FCC - TEST REPORT

Report Number	:	**68.940.19.0036.01**	Date of Issue:	September 26, 2019
Model	:	**59963*, 59964*, 59965*, 59966*** ***Note: The model number can follow with 'XXYY' or '/XX/YY'. 'X' and 'Y' are digital numbers or letters, which will be 0-9, A-Z. 'XX' denotes the different color versions of article; 'YY' denotes the different marketing.**		
Product Type	:	LED RETROFIT LUMINAIRE		
Applicant	:	Signify (China) Investment Co., Ltd.		
Address	:	Building no.9, Lane 888, Tianlin Road, Minhang District, Shanghai, 200233 China		
Production Facility	:	Dongguan Zoyo Electronics Technology Co., Ltd.		
Address	:	No.11, Nange west road, Nanya Village, Daojiao Town, Dongguan, Guangdong, China		
Test Result	:	**n Positive** **o Negative**		
Total pages including Appendices	:	31		

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1 Table of Contents

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Shenzhen City, 518052, P. R. China Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen City, 518052, P. R. China
FCC Registration Number:	514049
ISED#:	10320A
CAB identifier:	CN0077
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299

Test Site 2

Company name:	Dongguan Dongdian Testing Service Co., Ltd. No.17,Zong bu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City,Guangdong Province, China, 523808
Telephone:	+86-0769-38826678
Fax:	+86-0769-38826678
IC Registration No.:	10288A
CAB identifier:	CN0048

3 Description of the Equipment under Test

Product:	LED RETROFIT LUMINAIRE
Model no.:	5996611U5
FCC ID:	2AGBW19USDL456XY
Ratings:	AC 120V/60Hz, 82mA
RF Transmission Frequency:	2405MHz-2480MHz
No. of Operated Channel:	16
Modulation:	OQPSK
Antenna Type:	Integral PCB antenna
Antenna Gain:	2.18dBi
Description of the EUT:	The Equipment Under Test (EUT) is a LED RETROFIT LUMINAIRE supports 2.4GHz Zigbee function.
Remark:	Ratings for other models: AC 120V/60Hz, 77mA, Max 8.5W for 59963*, 59965*; 82mA, Max 9W for 59964*;

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2018 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 DTS Meas Guidance v05r02 and ANSI C63.10 (2013).

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5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart C						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	10	Site 1	☒	☐	☐
§15.247 (b) (1)	Conducted peak output power	13	Site 2	☒	☐	☐
§15.247(a)(1)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Dwell Time	---	---	☐	☐	☒
§15.247(a)(2)	6dB bandwidth	15	Site 2	☒	☐	☐
§15.247(e)	Power spectral density	17	Site 2	☒	☐	☐
§15.247(d)	Spurious RF conducted emissions	19	Site 2	☒	☐	☐
§15.247(d)	Band edge	23	Site 2	☒	☐	☐
§15.247(d) & §15.209	Spurious radiated emissions for transmitter	25	Site 2	☒	☐	☐
§15.203	Antenna requirement	See note 1		☒	☐	☐

Note 1: N/A=Not Applicable.
Note 2: The EUT uses an Integral PCB antenna, which gain is 2.18dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AGBW19USDL456XY complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules.

All models are the same except model no., size and LED. So EMC Full tests were applied on 5996611U5, other models are deemed to fulfill relevant EMC requirement without further testing.

SUMMARY:

All tests according to the regulations cited on page 5 were

n - Performed

o - **Not** Performed

The Equipment under Test

n - **Fulfills** the general approval requirements.

o - **Does not** fulfill the general approval requirements.

Sample Received Date: August 30, 2019

Testing Start Date: August 30, 2019

Testing End Date: September 24, 2019

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:	Prepared by:	Tested by:	Tested by:
Laurent Yuan	Henry Chen	Louise Liu	Sunny Zhang
EMC Project Manager	EMC Project Engineer	EMC Test Engineer Test Site 1	EMC Test Engineer Test Site 2

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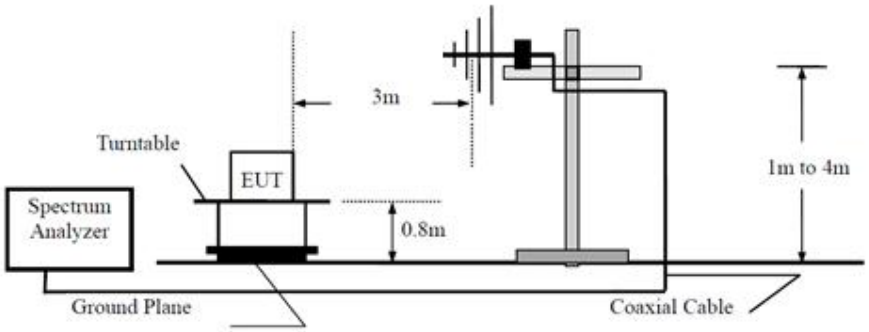
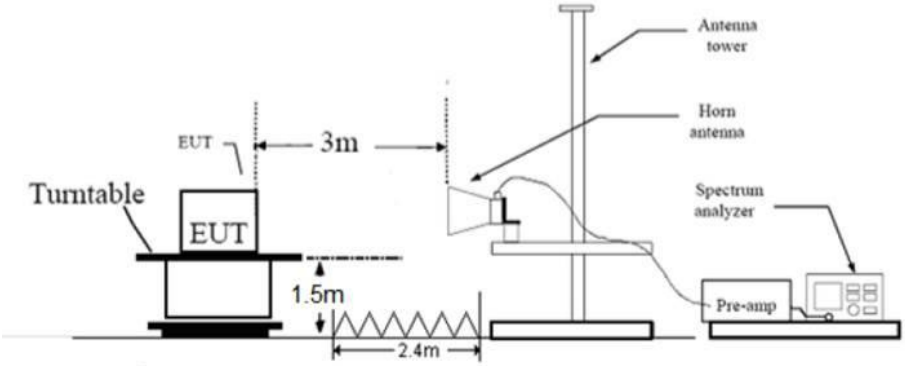
7 Test Setups

