

FCC CFR47 PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

Z-WAVE WIRELESS DOOR/WINDOW SENSOR

MODEL NUMBER: DWZWAVE1

FCC ID: XQC-DWZ1 IC: 9863B-DWZ1

REPORT NUMBER: 12U14240-1, Revision B

ISSUE DATE: APRIL 06, 2012

Prepared for ECOLINK INTELLIGENT TECHNOLOGY, INC. 2055 CORTE DEL NOGAL CARLSBAD, CALIFORNIA 92011, U.S.A.

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
	02/07/12	Initial Issue	F. Ibrahim
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Pass

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1. ATTESTATION OF TEST RESULTS

INDUSTRY CANADA RSS-210 Issue 8, Annex 1

INDUSTRY CANADA RSS-GEN Issue 3

compliance with the requirements as documented in this report.

	ANDARD	TEST RESULTS Pass			
APPLICABLE STANDARDS					
DATE TESTED:	FEBRUARY 6, 2012				
SERIAL NUMBER:	DW-012 AND DW-029				
MODEL:	DWZWAVE1				
EUT DESCRIPTION:	Z-WAVE WIRELESS DOOR/WINDOW	V SENSOR			
COMPANY NAME:	ECOLINK INTELLIGENT TECHNOLC 2055 CORTE DEL NOGAL CARLSBAD, CA 92011, U.S.A.	IGY, INC.			

	F 855	
Compliance Certification Services (UL CCS) tested the above equipr	ment in accordance wit	h the
requirements set forth in the above standards. All indications of Pass	/Fail in this report are	
opinions expressed by UL CCS based on interpretations and/or obse	ervations of test results	
Measurement Uncertainties were not taken into account and are pub	lished for informational	
purposes only. The test results show that the equipment tested is ca	pable of demonstrating	

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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS 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 CCS By:

FRANK IBRAHIM EMC SUPERVISOR UL CCS

Tested By:

auton guym

THANH NGUYEN EMC ENGINEER UL CCS

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4:2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://www.ccsemc.com</u>.

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
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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 Wireless Door/Window Sensor.

5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of -10dBi.

5.3. SOFTWARE AND FIRMWARE

The "Continuous TX" sample contains firmware ESW1025P-01-006 (Rev 006) and firmware ESW1025ZTEST-01-004 (Rev 004). The "Factory Product" sample contained ESW1025P-01-006 (Rev 006) and ESW1025Z-01-004 (Rev 004).

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT was investigated in three orthogonal orientations X,Y and Z to find worst-case orientation, it was determined that X orientation is the worst-case orientation, therefore, all final radiated testing was conducted with EUT in X orientation.

The EUT operates at a single frequency, which is 908.42 MHz.

EUT in continuous transmission mode was used for the following test items:

- Peak Fundamental, Harmonics and Spurious radiated emission.
- RX Spurious emission.
- 99% BW.
- 20 dB BW.

EUT (factory default) in normal operation was triggered to transmit and the following was measured:

- Duty Cycle
- Transmission Time

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Not Applicable; EUT is stand-alone unit.

I/O CABLES

Not Applicable; EUT is stand-alone unit.

TEST SETUP

The EUT is a stand-alone unit that is powered by battery.

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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	Mode	Asset	Cal Date	Cal Due
Preamplifier, 26.5 GHz	Agilent/HP	8449B	C01052	6/13/2011	6/13/2012
Preamplifier, 1300 MHz	Agilent/HP	8447D	C01048	7/16/2011	7/16/2012
BiLog Antenna	ETS	3117	C01005	7/25/2011	7/25/2012
Antenna, Horn, 18 GHz	EMCO	31158	C00945	6/26/2011	6/26/2012
Preamplifier, 26.5 GHz	Agilent/HP	8449B	C01052	8/7/2007	6/17/2012
PSA	Agilent	E4440A	T129	4/28/2011	4/28/2012

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7. ANTENNA PORT TEST RESULTS

7.1. 20 dB AND 99% BW

<u>LIMITS</u>

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.

IC A1.1.3

For the purpose of Section A1.1, the 99% Bandwidth shall be no wider than 0.25% of the center frequency for devices operating between 70-900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

TEST PROCEDURE

ANSI C63.4

The transmitter output is connected to the spectrum analyzer.

20dB Bandwidth: The RBW is set to 100 KHz. The VBW is set to 300 KHz. The sweep time is coupled. Bandwidth is determined at the points 20 dB down from the modulated carrier.

99% Bandwidth: 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.

