



FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

**EUT
HOME AUTOMATION DONGLE**

MODEL NUMBER: ID:083

FCC ID: DKN-201HD

REPORT NUMBER: 14U18557-1

ISSUE DATE: 2014-10-02

Prepared for

**ECHOSTAR
90 INVERNESS CIRCLE EAST
ENGLEWOOD, CO 80112**

Prepared by

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NVLAP LAB CODE 100255-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	2014-09-25	Initial Issue	Joseph Danisi
1	2014-10-08	Correct orientation photo, add plots to show meets band edge, add additional QP data, correct antenna cal. date.	Joseph Danisi

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: EHOSTAR
90 INVERNESS CIRCLE EAST
ENGLEWOOD, CO 80112

EUT DESCRIPTION: HOME AUTOMATION DONGLE

MODEL: ID:083

SERIAL NUMBER: Non serialized sample

DATE TESTED: 2014-08-25 to 2014-09-25

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	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:

Tested By:



Bob DeLisi
Program Manager – EMC
ULLLC

Joseph Danisi
Project Lead
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 1285 Walt Whitman Rd. Melville, NY 11747, USA.

UL Melville is accredited by NVLAP, Laboratory Code 100255-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/1002550.htm>.

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

Test	Uncertainty
Conducted Emissions - Mains(worst case 9kHz-30MHz)	3.0, k=2 (95%)
Radiated Emissions, 30-200MHz, Horizontal	3.6, k=2 (95%)
Radiated Emissions, 30-200MHz, Vertical	3.8, k=2 (95%)
Radiated Emissions, 200-1000MHz, Horizontal	2.8, k=2 (95%)
Radiated Emissions, 200-1000MHz, Vertical	3.7, k=2 (95%)

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Z-wave dongle

The Dongle is manufactured by Echostar 90 Inverness Circle East Englewood, CO 80112

5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

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

Frequency Range (MHz)	Mode	Output PK E-field Strength (dBuV/m)
908.4	9.6kbps	93.58
908.42	40kbps	93.48

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Bent monopole antenna, with a maximum gain of 0 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Z-Wave Programmer v2.79.

The test utility software used during testing was not applicable

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

The worst-case orientation was determined as the X-Axis and configured and evaluated throughout tests. The duty cycle is >98% therefore all testing was performed with 100% duty cycle.

4.4 DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Hewlett Packard	Elite Book	N/A	N/A
Router	Netgear	MBRN3000	N/A	PY309200112
Hopper with Sling	Echostar	913	N/A	DKNCB1138

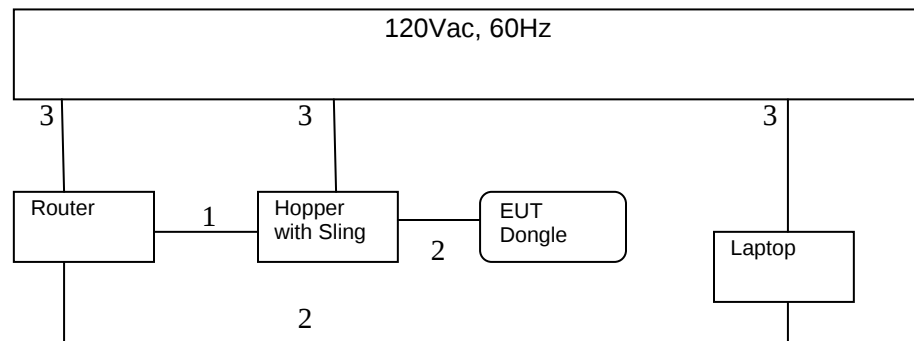
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Network	2	RJ45	Ethernet	5	None
2	Communication	1	USB	USB	1	None
3	Mains	3	Power	Wire	1	None

TEST SETUP

The EUT is stand-alone device software exercised the radio card.

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					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESC17	75141	2014-01-29	2015-01-31
Hybrid Antenna	Sunol	JB-1	84106	2014-02-19	2015-02-19
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22
Multimeter	Fluke	83III	ME5B-305	2014-01-28	2015-01-31
Above 1GHz (Band Optimized System)					
Spectrum Analyzer	Agilent	E4446A	72823	2014-06-13	2015-06-13
Horn Antenna (2-4 GHz)	ETS	3161-02 (22°)**	48107	2007-09-27	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03 (22°)**	48106	2007-09-27	See * below
Horn Antenna (8-12 GHz)	ETS	3160-07 (26°)**	8933	2008-11-24	See * below
Horn Antenna (1-18GHz)	EMCO	3115	5A-766	2013-12-03	2014-12-03
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22
Multimeter	Fluke	83III	ME5B-305	2014-01-28	2015-01-31
* - Note: As allowed by the calibration standard ANSI C63.10-2009 section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration. Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than $2D^2/\lambda$. Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances.** - Number in parentheses denotes antenna beam width.					

Bench Tests					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
RF Room 1					
Spectrum Analyzer	Agilent	N9030A	85671	2014-06-27	2015-06-27
Dipole Antenna	EMCO	3121C	3359	2014-10-01	2015-01-10
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43733	2014-03-24	2016-03-24
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Multimeter	Fluke	83III	ME5B-305	2014-01-28	2015-01-31

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESIB 40	34968	2014-04-09	2015-04-09
LISN	Solar	9252-50-R-24-BNC	ME5A-636	2014-01-28	2015-01-31
Switch Driver	HP	11713A	44397	N/A	N/A
RF Switch Box	UL	4	44404	N/A	N/A
Measurement Software	UL	Version 9.5	44736	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2014-03-24	2016-03-24
Multimeter	Fluke	83V	43443	2014-01-28	2015-01-31

7. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207 (a)

Frequency of emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50
* Decreases with the logarithm of the frequency.		

TEST PROCEDURE

ANSI C63.10-2009

RESULTS

No non-compliance noted:

