

FCC RADIO TEST REPORT

For

FCC ID: 2AV2A-ZWC663E269WD

IC: 4142A-ZWC663E269W

Report Reference No..... : 20EFGB03024 1921

Date of issue..... : 2020-03-19

Testing Laboratory..... : DongGuan ShuoXin Electronic Technology Co., Ltd.

Address..... : Zone A, 1F, No. 6, XinGang Road YuanGang Street, XinAn
District, ChangAn Town, DongGuan City, GuangDong, China

Applicant's name..... : All-line International Inc

Address..... : 12F, No.221, Sec.4 Zhongxiao East Road, Daan District, Taipei,
Taiwan

Manufacturer..... : All-line International Inc

Test specification:


Test item description..... : Z-Wave Dimming LED Bulb

Trade Mark : N/A

Model/Type reference..... : ZW-C663E26-9WD

Ratings..... : I/P: 120VAC 60Hz

Responsible Engineer :


Smile Wang

Authorized Signatory:

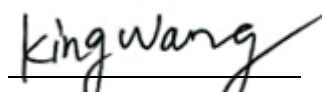

King Wang

TABLE OF CONTENTS

1. Summary of test Standards and results	3
2. General test information.....	4
2.1. Description of EUT	4
2.2. Accessories of EUT	4
2.3. Assistant equipment used for test.....	4
2.4. Block diagram of EUT configuration for test.....	4
2.5. Test environment conditions.....	5
2.6. Measurement uncertainty.....	5
2.7. Table Of Parameters Of Test Software Setting	5
3. 99% Occupied Bandwidth	6
3.1. Test equipment	6
3.2. Block diagram of test setup.....	6
3.3. Limits	6
3.4. Test Procedure	6
3.5. Test Result.....	7
3.6. Original test data.....	7
4. Field Strength of Spurious Emissions And Field Strength of Fundamental	8
4.1. Test equipment	8
4.2. Block diagram of test setup.....	8
4.3. Limit	9
4.4. Test Procedure	11
4.5. Test result	12
5 Power Line Conducted Emission.....	20
5.1 Test equipment	20
5.2 Block diagram of test setup.....	20
5.3 Power Line Conducted Emission Limits(Class B)	20
5.4 Test Procedure.....	21
5.5 Test Result.....	21
6 Frequency Stability	24
6.1. Test equipment	24
6.2. Block diagram of test setup.....	24
6.3 Test Result.....	25

TEST REPORT DECLARE

Applicant	:	All-line International Inc
Address	:	12F, No.221, Sec.4 Zhongxiao East Road, Daan District, Taipei, Taiwan
Equipment under Test	:	Z-Wave Dimming LED Bulb
Test Model No	:	ZW-C663E26-9WD
Manufacturer	:	All-line International Inc
Address	:	12F, No.221, Sec.4 Zhongxiao East Road, Daan District, Taipei, Taiwan

Test Standard Used: FCC Rules and Regulations Part 15 Subpart C (15.249)

RSS-210 Issue 10 December 2019

Test procedure used: ANSI C63.10:2013; RSS-GEN Issue 5, March 2019

We Declare:

The equipment described above is tested by DongGuan ShuoXin Electronic Technology Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and DongGuan ShuoXin Electronic Technology Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	20EFGB03024 1921		
Date of Test:	2020-03-19 To 2020-04-07	Date of Report:	2020-04-07

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of DongGuan ShuoXin Electronic Technology Co., Ltd.

1. Summary of test Standards and results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Results
AC Line Conducted Emissions	FCC Part 15.207 (a), RSS-GEN 8.8	PASS
99% Bandwidth	15.215(c), RSS-GEN 6.7	PASS
Radiated emission	FCC Part 15.209, 15.249 (a), RSS-GEN 8.9	PASS
Bandedge	15.205(d), RSS-210 B.10 (b)	PASS
Frequency Stability	RSS-GEN section 6.11	PASS

NOTE: "N/A" denotes test is not applicable in this Test Report

2. General test information

2.1. Description of EUT

EUT* Name	:	Z-Wave Dimming LED Bulb
Model Number	:	ZW-C663E26-9WD
EUT function description	:	Please reference user manual of this device
Power supply	:	AC120V 60Hz
Adaptor	:	N/A
Operation frequency	:	908.4MHz
Modulation	:	GFSK
Antenna Type	:	Internal Antenna, maximum PK gain: 0dBi
Date of Receipt	:	2020/03/19
Sample Type	:	Single production
Hardware Version	:	V1.0
Software Version	:	V1.0

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number or Type	Other
/	/	/	/

2.3. Assistant equipment used for test

Description of Assistant equipment	Manufacturer	Model number or Type	Other
/	/	/	/

2.4. Block diagram of EUT configuration for test



2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25°C
Humidity range:	40-75%
Pressure range:	86-106kPa

2.6. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test (9kHz-150kHz)	3.7 dB
Uncertainty for Conduction emission test (150kHz-30MHz)	3.3 dB
Uncertainty for Radiation Emission test (30MHz-200MHz)	4.60 dB (Polarize: V)
	4.60 dB (Polarize: H)
Uncertainty for Radiation Emission test (200MHz-1GHz)	6.10 dB (Polarize: V)
	5.08 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz-6GHz)	5.01 dB (Polarize: V)
	5.01 dB (Polarize: H)
Uncertainty for Radiation Emission test (6GHz-18GHz)	5.26 dB (Polarize: V)
	5.26 dB (Polarize: H)
Uncertainty for Radiation Emission test (18GHz-40GHz)	5.06 dB (Polarize: V)
	5.06 dB (Polarize: H)
Uncertainty for radio frequency	$\pm 0.048\text{kHz}$
Uncertainty for conducted RF Power	$\pm 0.32\text{dB}$

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.7. Table Of Parameters Of Test Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

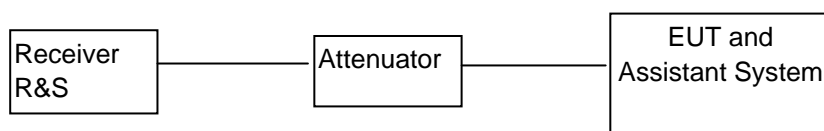
Test Software Version	
Frequency (MHz)	908
Power Parameters (GFSK)	default

3. 99% Occupied Bandwidth

3.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Calibrated Date
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	05/27/2020	05/28/2019
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A	N/A
3	RF Cable	Micable	C10-01-01-1	100309	N/A	N/A

