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

CERTIFICATION TEST REPORT

FOR

MyTurn Source Selector Button

MODEL NUMBER: HPA-MYT-TX

FCC ID: CWU-MYTTX
IC: 5078B-MYTTX

REPORT NUMBER: 11028200

ISSUE DATE: April 27, 2016

Prepared for
AMX LLC
3000 Research Dr
Richardson
TX 75082, USA

Prepared by
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NVLAP Lab code: 100414-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	April 18, 2016	Initial Issue	Vincent Sabalvaro
REV1	April 27, 2016	Editorial Changes	Vincent Sabalvaro

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: AMX LLC
3000 Research Dr
Richardson, TX 75082, USA

EUT DESCRIPTION: Automation Radio

MODEL: HPA-MYT-TX

SERIAL NUMBER: Non-serialized

DATE TESTED: March 24, 2016 – April 27, 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 LLC By:

Bart Mucha
Staff Engineer
Consumer Technology

Tested By:

Vincent Sabalvaro
Consumer Technology

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 333 Pfingsten Road, Northbrook, IL 60062 USA.

UL NBK is accredited by NVLAP, Laboratory Code 100414-0. The full scope of accreditation can be viewed at http://ts.nist.gov/

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

Sample Calculations
Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:
Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)
Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)
Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

4.3. MEASUREMENT UNCERTAINTY

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

Test	Range	Equipment	Uncertainty k=2
Radiated Emissions	9k-30MHz	E-Field Rod	2.88dB
Radiated Emissions	30-200MHz	Bicon 10m Horz	4.27dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	4.28dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	3.33dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	3.39dB
Radiated Emissions	30-200MHz	Bicon 3m Horz	3.30dB
Radiated Emissions	30-130MHz	Bicon 3m Vert	4.84dB
Radiated Emissions	130-200MHz	Bicon 3m Vert	4.94dB
Radiated Emissions	200-1000MHz	LogP 3m Horz	3.46dB
Radiated Emissions	200-1000MHz	LogP 3m Vert	4.98dB
Radiated Emissions	1-6GHz	Horn	5.02dB
Radiated Emissions	6-18GHz	Horn	5.34dB
Radiated Emissions	18-26GHz	Horn	6.60dB
Conducted Ant Port	30MHz-26GHz	Spectrum Analyzer	2.94

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT, HPA-MYT-TX, is a Zigbee transmitter, which transmits at a fixed channel of 2450MHz. The transmitter's only function is to transmit to the HPA-MYT-RX receiver, and is otherwise inactive while not transmitting.
The radio device is manufactured by AMC LLC.

5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

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

Frequency Range (MHz)	Mode	Output AVG E-field Strength (dBuV/m)
2450	TX	77.28

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Chip antenna, with a maximum gain of 1.0 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

The device only transmits at 2450MHz. The device was set in the worst case configuration and axis, as found in preliminary testing to be the Y-Axis and not attached to any cables.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
none				

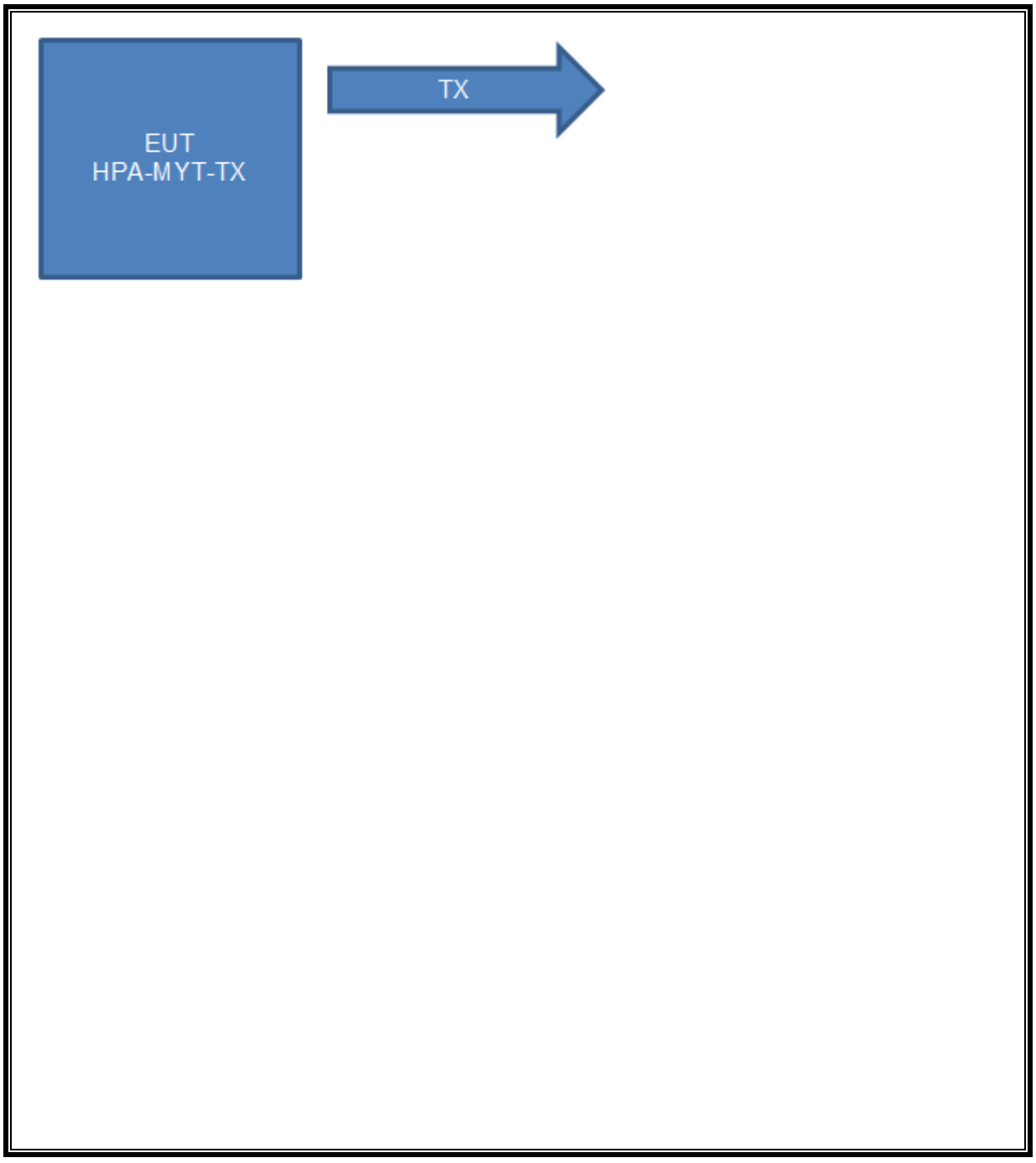
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
0	Enclosure	-	Non-Electrical	-	-	None