6 WORST EMISSIONS: 9.6kbps

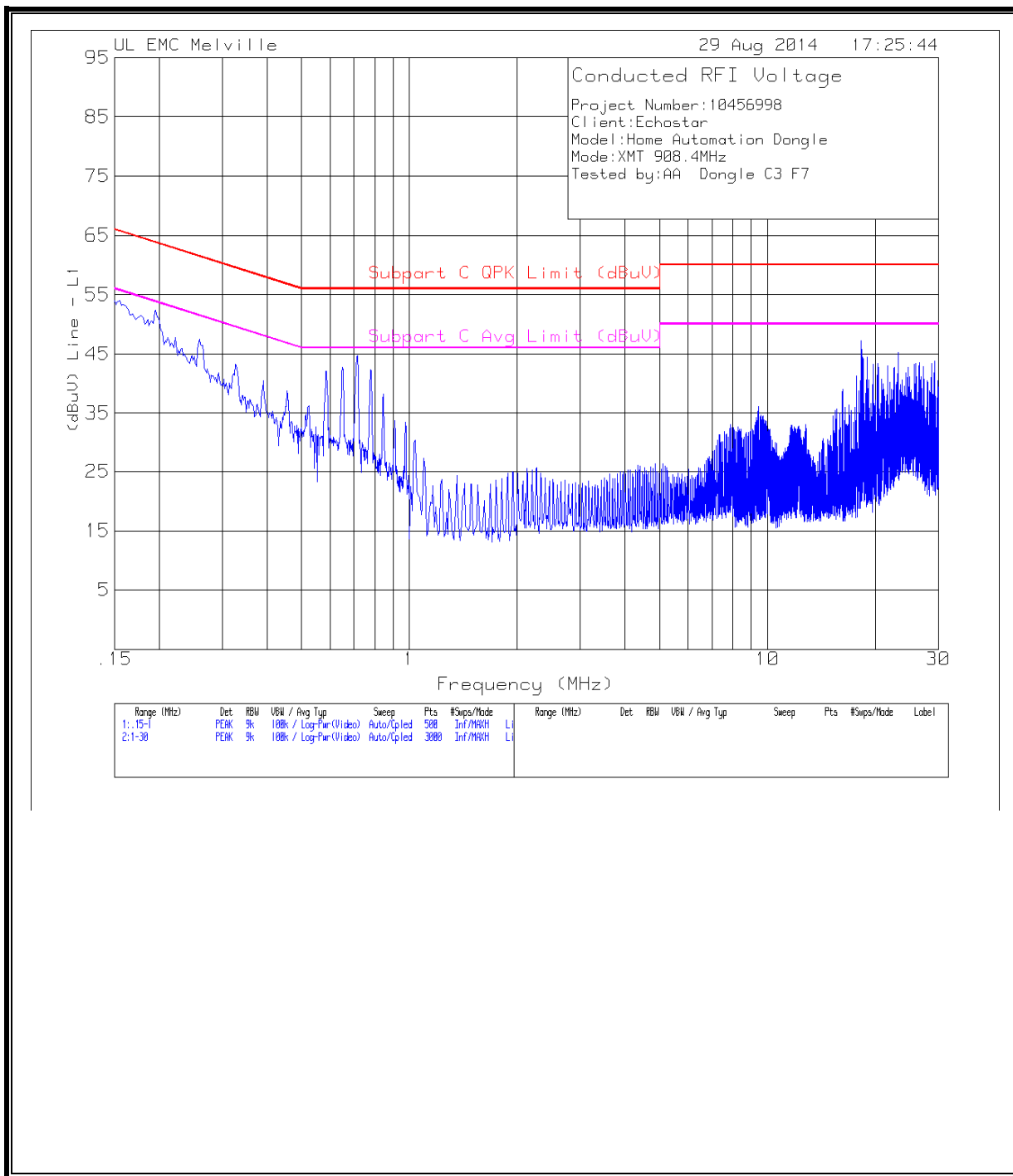
Frequency (MHz)	Meter Reading (dBuV)	Det	Line 1 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.19599	42.32	PK	10	52.32	63.78	-11.46	53.78	-1.46
.71212	33.66	PK	10	43.66	56	-12.34	46	-2.34
.77685	30.91	PK	10	40.91	56	-15.09	46	-5.09
9.45148	25.55	PK	10.5	36.05	60	-23.95	50	-13.95
18.36712	34.19	PK	11	45.19	60	-14.81	50	-4.81
23.13438	33.71	PK	11.5	45.21	60	-14.79	50	-4.79

PK - Peak detector

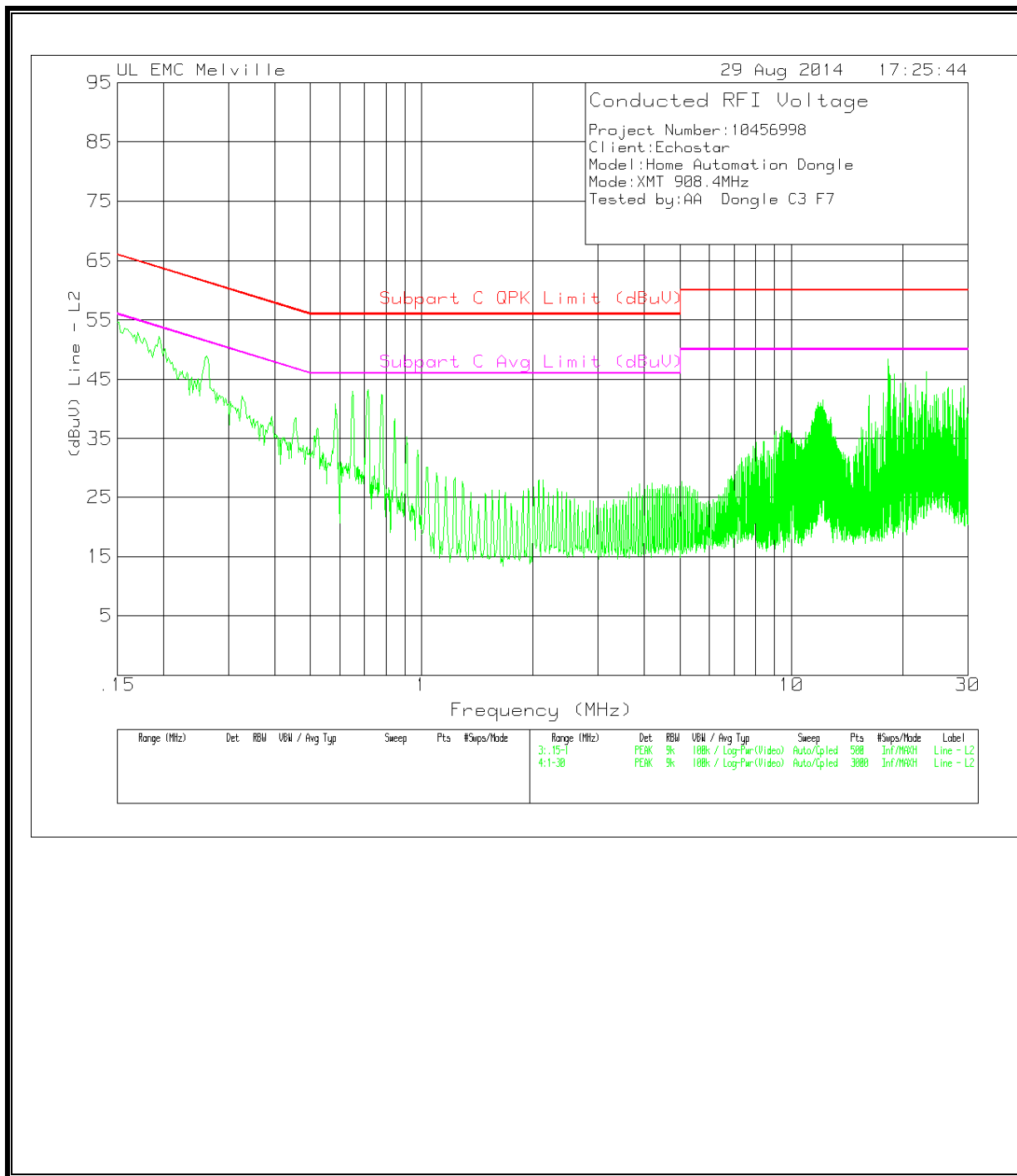
Frequency (MHz)	Meter Reading (dBuV)	Det	Line 2 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.19429	42.19	PK	10	52.19	63.85	-11.66	53.85	-1.66
.71553	33.18	PK	10.1	43.28	56	-12.72	46	-2.72
.78026	32.35	PK	10.1	42.45	56	-13.55	46	-3.55
12.15905	29.58	PK	10.9	40.48	60	-19.52	50	-9.52
18.25108	37.36	PK	11	48.36	60	-11.64	50	-1.64
23.13438	34.77	PK	11.5	46.27	60	-13.73	50	-3.73