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RESULTS

20dB Bandwidth

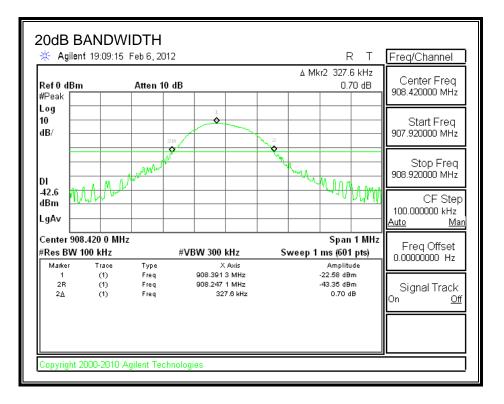
Frequency	20dB Bandwidth	Limit	Margin
(MHz)	(kHz)	(kHz)	(kHz)
908.42	327.6	4542.1	-4214.5

99% Bandwidth

Frequency	99% Bandwidth	Limit	Margin
(MHz)	(kHz)	(kHz)	(kHz)
908.42	89.3055	4542.1	-4452.7945

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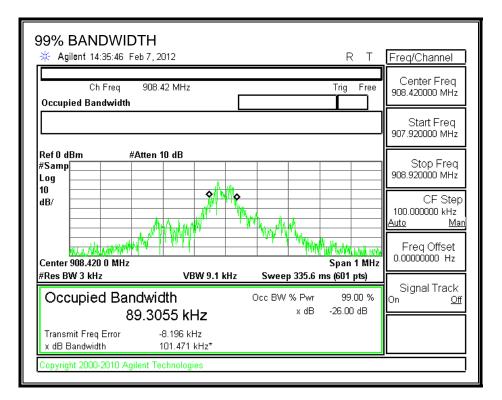
20dB BANDWIDTH



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99% BANDWIDTH



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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. The RBW is set to 100 kHz and the VBW is set to 100 kHz. 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

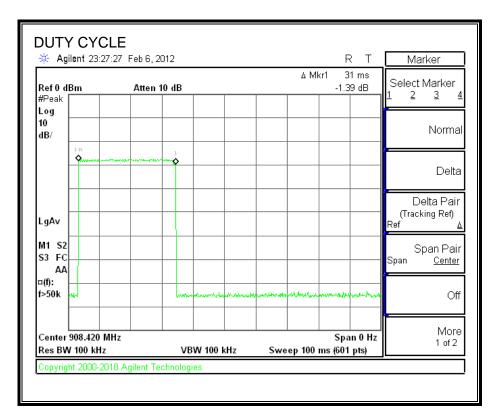
Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is (# of long pulses * long pulse width) + (# of short pulses * short pulse width) / 100 or T

<u>RESULT</u>

One	Long Pulse	# of	Short	# of	Duty	20*Log
Period	Width	Long	Width	Short	Cycle	Duty Cycle
(ms)	(ms)	Pulses	(ms)	Pulses		(dB)

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DUTY CYCLE



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7.3. TRANSMISSION TIME

LIMITS

FCC §15.231 (a) (2)

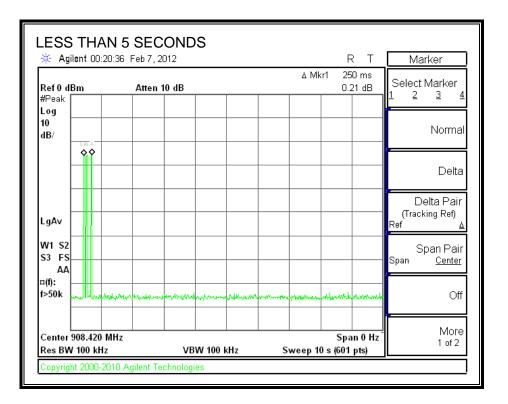
IC A1.1.1 (b)

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. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is set to 10 seconds and the span is set to 0 Hz.

RESULTS



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8. RADIATED EMISSION TEST RESULTS

8.1. TX RADIATED SPURIOUS EMISSION

<u>LIMITS</u>

FCC §15.231 (b) IC A1.1.2

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	Field Strength of	Field Strength of
Frequency	Fundamental Frequency	Spurious Emissions
(MHz)	(microvolts/meter)	(microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,7501	125 to 3751
174 - 260	3,750	375
260 - 470	3,750 to 12,5001	375 to 1,2501
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	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(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.

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TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. 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.