TEST SETUP

The EUT Programed for Continuous TX mode

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 List					
Description	**Manufacturer**	**Model**	**T No.**	**Cal Date**	**Cal Due**
Radiated Software	UL	UL EMC	Ver 9.5, Nov, 2015		
Signal Analyzer	Agilent	PXA	EMC4360	01/08/16	01/31/17
Near Field Probe	EMCO	7405	1270	N/A	N/A
Test Receiver	Rhode & Schwarz	ESCI	EMC4328	11/18/15	11/30/16
Log-P Antenna	Chase	UPA6109	EMC4258	04/27/15	04/30/16
Bicon Antenna	Chase	UPA6106A	EMC4078	12/28/15	12/31/16
Loop Antenna	ETS-Lindgren	6502	SN 00201021	07/31/15	07/31/16
Antenna Array	UL	BOMS	EMC4276	12/01/15	12/31/16
Test Receiver	Rhode & Schwarz	ESU	EMC4323	01/02/16	01/31/17

7. TEST RESULTS

7.1. Duty Cycle

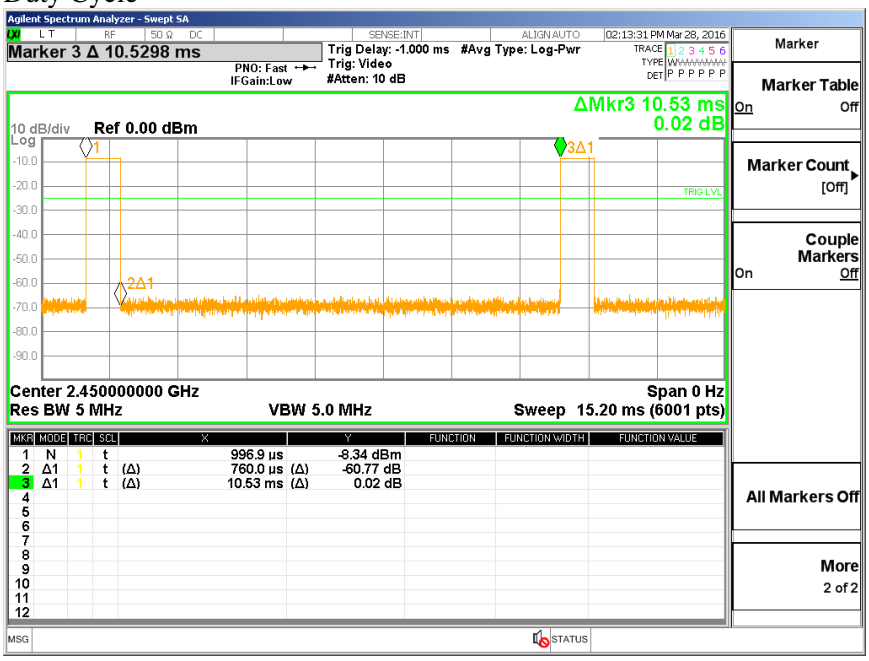
LIMITS

None; for reporting purposes only.

RESULTS

Tx on = 760 us

Duty Cycle



7.2. 99% BANDWIDTH and 20dB BANDWIDTH

None; for reporting purposes only.