7.1 Radiated test setups

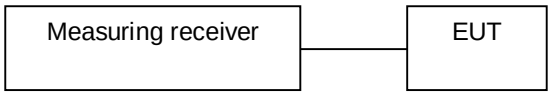
Below 1GHz



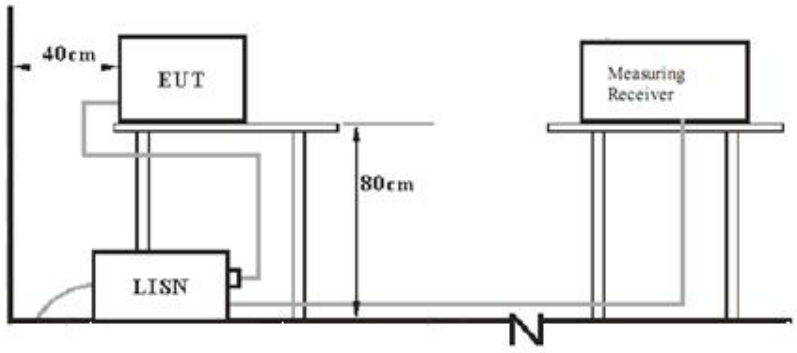
Above 1GHz



7.2 Conducted RF test setups



7.3 AC Power Line Conducted Emission test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.	S/N
---	---	---	---

Test software information:

Test Software Version		
Modulation	Setting TX Power	Packet Type
OQPSK	9dBm	---

The system was configured to channel 11, 18, and 26 for the test.

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Note: "*" means Decreasing line;

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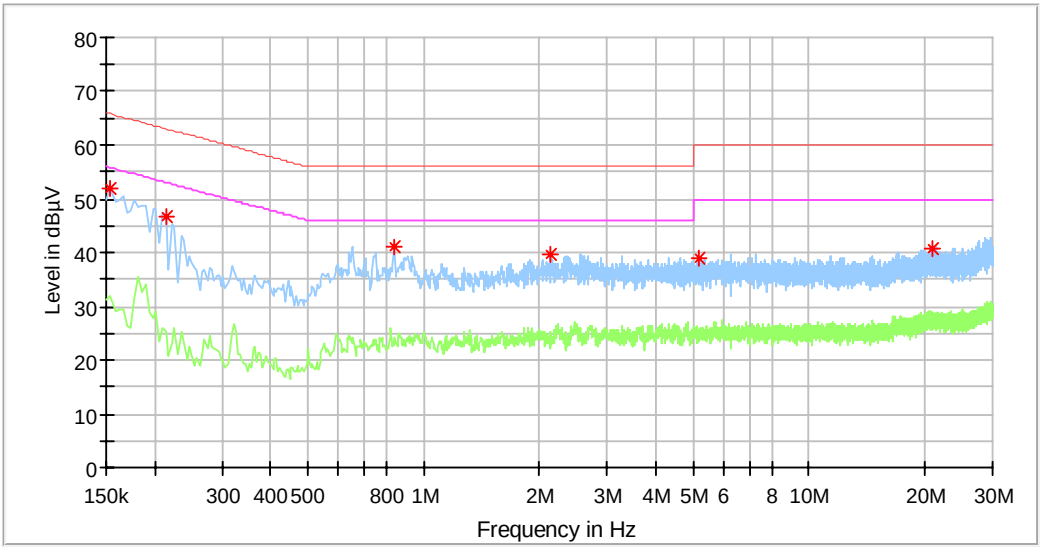
Conducted Emission

Product Type : LED RETROFIT LUMINAIRE
M/N : 5996611U5
Operating Condition : Normal working with transmitting
Test Specification : Power Line, Live
Comment : AC 120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.154000	51.94	---	65.78	13.84	L1	10.2
0.214000	46.64	---	63.05	16.41	L1	10.2
0.842000	41.06	---	56.00	14.94	L1	10.3
2.142000	39.58	---	56.00	16.42	L1	10.3
5.202000	38.89	---	60.00	21.11	L1	10.5
20.974000	40.86	---	60.00	19.14	L1	11.0