PK - Peak detector

LINE 1 RESULTS



LINE 2 RESULTS



WORST EMISSIONS: 40kbps

Frequency (MHz)	Meter Reading (dBuV)	Det	Line 1 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.16022	50.32	PK	10	60.32	65.45	-5.13	-	-
.1764	49.78	PK	10	59.78	64.65	-4.87	-	-
.18748	49.8	PK	10	59.8	64.15	-4.35	-	-
.2011	47.56	PK	10	57.56	63.57	-6.01	-	-
.26243	39.1	PK	10	49.1	61.35	-12.25	-	-
.31182	37.56	PK	10	47.56	59.92	-12.36	-	-
.33738	35.55	PK	10	45.55	59.27	-13.72	-	-
.40892	32.08	PK	10	42.08	57.67	-15.59	-	-
.52134	30.27	PK	10	40.27	56	-15.73	-	-
.58437	32.13	PK	10	42.13	56	-13.87	-	-
.6491	33.34	PK	10	43.34	56	-12.66	-	-
.71383	33.57	PK	10	43.57	56	-12.43	-	-
.77856	33.23	PK	10	43.23	56	-12.77	-	-
.84499	29.7	PK	10	39.7	56	-16.3	-	-
16.23008	36.67	PK	10.9	47.57	60	-12.43	-	-
18.25108	40.34	PK	11	51.34	60	-8.66	-	-
18.91831	36.74	PK	11.1	47.84	60	-12.16	-	-
23.13438	36.34	PK	11.5	47.84	60	-12.16	-	-
26.61554	38.6	PK	11.8	50.4	60	-9.6	-	-
27.16672	38.19	PK	11.8	49.99	60	-10.01	-	-
28.69457	36.86	PK	11.9	48.76	60	-11.24	-	-

PK - Peak detector

Frequency (MHz)	Meter Reading (dBuV)	Det	Line 2 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.16363	50.22	PK	10	60.22	65.28	-5.06	-	-
.17555	47.4	PK	10	57.4	64.69	-7.29	-	-
.19429	46.03	PK	10	56.03	63.85	-7.82	-	-
.21132	42.23	PK	10	52.23	63.15	-10.92	-	-
.22495	40.56	PK	10	50.56	62.63	-12.07	-	-
.23687	39.36	PK	10	49.36	62.21	-12.85	-	-
.26072	40.04	PK	10	50.04	61.41	-11.37	-	-
.27094	37.14	PK	10	47.14	61.09	-13.95	-	-
.29649	36.27	PK	10	46.27	60.34	-14.07	-	-
.34249	34.2	PK	10	44.2	59.14	-14.94	-	-
.42936	29.99	PK	10	39.99	57.27	-17.28	-	-
.45321	29.66	PK	10	39.66	56.82	-17.16	-	-
.51964	28.68	PK	10.1	38.78	56	-17.22	-	-
.58437	29	PK	10.1	39.1	56	-16.9	-	-
.6508	32.48	PK	10.1	42.58	56	-13.42	-	-
.71553	31.89	PK	10.1	41.99	56	-14.01	-	-
.77345	32.33	PK	10.1	42.43	56	-13.57	-	-
.84499	28.63	PK	10.1	38.73	56	-17.27	-	-
16.23008	35.2	PK	10.9	46.1	60	-13.9	-	-
18.25108	41.15	PK	11	52.15	60	-7.85	-	-

18.91831	39.39	PK	11.2	50.59	60	-9.41	-	-
Frequency (MHz)	Meter Reading (dBuV)	Det	Line 2 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
19.71124	37.31	PK	11.1	48.41	60	-11.59	-	-
23.13438	37.41	PK	11.5	48.91	60	-11.09	-	-
27.16672	34.7	PK	11.9	46.6	60	-13.4	-	-
28.69457	35.46	PK	12	47.46	60	-12.54	-	-
29.24575	36.15	PK	12	48.15	60	-11.85	-	-

PK - Peak detector

Frequency (MHz)	Meter Reading (dBuV)	Det	Line 1 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.15767	22.77	CAV	10	32.77	-	-	55.59	-22.82
.17397	22.25	CAV	10	32.25	-	-	54.77	-22.52
.19162	32.95	CAV	10	42.95	-	-	53.97	-11.02
.1969	32.74	CAV	10	42.74	-	-	53.74	-11
.25875	32.33	CAV	10	42.33	-	-	51.47	-9.14
.31598	12.92	CAV	10	22.92	-	-	49.81	-26.89
.34074	12.5	CAV	10	22.5	-	-	49.19	-26.69
.40691	5.06	CAV	10	15.06	-	-	47.71	-32.65
.51767	24.29	CAV	10	34.29	-	-	46	-11.71
.58205	29.66	CAV	10	39.66	-	-	46	-6.34
.64703	31.71	CAV	10	41.71	-	-	46	-4.29
.71152	31.06	CAV	10	41.06	-	-	46	-4.94
.77638	31.34	CAV	10	41.34	-	-	46	-4.66
.84182	20.41	CAV	10	30.41	-	-	46	-15.59
16.2279	30.08	CAV	10.9	40.98	-	-	50	-9.02
18.2428	34.6	CAV	11	45.6	-	-	50	-4.4
18.9146	34.52	CAV	11.1	45.62	-	-	50	-4.38
23.1278	35.02	CAV	11.5	46.52	-	-	50	-3.48
26.6083	34.5	CAV	11.8	46.3	-	-	50	-3.7
27.1579	31.85	CAV	11.8	43.65	-	-	50	-6.35
28.6845	33.33	CAV	11.9	45.23	-	-	50	-4.77