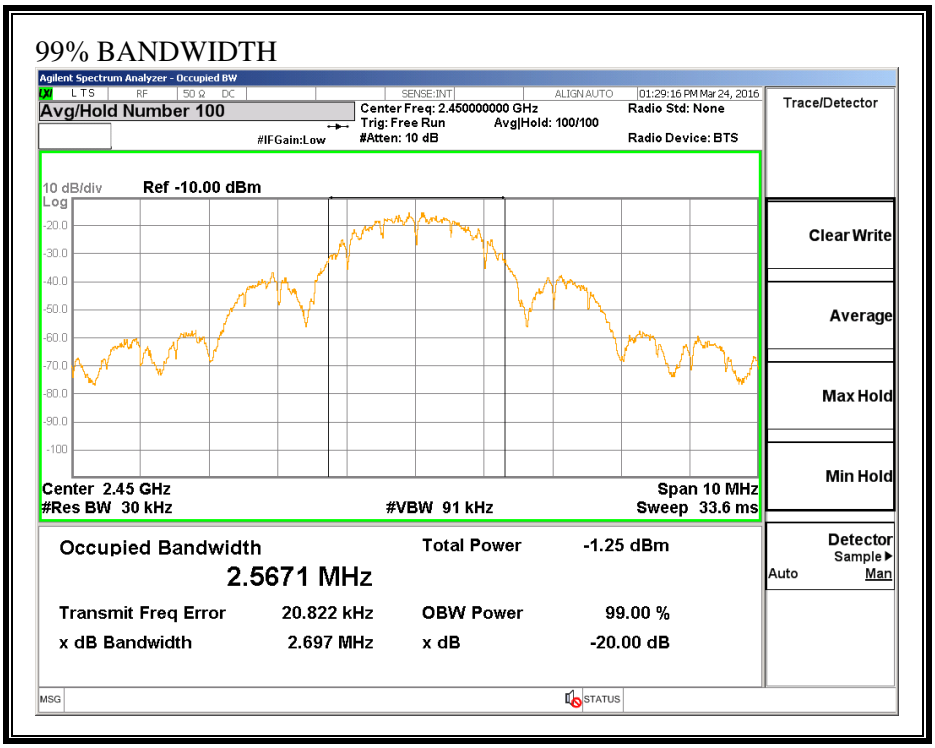
TEST PROCEDURE

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

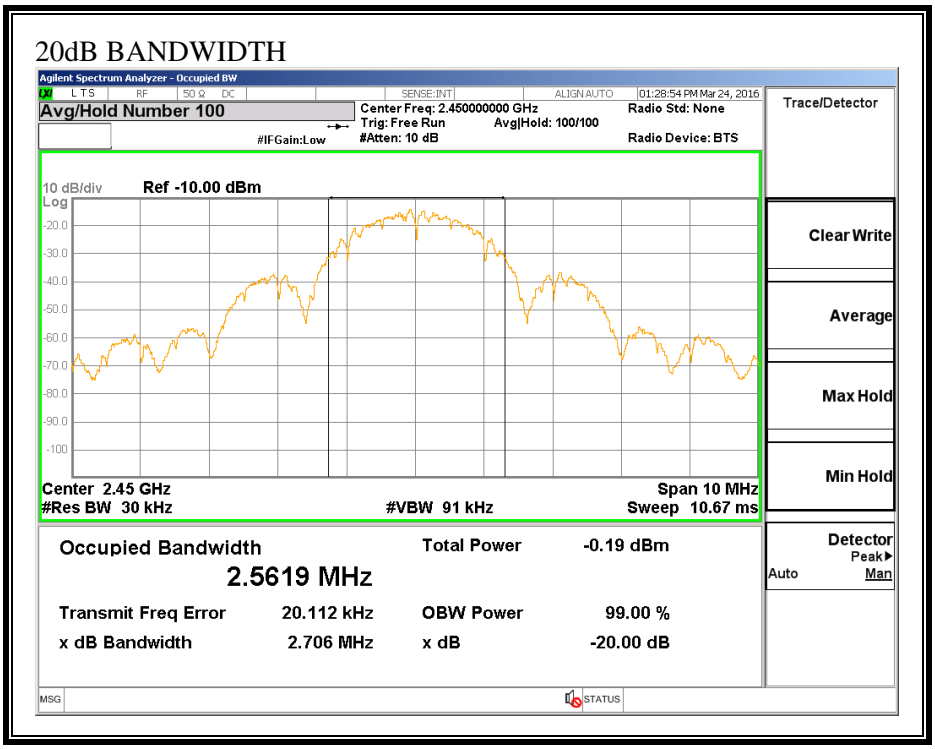
RESULTS

Frequency (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)
2450	2.5671	2.706

7.2.1. 99% BANDWIDTH 99% BANDWIDTH



7.2.2. 20dB BANDWIDTH



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.

RESULTS

C63.10-2013 11.12.2.5.3 Average linear voltage measurements using spectrum analyzer reduced video bandwidth.

PK: RBW 1MHz, VBW 1MHz
AV: RBW 1MHz, VBW 2kHz

7.3.1. FUNDAMENTAL FREQUENCY RADIATED EMISSION

AMX LLC
HPA-MYT-TX
TX
Battery
RED:Horizontal, GREEN:Vertical

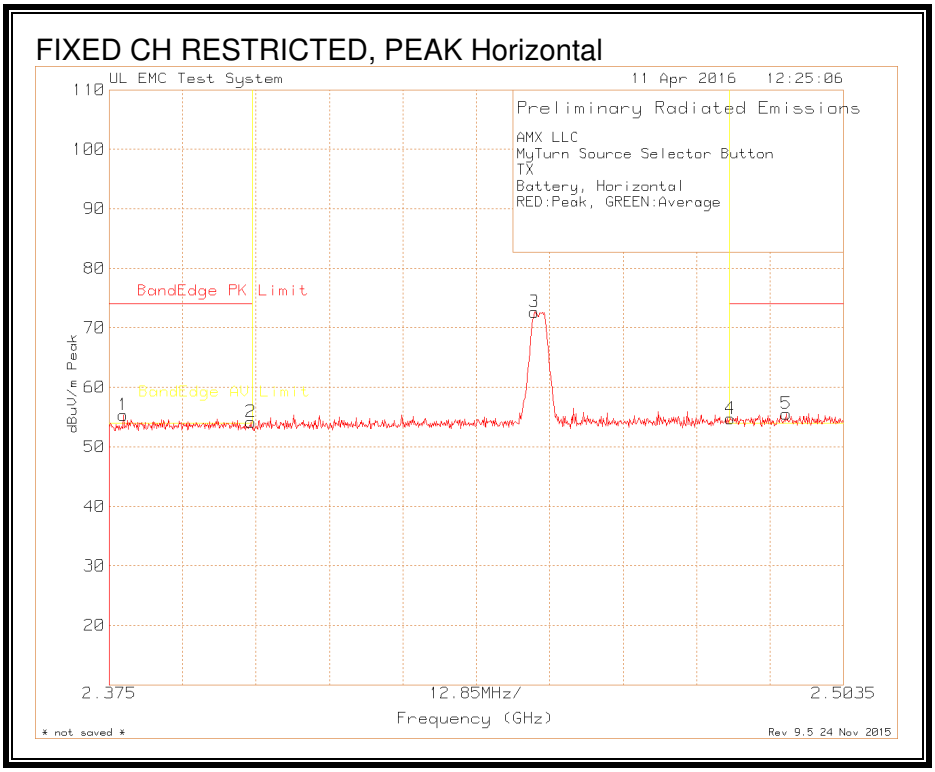
Range 2: 2 - 4GHz 2 - 4GHz

Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor (dBm)	Gain/Loss (dB)	Corrected Reading dBuV/m	PK Limit	PK Margin (dB)	AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.4505	45.42	Pk	22	4.7	72.12	114	-41.88	-	-	193	119	H
2.45	38.27	Av	22	4.7	64.97	-	-	94	-29.03	193	119	H
2.4495	61.79	Pk	21.9	4.7	88.39	114	-25.61	-	-	188	116	V
2.4499	50.68	Av	21.9	4.7	77.28	-	-	94	-16.72	188	116	V

