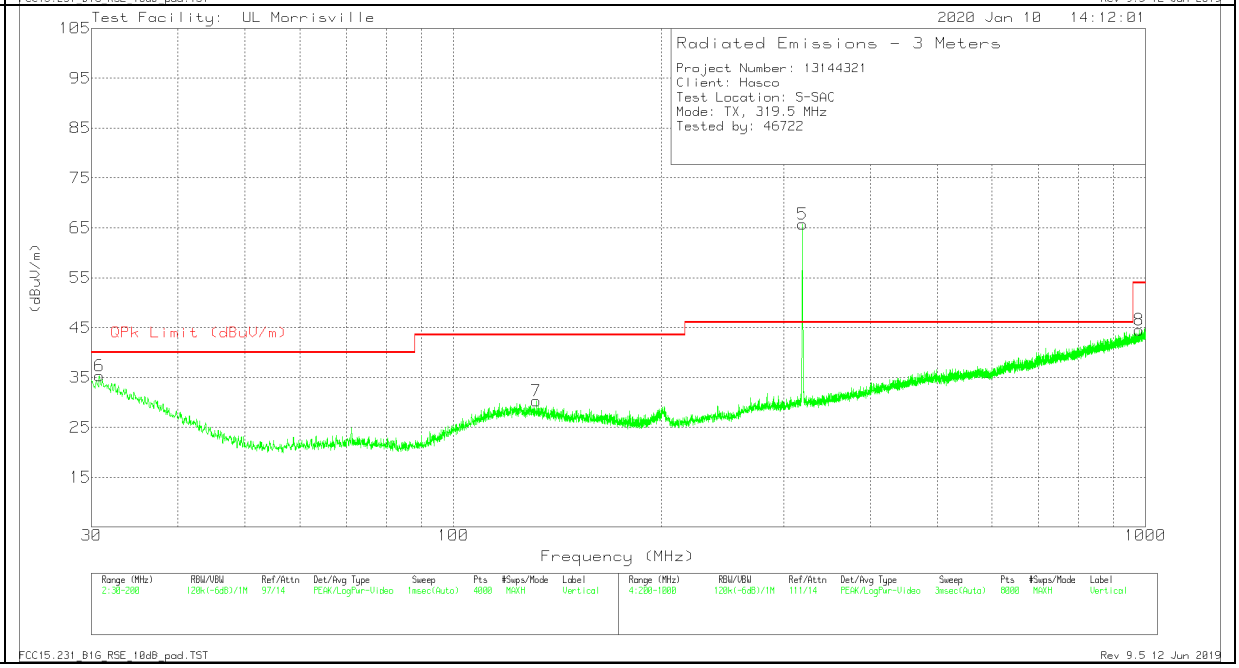
8.1.2. FUNDAMENTAL, HARMONICS AND TX SPURIOUS EMISSIONS (>30MHz)

FUNDAMENTAL AND SPURIOUS EMISSIONS(30-1000MHz)

Horizontal



Vertical



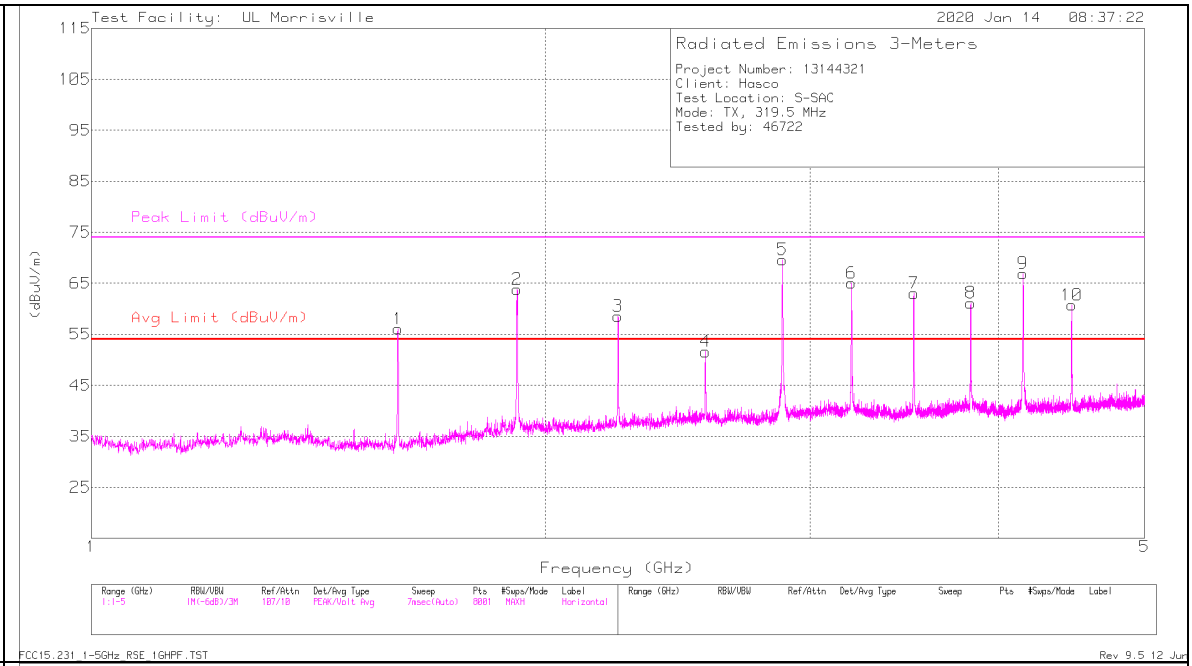
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp	Pad (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Pk Limit (dBuV/m)	Margin (dB)	Avg/QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	319.5203	84.48	Pk	20	-29.6	10	0	84.88	95.89	-11.01	-	-	58	103	H
	319.5203	84.48	Pk	20	-29.6	10	-21.25	63.63	-	-	75.89	-12.26	58	103	H
5	319.5237	65.33	Pk	20	-29.6	10	0	65.73	95.89	-30.16	-	-	319	108	V
	319.5237	65.33	Pk	20	-29.6	10	-21.25	44.48	-	-	75.89	-31.41	319	108	V
2	30.0066	25.42	Qp	26.5	-31.8	9.9	0	30.02	-	-	-	-	210	284	H
3	* ** 130.2084	25.25	Qp	19.8	-30.8	9.9	0	24.15	-	-	43.52	-19.37	170	149	H
4	* ** 974.1849	24.47	Qp	29.1	-26.1	10.1	0	37.57	-	-	53.97	-16.4	115	217	H
6	30.8408	25.44	Qp	26.4	-31.8	9.9	0	29.94	-	-	-	-	356	354	V
7	* ** 131.7943	25.17	Qp	19.7	-30.8	9.9	0	23.97	-	-	43.52	-19.55	331	250	V
8	* ** 979.6709	24.46	Qp	29.2	-26.1	10.1	0	37.66	-	-	53.97	-16.31	195	182	V