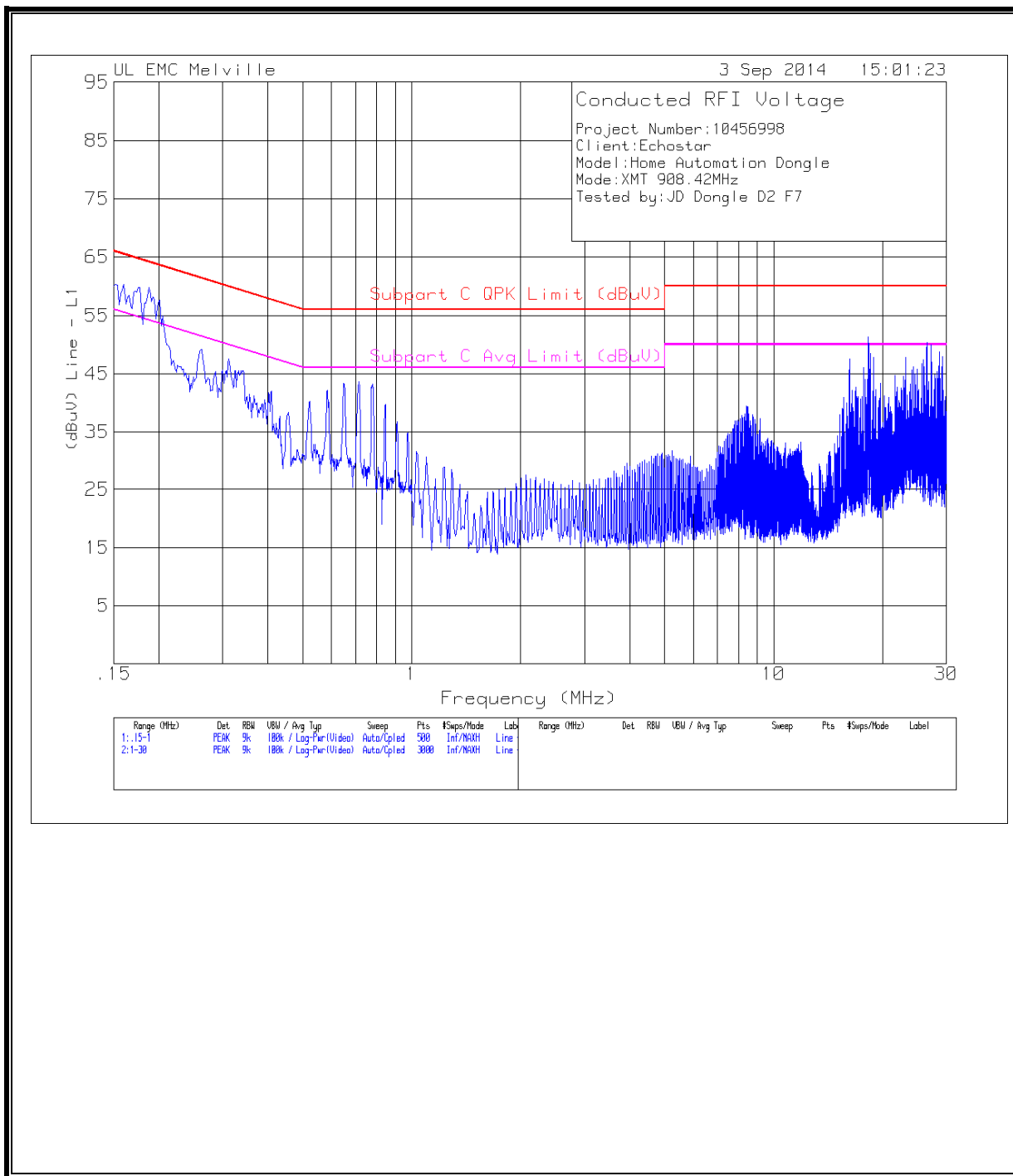
CAV - CISPR average detection

Frequency (MHz)	Meter Reading (dBuV)	Det	Line 2 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.1599	21.86	CAV	10	31.86	-	-	55.47	-23.61
.17291	21.59	CAV	10	31.59	-	-	54.82	-23.23
.19394	34.16	CAV	10	44.16	-	-	53.87	-9.71
.20767	15.18	CAV	10	25.18	-	-	53.3	-28.12
.22501	14.52	CAV	10	24.52	-	-	52.63	-28.11
.23606	10.42	CAV	10	20.42	-	-	52.23	-31.81
.25878	31.74	CAV	10	41.74	-	-	51.47	-9.73
.26673	17.36	CAV	10	27.36	-	-	51.22	-23.86
.29492	9.7	CAV	10	19.7	-	-	50.38	-30.68
.34217	9.08	CAV	10	19.08	-	-	49.15	-30.07
.42682	3.38	CAV	10	13.38	-	-	47.31	-33.93
.45311	23.83	CAV	10	33.83	-	-	46.82	-12.99

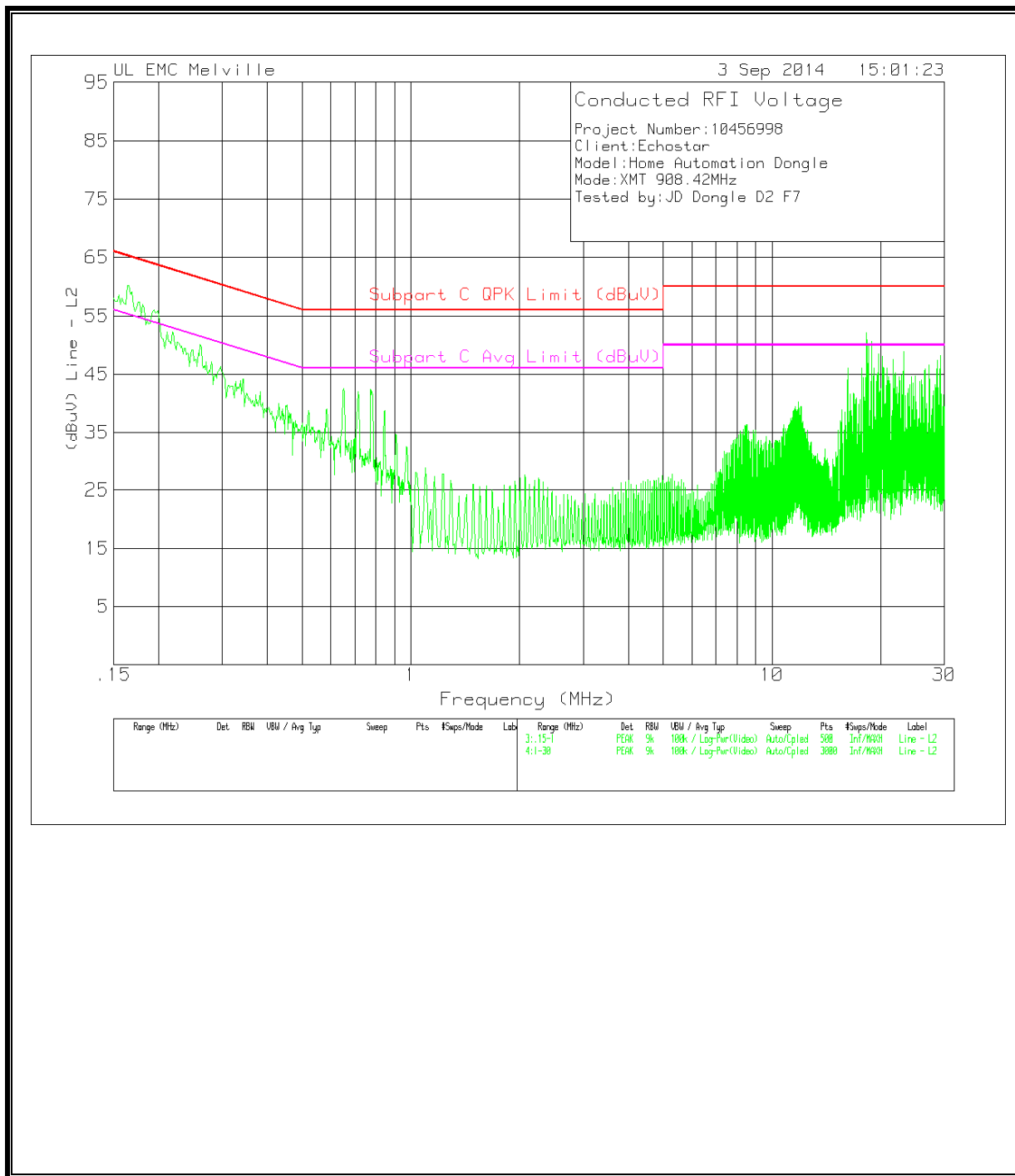
.51746	25.68	CAV	10.1	35.78	-	-	46	-10.22
Frequency (MHz)	Meter Reading (dBuV)	Det	Line 2 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.58263	26.82	CAV	10.1	36.92	-	-	46	-9.08
.64694	31.07	CAV	10.1	41.17	-	-	46	-4.83
.71276	30.52	CAV	10.1	40.62	-	-	46	-5.38
.77632	31.75	CAV	10.1	41.85	-	-	46	-4.15
.84179	16.16	CAV	10.1	26.26	-	-	46	-19.74
16.2275	33.11	CAV	10.9	44.01	-	-	50	-5.99
18.2431	36.77	CAV	11	47.77	-	-	50	-2.23
18.9144	36.15	CAV	11.2	47.35	-	-	50	-2.65
19.7083	34.56	CAV	11.1	45.66	-	-	50	-4.34
23.1277	36.22	CAV	11.5	47.72	-	-	50	-2.28
27.158	35.34	CAV	11.9	47.24	-	-	50	-2.76
28.6847	33.24	CAV	12	45.24	-	-	50	-4.76
29.234	33.52	CAV	12	45.52	-	-	50	-4.48

CAV - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS



7.1. 20 dB BW

LIMITS

FCC 15.215

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

TEST PROCEDURE

ANSI C63.10-2009

The transmitter output is connected to the spectrum analyzer.