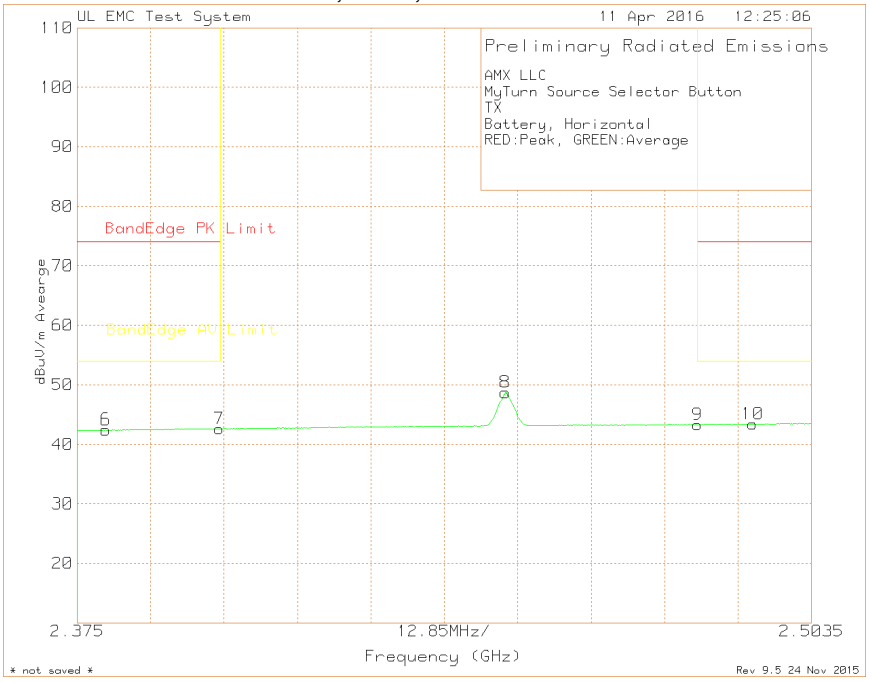
Pk - Peak detector
Av - Average detection

7.3.2. TRANSMITTER RESTRICTED BAND EDGES

RESTRICTED BANDEDGE (FIXED CHANNEL, HORIZONTAL)



FIXED CH RESTRICTED, AVG, Horizontal



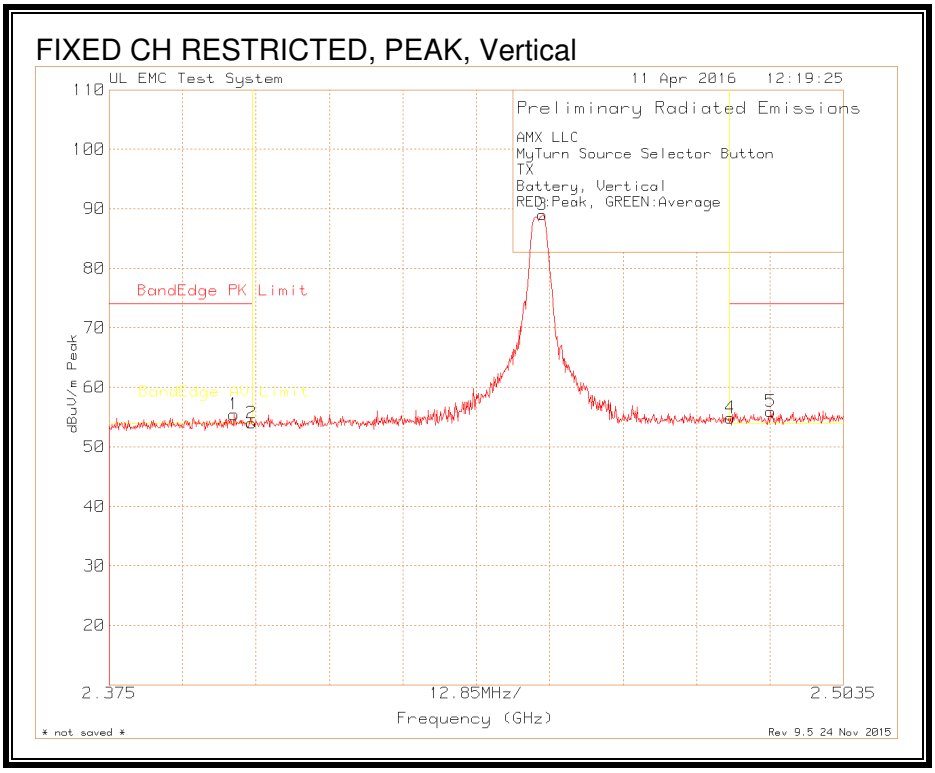
FIXED CH RESTRICTED, AVG, Horizontal Data

