



FCC ID: 2ALSZ-CL4100TH Report No.: T190509E05-RP IC: 22787-CL4100TH

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RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

Test Standard	FCC Part 15.247 IC RSS-247 issue 2 and IC RSS-GEN issue 5
Product name	Photocontroller
Brand Name	CIMCON
Model	iSLC4100-7P-T
Test Result	Pass
Statements of Conformity	Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

Approved by:

Komil Tson

Kevin Tsai Deputy Manager Tested by:

Dally. Hong

Dally Hong Engineer

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部分複製。

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	October 17, 2019	Initial Issue	Allison Chen



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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	CIMCON Lighting, Inc. 200 Summit Drive, Suite 500, South Tower, Burlington, MA 01803, United States						
Manufacturer	CIMCON Lighting, Inc. 200 Summit Drive, Suite 500, South Tower, Burlington, MA 01803, United States						
Equipment	Photocontroller						
Model No.	iSLC4100-7P-T						
Model Discrepancy	N/A						
Trade Name	CIMCON						
Received Date	May 9, 2019						
Date of Test	July 26 ~ September 25, 2019						
Output Power(W)	Zigbee: 0.6194 (EIRP: 0.8750)						
Power Operation	120 to 277VAC, 50/60Hz						

Remark:

1. The above test method for conduction measurements is in accordance with Part 15.247 & RSS-247, so the test data is identical to another test report T190212E01-RP.



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1.2 EUT CHANNEL INFORMATION

Frequency Range	Zigbee: 2405~2475MHz
Modulation Type	Zigbee: OQPSK (Offset Quadrature Phase Shift Keyed)
Number of channels	Zigbee: 13 Channels

Remark:

Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 and RSS-GEN Table A1 for test channels

Number of frequencies to be tested						
Frequency range inNumber ofLocation in frequencywhich device operatesfrequenciesrange of operation						
☐ 1 MHz or less	1	Middle				
1 MHz to 10 MHz	2	1 near top and 1 near bottom				
🖾 More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom				

1.3 ANTENNA INFORMATION

Antenna Type	 □ PIFA □ PCB □ Dipole □ Coils ☑ Monopole Antenna
Antenna Gain	1.5 dBi
Antenna Connector	I-PEX



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1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

Remark:

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

2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.



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1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
AC Conduction Room	Dally Hong	-
Radiation	Jerry Lu	-
RF Conducted	Dally Hong	-

Remark: The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Coaxial Cable	Woken	WC12	CC001	06/28/2019	06/27/2020
Coaxial Cable	Woken	WC12	CC003	06/28/2019	06/27/2020
Power Meter	Anritsu	ML2495A	1149001	02/12/2019	02/11/2020
Power Seneor	Anritsu	MA2491A	030982	02/12/2019	02/11/2020
Signal Analyzer	R&S	FSV 40	101073	09/27/2018	09/26/2019
Software			N/A		

For Section 3.3: Test date: 2019/05/15

Wugu 966 Chamber A						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/26/2019	02/25/2020	
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019	
Cable	HUBER SUHNER	SUCOFLE X 104PEA	25157	02/26/2019	02/25/2020	
Cable	HUBER SUHNER	SUCOFLE X 104PEA	20995	02/26/2019	02/25/2020	
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020	
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	08/20/2018	08/19/2019	
Loop Ant	COM-POWER	AL-130	121051	03/21/2018	03/20/2019	
Pre-Amplifier	EMEC	EM330	060609	02/26/2019	02/25/2020	
Pre-Amplifier	HP	8449B	3008A00965	02/26/2019	02/25/2020	
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/31/2018	05/30/2019	
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R	
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R	
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R	
Software		e3 6.11-20180413				

Remark: Each piece of equipment is scheduled for calibration once a year.



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For Section 4.6: Test date: 2019/07/26 ~ 2019/08/23

Wugu 966 Chamber A						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
Bilog Antenna	Sunol Sciences	JB1	A052609	03/06/2019	03/05/2020	
Cable	HUBER SUHNER	SUCOFLE X 104PEA	23452	06/27/2019	06/26/2020	
Cable	HUBER SUHNER	SUCOFLE X 104PEA	33960	06/27/2019	06/26/2020	
Digital Thermo-Hygro Meter	WISEWIND	1110	D06	01/30/2019	01/29/2020	
High Pass Filters	MICRO TRONICS	HPM13195	003	02/26/2019	02/25/2020	
Horn Antenna	ETS LINDGREN	3116	00026370	12/26/2018	12/25/2019	
Horn Antenna	SCHWARZBECK	BBHA 9120D	779	03/09/2019	03/08/2020	
Pre-Amplifier	Anritsu	MH648A	M89145	06/27/2019	06/26/2020	
Pre-Amplifier	EMEC	EM01G26G	060570	06/27/2019	06/26/2020	
Pre-Amplifier	MITEQ	AMF-6F-18 004000-37- 8P	985646	06/18/2019	06/17/2020	
Signal Analyzer	Agilent	N9010A	MY52220817	03/20/2019	03/19/2020	
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R	
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R	
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R	
Software	EZ-EMC (CCS-3A1RE)					

Conducted Emission Room # B										
Name of Equipment	e of Equipment Manufacturer Model Serial Number Calibration Date Calibration Du									
CABLE	EMCI	CFD300-NL	_ CERF 06/27/201		06/26/2020					
EMI Test Receiver	R&S	ESCI	100064	07/26/2019	07/25/2020					
LISN	SCHWARZBECK	NSLK 8127	8127-541	01/31/2019	01/30/2020					
LISN	SCHAFFNER NNB 41 03/10013 02/13/2019 02/12/									
Software	EZ-EMC(CCS-3A1-CE-Wugu)									

Remark: Each piece of equipment is scheduled for calibration once a year.