3.2. Block diagram of test setup



3.3. Limits

N/A

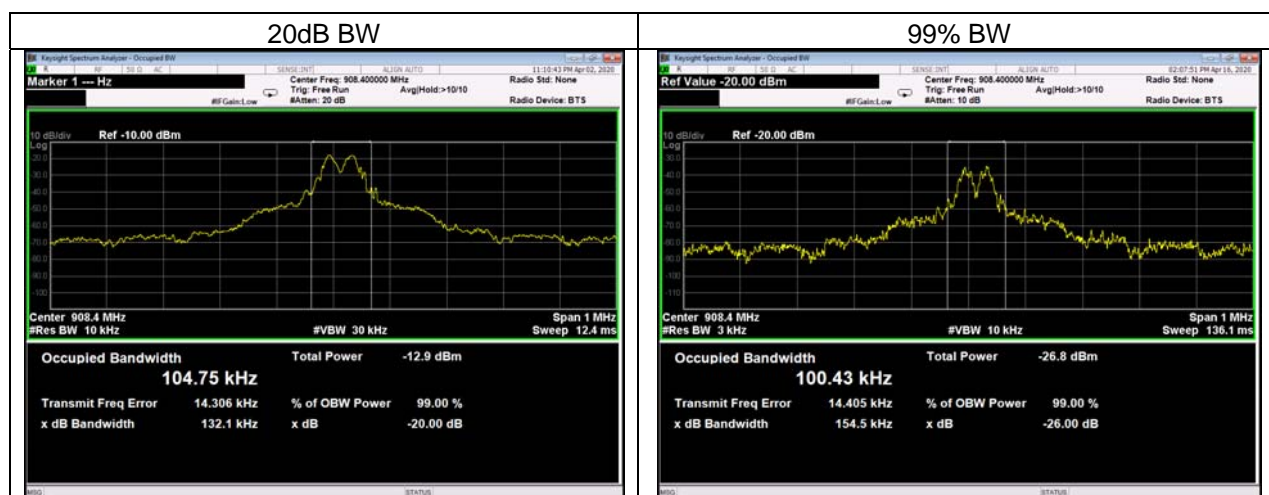
3.4. Test Procedure

- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (3) Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
- (4) Repeat above procedures until all frequencies measured were complete.

3.5. Test Result

Frequency (MHz)	20dB Bandwidth (kHz)	99% dB bandwidth (kHz)
908	132.1	100.43

3.6. Original test data



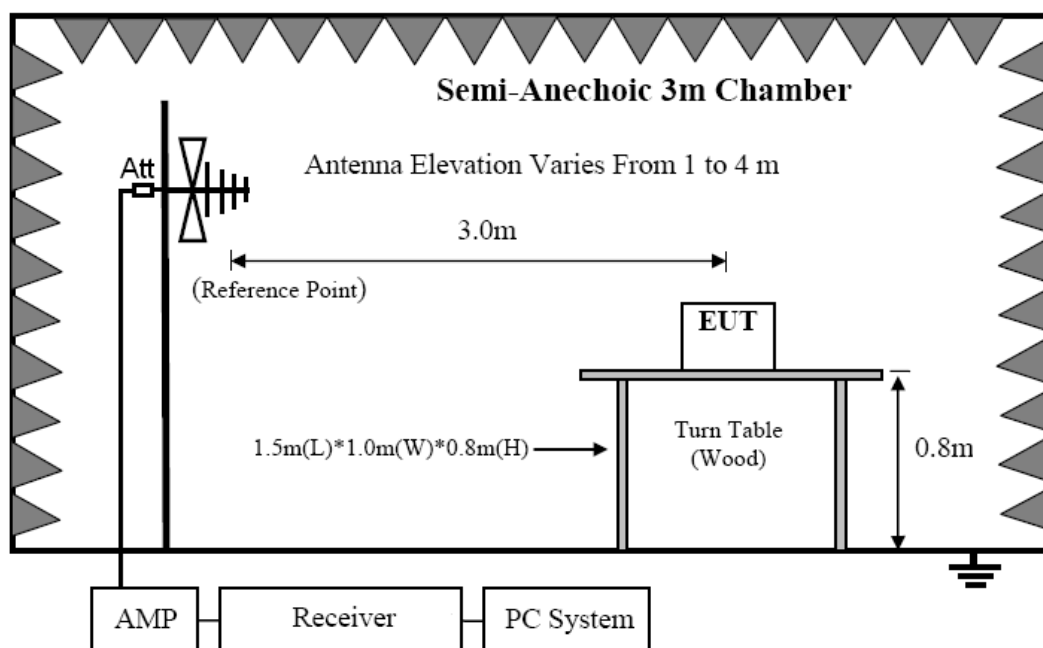
4. Field Strength of Spurious Emissions And Field Strength of Fundamental

4.1. Test equipment

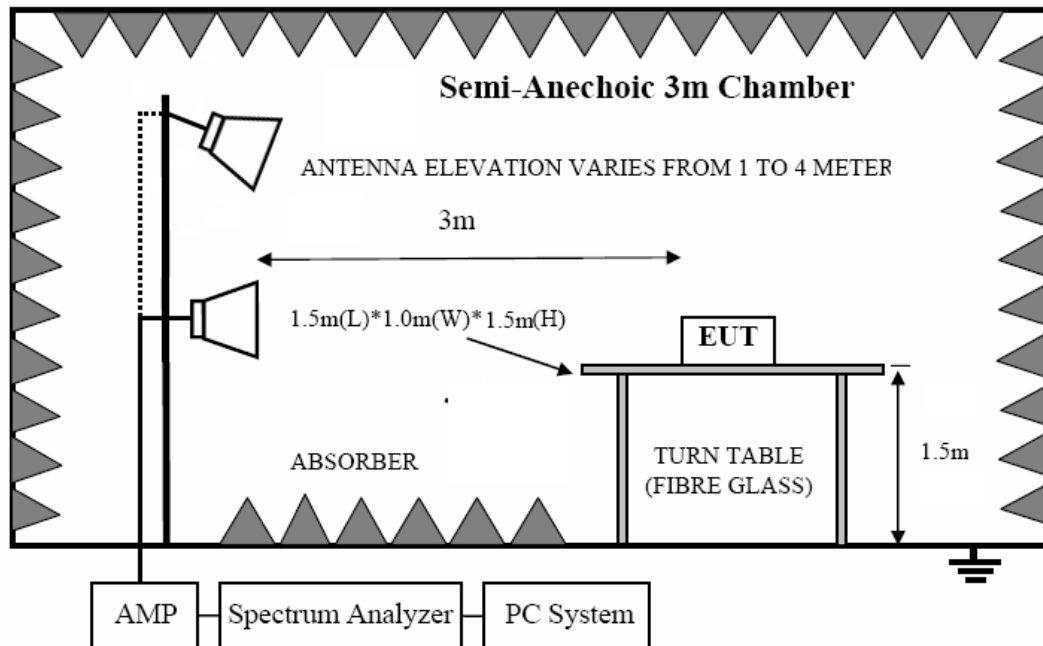
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Calibrated Date
1	EMI Test Receiver	R&S	ESCI	101307	12/12/2020	1 Year
2	Spectrum Analyzer	Agilent	E4407B	US40240708	11/17/2020	1 Year
3	Loop antenna	SCHWARZBECK K	FMZB1519	1519-062	12/14/2020	1 Year
4	Broadband antenna	SCHWARZBECK	VULB9168	VULB9168-192	03/22/2021	1 Year
5	HORN ANTENNA	SCHWARZBECK	BBHA9120D	BBHA 9120D 1065	04/16/2020	1 Year
6	Preamplifier Amplifier	HP	8447F	3113A05680	12/11/2020	1 Year
7	PRE-AMPLIFIER	CY	EMC011830	980136	12/11/2020	1 Year
8	RF Cable	R&S	Test Cable 4	4	12/11/2020	1 Year
9	RF Cable	R&S	Test Cable 5	5	12/11/2020	1 Year
10	RF Cable	R&S	Test Cable 9	9	04/22/2020	1 Year
11	RF Cable	R&S	Test Cable 10	10	12/11/2020	1 Year
12	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A	N/A