Remark：
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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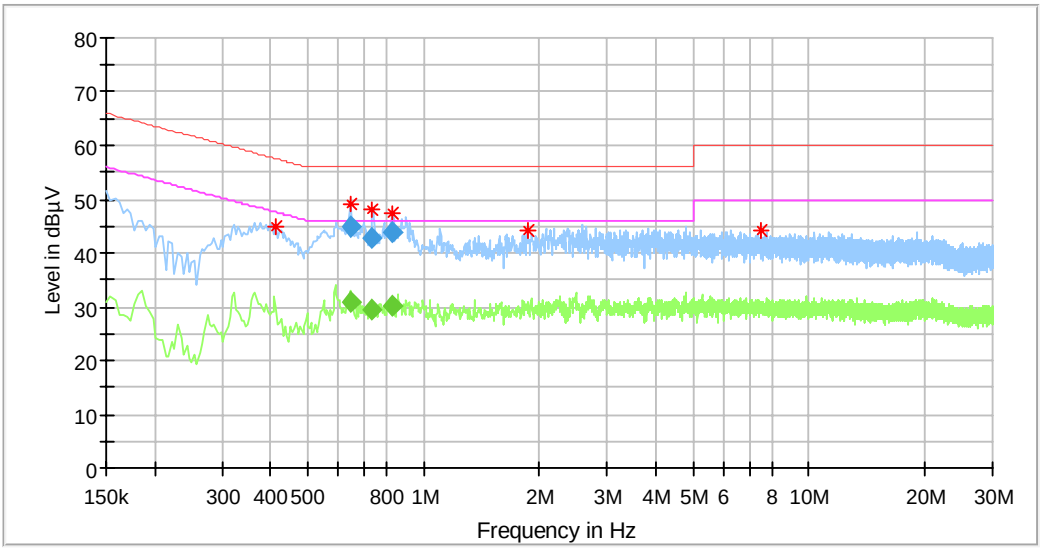
Conducted Emission

Product Type : LED RETROFIT LUMINAIRE
M/N : 5996611U5
Operating Condition : Normal working with transmitting
Test Specification : Power Line, Neutral
Comment : AC 120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.414000	45.00	---	57.57	12.56	N	10.3
0.645500	49.08	---	56.00	6.92	N	10.3
0.733500	47.95	---	56.00	8.05	N	10.3
0.825500	47.54	---	56.00	8.46	N	10.3
1.870000	44.06	---	56.00	11.94	N	10.3
7.498000	44.06	---	60.00	15.94	N	10.6

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.645500	---	31.01	46.00	14.99	N	10.3
0.645500	44.83	---	56.00	11.17	N	10.3
0.733500	---	29.52	46.00	16.48	N	10.3
0.733500	42.66	---	56.00	13.34	N	10.3
0.825500	---	30.30	46.00	15.70	N	10.3
0.825500	43.70	---	56.00	12.30	N	10.3

Remark：
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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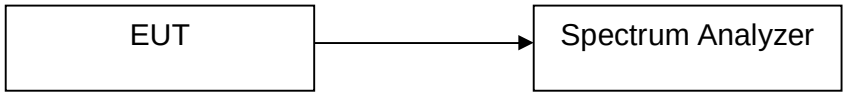
9.2 Conducted Peak output power

Test Method

1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Setting the highest output power level of the EUT
3. Use the following spectrum analyzer settings:
   RBW≥DTS bandwidth, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold, allow trace to fully stabilize.
4. Record the peak power value.

Test Setup



Limits

According to §15.247 (b) (3), conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Test result as below table

Frequency MHz	Conducted peak Output Power dBm	Result
Top channel 2405MHz	8.82	Pass
Middle channel 2440MHz	8.90	Pass
Bottom channel 2480MHz	8.53	Pass

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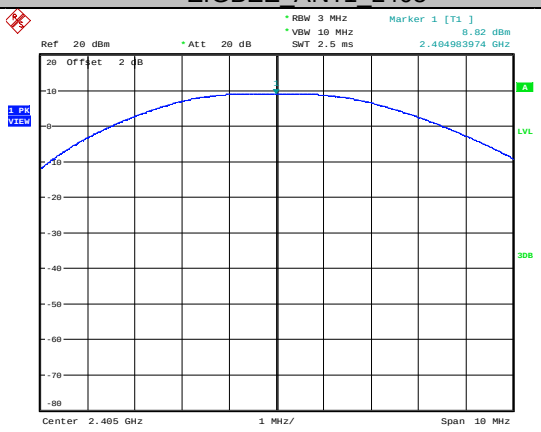
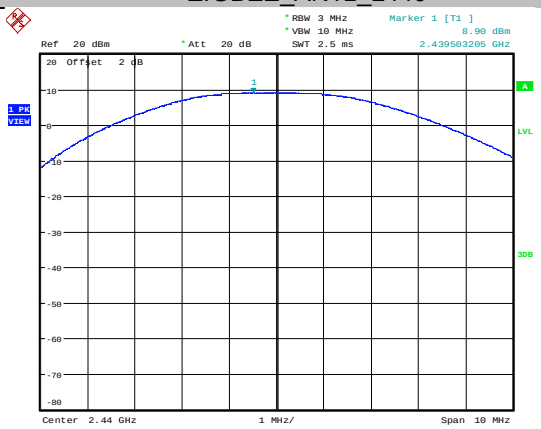
Test Graphs

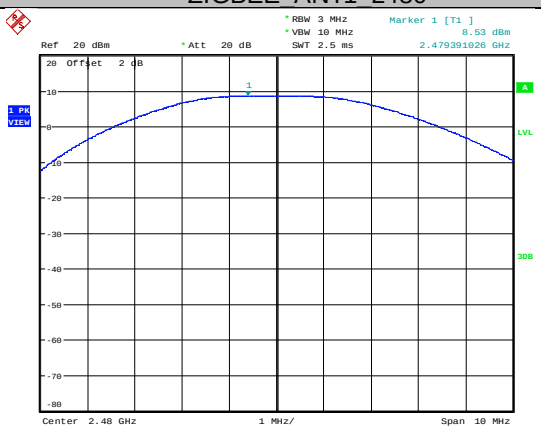
ZIGBEE_ANT1_2405



ZIGBEE_ANT1_2440



ZIGBEE_ANT1_2480



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9.3 6dB bandwidth

Test Method

1. Connect EUT test port to spectrum analyzer.
2. Use the following spectrum analyzer settings:
   Set RBW ³ 1% of the 99% bandwidth, VBW ³ RBW.
   Sweep = auto, Detector function = peak, Trace = max hold
3. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
4. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]
≥500