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1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

	EUT Accessories Equipment							
No.	No. Equipment Brand Model Series No. FCC ID							
N/A								

	Support Equipment							
No.	No. Equipment Brand Model Series No. FCC ID							
1	NB(B)	Toshiba	PORTEGE R30-A	N/A	PD97260H			

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247, KDB 558074 D01, RSS-247 Issue 2 and RSS-GEN Issue 5



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2. TEST SUMMERY

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FCC Standard Section	ISED Standard Section	Chapter	er Test Item	
15.203	-	1.3	Antenna Requirement	Pass
15.207	RSS-GEN 8.8	4.1	AC Conducted Emission	Pass
15.247(a)(2)	RSS-247(5.2)(a)	4.2	6 dB Bandwidth	Pass
-	RSS-GEN 6.7	4.2	Occupied Bandwidth (99%)	-
15.247(b)	RSS-247(5.4)(d)	4.3	Output Power Measurement	Pass
15.247(e)	RSS-247(5.2)(b)	4.4	Power Spectral Density	Pass
15.247(d)	RSS-247(5.5)	4.5	Conducted Band Edge	Pass
15.247(d)	RSS-247(5.5)	4.5	Conducted Emission	Pass
15.247(d)	RSS-247(5.5)	4.6	Radiation Band Edge	Pass
15.247(d)	RSS-247(5.5)	4.6	Radiation Spurious Emission	Pass



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3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	Zigbee
Test Channel Frequencies	Zigbee: 1. Lowest Channel : 2405MHz 2. Middle Channel : 2445MHz 3. Highest Channel : 2475MHz

Remark:

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.



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3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission				
Test Condition AC Power line conducted emission for line and neutral				
Power supply Mode Mode 1:EUT power by AC.				
Worst Mode Mode 1 Mode 2 Mode 3 Mode 4				

Radiated Emission Measurement Above 1G					
Test Condition	Band edge, Emission for Unwanted and Fundamental				
Power supply Mode	Power supply Mode Mode 1:EUT power by AC.				
Worst Mode	Worst Mode Mode 1 Mode 2 Mode 3 Mode 4				
Worst Position	 Placed in fixed position. Placed in fixed position at X-Plane (E2-Plane) Placed in fixed position at Y-Plane (E1-Plane) Placed in fixed position at Z-Plane (H-Plane) 				

Radiated Emission Measurement Below 1G				
Test Condition Radiated Emission Below 1G				
Power supply Mode Mode 1:EUT power by AC.				
Worst Mode Mode 1 Mode 2 Mode 3 Mode 4				

Remark:

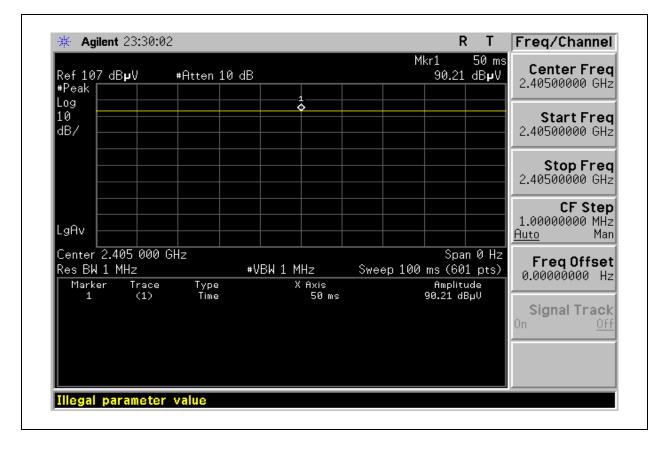
1. The worst mode was record in this test report.

EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case(X-Plane) were recorded in this report
 AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.



3.3 EUT DUTY CYCLE

Duty Cycle						
Configuration TX ON (ms) TX ALL (ms) Duty Cycle (%)						
Zigbee	1.0000	1.0000	100.00%			





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4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a)(2) and RSS-GEN section 8.8,

Frequency Range	Limits(dBµV)			
(MHz)	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		

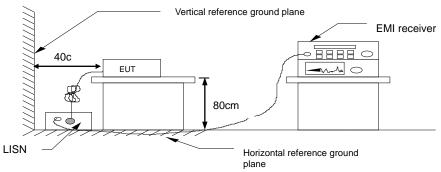
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

- 1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
- 2. EUT connected to the line impedance stabilization network (LISN)
- 3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. Recorded Line for Neutral and Line.

4.1.3 Test Setup



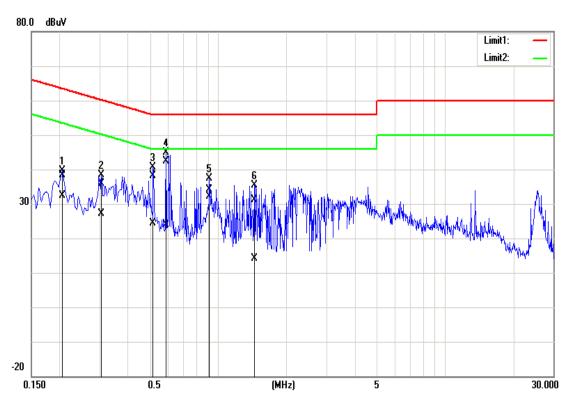
4.1.4 Test Result

<u>Pass.</u>



Test Data

Test Mode:	Mode 1	Temp/Hum	24(°C)/ 50%RH
Test Voltage:	120Vac / 60Hz	Test Date	2019/09/25
Phase:	Line	Test Engineer	Dally Hong