Note: Markers 1 and 5 are fundamental

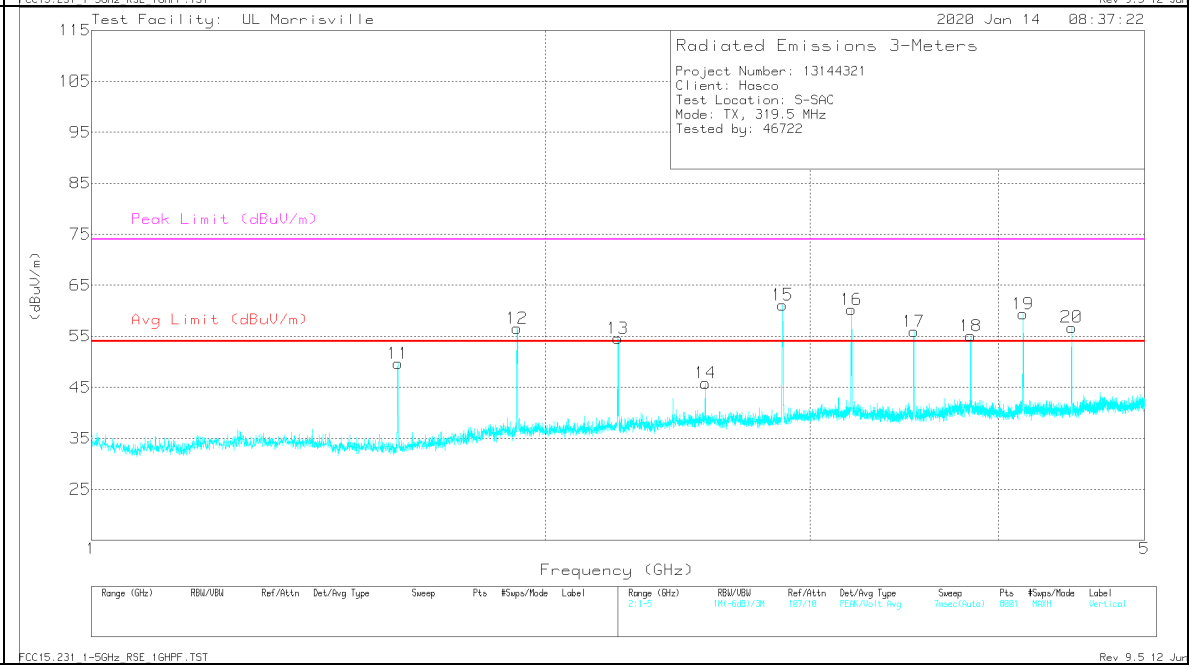
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 1GHz