Test result

Test Mode	Channel (MHz)	6dB bandwidth (MHz)	Limit (KHz)	Verdict
Zigbee	2405	1.828	≥500	PASS
Zigbee	2440	1.816	≥500	PASS
Zigbee	2480	1.820	≥500	PASS

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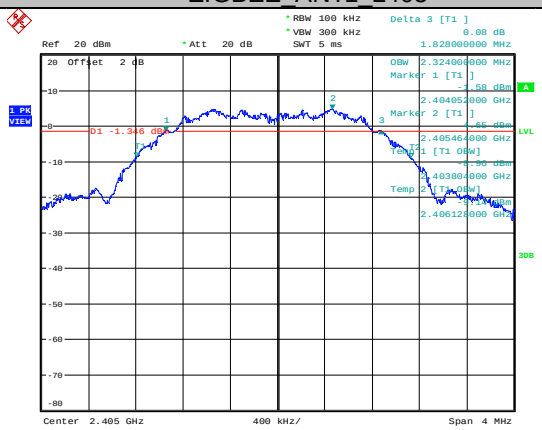
Test Graphs

ZIGBEE_ANT1_2405



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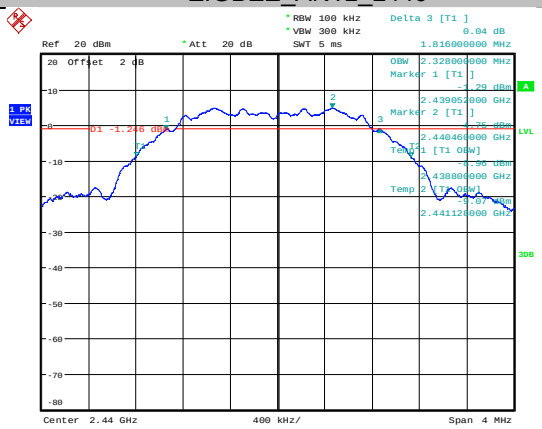
ZIGBEE_ANT1_2440



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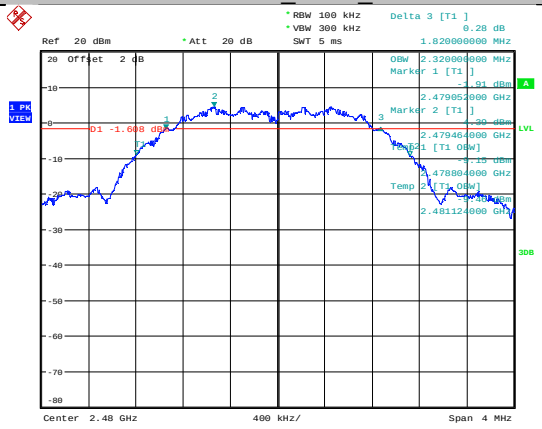

Date: 24.SEP.2019 15:06:59

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9.4 Power spectral density

Test Method

1. Connect EUT test port to spectrum analyzer.
2. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW≥3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
3. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
4. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3KHz]
≤8

Test result

Test Mode	Channel (MHz)	Result (dBm/3KHz)	Limit(dBm/3KHz)	Verdict
Zigbee	2405	-6.91	8	PASS
Zigbee	2440	-7.06	8	PASS
Zigbee	2480	-7.37	8	PASS

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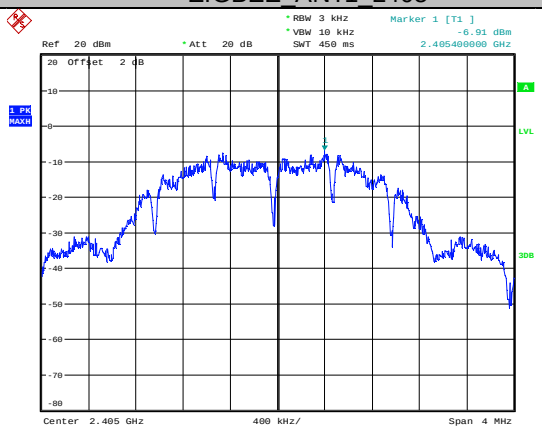
Test Graphs