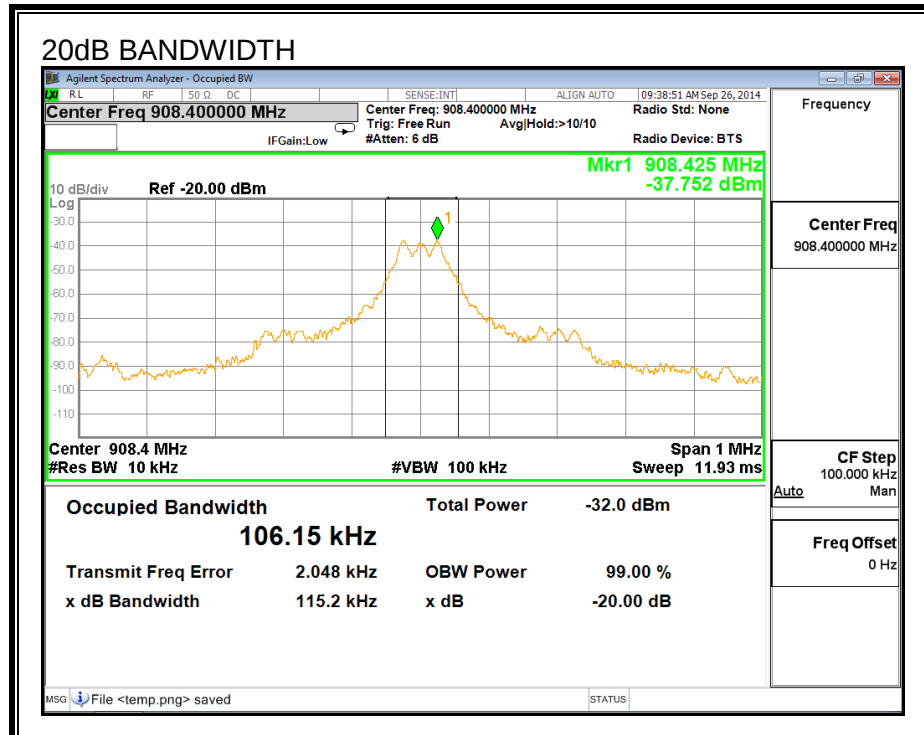
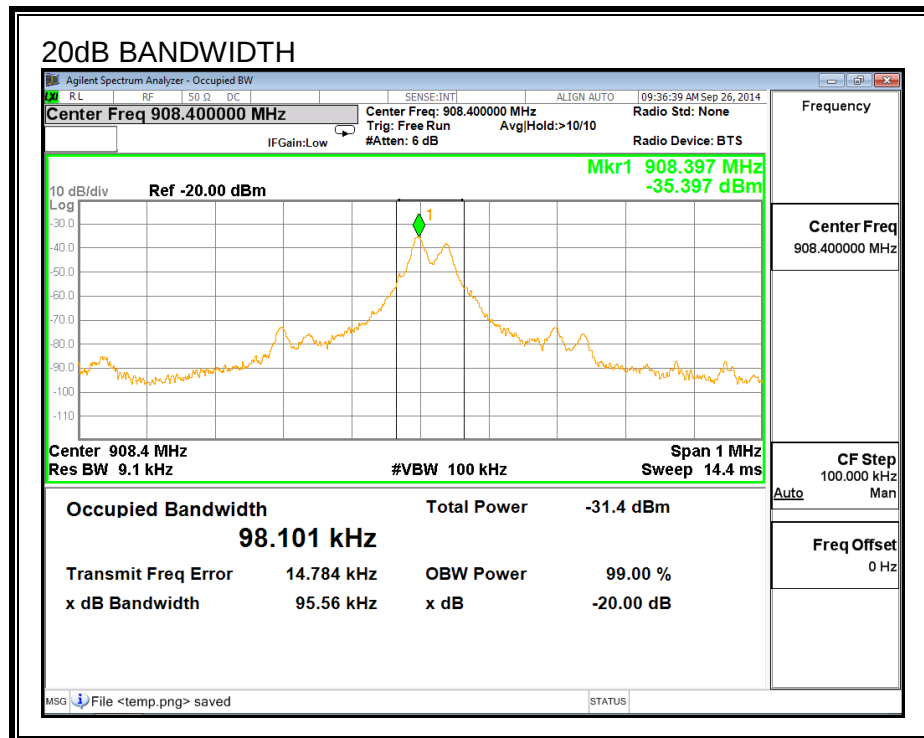
20dB Bandwidth: The RBW is set to 10 KHz. The VBW is set to 100 KHz. The sweep time is coupled. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RESULTS

No non-compliance observed:

The plots show that the 20dB bandwidth of the signal is fully contained within the 902-928MHz band

20dB BANDWIDTH



8. TEST RESULTS

8.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.10-2009

LIMIT

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

8.1.2 FUNDAMENTAL FREQUENCY RADIATED EMISSION

Frequency (MHz)	Meter Reading (dBuV)	Det	AF-84106 [dB/m]	GL [dB]	Corrected Reading (dBuV/m)	FCC Pt 15 SubC 15.249 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
908.3988	65.78	PK	23	4.8	93.58	94	-0.42	133	103	H
908.3988	61.41	PK	22.5	4.8	88.71	94	-5.29	217	103	V

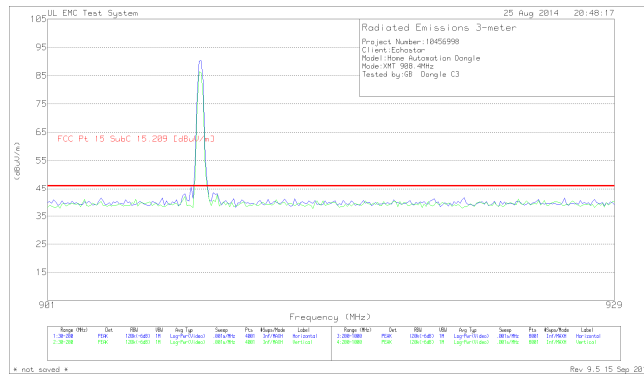
Frequency 908.4 MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	AF-84106 [dB/m]	GL [dB]	Corrected Reading (dBuV/m)	FCC Pt 15 SubC 15.249 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
908.4038	65.68	PK	23	4.8	93.48	94	-0.52	134	101	H
908.4038	61.9	PK	22.5	4.8	91.8	94	-2.2	216	101	V

Frequency 908.42 MHz

Note: maximized peak meets both peak and average limits. Peak limit is 20dB above the noted limit (114dBuV/m).