AMX LLC
HPA-MYT-TX
TX
Battery, Horizontal
RED:Peak, GREEN:Average

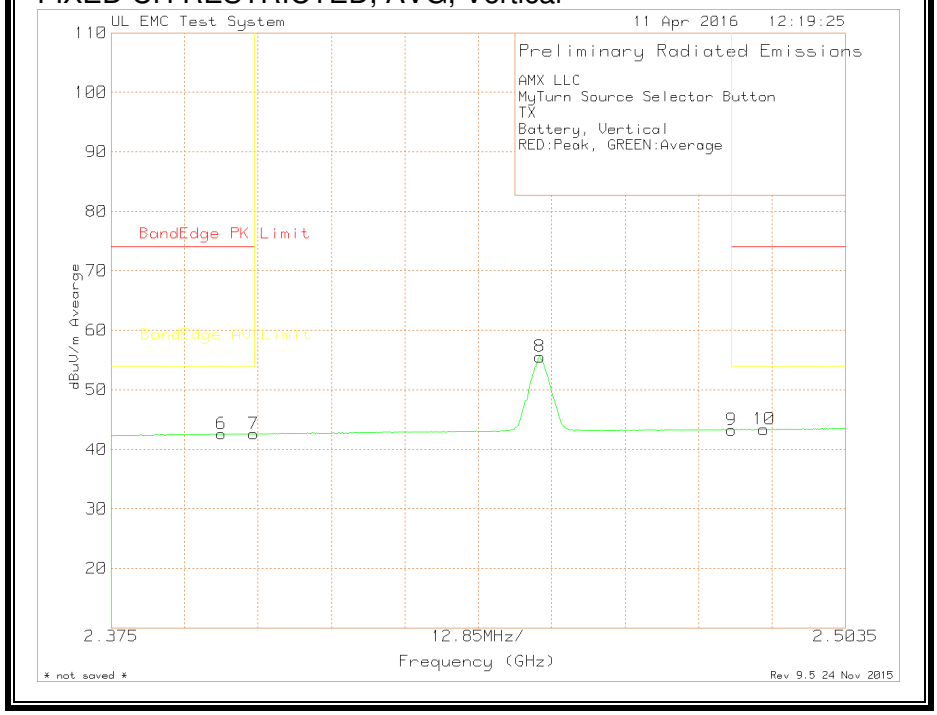
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor (dBm)	Gain/Loss (dB)	Corrected Reading dBuV/m	Bandedge PK Limit	PK Margin (dB)	Bandedge AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.3774	28.89	Pk	21.8	4.64	55.33	74	-18.67	-	-	193	119	H
2	2.3998	27.77	Pk	21.8	4.64	54.21	74	-19.79	-	-	193	119	H
3	2.4494	46.09	Pk	21.9	4.7	72.69	-	-	-	-	193	119	H
4	2.4837	27.89	Pk	22.1	4.76	54.75	74	-19.25	-	-	193	119	H
5	2.4935	28.73	Pk	22.1	4.76	55.59	74	-18.41	-	-	193	119	H
6	2.38	15.99	Av	21.8	4.64	42.43	-	-	54	-11.57	193	119	H
7	2.3999	16.17	Av	21.8	4.64	42.61	-	-	54	-11.39	193	119	H
8	2.4499	22.12	Av	21.9	4.7	48.72	-	-	-	-	193	119	H
9	2.4836	16.45	Av	22.1	4.76	43.31	-	-	54	-10.69	193	119	H
10	2.4932	16.57	Av	22.1	4.76	43.43	-	-	54	-10.57	193	119	H

Pk - Peak detector
Av - Linear Average detection

RESTRICTED BANDEDGE (FIXED CHANNEL, VERTICAL)



FIXED CH RESTRICTED, AVG, Vertical



FIXED CH RESTRICTED, AVG, Vertical Data

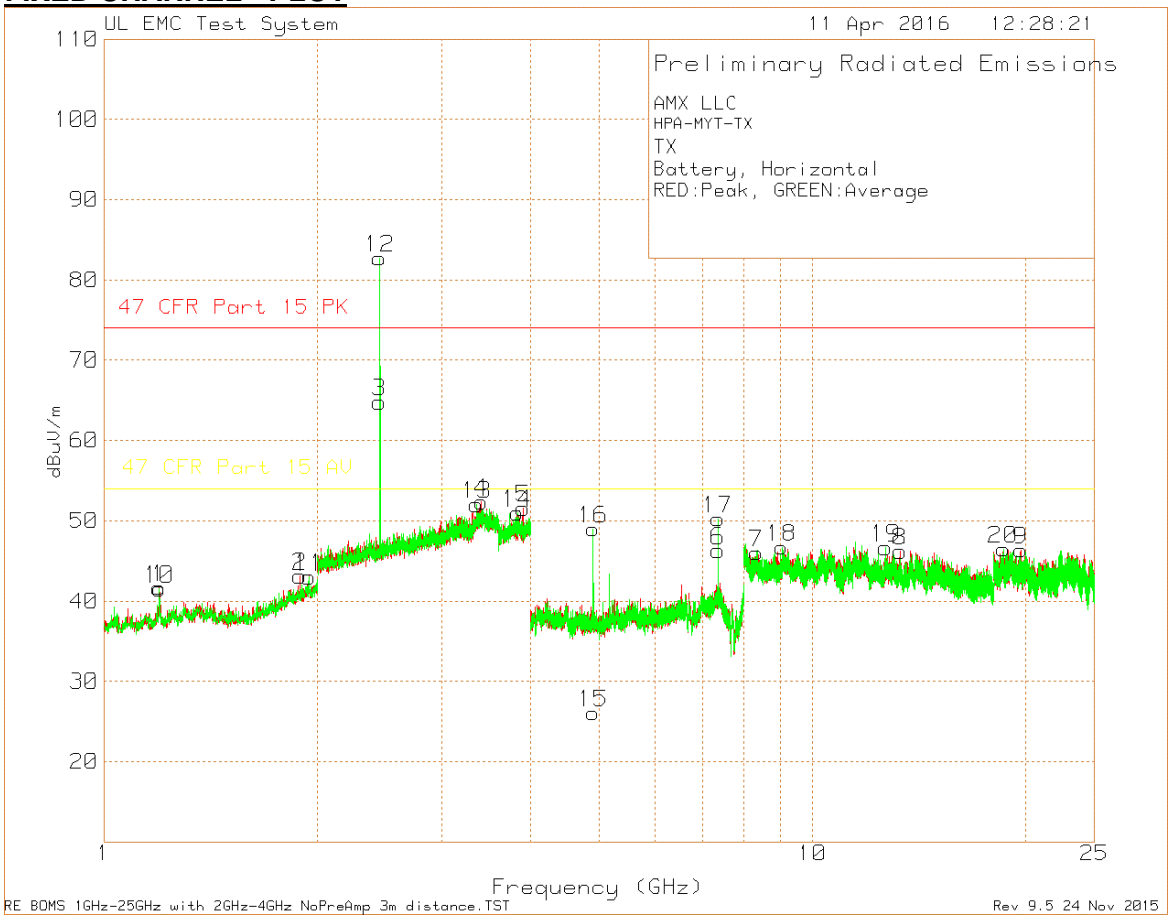
AMX LLC
HPA-MYT-TX
TX
Battery, Vertical
RED:Peak, GREEN:Average