4.2. Block diagram of test setup

In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

4.3. Limit

6.3.1 FCC 15.205 Restricted frequency band

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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

6.3.2 FCC 15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

6.3.3 FCC 15.249(a) limit

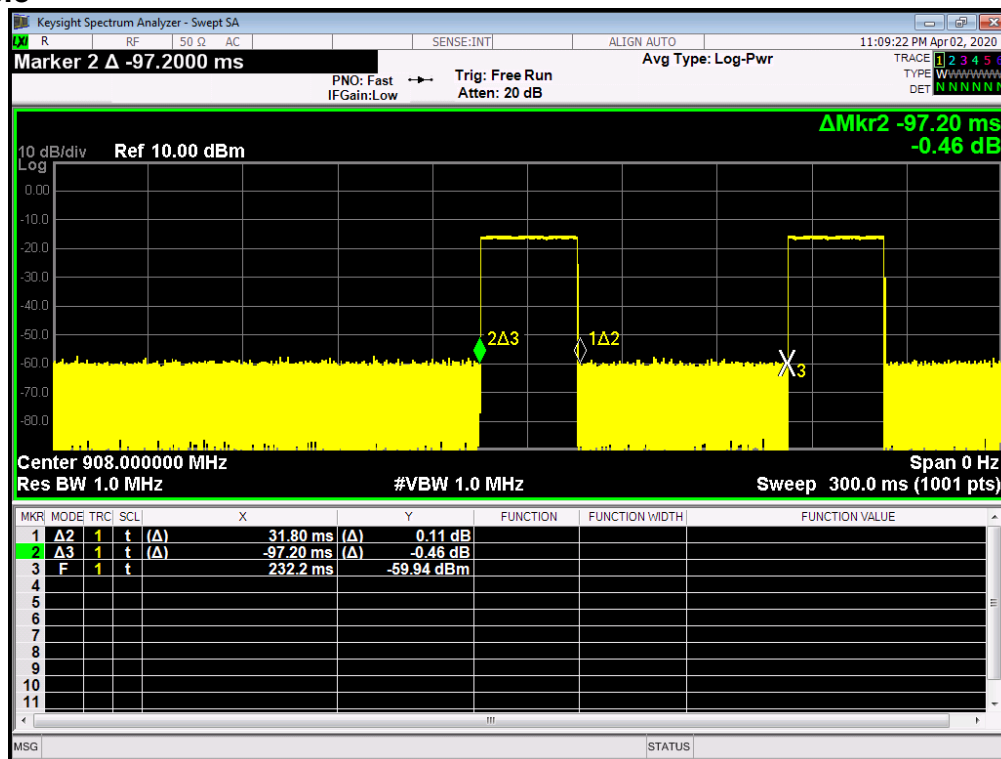
Fundamental Frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24.0-24.25	250	2500

4.4. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.4 and 8.2
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Change power supply range from 85% to 115% of the rated supply voltage
 - (d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9MHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.
- (6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 KHz.
- (7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure, Detector is at PK; RBW is set at 1MHz, VBW is set at 3MHz for Average measure, Detector is at RMS..
- (8) For Field Strength of Fundamental were measured with Spectrum Analyzer, and the RBW is set at above 99% Occupied Bandwidth , VBW is set at equal to RBW for Peak measure, Detector is at PK
- (9) $AVG = Peak + 20 \log(Duty\ Cycle) = PEAK - 9.70$

4.5. Test result

Duty Cycle



$$\text{DUTY CYCLE} = \text{ON TIME} / \text{TOTAL TIME} = 31.80\text{ms} / 97.20 \approx 0.327$$

$$\text{AVG} = \text{PEAK} + 20\text{LOG}(\text{DUTY CYCLE}) = \text{PEAK} + 20\text{LOG}0.327 = \text{PEAK} - 9.70$$

Below 30M

EUT:	Z-Wave Dimming LED Bulb	Model No.:	ZW-C663E26-9WD
Temperature:	24°C	Relative Humidity:	55%
Distance:	3m	Test Power:	AC120V/60Hz
Polarization:	--	Test Result:	Pass
Test Mode:	Keeping TX mode	Test By:	Smile