8.1.3 BANDEDGE RADIATED EMISSION

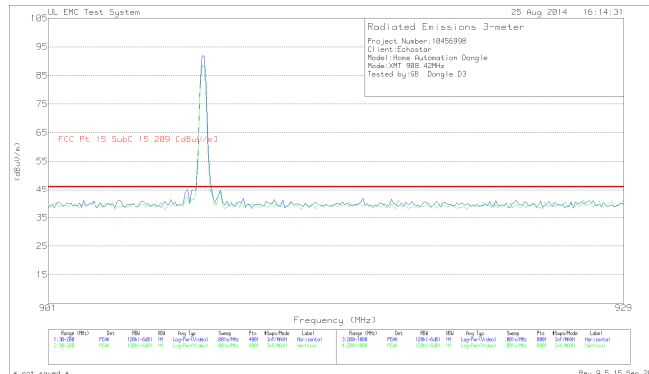


Horizontal 200 - 1000MHz										
Frequency (MHz)	Meter Reading (dBuV)	Det	AF-84106 [dB/m]	GL [dB]	Corrected Reading (dBuV/m)	FCC Pt 15 SubC 15.209 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
902	11.98	Pk	22.9	4.8	39.68	46	-6.32	0-360	99	-
928.4	12.03	Pk	23	4.8	39.83	46	-6.17	0-360	400	-

Pk - Peak detector

Vertical 200 - 1000MHz										
Frequency (MHz)	Meter Reading (dBuV)	Det	AF-84106 [dB/m]	GL [dB]	Corrected Reading (dBuV/m)	FCC Pt 15 SubC 15.209 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
902.1	12.09	Pk	22.4	4.8	39.29	46	-6.71	0-360	99	-
928.4	12.16	Pk	22.6	4.8	39.56	46	-6.44	0-360	300	-

Pk - Peak detector



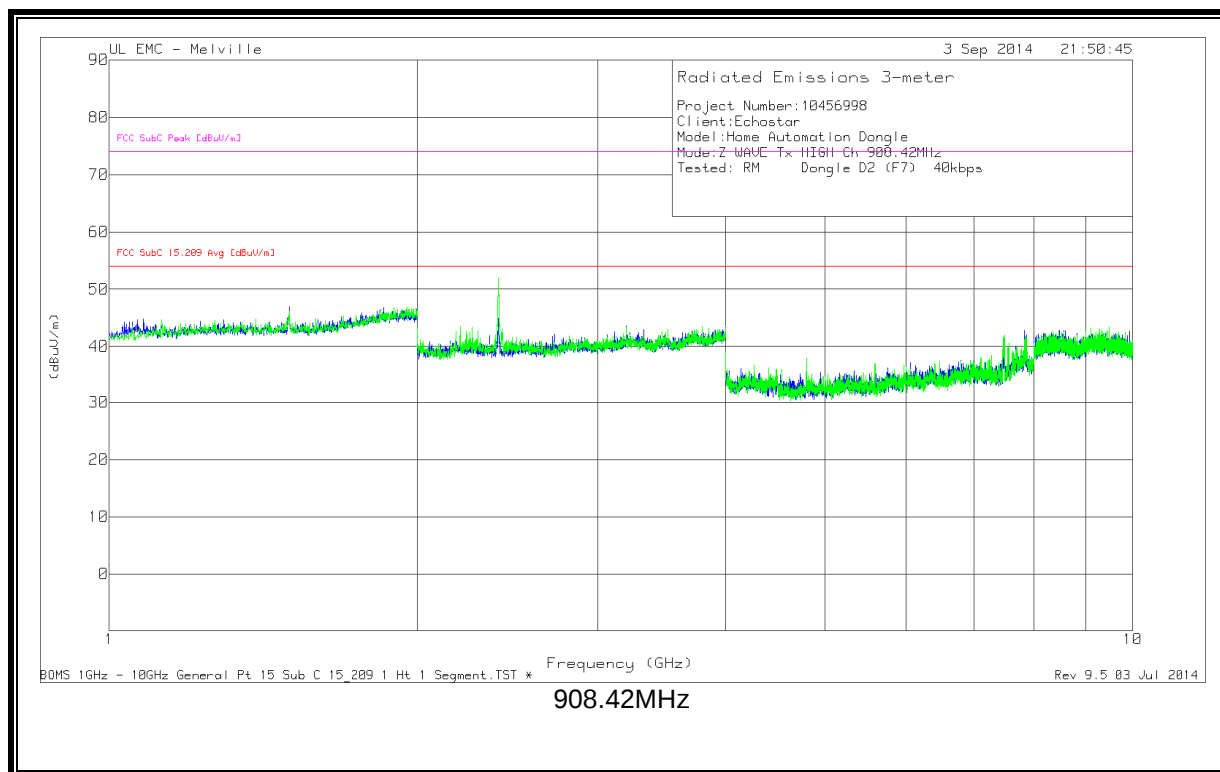
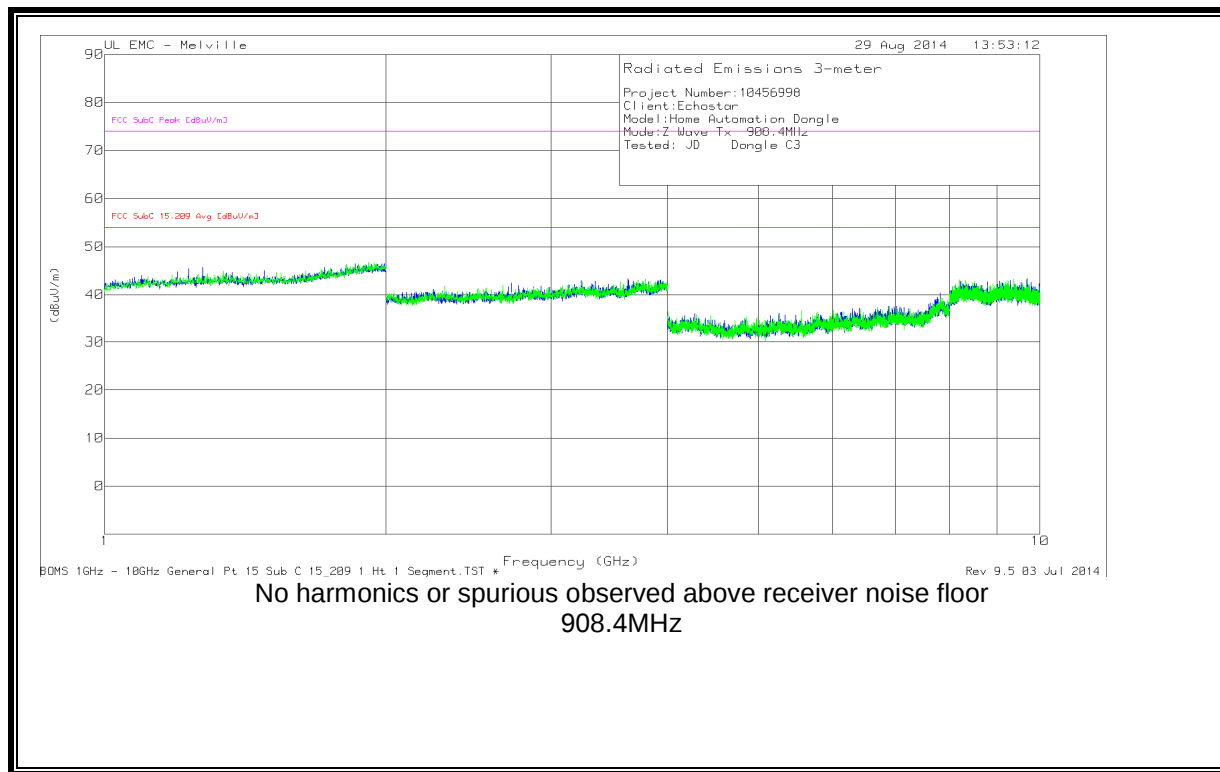
Horizontal 200 - 1000MHz										
Frequency (MHz)	Meter Reading (dBuV)	Det	AF-84106 [dB/m]	GL [dB]	Corrected Reading (dBuV/m)	FCC Pt 15 SubC 15.209 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
901.9	12.46	Pk	22.9	4.8	40.16	46	-5.84	0-360	200	H
928	12.49	Pk	23	4.8	40.29	46	-5.71	0-360	99	H