ZIGBEE_ANT1_2405



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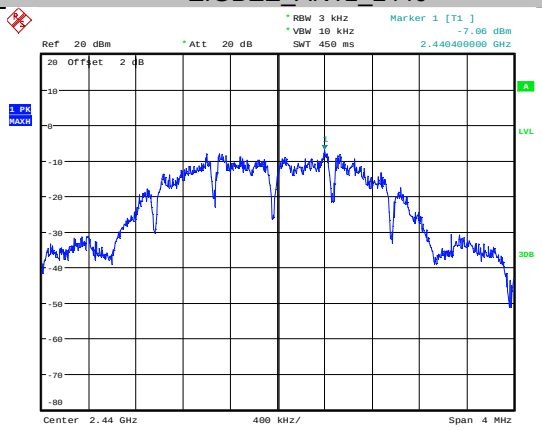
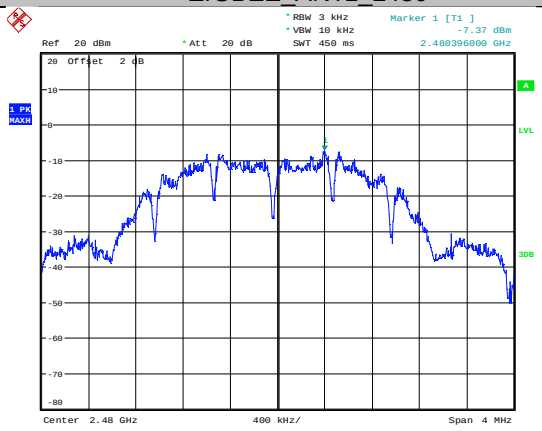


ZIGBEE_ANT1_2480



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9.5 Spurious RF conducted emissions

Test Method

1. Connect EUT test port to spectrum analyzer.
2. Establish a reference level by using the following procedure:
   a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
   b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
3. Use the maximum PSD level to establish the reference level.
   a. Set the center frequency and span to encompass frequency range to be measured.
   b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
4. Repeat above procedures until other frequencies measured were completed.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

Test Result:

Test Mode	Antenna	Channel (MHz)	Freq Range (MHz)	Ref Level (dBm)	Result (dBm)	Limit (dBm)	Verdict
ZIGBEE	ANT1	2405	30~1000	4.61	-43.94	-15.39	PASS
ZIGBEE	ANT1	2405	1000~26500	4.61	-38.94	-15.39	PASS
ZIGBEE	ANT1	2440	30~1000	4.61	-43.56	-15.39	PASS
ZIGBEE	ANT1	2440	1000~26500	4.61	-39.75	-15.39	PASS
ZIGBEE	ANT1	2480	30~1000	4.44	-43.21	-15.56	PASS
ZIGBEE	ANT1	2480	1000~26500	4.44	-39.96	-15.56	PASS

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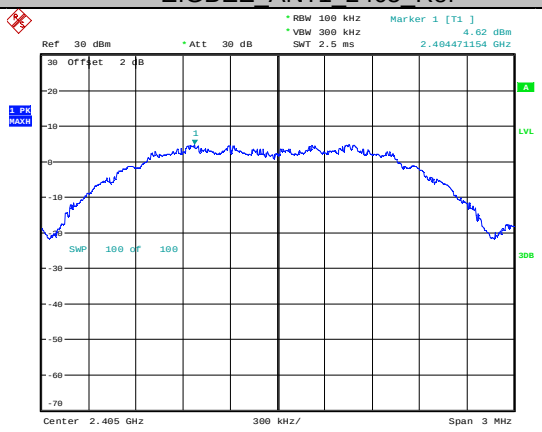
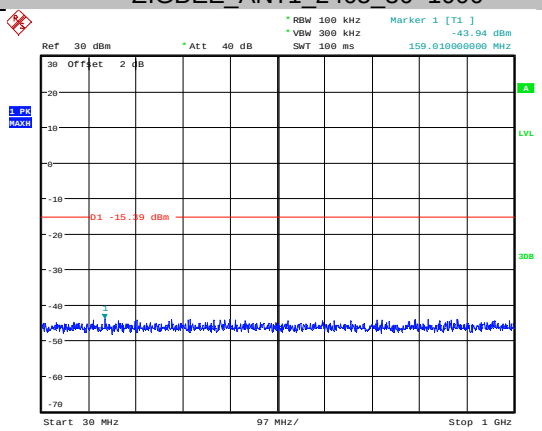
Test Graphs