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

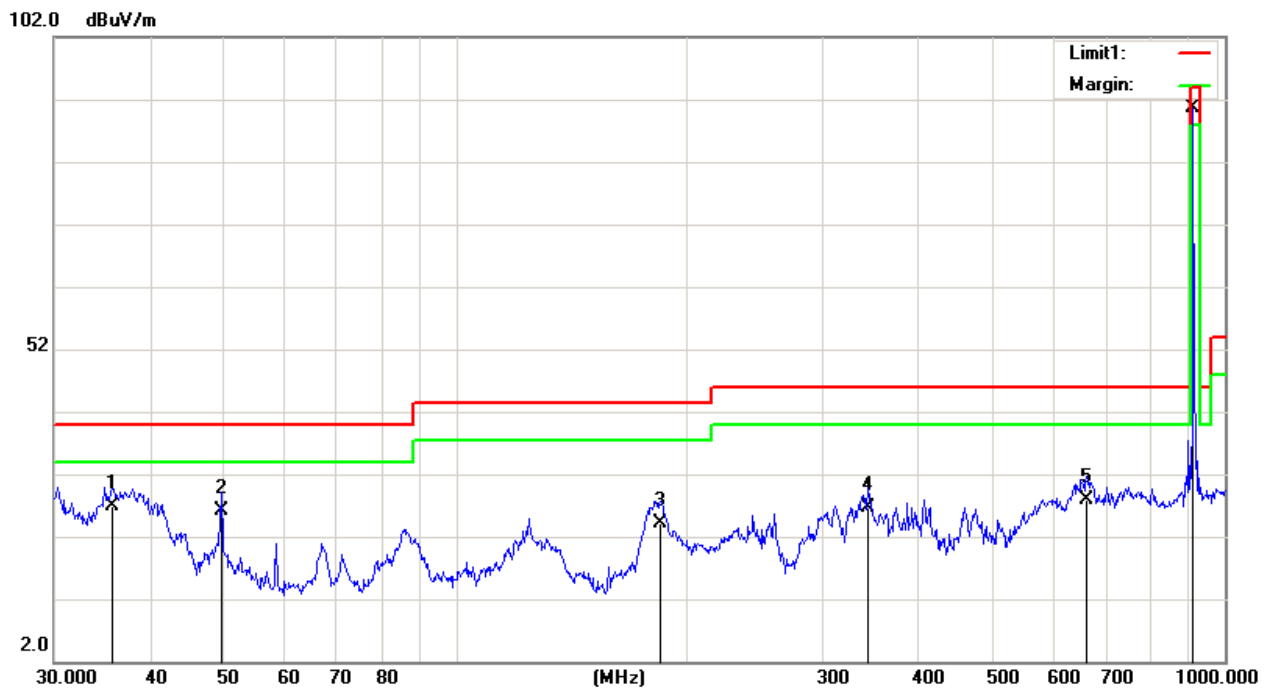
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $20 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor

Between 30M – 1000 MHz

EUT:	Z-Wave Dimming LED Bulb	Model No.:	ZW-C663E26-9WD
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	AC 120V/60Hz
Polarization:	Vertical	Test Result:	Pass
Test Time:	2020-4-2	Test By:	
Standard:	(RE)FCC PART 15.249 30M-1G		
Test Mode:	TX		
Note:			



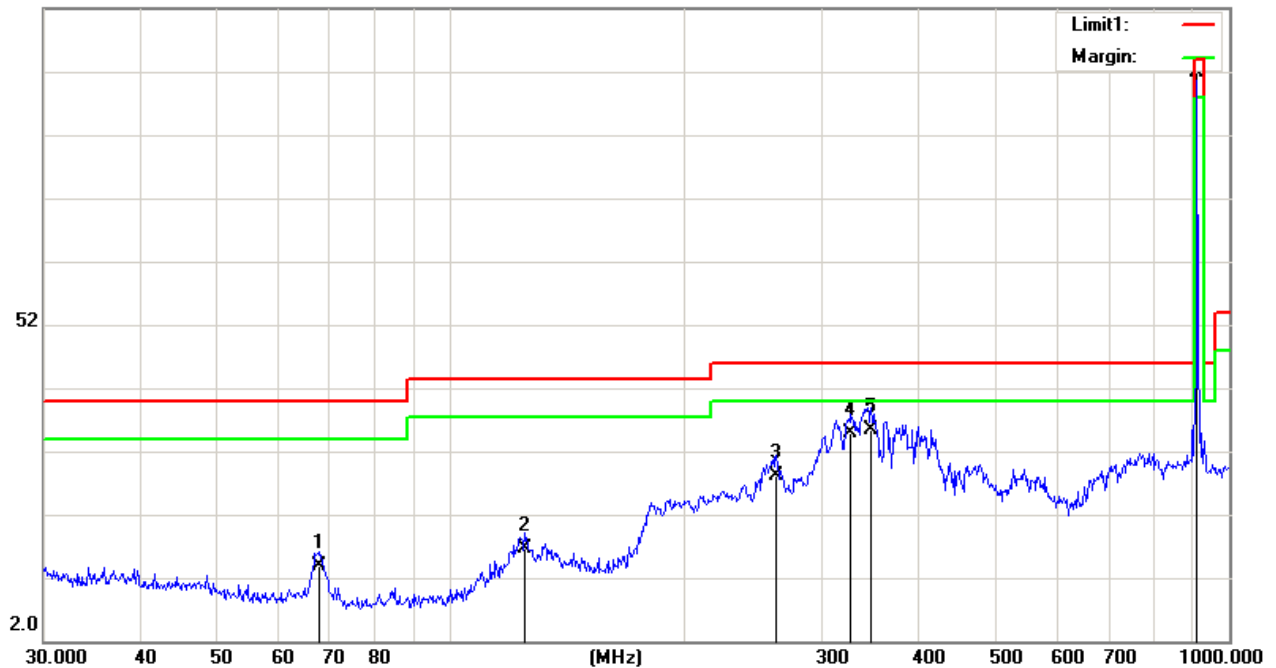
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	35.7490	40.28	-13.38	26.90	40.00	-13.10	QP
2	49.5328	39.37	-13.20	26.17	40.00	-13.83	QP
3	184.4898	35.33	-11.11	24.22	43.50	-19.28	QP
4	343.1800	34.18	-7.54	26.64	46.00	-19.36	QP
5	661.1505	30.08	-2.29	27.79	46.00	-18.21	QP
6	909.6667	87.14	3.51	90.65	94.00	-3.35	QP

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	Z-Wave Dimming LED Bulb	Model No.:	ZW-C663E26-9WD
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	AC 120V/60Hz
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2020-4-2	Test By:	
Standard:	(RE)FCC PART 15.249 30M-1G		
Test Mode:	TX		
Note:			

102.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	67.6751	29.46	-15.63	13.83	40.00	-26.17	QP
2	124.5690	29.34	-12.64	16.70	43.50	-26.80	QP
3	261.9753	33.05	-4.84	28.21	46.00	-17.79	QP
4	326.7395	43.18	-8.24	34.94	46.00	-11.06	QP
5	346.8092	43.22	-7.81	35.41	46.00	-10.59	QP
6	909.6667	88.38	3.51	91.89	94.00	-2.11	QP

