

FCC Test Report

Report No.: AGC10862210801FE02

FCC ID : 2AU29SC24B0634

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION: BTE DC Motor for Honeycomb Shades

BRAND NAME : Shade Connect

MODEL NAME : BTE24B-0.6/34

APPLICANT: Turnils North America

DATE OF ISSUE : Aug. 06, 2021

STANDARD(S) : FCC Part 15.247

REPORT VERSION: V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	9 /	Aug. 06, 2021	Valid	Initial Release

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1. VERIFICATION OF COMPLIANCE

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We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC part 15.247.

Prepared By	kerry chang	
	Kelly Cheng (Project Engineer)	Aug. 06, 2021
Reviewed By	Max Zhang	
GC .	Max Zhang (Reviewer)	Aug. 06, 2021
Approved By	Towasties	
SO SOC	Forrest Lei (Authorized Officer)	Aug. 06, 2021

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as a "BTE DC Motor for Honeycomb Shades". It is designed by way of utilizing the GFSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	1M: 4.820dBm (Max) 2M: 4.662dBm (Max)
Bluetooth Version	V5.0
Modulation	BR □GFSK, EDR □π /4-DQPSK, □8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	40 Channel
Antenna Designation	FPC Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	0.1dBi
Hardware Version	V 1.3
Software Version V1.0	
Power Supply	DC 7.4V by USB

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
60 6	0	2402 MHz
NO 100	. 1	2404 MHz
2400~2483.5MHz		
100 ac	38	2478 MHz
10	39	2480 MHz

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2.3. RELATED SUBMITTAL(S)/GRANT(S)

This submittal(s) (test report) is intended for **FCC ID: 2AU29SC24B0634** filing to comply with the FCC Part 15.247 requirements.

2.4. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.7. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 3.1 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 4.0 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.8 \text{ dB}$
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$
Uncertainty of spurious emissions, conducted	U _c = ±2 %
Uncertainty of Occupied Channel Bandwidth	U _c = ±2 %

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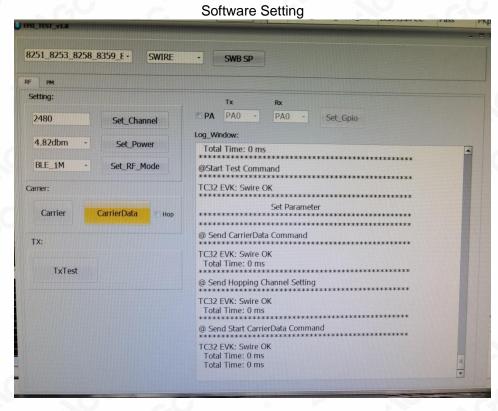
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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION	
1	Low channel TX	
2	Middle channel TX	
3	High channel TX	

Note:

- 1. Only the result of the worst case was recorded in the report, if no other cases.
- 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
- 3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.



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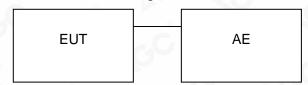


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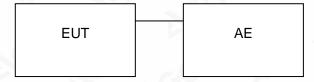
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF TESTED SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:



5.2. EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	BTE DC Motor for	BTE24B-0.6/34	2AU29SC24B0634	EUT
2	Adapter	ZL-PCB0100020502000	N/A	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.247 (b)(3)	Peak Output Power	Compliant
15.247 (a)(2)	6 dB Bandwidth	Compliant
15.247 (d)	Conducted Spurious Emission	Compliant
15.247 (e)	Maximum Conducted Output Power Density	Compliant
15.209	Radiated Emission	Compliant
15.207	Conducted Emission	Compliant

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6. TEST FACILITY

	Test Site	Test Site Attestation of Global Compliance (Shenzhen) Co., Ltd		
(C)	Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China		
Designation Number CN1259		CN1259		
	FCC Test Firm Registration Number	975832		
	A2LA Cert. No.	5054.02		
	Description	Attestation of Global Compliance (Shenzhen) Co., Ltd is accredited by A2LA		