Pk - Peak detector

Vertical 200 - 1000MHz										
Frequency (MHz)	Meter Reading (dBuV)	Det	AF-84106 [dB/m]	GL [dB]	Corrected Reading (dBuV/m)	FCC Pt 15 SubC 15.209 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
901.8	12.24	Pk	22.4	4.8	39.44	46	-6.56	0-360	400	V
928.1	11.83	Pk	22.6	4.8	39.23	46	-6.77	0-360	400	V

Pk - Peak detector

8.1.4 HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz



HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Gain/Loss (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.5	48.46	Av	25.1	-44.26	29.3	54	-24.7	-	-	31	138	H
* 7.5	44.79	Av	28.1	-50.77	22.12	54	-31.88	-	-	254	304	H
* 7.687	46.45	Av	28.4	-50.63	24.22	54	-29.78	-	-	1	369	H
* 1.5	48.84	Av	25.1	-44.27	29.67	54	-24.33	-	-	355	107	V
* 4.8	58.91	Av	27.3	-53.91	32.3	54	-21.7	-	-	164	191	V
* 7.481	45.74	Av	28	-50.91	22.83	54	-31.17	-	-	161	362	V
* 7.687	47.09	Av	28.4	-50.63	24.86	54	-29.14	-	-	208	233	V
* 7.575	45.31	Av	28.1	-50.56	22.85	54	-31.15	-	-	173	101	V
* 1.5	66.42	PK	25.1	-44.26	47.26	54	-6.74	74	-26.74	31	138	H
* 7.5	61.53	PK	28.1	-50.77	38.86	54	-15.14	74	-35.14	254	304	H
* 7.687	65.67	PK	28.4	-50.63	43.44	54	-10.56	74	-30.56	1	369	H
* 1.5	66.32	PK	25.1	-44.27	47.15	54	-6.85	74	-26.85	355	107	V
* 4.8	70.19	PK	27.3	-53.91	43.58	54	-10.42	74	-30.42	164	191	V
* 7.481	66.86	PK	28	-50.91	43.95	54	-10.05	74	-30.05	161	362	V
* 7.687	66.36	PK	28.4	-50.63	44.13	54	-9.87	74	-29.87	208	233	V
* 7.575	67.23	PK	28.1	-50.56	44.77	54	-9.23	74	-29.23	173	101	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