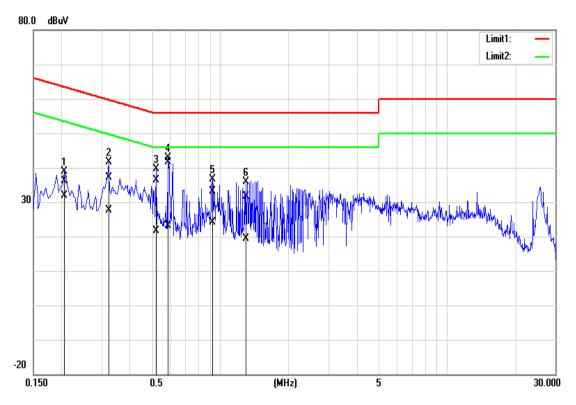


No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.2060	28.22	22.37	10.13	38.35	32.50	63.37	53.37	-25.02	-20.87	Pass
2	0.3060	25.65	17.02	10.14	35.79	27.16	60.08	50.08	-24.29	-22.92	Pass
3	0.5180	28.02	14.29	10.14	38.16	24.43	56.00	46.00	-17.84	-21.57	Pass
4*	0.5900	32.35	13.70	10.15	42.50	23.85	56.00	46.00	-13.50	-22.15	Pass
5	0.9180	23.84	21.84	10.17	34.01	32.01	56.00	46.00	-21.99	-13.99	Pass
6	1.4420	20.98	3.90	10.17	31.15	14.07	56.00	46.00	-24.85	-31.93	Pass



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Test Mode:	Mode 1	Temp/Hum	24(°C)/ 50%RH
Test Voltage:	120Vac / 60Hz	Test Date	2019/09/25
Phase:	Neutral	Test Engineer	Dally Hong



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.2060	26.07	21.91	10.02	36.09	31.93	63.37	53.37	-27.28	-21.44	Pass
2	0.3220	27.15	17.48	10.03	37.18	27.51	59.66	49.66	-22.48	-22.15	Pass
3	0.5220	26.32	11.71	10.03	36.35	21.74	56.00	46.00	-19.65	-24.26	Pass
4*	0.5900	31.64	13.20	10.03	41.67	23.23	56.00	46.00	-14.33	-22.77	Pass
5	0.9260	23.01	13.99	10.04	33.05	24.03	56.00	46.00	-22.95	-21.97	Pass
6	1.2980	21.52	9.37	10.04	31.56	19.41	56.00	46.00	-24.44	-26.59	Pass



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4.26dB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

4.2.1 Test Limit

According to §15.247(a)(2) and RSS-247 section 5.2(a), RSS-GEN 6.7,

6 dB Bandwidth :

Limit	Shall be at least 500kHz
-------	--------------------------

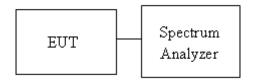
Occupied Bandwidth(99%) : For reporting purposes only.

4.2.2 Test Procedure

Test method Refer as KDB 558074 D01 and ANSI C63.10: 2013 clause 6.9.2,

- 1. The EUT RF output connected to the spectrum analyzer by RF cable.
- 2. Setting maximum power transmit of EUT
- 3. SA set RBW = 100kHz, VBW = 300kHz and Detector = Peak, to measurement 6 dB Bandwidth.
- 4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
- 5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth in the test report.

4.2.3 Test Setup

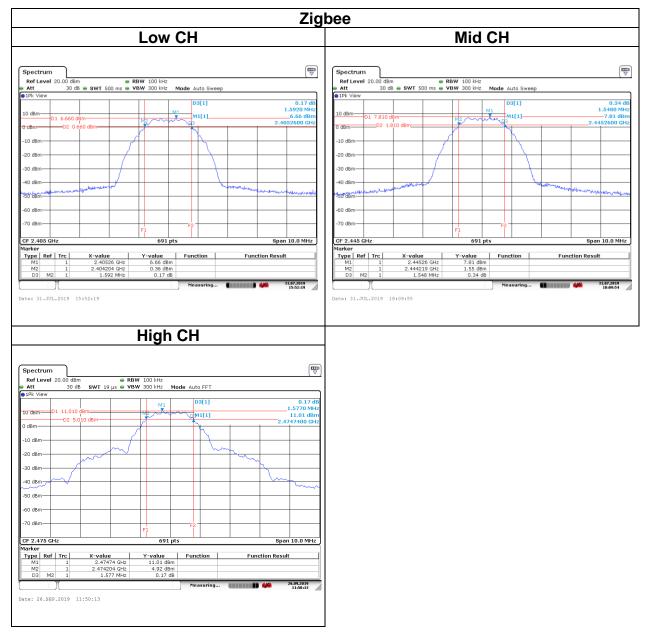


4.2.4 Test Result

Test mode: Zigbee / 2405-2475 MHz				
Channel	Frequency (MHz)	OBW (99%) (MHz)	6dB BW (MHz)	6dB limit (kHz)
Low	2405	2.1997	1.5920	
Mid	2445	2.1997	1.5480	≥500
High	2475	2.2286	1.5770	



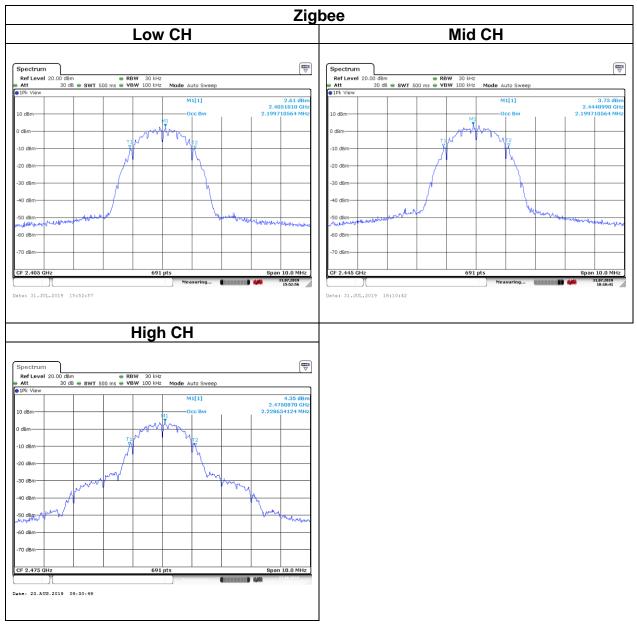
Test Data 6dB BANDWIDTH





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Test Data BANDWIDTH (99%)