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

TEG TEG THE MENT OF CONDUCTED EMISSION TEG.					
Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 15, 2021	May 14, 2022
LISN	R&S	ESH2-Z5	100086	Jun. 09, 2021	Jun. 08, 2022
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2021	May 14, 2022
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 07, 2020	Dec. 06, 2021
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2021	Apr. 22, 2022
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 08, 2021	Jan. 07, 2023
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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7. PEAK OUTPUT POWER

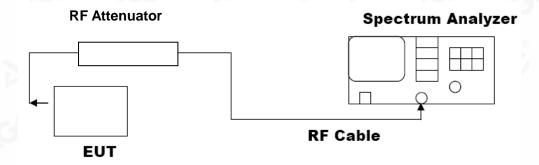
7.1. MEASUREMENT PROCEDURE

For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. RBW ≥ DTS bandwidth
- 3. VBW≥3*RBW.
- 4. SPAN≥VBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) PEAK POWER TEST SETUP



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7.3. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power					
Test Mode	Test Channel (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail	
10	2402	4.820	≤30	Pass	
GFSK 1M	2440	4.125	≤30	Pass	
8	2480	2.933	≤30	Pass	

Test Graphs of Conducted Output Power



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Test_Graph_LE1M_ANT1_2440_1Mbps_Peak Power



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Test Data of Conducted Output Power					
Test Mode Test Channel (MHz) Peak Power (dBm) Limits (dBm) Pass or Fail					
	2402	4.662	≤30	Pass	
GFSK 2M	2440	4.100	≤30	Pass	
	2480	3.055	≤30	Pass	

Test Graphs of Conducted Output Power



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8. BANDWIDTH

8.1. MEASUREMENT PROCEDURE

6dB bandwidth:

- Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW ≥3×RBW.
- 4. Set SPA Trace 1 Max hold, then View.

Occupied bandwidth:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hoping channel
 The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video
 bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

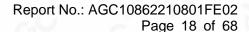
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

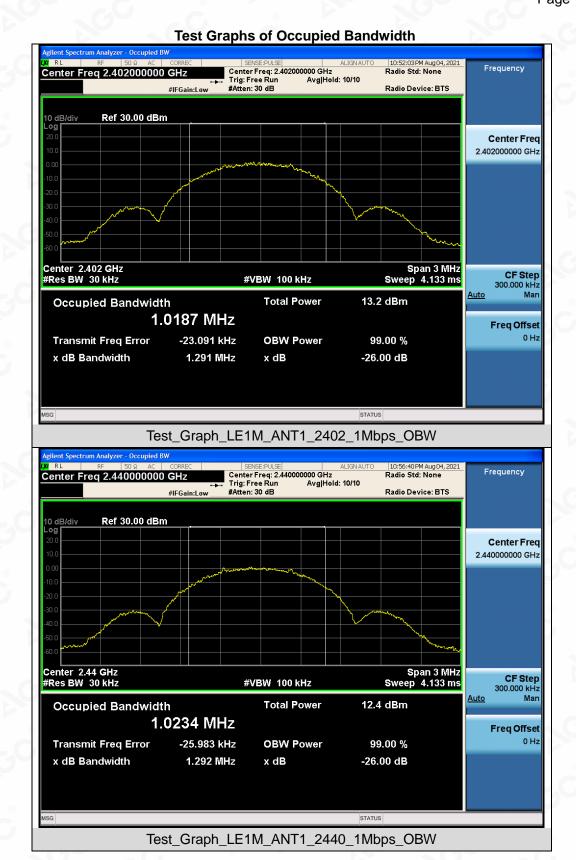
8.3. LIMITS AND MEASUREMENT RESULTS

Test Data of Occupied Bandwidth and DTS Bandwidth						
Test Mode Test Channel 99% Occupied -6dB Limits Bandwidth (MHz) Bandwidth (MHz) Pass or Fai						
60	2402	1.019	0.677	≥0.5	Pass	
GFSK 1M	2440	1.023	0.681	≥0.5	Pass	
®	2480	1.022	0.673	≥0.5	Pass	