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor (dBm)	Gain/Loss (dB)	Corrected Reading dBuV/m	Bandedge PK Limit	PK Margin (dB)	Bandedge AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.3968	29.01	Pk	21.8	4.65	55.46	74	-18.54	54	1.46	188	116	V
2	2.3999	27.58	Pk	21.8	4.64	54.02	74	-19.98	54	0.02	188	116	V
3	2.4508	62.32	Pk	22	4.7	89.02	-	-	-	-	188	116	V
4	2.4837	28.01	Pk	22.1	4.76	54.87	74	-19.13	54	0.87	188	116	V
5	2.4908	29.12	Pk	22.1	4.75	55.97	74	-18.03	54	1.97	188	116	V
6	2.3943	16.16	Av	21.8	4.65	42.61	74	-31.39	54	-11.39	188	116	V
7	2.3999	16.17	Av	21.8	4.64	42.61	74	-31.39	54	-11.39	188	116	V
8	2.45	28.88	Av	22	4.7	55.58	-	-	-	-	188	116	V
9	2.4836	16.42	Av	22.1	4.76	43.28	74	-30.72	54	-10.72	188	116	V
10	2.4892	16.54	Av	22.1	4.75	43.39	74	-30.61	54	-10.61	188	116	V

Pk - Peak detector
Av - Linear Average detection

7.3.1. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz

FIXED CHANNEL - PLOT



FIXED CHANNEL - DATA

AMX LLC
HPA-MYT-TX
TX
Battery, Horizontal
RED:Peak, GREEN:Average

Range 1: 1 - 2GHz 1 - 2MHz

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor (dBm)	Gain/Loss (dB)	Corrected Reading dBuV/m	PK Limit	PK Margin (dB)	AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.195	70.71	Pk	28.3	-57.32	41.69	74	-32.31	54	-12.31	0-360	150	H
2	1.888	66.69	Pk	31.1	-54.68	43.11	74	-30.89	54	-10.89	0-360	150	H
3	2.449	38.23	Pk	21.9	4.7	64.83	74	-9.17	54	10.83	0-360	150	H
4	3.408	22.97	Pk	23.5	5.89	52.36	74	-21.64	54	-1.64	0-360	100	H
5	3.902	21.3	Pk	23.8	6.48	51.58	74	-22.42	54	-2.42	0-360	100	H
6	7.352	61.78	Pk	30.8	-46.28	46.3	74	-27.7	54	-7.7	0-360	100	H
7	8.337	56.79	Pk	36.5	-47.24	46.05	74	-27.95	54	-7.95	0-360	150	H
8	13.301	50.64	Pk	39.8	-44.23	46.21	74	-27.79	54	-7.79	0-360	150	H
9	19.693	55.46	Pk	40.3	-49.39	46.37	74	-27.63	54	-7.63	0-360	100	H
10	1.197	70.53	Pk	28.3	-57.31	41.52	74	-32.48	54	-12.48	0-360	150	V
11	1.948	65.79	Pk	31.5	-54.29	43	74	-31	54	-11	0-360	150	V
12	2.449	56.14	Pk	21.9	4.7	82.74	74	8.74	54	28.74	0-360	150	V
13	3.356	23.17	Pk	23.1	5.77	52.04	74	-21.96	54	-1.96	0-360	150	V
14	3.831	20.79	Pk	24	6.19	50.98	74	-23.02	54	-3.02	0-360	150	V
15	4.899	49.01	Pk	27.7	-50.61	26.1	74	-47.9	54	-27.9	0-360	100	V
16	4.899	71.92	Pk	27.7	-50.61	49.01	74	-24.99	54	-4.99	0-360	100	V
17	7.352	65.74	Pk	30.8	-46.28	50.26	74	-23.74	54	-3.74	0-360	100	V
18	9.049	60.09	Pk	36.2	-49.57	46.72	74	-27.28	54	-7.28	0-360	150	V
19	12.685	52.86	Pk	39.5	-45.72	46.64	74	-27.36	54	-7.36	0-360	100	V
20	18.597	57.14	Pk	40.1	-50.73	46.51	74	-27.49	54	-7.49	0-360	100	V