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4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.247(b) and RSS-247 section 5.4(d),

Peak output power :

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt(30 dBm), base on the use of antennas with directional gain not exceed 6 dBi If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

	Antenna not exceed 6 dBi : 30dBm
Limit	Antenna with DG greater than 6 dBi :
	[Limit = 30 - (DG - 6)]
	Point-to-point operation :

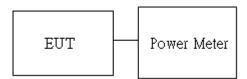
Average output power : For reporting purposes only.

4.3.2 Test Procedure

Test method Refer as KDB 558074 D01.

- 1. The EUT RF output connected to the power meter by RF cable.
- 2. Setting maximum power transmit of EUT.
- 3. The path loss was compensated to the results for each measurement.
- 4. Measure and record the result of Peak output power and Average output power in the test report.

4.3.3 Test Setup





4.3.4 Test Result

Peak output power :

Zigbee							
Config.	Freq. (MHz)	Power Settin g	PK Power (dBm)	EIRP PK Power (dBm)	PK Power (W)	EIRP PK Power (W)	Limit (dBm)
	2405	30	27.85	29.35	0.6095	0.8610	
Zigbee	2445	30	27.92	29.42	0.6194	0.8750	30
	2475	30	27.91	29.41	0.6180	0.8730	

Average output power :

Zigbee				
Config.	Freq. (MHz)	Power Setting	AV Power (dBm)	
	2405	30	27.18	
Zigbee	2445	30	27.23	
	2475	30	27.25	

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4.4 POWER SPECTRAL DENSITY

4.4.1 Test Limit

According to §15.247(e), RSS-247 section 5.2(b),

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

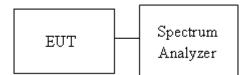
Limit \bigtriangleup Antenna not exceed 6 dBi : 8dBmLimit \square Antenna with DG greater than 6 dBi[Limit = 8 - (DG - 6)] \square Point-to-point operation :

4.4.2 Test Procedure

Test method Refer as KDB 558074 D01.

- 1. The EUT RF output connected to the spectrum analyzer by RF cable.
- 2. Setting maximum power transmit of EUT
- 3. SA set RBW = 3kHz, VBW = 30kHz, Span = 1.5 times DTS Bandwidth (6 dB BW), Detector = Peak, Sweep Time = Auto and Trace = Max hold.
- 4. The path loss and Duty Factor were compensated to the results for each measurement by SA.
- 5. Mark the maximum level.
- 6. Measure and record the result of power spectral density. in the test report.

4.4.3 Test Setup

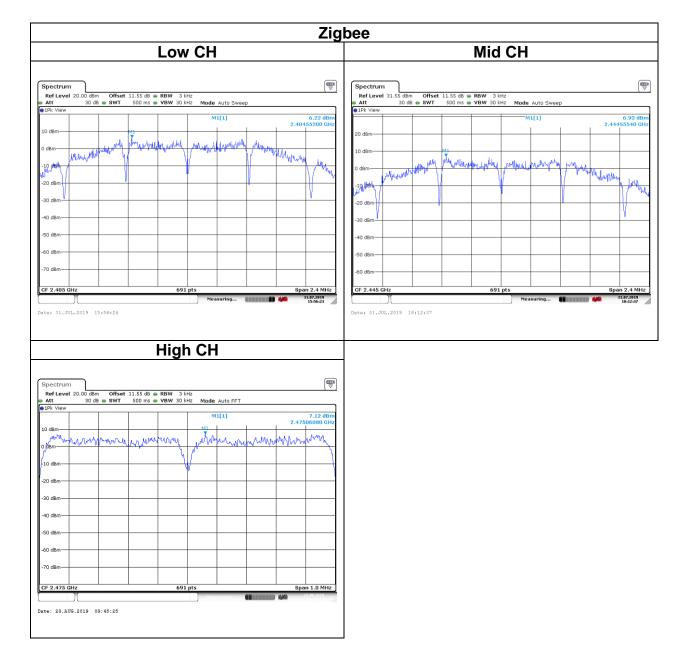


4.4.4 Test Result

Test mode: Zigbee				
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	
Low	2405	6.22		
Mid	2445	6.93	8	
High	2475	7.12		



Test Data



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4.5 CONDUCTED BANDEDGE AND SPURIOUS EMISSION

4.5.1 Test Limit

According to §15.247(d) and RSS-247 section 5.5,

In any 100 kHz bandwidth outside the authorized frequency band,

Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

4.5.2 Test Procedure

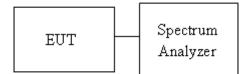
Test method Refer as KDB 558074 D01

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.

2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.