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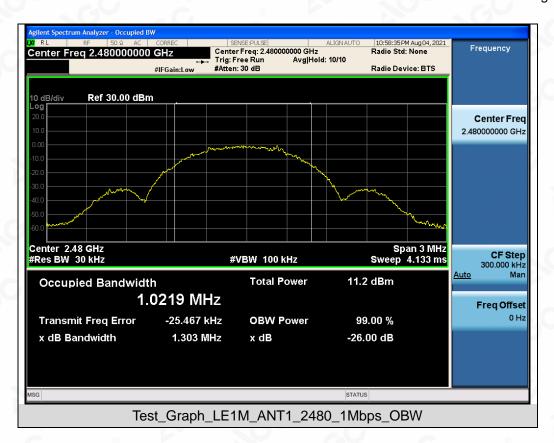






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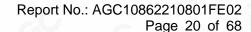




Test Graphs of DTS Bandwidth



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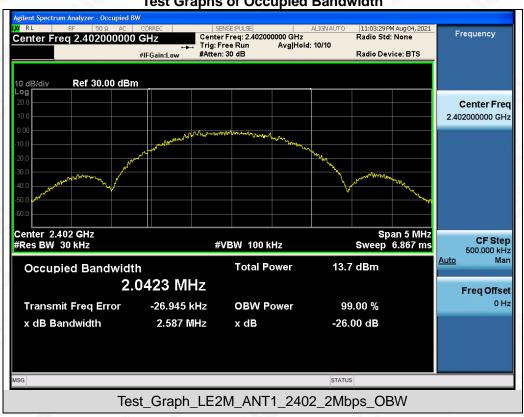
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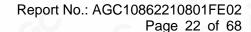
he test report.

Test Data of Occupied Bandwidth and DTS Bandwidth						
Test Mode Test Channel 99% Occupied -6dB Limits Bandwidth (MHz) Bandwidth (MHz) Pass or Fail						
	2402	2.0423	1.383	≥0.5	Pass	
GFSK 2M	2440	2.0515	1.442	≥0.5	Pass	
G	2480	2.0464	1.412	≥0.5	Pass	

Test Graphs of Occupied Bandwidth



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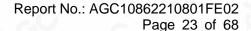




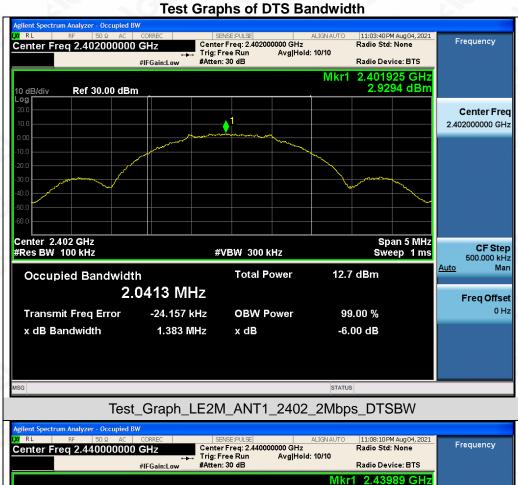


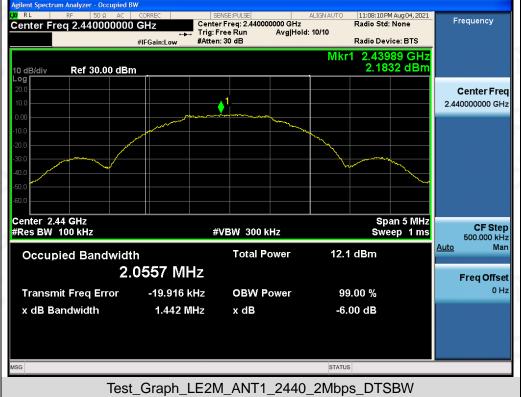


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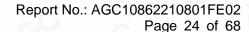




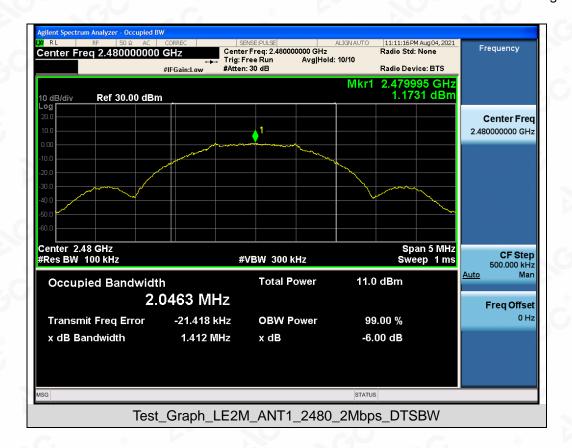




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9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