Pk - Peak detector

Radiated Emission Data

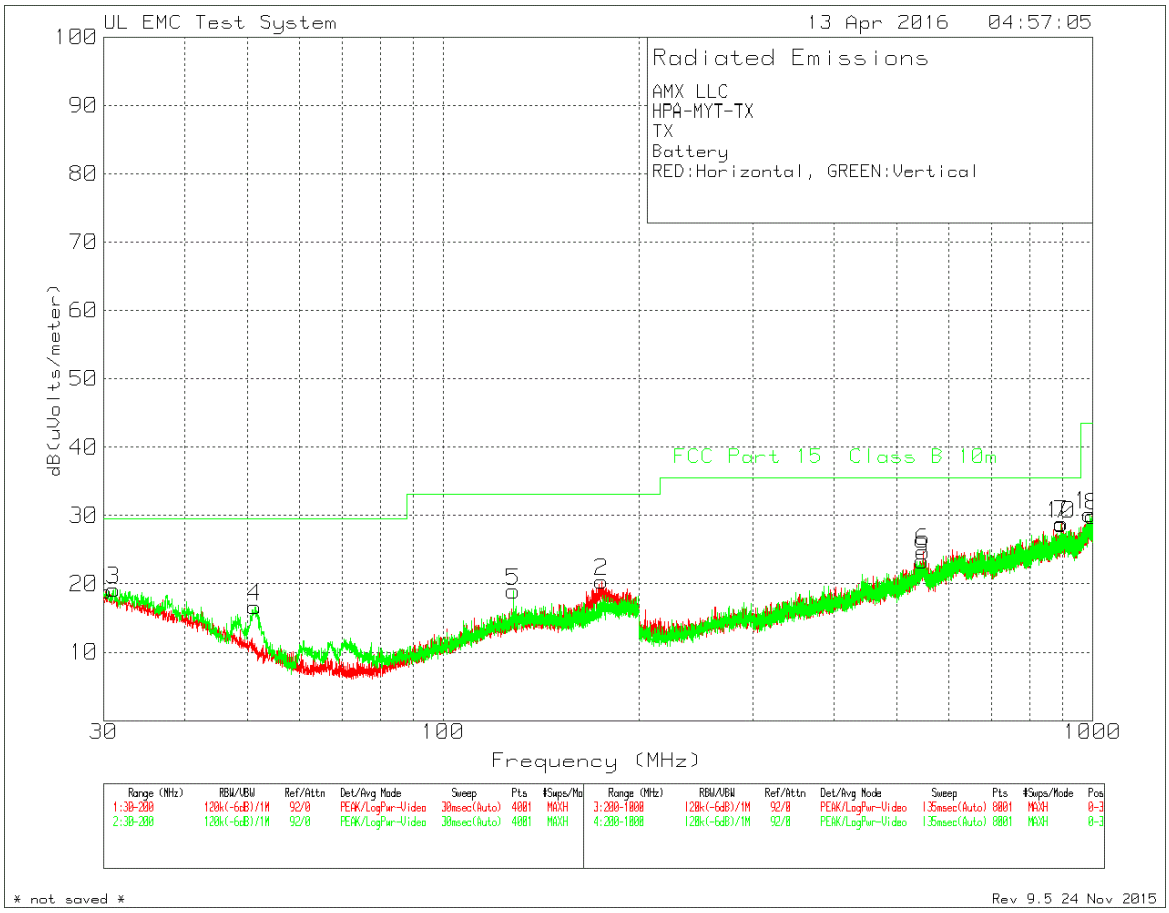
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor (dBm)	Gain/Loss (dB)	Corrected Reading dBuV/m	PK Limit	PK Margin (dB)	AV Limit	AV Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
3.4072	25.17	Pk	23.5	5.89	54.56	74	-19.44	-	-	222	114	H
3.4073	17.61	Av	23.5	5.89	47	-	-	54	-7	222	114	H
3.9008	26.84	Pk	23.8	6.47	57.11	74	-16.89	-	-	206	100	H
3.9014	14.58	Av	23.8	6.48	44.86	-	-	54	-9.14	206	100	H
3.3575	30.81	Pk	23.2	5.78	59.79	74	-14.21	-	-	101	121	V
3.3572	18.28	Av	23.2	5.78	47.26	-	-	54	-6.74	101	121	V
3.8305	28.11	Pk	24	6.2	58.31	74	-15.69	-	-	190	158	V
3.8305	15.19	Av	24	6.2	45.39	-	-	54	-8.61	190	158	V
7.3514	68.34	Pk	30.8	-46.27	52.87	74	-21.13	-	-	187	100	V
7.3515	47.75	Av	30.8	-46.28	32.27	-	-	54	-21.73	187	100	V
4.901	72.71	Pk	27.8	-50.59	49.92	74	-24.08	-	-	70	100	V
4.9002	53.07	Av	27.8	-50.6	30.27	-	-	54	-23.73	70	100	V