3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. f the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

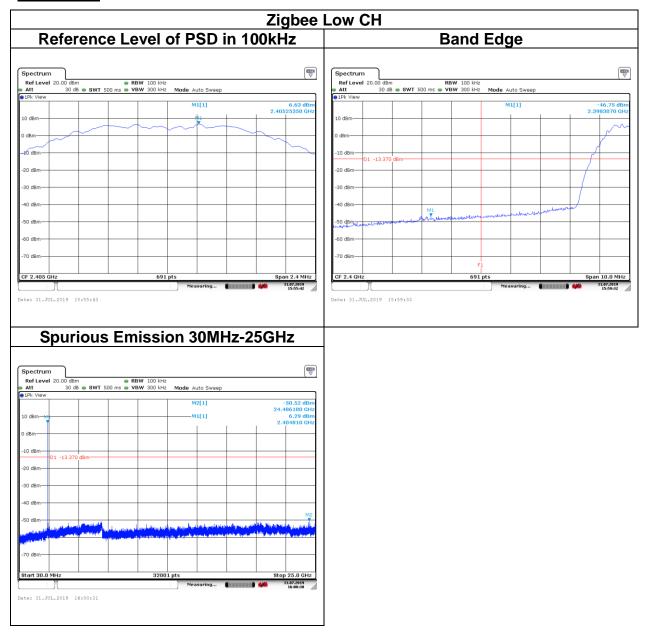
4.5.3 Test Setup





4.5.4 Test Result

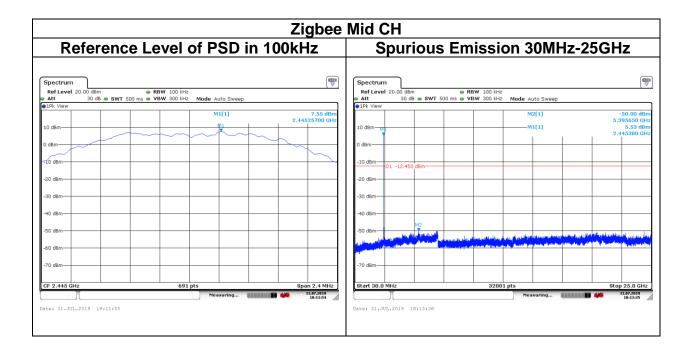
Test Data



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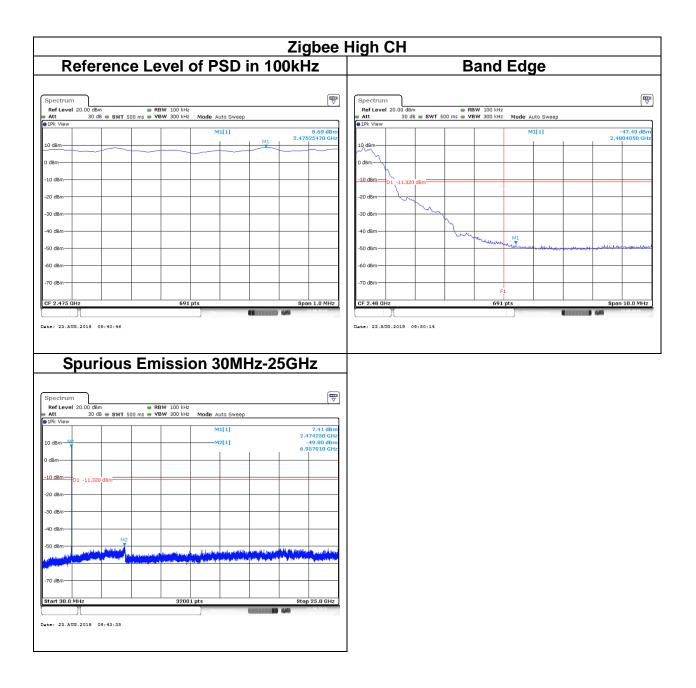


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4.6 RADIATION BANDEDGE AND SPURIOUS EMISSION

4.6.1 Test Limit

FCC according to §15.247(d), §15.209 and §15.205

IC according to RSS-247 section 5.5, RSS-Gen, Section 8.9 and 8.10,

In any 100 kHz bandwidth outside the authorized frequency band, all harmonic and spurious must be least 20 dB below the highest emission level with the authorized frequency band. Radiation emission which fall in the restricted bands must also follow the FCC section 15.209 as below limit in table.

Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Above 30 MHz

Frequency	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)		
(MHz)	Transmitters	Receivers	
30-88	100 (3 nW)	100 (3 nW)	
88-216	150 (6.8 nW)	150 (6.8 nW)	
216-960	200 (12 nW)	200 (12 nW)	
Above 960	500 (75 nW)	500 (75 nW)	

Remark:

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field.



<u>RSS-Gen Table 3 and Table 5 – General Field Strength Limits for Transmitters and</u> <u>Receivers at Frequencies Above 30 MHz</u> ^(Note)

Frequency	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)			
(MHz)	Transmitters	Receivers		
30-88	100 (3 nW)	100 (3 nW)		
88-216	150 (6.8 nW)	150 (6.8 nW)		
216-960	200 (12 nW)	200 (12 nW)		
Above 960	500 (75 nW)	500 (75 nW)		

Note: Measurements for compliance with the limits in table 3 may be performed at distances other than 3 metres, in accordance with Section 6.6.

RSS-Gen Table 6: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)

Frequency	Magnetic field strength (H-Field) (µA/m)	Measurement Distance (m)
9-490 kHz ^{Note}	6.37/F (F in kHz)	300
490-1,705 kHz	63.7/F (F in kHz)	30
1.705-30 MHz	0.08	30

Note: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector..



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4.6.2 Test Procedure

Test method Refer as KDB 558074 D01.

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10: 2013, and the EUT set in a continuous mode.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.

3. Span shall wide enough to full capture the emission measured. The SA from 30MHz to 26.5GHz set to the low, Mid and High channels with the EUT transmit.

4. The SA setting following :

- (1) Below 1G : RBW = 100kHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.
- (2) Above 1G:
 - (2.1) For Peak measurement : RBW = 1MHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.
 - (2.2) For Average measurement : RBW = 1MHz, VBW

If Duty Cycle \geq 98%, VBW=10Hz.