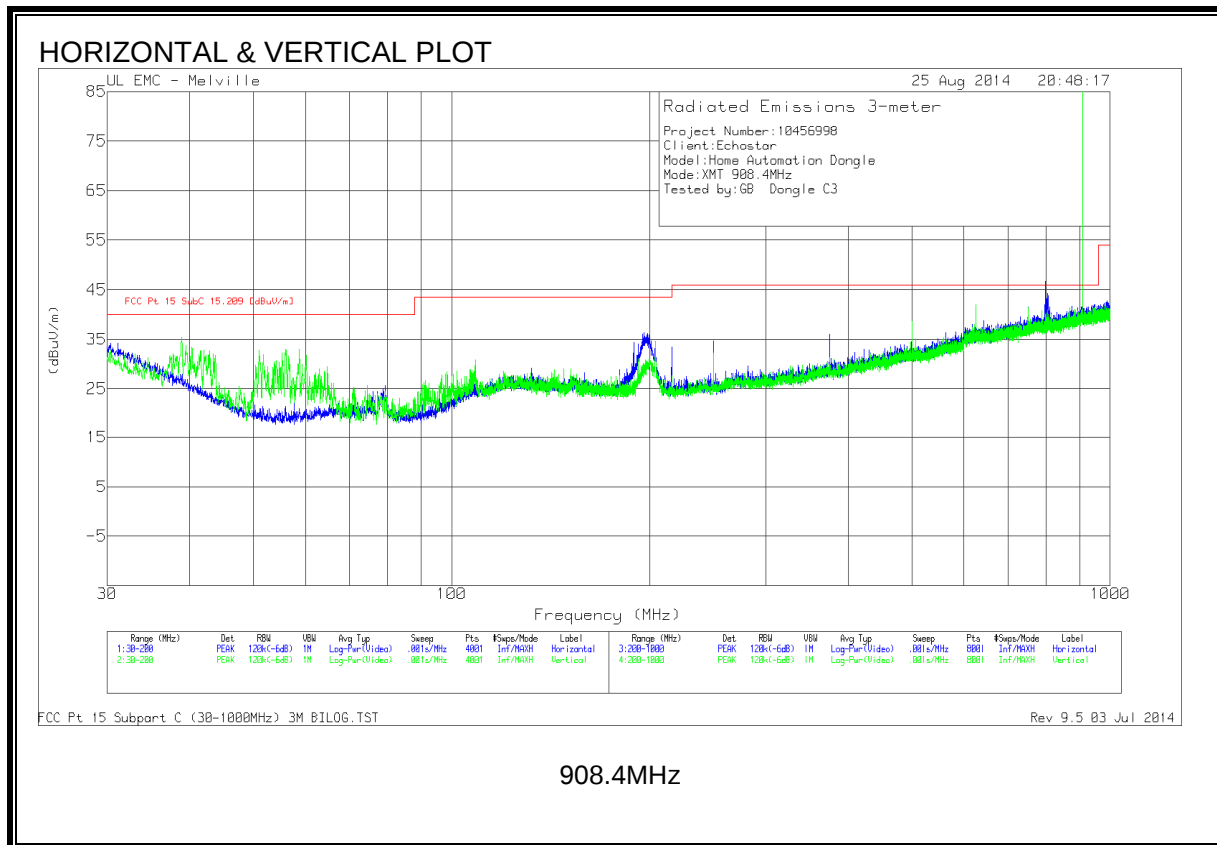
PK - Peak detector

Av - average detection

908.42MHz

8.1.5 WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz

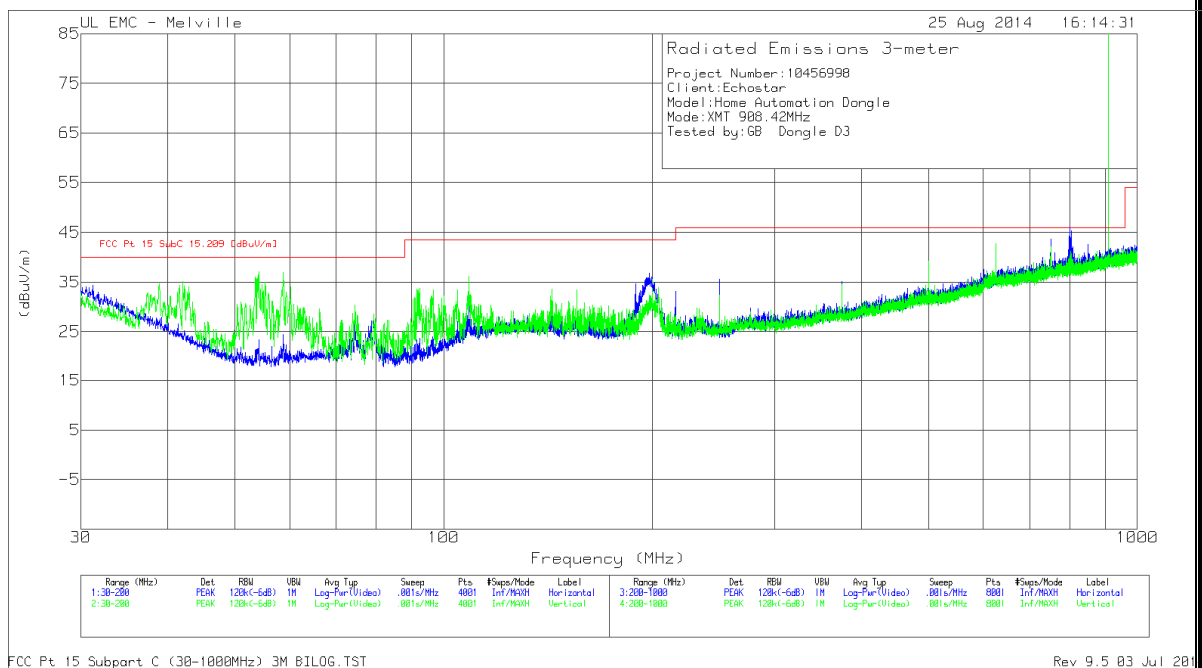


Frequency (MHz)	Meter Reading (dBuV)	Det	AF-84106 [dB/m]	GL [dB]	Corrected Reading (dBuV/m)	FCC Pt 15 SubC 15.209 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 108.8163	21.94	PK	12.6	1.5	36.04	43.5	-7.46	49	101	V
* 74.5592	23.06	PK	7.6	1.2	31.86	40	-8.14	254	104	V
* 250	22.51	PK	12.1	2.3	36.91	46	-9.09	356	129	H
* 250.0023	20.75	PK	12.3	2.3	35.35	46	-10.65	210	101	V

Frequency (MHz)	Meter Reading (dBuV)	Det	AF-84106 [dB/m]	GL [dB]	Corrected Reading (dBuV/m)	FCC Pt 15 SubC 15.209 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
47.8041	24.08	QP	8.1	1	33.18	40	-6.82	166	101	V
* 38.118	10.81	QP	14.1	.8	25.71	40	-14.29	340	106	V
30.6194	10.75	QP	19.9	.8	31.45	40	-8.55	228	111	V
799.9998	16.4	QP	21.9	4.4	42.7	46	-3.3	249	101	H
874.9938	12.71	QP	22.5	4.8	40.01	46	-5.99	236	105	H
800.011	11.38	QP	21.3	4.4	37.08	46	-8.92	105	122	V
500.0009	17.72	QP	17.7	3.4	38.82	46	-7.18	97	114	V
625.002	15.06	QP	19.5	4	38.56	46	-7.44	226	101	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
QP - Quasi-Peak detector

HORIZONTAL & VERTICAL PLOT



908.42MHz

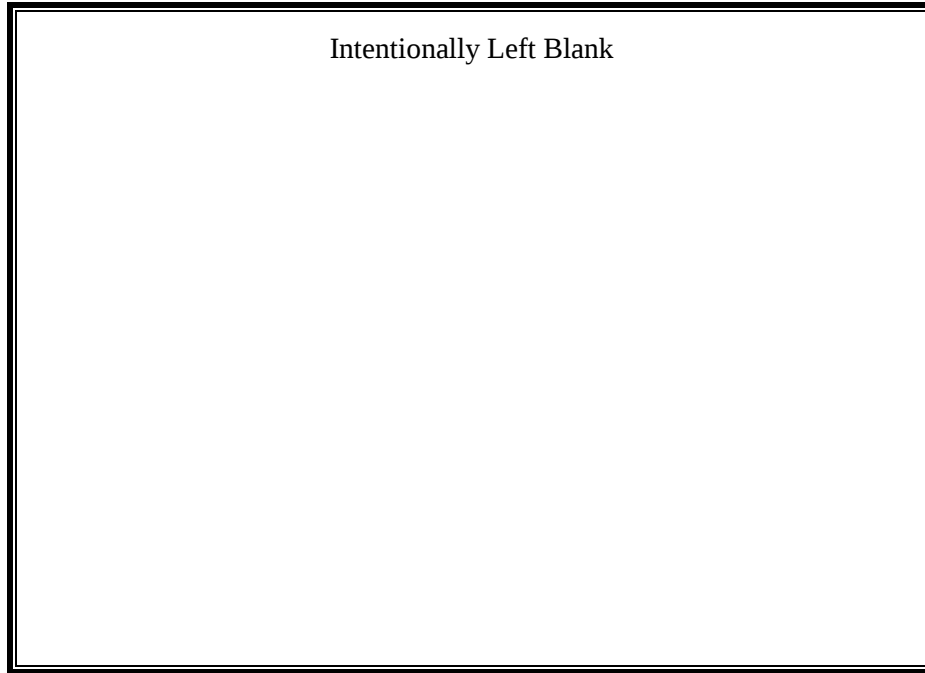
Note: frequency observed in the restricted band where identical as the 908.4MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	AF-84106 [dB/m]	GL [dB]	Corrected Reading (dBuV/m)	FCC Pt 15 SubC 15.209 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 108.8163	21.94	PK	12.6	1.5	36.04	43.5	-7.46	49	101	V
* 74.5592	23.06	PK	7.6	1.2	31.86	40	-8.14	254	104	V
* 250	22.51	PK	12.1	2.3	36.91	46	-9.09	356	129	H
* 250.0023	20.75	PK	12.3	2.3	35.35	46	-10.65	210	101	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK - Peak detector

9. SETUP PHOTOS

ANTENNA PORT MEASUREMENT SETUP



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED EMISSION (FRONT)
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LINE CONDUCTED EMISSION (BACK)
Intentionally Left Blank

RADIATED RF MEASUREMENT SETUP CONFIGURATION

X-AXIS FRONT PHOTO

Intentionally Left Blank

Y-AXIS BACK PHOTO

Intentionally Left Blank

Z-AXIS FRONT PHOTO

Intentionally Left Blank

RADIATED RF MEASUREMENT SETUP (BELOW 1 GHz)

RADIATED FRONT PHOTO (BELOW 1 GHz)
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RADIATED BACK PHOTO (BELOW 1 GHz)
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RADIATED RF MEASUREMENT SETUP (ABOVE 1 GHz)

RADIATED FRONT PHOTO (ABOVE 1 GHz)
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RADIATED BACK PHOTO (ABOVE 1 GHz)
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END OF REPORT