Horizontal



Vertical



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp	Filter (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Pk Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 1.5975	63.2	Pk	27.8	-34.9	0.6	0	56.7	74.00	-17.30	-	-	314	132	H
	* ** 1.5975	63.2	Pk	27.8	-34.9	0.6	-21.25	35.45	-	-	54.00	-18.55	314	132	H
2	** 1.9169	67.18	Pk	31.2	-34.6	0.4	0	64.18	75.89	-11.71	-	-	123	313	H
	** 1.9169	67.18	Pk	31.2	-34.6	0.4	-21.25	42.93	-	-	55.89	-12.96	123	313	H
3	* ** 2.23673	62	Pk	31.6	-34.3	0.4	0	59.7	74.00	-14.30	-	-	295	111	H
	* ** 2.23673	62	Pk	31.6	-34.3	0.4	-21.25	38.45	-	-	54.00	-15.55	295	111	H
4	** 2.55735	52.52	Pk	32.3	-34.1	0.5	0	51.22	75.89	-24.67	-	-	292	126	H
	** 2.55735	52.52	Pk	32.3	-34.1	0.5	-21.25	29.97	-	-	55.89	-25.92	292	126	H
5	* ** 2.87561	69.94	Pk	32.4	-33.9	0.5	0	68.94	74.00	-5.06	-	-	82	120	H
	* ** 2.87561	69.94	Pk	32.4	-33.9	0.5	-21.25	47.69	-	-	54.00	-6.31	82	120	H
6	3.19486	64.7	Pk	33.1	-33.5	0.5	0	64.8	75.89	-11.09	-	-	264	115	H
	3.19486	64.7	Pk	33.1	-33.5	0.5	-21.25	43.55	-	-	55.89	-12.34	264	115	H
7	* ** 3.51609	61.79	Pk	32.9	-33.1	0.5	0	62.09	74.00	-11.91	-	-	300	372	H
	* ** 3.51609	61.79	Pk	32.9	-33.1	0.5	-21.25	40.84	-	-	54.00	-13.16	300	372	H
8	* ** 3.83469	59.81	Pk	33.5	-32.8	0.4	0	60.91	74.00	-13.09	-	-	311	363	H
	* ** 3.83469	59.81	Pk	33.5	-32.8	0.4	-21.25	39.66	-	-	54.00	-14.34	311	363	H
9	* ** 4.15403	64.84	Pk	33.4	-32.4	0.3	0	66.14	74.00	-7.86	-	-	82	101	H
	* ** 4.15403	64.84	Pk	33.4	-32.4	0.3	-21.25	44.89	-	-	54.00	-9.11	82	101	H
10	4.47352	58.66	Pk	33.7	-32.4	0.4	0	60.36	75.89	-15.53	-	-	337	102	H
	4.47352	58.66	Pk	33.7	-32.4	0.4	-21.25	39.11	-	-	55.89	-16.78	337	102	H
11	* ** 1.59749	58.11	Pk	27.8	-34.9	0.6	0	51.61	74.00	-22.39	-	-	58	346	V
	* ** 1.59749	58.11	Pk	27.8	-34.9	0.6	-21.25	30.36	-	-	54.00	-23.64	58	346	V
12	** 1.91699	61.67	Pk	31.2	-34.6	0.4	0	58.67	75.89	-17.22	-	-	13	386	V
	** 1.91699	61.67	Pk	31.2	-34.6	0.4	-21.25	37.42	-	-	55.89	-18.47	13	386	V
13	* ** 2.23663	56.96	Pk	31.6	-34.3	0.4	0	54.66	74.00	-19.34	-	-	39	394	V
	* ** 2.23663	56.96	Pk	31.6	-34.3	0.4	-21.25	33.41	-	-	54.00	-20.59	39	394	V
14	** 2.55597	48.82	Pk	32.3	-34.1	0.5	0	47.52	75.89	-28.37	-	-	219	397	V
	** 2.55597	48.82	Pk	32.3	-34.1	0.5	-21.25	26.27	-	-	55.89	-29.62	219	397	V
15	* ** 2.87589	62.29	Pk	32.5	-33.9	0.5	0	61.39	74.00	-12.61	-	-	210	301	V
	* ** 2.87589	62.29	Pk	32.5	-33.9	0.5	-21.25	40.14	-	-	54.00	-13.86	210	301	V
16	3.19506	59.98	Pk	33.1	-33.5	0.5	0	60.08	75.89	-15.81	-	-	25	393	V
	3.19506	59.98	Pk	33.1	-33.5	0.5	-21.25	38.83	-	-	55.89	-17.06	25	393	V
17	* ** 3.51597	57.47	Pk	32.9	-33.1	0.5	0	57.77	74.00	-16.23	-	-	267	372	V
	* ** 3.51597	57.47	Pk	32.9	-33.1	0.5	-21.25	36.52	-	-	54.00	-17.48	267	372	V
18	* ** 3.83411	52.03	Pk	33.5	-32.8	0.4	0	53.13	74.00	-20.87	-	-	0	387	V
	* ** 3.83411	52.03	Pk	33.5	-32.8	0.4	-21.25	31.88	-	-	54.00	-22.12	0	387	V
19	* ** 4.15557	61.34	Pk	33.4	-32.4	0.3	0	62.64	74.00	-11.36	-	-	33	378	V
	* ** 4.15557	61.34	Pk	33.4	-32.4	0.3	-21.25	41.39	-	-	54.00	-12.61	33	378	V
20	4.47498	55.59	Pk	33.7	-32.4	0.4	0	57.29	75.89	-18.60	-	-	27	396	V
	4.47498	55.59	Pk	33.7	-32.4	0.4	-21.25	36.04	-	-	55.89	-19.85	27	396	V

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