[·]If Duty Cycle < 98%, VBW≥1/T.

Configuration	Duty Cycle (%)	T(ms)	1/T (kHz)	VBW Setting
Zigbee	100%	1.0000	-	10Hz

Remark:

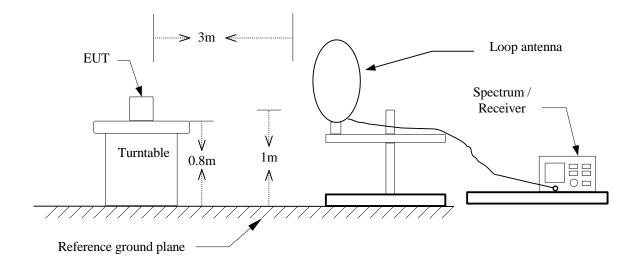
1. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

2. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

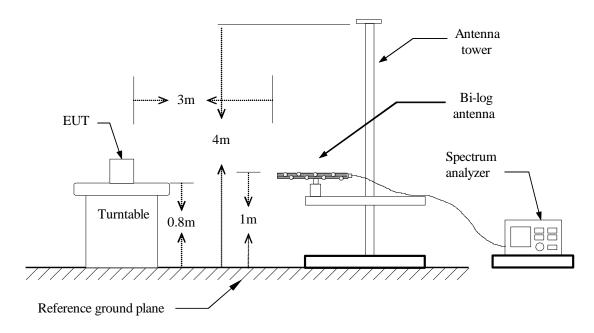


Report No.: T190509E05-RP 4.6.3 Test Setup

<u>9kHz ~ 30MHz</u>



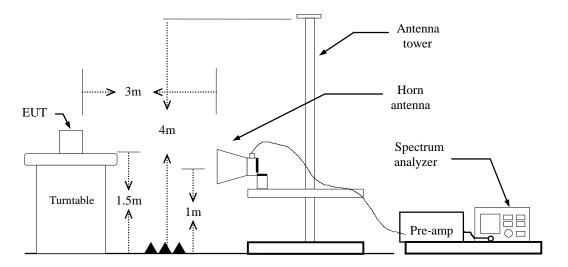
<u>30MHz ~ 1GHz</u>





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Above 1 GHz





4.6.4 Test Result

Band Edge Test Data

Test Mo	ode	Zigbee Low C	н	Temp/Hum	23.6(°C)/ 48%RH
Test Ite	em	Band Edge		Test Date		/ 30, 2019
Polariz		Vertical		Test Enginee		
Detect	or	Peak and Avera	ige			
130	ıV/m)					
120						~~~~
100						
80						
						the last
60	-	2	-lon warman	and the second	anisan masser	
					3	
40			1			
20						
⁰ 2310	2330		Frequency (MH	2370.	2390.	2410
		ľ	requency (win	12)		
Frequency	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
(MHz)	(PK/QP/AV) (dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
2340.70	Average	-	-19.09	39.82	54.00	-14.18
2340.70	Peak	62.20	-3.29	58.91	74.00	-15.09
2390.00	Average	-	-19.09	42.46	54.00	-11.54
	1		1		74.00	

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Test M	ode	Zigbee Low C	:н	Temperature	e: 23.6	(°C)/ 48%RF
Test It		Band Edge		Test Date		y 30, 2019
Polari		Horizontal		Test Engine	er ,	Jerry Lu
Detec	tor	Peak and Avera	age			
130	uV/m)					
120						~~~~
100						
80						
60				2	in many mer	m to
					3	
40						
20						
0 2310	2330.	2350.	requency (M	2370.	2390.	2410
			requerey (m			
requency	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode (PK/QP/AV)	Reading Level	(FS	@3m	(-10)
		(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
(MHz) 2377.20		-	-19.09	39.84	54.00	-14.16
. ,	Average Peak	62.29	-19.09 -3.36	39.84 58.93	54.00 74.00	-14.16 -15.07
2377.20	Average	-				



Test M	ode	Zigbee High C	H	Temp/Hum	23.6(°C)/ 48%RF	
Test It		Band Edge		Test Date		July 30, 2019	
Polari		Vertical		Test Engineer		Jerry Lu	
Detec	tor	Peak and Avera	age				
130 Level (dB	uV/m)						
120							
100	·/\						
80							
60			2	4 6			
				3 5			
40							
20							
0 <mark></mark> 2470			1 ()		i i	1	
24/0	2476.	2482.		2488.	2494.	2500	
2470	2476.		requency (MHz		2494.	2500	
requency	Detector	F Spectrum	requency (MHz Factor	Actual	Limit	2500 Margin	
		F)			
requency	Detector Mode	F Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin	
requency (MHz)	Detector Mode (PK/QP/AV)	F Spectrum Reading Level	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)	
Trequency (MHz) 2483.50	Detector Mode (PK/QP/AV) Average	F Spectrum Reading Level (dBµV) -	Factor (dB) -19.09	Actual FS (dBµV/m) 46.73	Limit @3m (dBµV/m) 54.00	Margin (dB) -7.27	
Trequency (MHz) 2483.50 2483.50	Detector Mode (PK/QP/AV) Average Peak	F Spectrum Reading Level (dBµV) -	Factor (dB) -19.09 -2.83	Actual FS (dBµV/m) 46.73 65.82	Limit @3m (dBµV/m) 54.00 74.00	Margin (dB) -7.27 -8.18	
requency (MHz) 2483.50 2483.50 2487.16	Detector Mode (PK/QP/AV) Average Peak Average	F Spectrum Reading Level (dBμV) - 68.65 -	Factor (dB) -19.09 -2.83 -19.09	Actual FS (dBμV/m) 46.73 65.82 48.00	Limit @3m (dBμV/m) 54.00 74.00 54.00	Margin (dB) -7.27 -8.18 -6.00	