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RESULTS

8.1.1. FUNDAMENTAL AND TX SPURIOUS 30-1000 MHz

56 PH	FCC, V	CCI, CISPR, A, TUV, BSM Y ROAD, S 163-0885	II, DHHS, I	NVLAP	-9001				Rej Date&	ject #: port #: Time: Engr:	12U14240 12U14240 02/06/12 Thanh Nguy	en		
		Test C	T Descri onfigur Type oj	ation : f Test:	Z-Wave Stand-al FCC 15.	Wireless D one EUT, t 15.231b	Technology loor Windor battery ope ontinuously	w Sensor rated						
		Duty Cyc	le	31.00%	Av Reading = Pk Reading + 20*log(M%) 20 * log (M%) = -10.17									
Freq.	Pk Rdg	Av Rdg	AF		Pre-amp		Av Level	Pk Limit			Avg Margin	Pol	Az	Height
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	FCC_B	FCC_B	(dB)	(dB)	(H/V)	(Deg)	(Meter)
908.42 908.42	(EUT Lay 54.66 67.23 (EUT Star	44.49 57.06	17.00 17.00	1.82 1.82	0.00 0.00	73.48 86.05	63.31 75.88	101.94 101.94	81.94 81.94	-28.46 -15.89	-18.63 -6.06	3mV 3mH	0.00 0.00	1.00 2.00
908.42 908.42 Z-Position	64.71 54.47 (EUT Side	54.54 44.30 Lay dowr	17.00 17.00 ו)	1.82 1.82	0.00 0.00	83.53 73.29	73.36 63.12	101.94 101.94	81.94 81.94	-18.41 -28.65	-8.58 -18.82	3mV 3mH	0.00 0.00	1.00 2.00
908.42 908.42	54.44 62.38	44.27 52.21	17.00 17.00	1.82 1.82	0.00 0.00	73.26 81.20	63.09 71.03	101.94 101.94	81.94 81.94	-28.68 -20.74	-18.85 -10.91	3mV 3mH	0.00 0.00	1.00 2.00
	no oth of 30-'			vere o	obser	ved ab	pove th	e syst	em no	oise floo	or in the	frequ	lency	

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8.1.2. HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 1GHz

ompany			Feelink inte	lligent T	'achnol	ory Inc.									
Company: Ecolink intelligent Technology, Inc Project #: 12U14240						ogy, 1nc,									
Date: 2/6/2012															
Test Engineer: Thanh Nguyen															
Configuration: EUT at worst Position Mode: Transmitting continuously						Duty Cycl	le	31.0%		20 log(duty o	cvcle)	-10.17			
	ipment:			,			2011.0	ic .			20 - B	cycar)			
		-18GHz	Pre-at	mplifer	1-260	GH7	Pre-amplifer 26-40GHz Horn > 18GHz Limit								
T60; S/N: 2238 @3m			T34 HF		VII2	Fie-un.	phre.	20-40-01	- -		FCC 15.231(b)				
Hi Frequ	uency Cable	les								<u>ו</u>					I
3' cable 22807700			12' c	28076	500	20' cat	ole 22	2807500		HPF	Re	ject Filte	i <u>k Measurements</u> W=VBW=1MHz		
3' ca	able 228	07700	- 12' ca	able 2280)7600	-	20' cable	e 2280	7500 👻	HPF	F_1.5GHz	•		Aver	age Measurements 1MHz ; VBW=10Hz
f CH-	Dist		Read Avg.	AF JD/m	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar		Notes
GHz	(m) cs and Sp	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
armonic 817	cs and Sp 3.0	46.4	36.2	27.5	3.8	-36.6	0.0	0.3	41.4	31.2	81.94	61.94	-40.5	-30.7	V
725	3.0	44.3	34.1	29.5	4.9	-35.5	0.0	0.6	43.7	33.6	74.00	54.00	-30.3	-20.4	V
817	3.0	47.4	37.2	27.5	3.8	-36.6	0.0	0.3	42.4	32.2	81.94 74.00	61.94 54.00	-39.6	-29.7	H
	3.0	44.8	34.6	29.5	4.9	-35.5	0.0	0.6	44.2	34.1	74.00	54.00	-29.8	-19.9	Н
725	1	·	·	· .		1	.i							1	
	= PK + 2	20 log (duty	cycle)	1	T		I		I					I	
ote: AV =			1												
ote: AV =			cycle) cted above 3rd	l harmor	nics										
iote: AV =	emission 8.11 f Dist	ns were detec Measureme Distance to	ent Frequency					Correc	ect to 3 mete			Pk Lim	Peak Fiel	Field Strengt d Strength L	imit
ev. 07.08	emission 8.11 f Dist	ns were deter	ent Frequency o Antenna Reading			-	Distance Average I	Correc Field S	oct to 3 mete Strength @ k Field Stre	3 m		Pk Lim Avg Mar	Peak Fiel Margin v	-	imit .imit

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8.2. RX RADIATED SPURIOUS EMISSION

<u>LIMITS</u>

IC RSS-Gen Issue 2, section 7.2.3.2

All spurious emissions shall comply with the limits shown below:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m						
Frequency range	Quasi-peak limits					
(MHz)	(dBµV/m)					
30 to 88	40					
88 to 216	43.5					
216 to 960	46					
Above 960 MHz 54						
Note: The lower limit shall apply at the transition frequency.						

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to receive in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 5th harmonic is investigated with the transmitter set to the middle channel.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. 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.

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RESULTS

RECEIVER SPURIOUS EMISSION (30MHz - 1GHz)

No signals were observed in the RX mode above the system noise floor.

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RECEIVER SPURIOUS EMISSION ABOVE 1GHz

No signals were observed in the RX mode above the system noise floor.

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