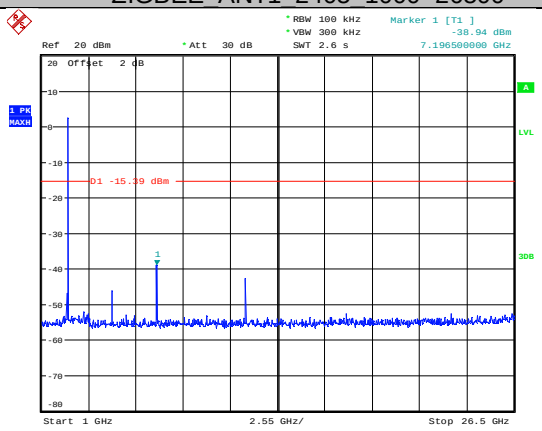
ZIGBEE_ANT1_2405_Ref



ZIGBEE_ANT1_2405_30~1000



ZIGBEE_ANT1_2405_1000~26500



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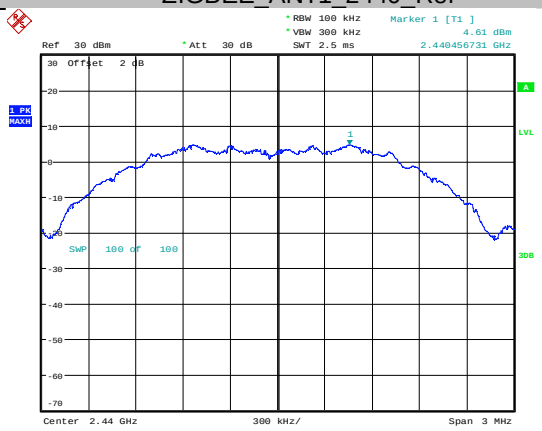
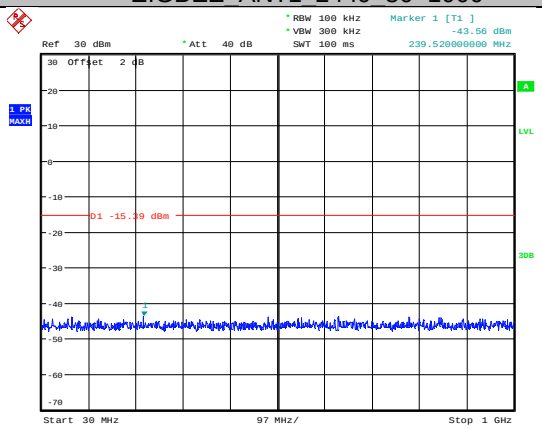
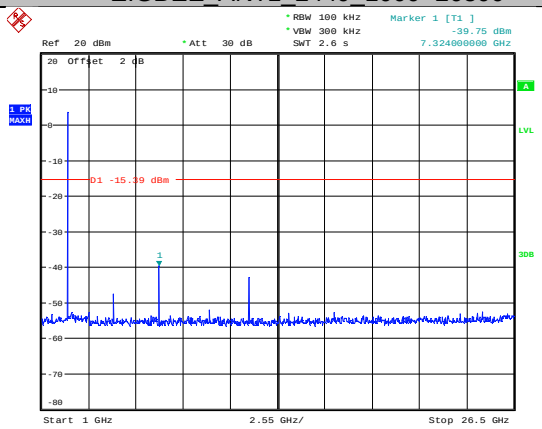
ZIGBEE_ANT1_2440_Ref



ZIGBEE_ANT1_2440_30~1000



ZIGBEE_ANT1_2440_1000~26500



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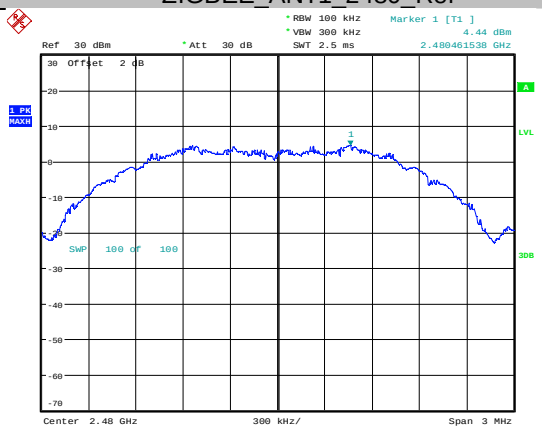
ZIGBEE_ANT1_2480_Ref



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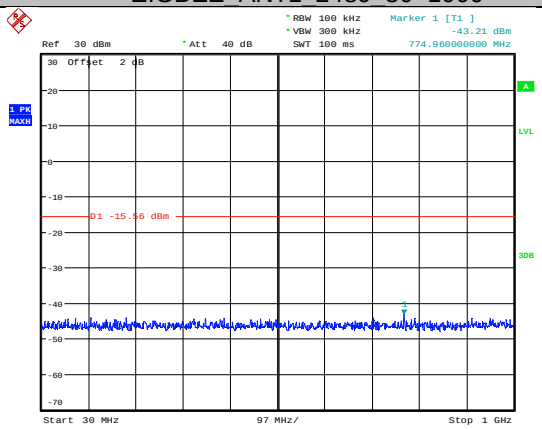
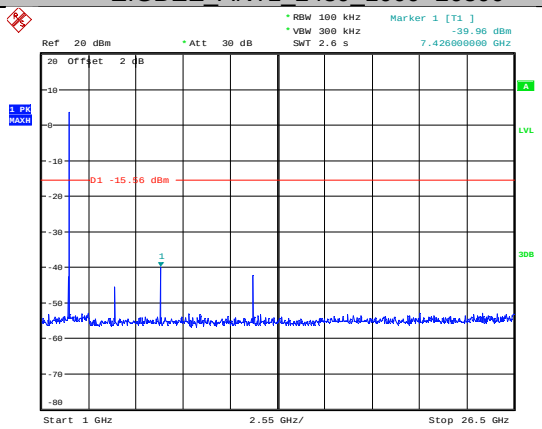


ZIGBEE_ANT1_2480_1000~26500



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9.6 Band edge

Test Method

1. Connect EUT test port to spectrum analyzer.
2. Set spectrum analyzer setting as below:
   Set RBW ³ 1% of the span, VBW ³ RBW.
   Set Sweep = auto. Set Detector function = peak. Allow the trace to stabilize.
   Set Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.
3. Repeat above procedures until all frequencies measured were complete.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

Test result

Test Mode	Channel (MHz)	Reference Level(dBm)	Result (dBm)	Limit (dBm)	Verdict
Zigbee	2405	4.58	-48.06	-15.42	PASS
Zigbee	2480	4.58	-45.28	-15.42	PASS