Test M	ode	Zigbee High C	;H -	Temperature	: 23.6(°C)/ 48%RF	
Test It	em	Band Edge		Test Date	July	July 30, 2019	
Polari		Horizontal		lest Enginee	er .	Jerry Lu	
Detec	tor	Peak and Avera	age				
130	uV/m)						
120							
120							
100		\sim					
80							
and the second se			2	4 6			
60						action	
40							
40							
20							
0 <mark></mark> 2470	2476.	2482.		2488.	2494.	2500	
		F	requency (MHz)				
requency	Detector	Spectrum	Factor	Actual	Limit	Margin	
requency	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin	
requency (MHz)		•	Factor (dB)			Margin (dB)	
	Mode	Reading Level		FS	@3m	-	
(MHz)	Mode (PK/QP/AV)	Reading Level	(dB)	FS (dBµV/m)	@3m (dBµV/m)	(dB)	
(MHz) 2483.50	Mode (PK/QP/AV) Average	Reading Level (dBµV)	(dB) -19.09	FS (dBμV/m) 47.56	@3m (dBµV/m) 54.00	(dB) -6.44	
(MHz) 2483.50 2483.50	Mode (PK/QP/AV) Average Peak	Reading Level (dBµV) - 69.48	(dB) -19.09 -2.83	FS (dBμV/m) 47.56 66.65	@3m (dBµV/m) 54.00 74.00	(dB) -6.44 -7.35	
(MHz) 2483.50 2483.50 2487.40	Mode (PK/QP/AV) Average Peak Average	Reading Level (dBµV) - 69.48	(dB) -19.09 -2.83 -19.09	FS (dBµV/m) 47.56 66.65 48.39	@3m (dBμV/m) 54.00 74.00 54.00	(dB) -6.44 -7.35 -5.61	



Below 1GHz

Test M	ode	Zigbee Mid CH	Г	emp/Hum	23.6(°C)/ 48%Rł
Test It		30MHz-1GHz		Test Date	July 26, 2019	
Polari		Vertical	Test Engineer		Jerry Lu	
Detec	tor	Peak				
100 Level (dB	uV/m)	i	i	iii		
90					· · · · · · · · · · · · · · · · · · ·	
80						
70						
60						
50			, , , , ,		 	
40	34			· · · · · · · · · · · · · · · · · · ·		
30	5		5	· · · · · · · · · · · · · · · · · · ·		
20						
10						
0 <mark></mark>						
30	224.	418. Fre	quency (MHz)	i12.	806.	1000
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
Freq. (MHz)		-	Factor (dB)			Margin (dB)
-	Mode	Reading Level		FS	@3m	-
(MHz)	Mode (PK/QP/AV)	Reading Level (dBµV)	(dB)	FS (dBµV/m)	@3m (dBµV/m)	(dB)
(MHz) 31.94	Mode (PK/QP/AV) Peak	Reading Level (dBµV) 34.84	(dB) -3.40	FS (dBμV/m) 31.44	@3m (dBµV/m) 40.00	(dB) -8.56
(MHz) 31.94 68.80	Mode (PK/QP/AV) Peak Peak	Reading Level (dBµV) 34.84 48.17	(dB) -3.40 -14.93	FS (dBµV/m) 31.44 33.24	@3m (dBμV/m) 40.00 40.00	(dB) -8.56 -6.76
(MHz) 31.94 68.80 104.69	Mode (PK/QP/AV) Peak Peak Peak	Reading Level (dBµV) 34.84 48.17 48.31	(dB) -3.40 -14.93 -11.18	FS (dBµV/m) 31.44 33.24 37.13	@3m (dBμV/m) 40.00 40.00 43.50	(dB) -8.56 -6.76 -6.37



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16311	lode	Zigbee Mid C		Temp/Hum	23.6(°C	C)/ 48%R	
Test I		30MHz-1GHz		Test Date		July 26, 2019	
Pola		Horizontal		est Enginee	r Je	erry Lu	
Dete	ctor	Peak and Quasi-	peak				
100 Level (dB	uV/m)						
90					 		
80					 		
70							
60							
50							
40 2	4						
30	5						
1 11							
20							
20							
10	224	440		64.2	906	1000	
	224.	418. Fre	quency (MHz)	612.	806.	1000	
10	224. Detector			512.	806. Limit	1000 Margin	
10 0 30		Fre	quency (MHz)				
10 0 30	Detector	Fre	quency (MHz)	Actual	Limit		
10 0 30	Detector Mode	Fre Spectrum Reading Level	equency (MHz) Factor	Actual FS	Limit @3m	-	
10 0 30 Freq. (MHz)	Detector Mode (PK/QP/AV)	Fre Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)	
10 0 30 Freq. (MHz) 30.00	Detector Mode (PK/QP/AV) QP	Free Spectrum Reading Level (dBµV) 38.65	Factor (dB) -1.51	Actual FS (dBμV/m) 37.14	Limit @3m (dBμV/m) 40.00	Margin (dB) -2.86	
10 0 30 Freq. (MHz) 30.00 65.89	Detector Mode (PK/QP/AV) QP QP	Free Spectrum Reading Level (dBµV) 38.65 50.96	Factor (dB) -1.51 -15.35	Actual FS (dBμV/m) 37.14 35.61	Limit @3m (dBµV/m) 40.00 40.00	Margin (dB) -2.86 -4.39	
10 0 30 Freq. (MHz) 30.00 65.89 75.59	Detector Mode (PK/QP/AV) QP QP QP	Free Spectrum Reading Level (dBµV) 38.65 50.96 53.06	Factor (dB) -1.51 -15.35 -14.79	Actual FS (dBμV/m) 37.14 35.61 38.27	Limit @3m (dBµV/m) 40.00 40.00 40.00	Margin (dB) -2.86 -4.39 -1.73	