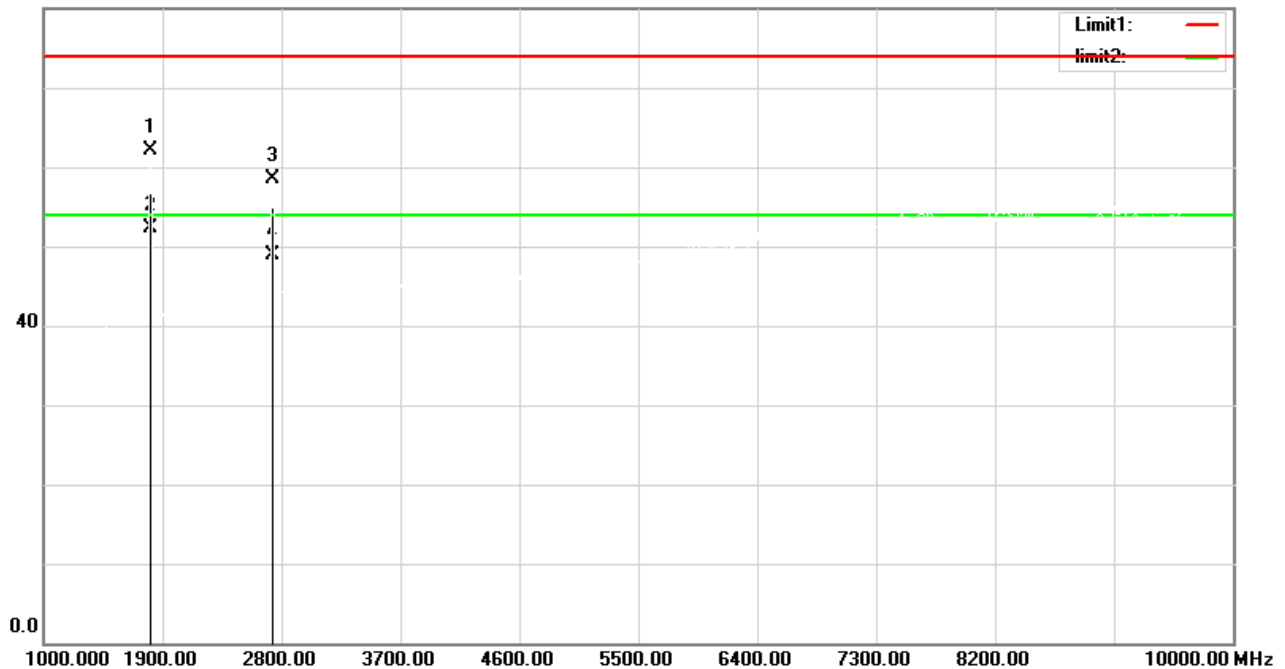
The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

Between 1000M – 10000 MHz

EUT:	Z-Wave Dimming LED Bulb	Model No.:	ZW-C663E26-9WD
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	AC 120V/60Hz
Polarization:	Vertical	Test Result:	Pass
Test Time:	2020-4-7	Test By:	
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:			

80.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1810.000	74.54	-12.47	62.07	74.00	-11.93	peak
2	2732.500	67.56	-9.00	58.56	74.00	-15.44	peak

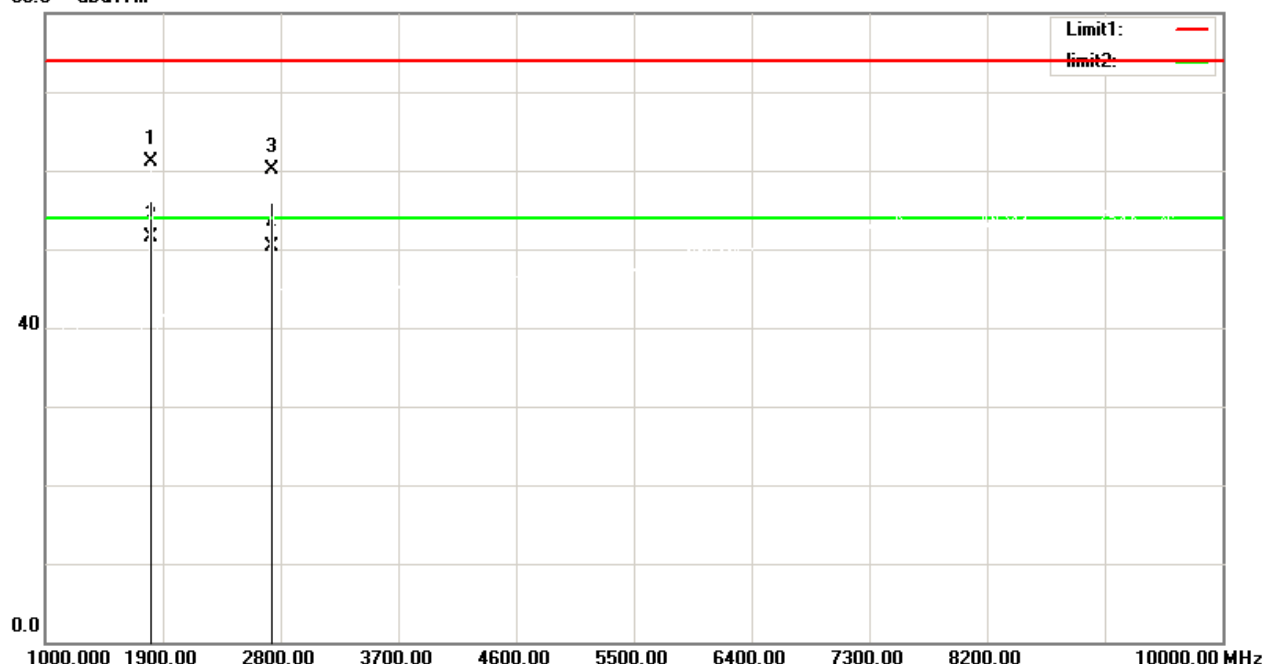
No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1810.00	52.37	54	-1.63	AVG
2	2732.5	48.86	54	-5.14	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result – Limit
- (4) AVG=Peak+20Log(Duty Cycle)=Peak-9.70

EUT:	Z-Wave Dimming LED Bulb	Model No.:	ZW-C663E26-9WD
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	AC 120V/60Hz
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2020-4-7	Test By:	
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:			

80.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1810.000	73.61	-12.47	61.14	74.00	-12.86	peak
2	2732.500	69.08	-9.00	60.08	74.00	-13.92	peak