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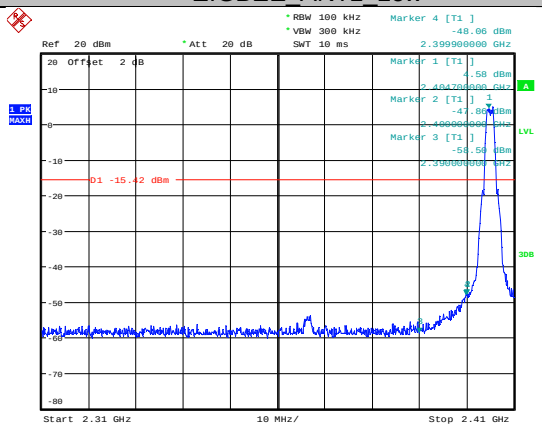
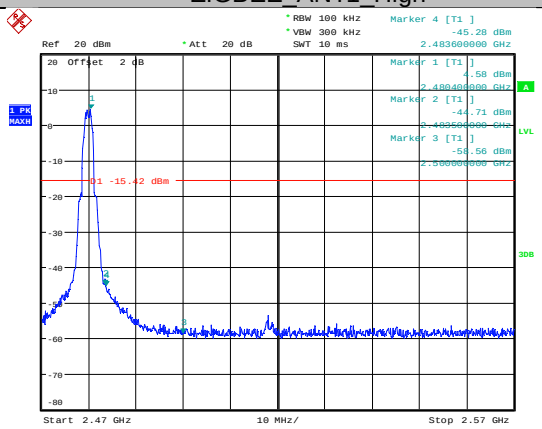
Test Graphs

ZIGBEE_ANT1_Low



ZIGBEE_ANT1_High



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9.7 Spurious radiated emissions for transmitter

Test Method

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5: Use the following spectrum analyzer settings According to C63.10:
For Below 1GHz
Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz to 120KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW≥RBW for peak measurement ,Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz
a) RBW = 1 MHz.
b) VBW \ [3 × RBW].
c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
e) Sweep time = auto.
f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D,where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty

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cycle was 50%, then 3 dB shall be added to the measured emission levels.
2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

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Spurious radiated emissions for transmitter

Transmitting spurious emission test result as below:

2405MHz (30MHz – 1GHz)

Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBµV/m	Margin dB	Detector	Antenna Factor dB	PRM Factor dB	Cable Loss dB	Result
925.76	31.33	Horizontal	46.00	14.67	QP	21.99	--	7.04	Pass
112.13*	30.61	Vertical	43.50	11.14	QP	11.34	--	4.27	Pass

2405MHz (Above 1GHz)

Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBµV/m	Margin dB	Detector	Antenna Factor dB	PRM Factor dB	Cable Loss dB	Result
17864.00*	60.90	Horizontal	74.00	13.10	PK	44.36	39.11	11.74	Pass
17864.00*	47.93	Horizontal	54.00	6.07	AV	44.36	39.11	11.74	Pass
17796.00*	60.83	Vertical	74.00	13.17	PK	44.24	39.12	11.66	Pass
17796.00*	47.85	Vertical	54.00	6.15	AV	44.24	39.12	11.66	Pass

2440MHz (30MHz – 1GHz)

Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBµV/m	Margin dB	Detector	Antenna Factor dB	PRM Factor dB	Cable Loss dB	Result
839.18	30.61	Horizontal	46.00	15.39	QP	6.70	--	4.96	Pass
175.04	32.54	Vertical	46.00	17.08	QP	21.43	--	6.80	Pass

2440MHz (Above 1GHz)

Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBµV/m	Margin dB	Detector	Antenna Factor dB	PRM Factor dB	Cable Loss dB	Result
17575.00	60.62	Horizontal	74.00	13.38	PK	43.84	39.16	11.42	Pass
17575.00	47.76	Horizontal	54.00	6.24	AV	43.84	39.16	11.42	Pass
17711.00*	60.81	Vertical	74.00	13.19	PK	44.08	39.13	11.57	Pass
17711.00*	47.85	Vertical	54.00	6.15	AV	44.08	39.13	11.57	Pass

2480MHz (30MHz – 1GHz)

Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBµV/m	Margin dB	Detector	Antenna Factor dB	PRM Factor dB	Cable Loss dB	Result
647.39	29.10	Horizontal	46.00	16.90	QP	19.29	--	6.23	Pass
109.03	32.04	Vertical	43.50	11.46	QP	11.79	--	4.25	Pass

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Spurious radiated emissions for transmitter