Pk - Peak detector
Av - Average detection

7.3.2. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz

PLOT



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

DATA

AMX LLC
HPA-MYT-TX
TX
12VDC
RED:Horizontal, GREEN:Vertical

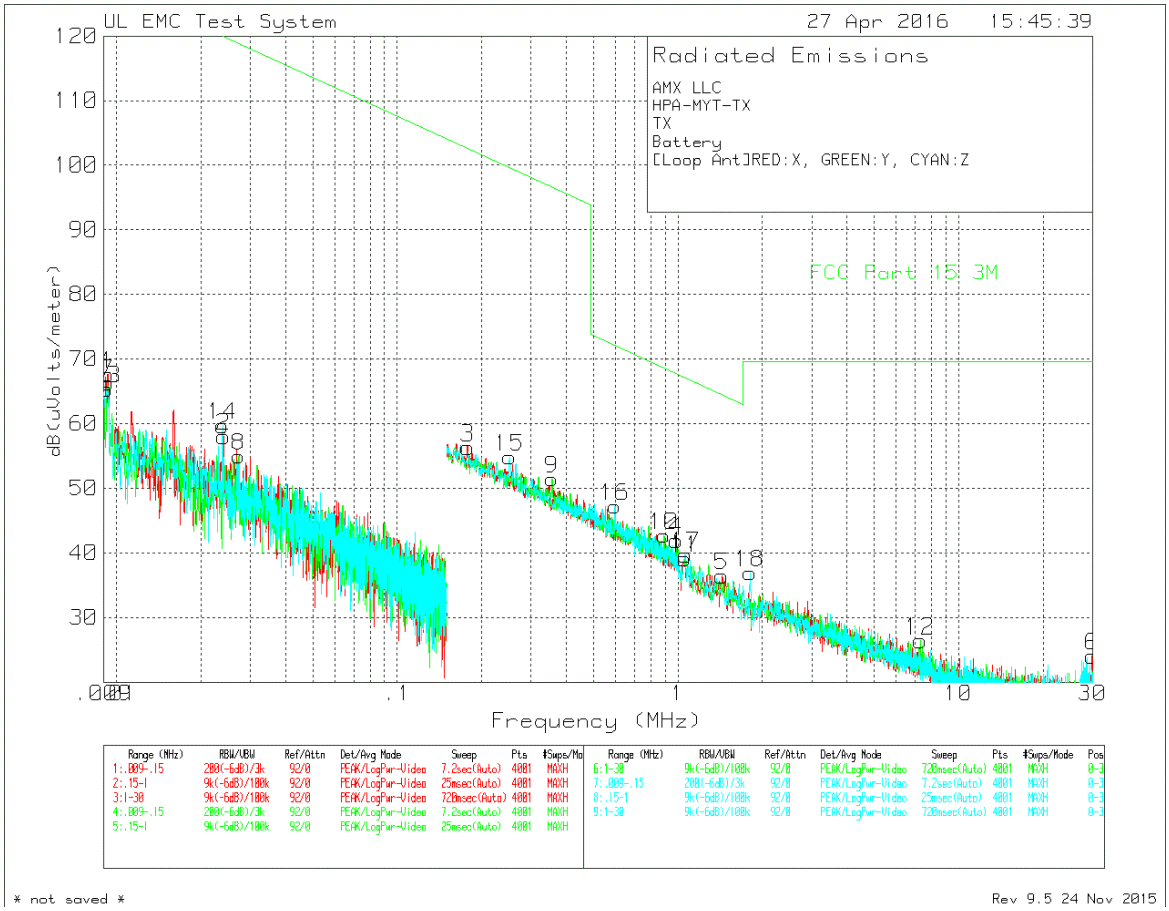
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dBm	Gain/Loss dB	Corrected Reading dB(uVolts/meter)	Qp Limit	Qp Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	30.2125	30.82	Pk	18.1	-30	18.92	29.55	-10.63	0-360	398	H
2	175.52	34.57	Pk	15.1	-29.3	20.37	33.07	-12.7	0-360	249	H
3	31.0625	31.35	Pk	17.8	-30	19.15	29.55	-10.4	0-360	398	V
4	51.25	36.72	Pk	9.9	-30	16.62	29.55	-12.93	0-360	101	V
5	128.2175	34.64	Pk	14	-29.7	18.94	33.07	-14.13	0-360	101	V
6	548.7	31.93	Pk	19.6	-26.8	24.73	35.57	-10.84	0-360	299	H
7	895.9	32.71	Pk	22.9	-26.8	28.81	35.57	-6.76	0-360	199	H
8	998.1	31.03	Pk	24.3	-25.4	29.93	43.52	-13.59	0-360	299	H
9	546.9	30.44	Pk	19.7	-26.8	23.34	35.57	-12.23	0-360	103	V
10	894.1	32.71	Pk	22.8	-26.8	28.71	35.57	-6.86	0-360	399	V
11	990.1	31.14	Pk	24.6	-25.6	30.14	43.52	-13.38	0-360	199	V

Pk - Peak Detector

All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

SPURIOUS EMISSIONS 9 kHz TO 30 MHz

PLOT



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

DATA

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AMX LLC
HPA-MYT-TX
TX
Battery

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dBm	Gain/Loss dB	Corrected Reading dB(uVolts/ meter)	Limit	Margin (dB)	Azimuth [Degs]	Antenna Polarity
1	0.009315	48.33	Pk	19.3	0	67.63	128.2	-60.57	0-360	X
2	0.024085	43.84	Pk	14.2	0	58.04	119.95	-61.91	0-360	X
3	0.17833	44.7	Pk	11.6	0	56.3	102.57	-46.27	0-360	X
4	0.9889	30.26	Pk	11.6	0.1	41.96	67.7	-25.74	0-360	X
5	1.435	24.75	Pk	11.6	0.1	36.45	64.47	-28.02	0-360	X
6	29.84775	15.93	Pk	7.8	0.3	24.03	69.54	-45.51	0-360	X
7	0.00928	46.91	Pk	19.4	0	66.31	128.23	-61.92	0-360	Y
8	0.02727	41.06	Pk	13.9	0	54.96	118.88	-63.92	0-360	Y
9	0.35618	39.84	Pk	11.6	0	51.44	96.57	-45.13	0-360	Y
10	0.89262	30.97	Pk	11.6	0.1	42.67	68.59	-25.92	0-360	Y
11	1.058	27.42	Pk	11.6	0.1	39.12	67.11	-27.99	0-360	Y
12	7.3075	15.07	Pk	11.2	0.1	26.37	69.54	-43.17	0-360	Y
13	0.00921	45.94	Pk	19.4	0	65.34	128.3	-62.96	0-360	Z
14	0.023875	45.51	Pk	14.2	0	59.71	120.03	-60.32	0-360	Z
15	0.25171	43.24	Pk	11.6	0	54.84	99.58	-44.74	0-360	Z
16	0.59666	35.62	Pk	11.6	0	47.22	72.09	-24.87	0-360	Z
17	1.06525	28	Pk	11.6	0.1	39.7	67.06	-27.36	0-360	Z
18	1.80475	25.12	Pk	11.7	0.1	36.92	69.54	-32.62	0-360	Z

Pk - Peak detector