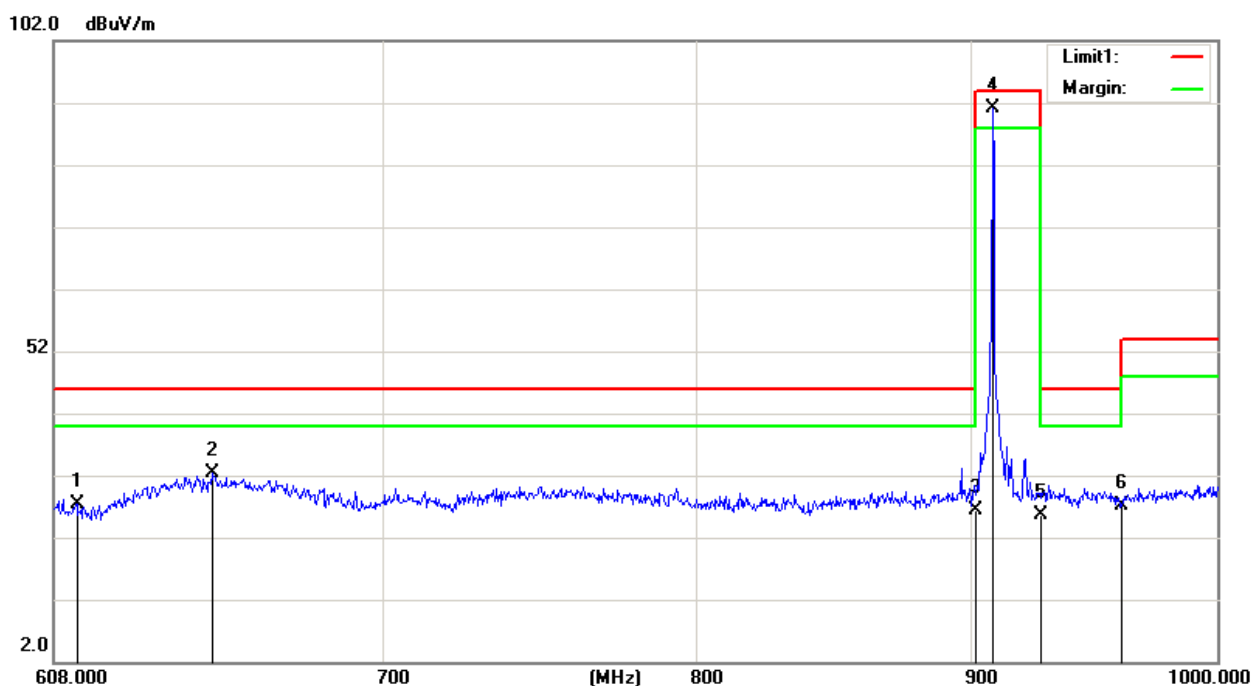
No.	Frequency (MHz)	Result (dBuV/m)	Limit dBuV/m)	Margin (dB)	Remark
1	1810.00	51.44	54	-2.56	AVG
2	2732.5	50.38	54	-3.62	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result – Limit
- (4) AVG=Peak+20Log(Duty Cycle)=Peak-9.70

Radiated band edge and Field Strength of Fundamental

EUT:	Z-Wave Dimming LED Bulb	Model No.:	ZW-C663E26-9WD
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	AC 120V/60Hz
Polarization:	Vertical	Test Result:	Pass
Test Time:	2020-4-2	Test By:	
Standard:	(RE)FCC PART 15.249 30M-1G		
Test Mode:	TX		
Note:			

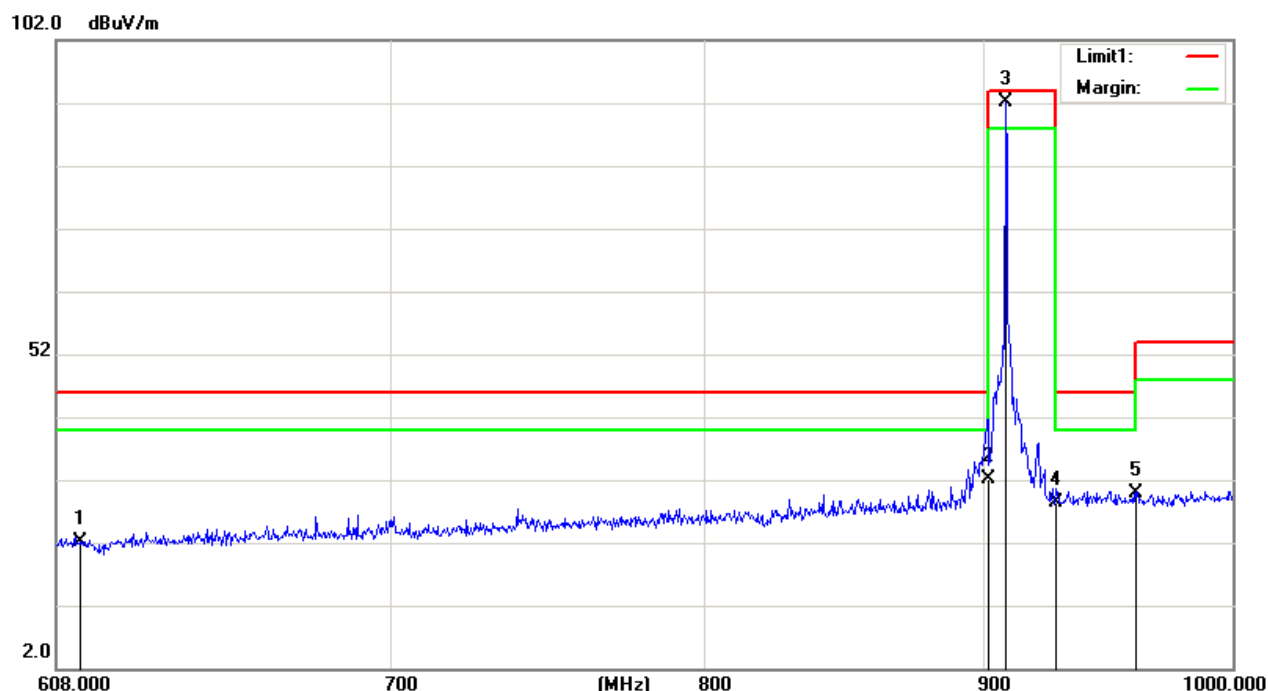


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	614.0000	30.41	-3.13	27.28	46.00	-18.72	peak
2	650.5680	34.94	-2.48	32.46	46.00	-13.54	peak
3	902.0000	23.57	2.81	26.38	46.00	-19.62	QP
4	908.4340	87.58	3.49	91.07	94.00	-2.93	peak
5	928.0000	21.99	3.72	25.71	46.00	-20.29	QP
6	960.0000	24.11	3.09	27.20	46.00	-18.80	peak