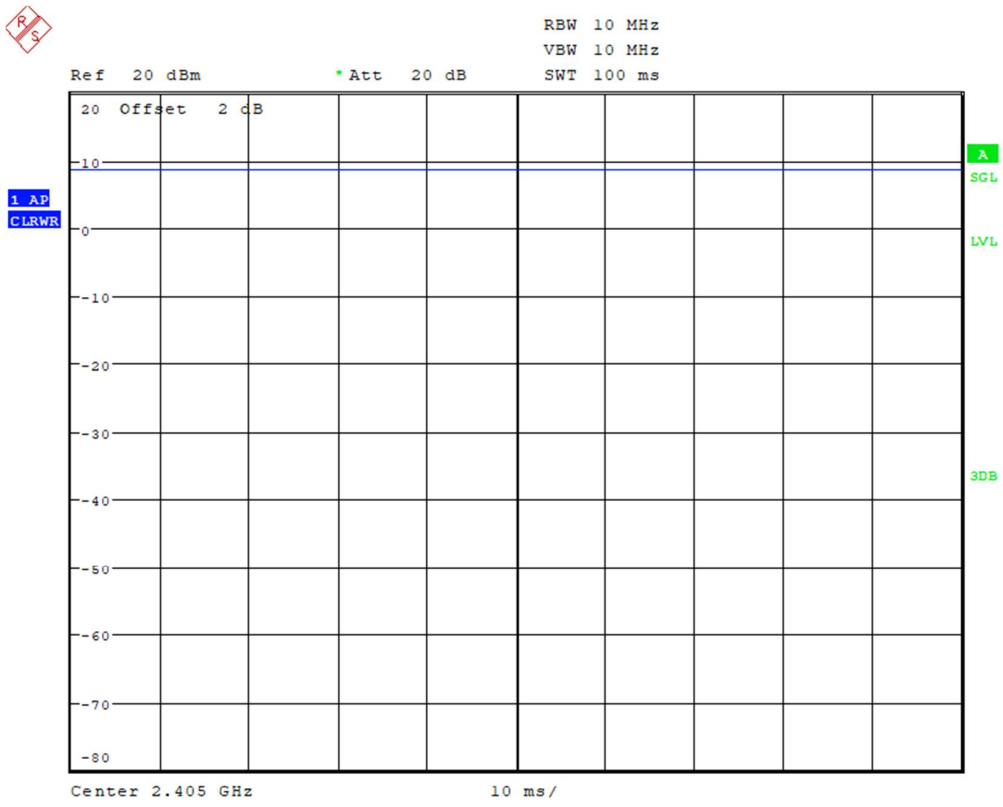
2480MHz (Above 1GHz)

Frequency	Emission Level	Polarization	Limit	Margin	Detector	Antenna Factor	PRM Factor	Cable Loss	Result
MHz	dBuV/m		dBμV/m	dB		dB	dB	dB	
17524.00	61.26	Horizontal	74.00	12.74	PK	43.74	39.17	11.36	Pass
17524.00	47.81	Horizontal	54.00	6.19	AV	43.74	39.17	11.36	Pass
17541.00	60.28	Vertical	74.00	13.72	PK	43.77	39.17	11.38	Pass
17541.00	47.73	Vertical	54.00	6.27	AV	43.77	39.17	11.38	Pass

Remark:

(1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
(2) Duty Cycle=100%
(3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.
(4) Level=Reading Level + Correction Factor
Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)

Duty Cycle:



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10 Test Equipment List

Site 1:
Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-14-001	101782	2020-6-28
LISN	Rohde & Schwarz	ENV4200	8-4-87-14-001	100249	2020-6-28
LISN	Rohde & Schwarz	ENV432	68-4-87-16-001	101318	2020-7-19
LISN	Rohde & Schwarz	ENV216	68-4-87-14-002	100326	2020-6-28
ISN	Rohde & Schwarz	ENY81	68-4-87-14-003	100177	2020-6-28
ISN	Rohde & Schwarz	ENY81-CA6	68-4-87-14-004	101664	2020-6-28
High Voltage Probe	Rohde & Schwarz	TK9420(VT9 420)	68-4-27-14-001	9420-584	2020-6-24
RF Current Probe	Rohde & Schwarz	EZ-17	68-4-27-14-002	100816	2020-7-2
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	2020-6-28
Test software	Rohde & Schwarz	EMC32	68-4-90-14-003-A10	Version9.15.00	N/A

Test Site 2:
Radiated Emission Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	R&S	ESU8	100316	Oct. 12, 2018	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 25, 2019	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 09, 2018	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Oct. 20, 2018	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 16, 2018	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Oct. 25, 2018	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Oct. 12, 2018	1 Year
Pre-amplifier	TERA-MW	TRLA-0040G35	101303	Oct. 12, 2018	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Oct. 21, 2018	1 Year
RF Cable	N/A	SMAJ-SMAJ-1M+ 11M	17070133+1707 0131	Nov. 08, 2018	1 Year
MI Cable	HUBSER	C10-01-01-1M	1091629	Oct. 21, 2018	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

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RF Conducted Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Spectrum analyzer	R&S	FSU26	200071	Oct. 12, 2018	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jun. 25, 2019	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Oct. 12, 2018	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jun. 25, 2019	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Jun. 28, 2019	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Jun. 28, 2019	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Aug. 18, 2019	1 Year
Attenuator	Mini-Circuits	BW-S10W2	101109	Aug. 18, 2019	1 Year
RF Cable	Micable	C10-01-01-1	100309	Oct. 21, 2018	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Oct. 21, 2018	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A

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11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Site 1:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3.21dB

Site 2:

Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power(Conducted)(Spectrum analyzer)	0.86dB (10 MHz ≤ f < 3.6GHz);
	1.38dB (3.6GHz ≤ f < 8GHz)
Peak Output Power(Conducted)(Power Sensor)	0.74dB
Power Spectral Density	0.74dB (10 MHz ≤ f < 3.6GHz);
	1.38dB (3.6GHz ≤ f < 8GHz)
Frequencies Stability	6.7×10^{-8} (Antenna couple method)
	5.5×10^{-8} (Conducted method)
Conducted spurious emissions	0.86dB (10 MHz ≤ f < 3.6GHz);
	1.40dB (3.6GHz ≤ f < 8GHz)
	1.66dB (8GHz≤ f < 22GHz)
Uncertainty for radio frequency (RBW<20kHz)	3×10^{-8}
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-40GHz)	4.10dB (1-6GHz)
	4.40dB (6GHz-18GHz)
	3.54dB (18GHz-26GHz)
	4.30dB (26GHz-40GHz)
Uncertainty for Power line conduction emission test	3.32dB (150kHz-30MHz)

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