Above 1 GHz

Test M	ode	Zigbee Low CH	-	Temp/Hum	23.6(°C	23.6(°C)/ 48%RH	
Test It		Harmonic		Test Date		July 30, 2019	
Polar		Vertical		est Engineer	Jei	Jerry Lu	
Detec	tor	Peak and Average	ge				
100	uV/m)						
90							
80							
70							
60	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						
50	2						
40							
30					· · · · · · · · · · · · · · · · · · ·		
20				- <u>-</u>			
10					·		
0 <mark>1000</mark>	6100.	11200.	16	5300.	21400.	26500	
1000	0100.		quency (MHz)		211001	20000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
-	Mode	Reading Level		FS	@3m	-	
			(15)	(dDu)//m)	(dBµV/m)	(dB)	
(MHz)	(PK/QP/AV)	(dBµV)	(dB)	(dBµV/m)			
(MHz) 4810.00	(PK/QP/AV) Average	(dBµV) -	(dB) -19.09	25.95	54.00	-28.05	
		(dBµV) - 42.00			54.00 74.00	-28.05 -28.96	
4810.00	Average	-	-19.09	25.95			
4810.00 4810.00	Average	-	-19.09	25.95			
4810.00 4810.00	Average	-	-19.09	25.95			
4810.00 4810.00	Average	-	-19.09	25.95			
4810.00 4810.00	Average	-	-19.09	25.95			

fundamental frequency.



Test M	ode	Zigbee Low CH		Femp/Hum	23.6(°C	23.6(°C)/ 48%RH	
Test It		Harmonic		Test Date	July 30, 2019		
Polari		Horizontal		est Engineer	Jei	Jerry Lu	
Detec	tor	Peak and Averag	je				
100 Level (dB	uV/m)						
90							
80							
70							
60							
50				· · · · · · · · · · · · · · · · · · ·			
40							
30				-+	· · · · · · · · · · · · · · · · · · ·		
20							
10							
0 <mark></mark>	6100.	11200. Fre	16 quency (MHz)	5300.	21400.	26500	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
	Mode	Reading Level		FS	@3m		
(MHz)	(PK/QP/AV)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
4810.00	Average	-	-19.09	26.77	54.00	-27.23	
4810.00	Peak	42.82	3.04	45.86	74.00	-28.14	
N/A							

Remark:



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Test M	lode	Zigbee Mid CH	1	Temp/Hum	23.6(°C)/ 48%RF
Test It		Harmonic		Test Date	July 30, 2019	
Polar		Vertical	9		er Jerry Lu	
Detec	ctor	Peak and Average	ge			
100 Level (dBi	uV/m)	i i	i			
90						
80						
70						
60						
50	2		·			
40		· · · · · · · · · · · · · · · · · · ·				
30						
20						
10						
0 <mark></mark>						
1000	6100.	11200. Fre	quency (MHz)	6300.	21400.	26500
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
(MHz)	(PK/QP/AV)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
4890.00	Average	-	-19.09	27.16	54.00	-26.84
4890.00	Peak	42.78	3.47	46.25	74.00	-27.75
N/A						

Remark:



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Test M	ode	Zigbee Mid CH	1	Temp/Hum	23.6(°C	:)/ 48%RF	
Test It		Harmonic		Test Date		July 30, 2019	
Polar		Horizontal		est Engineer	Je	Jerry Lu	
Detec	tor	Peak and Average	ge				
100 Level (dBr 90	JV/m)						
30							
10							
0 1000	6100.	11200. Fre	1(quency (MHz)	5300.	21400.	26500	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
	Mode	Reading Level		FS	@3m		
(MHz)	(PK/QP/AV)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
4890.00	Average	-	-19.09	28.54	54.00	-25.46	
4890.00	Peak	44.16	3.47	47.63	74.00	-26.37	
N/A							

Remark:



Test M		Zigbee High CH	1	Temp/Hum		28.3(°C)/ 35%R⊢ August 23, 2019	
Test It		Harmonic		Test Date			
Polari Detec		Vertical Peak and Averag		est Engineer	Jei	rry Lu	
100 Level (dBu 90	ıV/m)						
50 40 30	2						
20 10							
0 <mark></mark> 1000	8800.	16600. Fre	quency (MHz)	24400.	32200.	40000	
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin	
(MHz)	(PK/QP/AV)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
4890.00	Average	-	-19.09	28.54	54.00	-25.46	
4890.00	Peak	44.16	3.47	47.63	74.00	-26.37	
N/A							

Remark:



Test Mode Test Item		Zigbee High CH Harmonic		Temp/Hum		28.3(°C)/ 35%RF August 23, 2019	
				Test Date			
Polar Deteo		Horizontal Peak and Average		est Engineer	Jerry Lu		
100 Level (dB	i		<u> </u>				
90							
80							
70				· · · · · · · · · · · · · · · · · · ·			
60	· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·			
50	2	1 1 1			I I I I I I I I I I I I I I I I I I I		
40					· · · · · · · · · · · · · · · · · · ·		
30				· · · · · · · · · · · · · · · · · · ·			
20							
10							
0 <mark></mark> 1000	8800.	16600. 24400. Frequency (MHz)			32200.	40000	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
	Mode	Reading Level		FS	@3m		
(MHz)	(PK/QP/AV)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
4955.00	Average	-	-19.09	31.17	54.00	-22.83	
4955.00	Peak	46.23	4.03	50.26	74.00	-23.74	
N/A							

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

--End of Report--