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	Z-Wave Dimming LED Bulb	Model No.:	ZW-C663E26-9WD
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	AC 120V/60Hz
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2020-4-2	Test By:	
Standard:	(RE)FCC PART 15.249 30M-1G		
Test Mode:	TX		
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	614.0000	25.27	-3.13	22.14	46.00	-23.86	peak
2	902.0000	28.62	3.41	32.03	46.00	-13.97	QP
3	908.4340	88.73	3.49	92.22	94.00	-1.78	peak
4	928.0000	24.69	3.72	28.41	46.00	-17.59	QP
5	960.0000	25.70	4.09	29.79	46.00	-16.21	peak

The test result is calculated as the following:

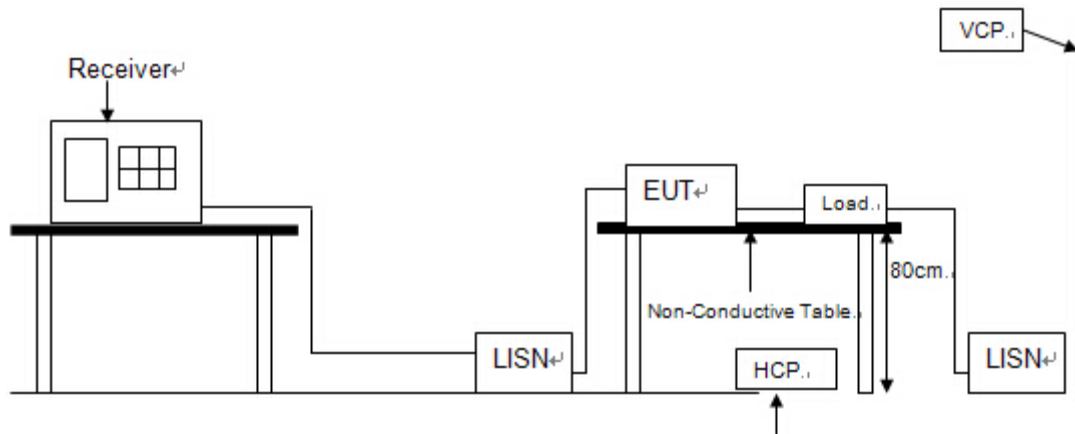
- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

5 POWER LINE CONDUCTED EMISSION

5.1 Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Calibrated Date
1	Pulse Limiter	MTS-systemtechnik	MTS-IMP-136	261115-010-0024	12/11/2020	1 Year
2	EMI Test Receiver	R&S	ESCI	101308	12/11/2020	1 Year
3	LISN	AFJ	LS16	16011103219	06/09/2020	1 Year
4	LISN	Schwarzbeck	NSLK 8127	8127-432	12/11/2020	1 Year
5	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A	N/A

5.2 Block diagram of test setup



5.3 Power Line Conducted Emission Limits(Class B)

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

5.4 Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 KHz.

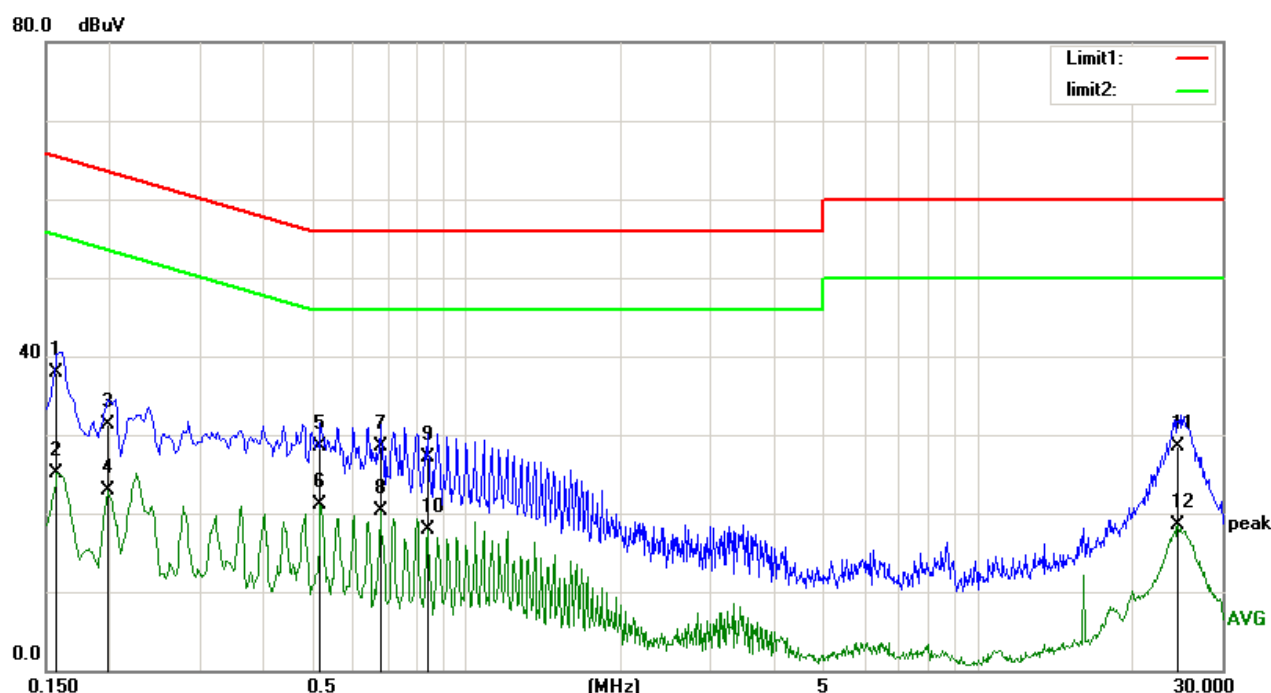
5.5 Test Result

PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.

Note2: “----” means peak detection; “----” mans average detection

EUT:	Z-Wave Dimming LED Bulb	Model No.:	ZW-C663E26-9WD
Temperature:	24	Relative Humidity:	55%
		Test Power:	AC 120V/60Hz
Probe:	L1	Test Result:	Pass
Test Time:	2020-4-7	Test By:	
Standard:	(CE)FCC PART 15 class B_QP		
Test Mode:	TX		
Note:			

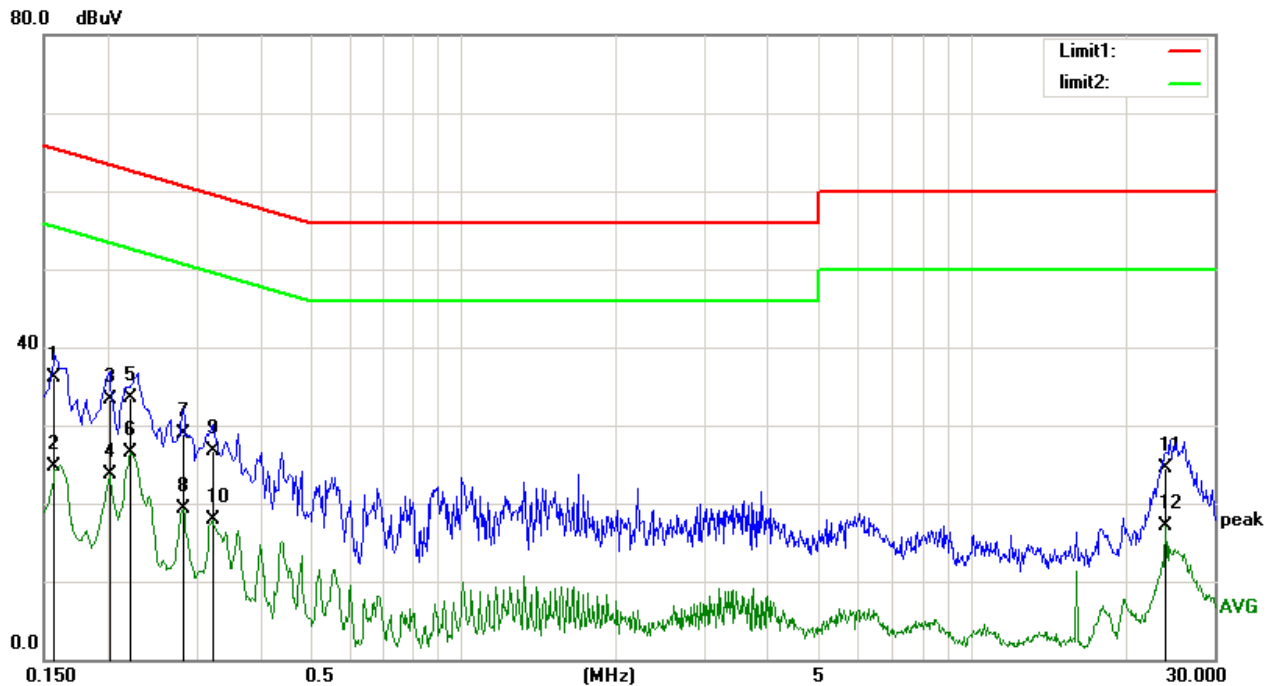


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1580	26.54	11.41	37.95	65.56	-27.61	QP
2	0.1580	13.61	11.41	25.02	55.56	-30.54	AVG
3	0.1980	20.18	11.14	31.32	63.69	-32.37	QP
4	0.1980	11.85	11.14	22.99	53.69	-30.70	AVG
5	0.5180	18.34	10.17	28.51	56.00	-27.49	QP
6	0.5180	10.85	10.17	21.02	46.00	-24.98	AVG
7	0.6780	18.41	10.13	28.54	56.00	-27.46	QP
8	0.6780	10.21	10.13	20.34	46.00	-25.66	AVG
9	0.8380	17.05	10.10	27.15	56.00	-28.85	QP
10	0.8380	7.77	10.10	17.87	46.00	-28.13	AVG
11	24.5860	18.32	10.20	28.52	60.00	-31.48	QP
12	24.5860	8.21	10.20	18.41	50.00	-31.59	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = (LISN, ISN, PLC or Current Probe) Factor + Cable Loss + Attenuator
- (3) Margin = Result - Limit

EUT:	Z-Wave Dimming LED Bulb	Model No.:	ZW-C663E26-9WD
Temperature:	24	Relative Humidity:	55%
		Test Power:	AC 120V/60Hz
Probe:	N	Test Result:	Pass
Test Time:	2020-4-7	Test By:	
Standard:	(CE)FCC PART 15 class B_QP		
Test Mode:	TX		
Note:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1580	24.64	11.41	36.05	65.56	-29.51	QP
2	0.1580	13.25	11.41	24.66	55.56	-30.90	AVG
3	0.2020	22.18	11.11	33.29	63.52	-30.23	QP
4	0.2020	12.57	11.11	23.68	53.52	-29.84	AVG
5	0.2220	22.49	10.97	33.46	62.74	-29.28	QP
6	0.2220	15.53	10.97	26.50	52.74	-26.24	AVG
7	0.2819	18.37	10.56	28.93	60.76	-31.83	QP
8	0.2819	8.78	10.56	19.34	50.76	-31.42	AVG
9	0.3220	16.29	10.41	26.70	59.65	-32.95	QP
10	0.3220	7.53	10.41	17.94	49.65	-31.71	AVG
11	24.1380	14.22	10.19	24.41	60.00	-35.59	QP
12	24.1380	6.92	10.19	17.11	50.00	-32.89	AVG

The test result is calculated as the following:

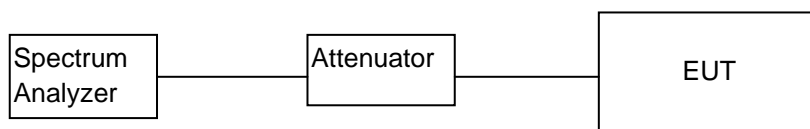
- (1) Result = Reading + Correct Factor
- (2) Correct Factor = (LISN, ISN, PLC or Current Probe) Factor + Cable Loss +Attenuator
- (3) Margin = Result - Limit

6 Frequency Stability

6.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Calibrated Date
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	05/27/2020	05/28/2019
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A	N/A
3	RF Cable	Micable	C10-01-01-1	100309	N/A	N/A
4	Const Temp.&Humidity Chamber	Giant Force	ITH-225-20-S	IAB0309-001	N/A	N/A
5	AC Power Supply	JingJiu	JJ98dd33b	983-377	N/A	N/A

6.2. Block diagram of test setup



6.3 Test Result

GFSK

Temperature vs. Frequency Stability		
Voltage	Temperature	Measurement Frequency (MHz)
120V	(°C)	908.4
	-20	908.423
	20	908.420
	50	908.411
90V	20	908.419
138V	20	908.416
	Max. Deviation (MHz)	0.023
	Max. Deviation (ppm)	25.32

Note:90V is the end point voltage,and products below 90Vwill cease working

END OF REPORT