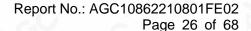
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT					
Annii alia i inii	Measurement Result				
Applicable Limits	Test Data	Criteria			
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	At least -20dBc than the reference level	PASS			

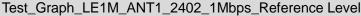
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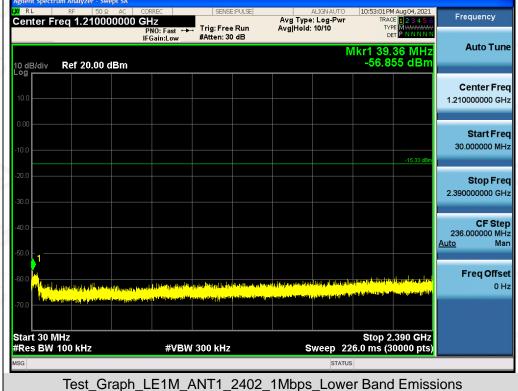




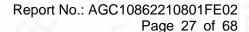
Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands







Complian Pesting/Inspection Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the Any report having not been signed by authorized approver, or having peen altered without authorization, or having not been signed by authorized approver, or having peen altered without authorization, or having not been signed by authorization of AGC. The test results start a signed by authorization of AGC and the test report is not permitted without the written authorization of AGC. The test results are the tested cample. Any objections to report issued by AGC should be submitted to AGC within 15day after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.





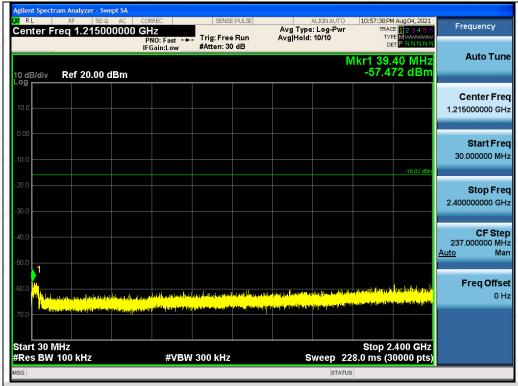


Test_Graph_LE1M_ANT1_2402_1Mbps_Higher Band Emissions



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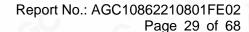




Test_Graph_LE1M_ANT1_2440_1Mbps_Lower Band Emissions



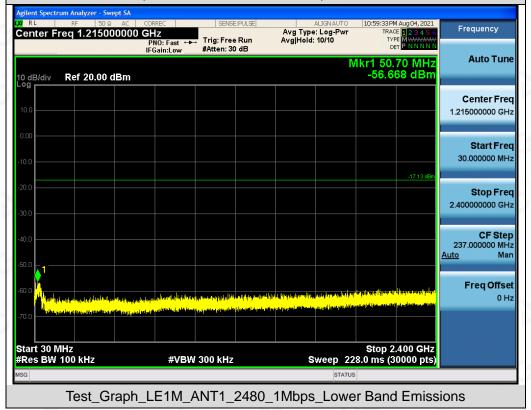
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Test_Graph_LE1M_ANT1_2480_1Mbps_Reference Level



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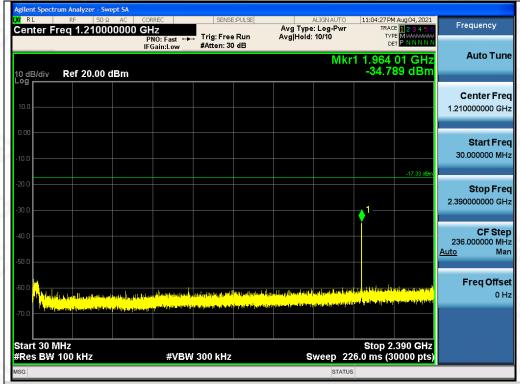


Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



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Test_Graph_LE2M_ANT1_2402_2Mbps_Lower Band Emissions



Test_Graph_LE2M_ANT1_2402_2Mbps_Higher Band Emissions

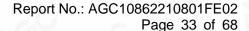
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Frequency Avg Type: Log-Pwi Avg|Hold: 10/10 Center Freq 1.215000000 GHz Trig: Free Run #Atten: 30 dB IFGain:Low **Auto Tune** -31.424 dBm 10 dB/div Ref 20.00 dBm Center Freq 1.215000000 GHz 30.000000 MHz Stop Freq 2.400000000 GHz CF Step 237.000000 MHz Freq Offset Start 30 MHz #Res BW 100 kHz Stop 2.400 GHz Sweep 228.0 ms (30000 pts) #VBW 300 kHz Test_Graph_LE2M_ANT1_2440_2Mbps_Lower Band Emissions

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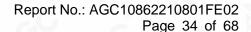




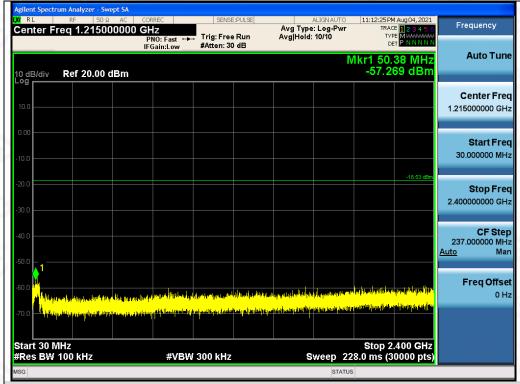
Test_Graph_LE2M_ANT1_2440_2Mbps_Higher Band Emissions



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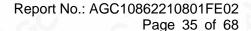


Test_Graph_LE2M_ANT1_2480_2Mbps_Lower Band Emissions



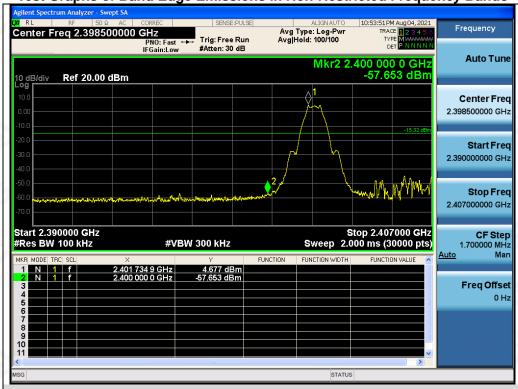
Test_Graph_LE2M_ANT1_2480_2Mbps_Higher Band Emissions

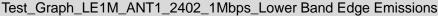
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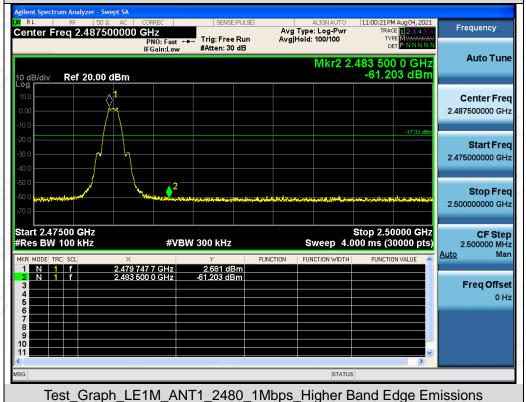




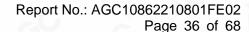
Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



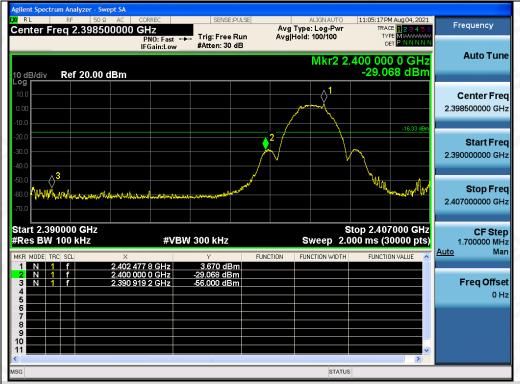




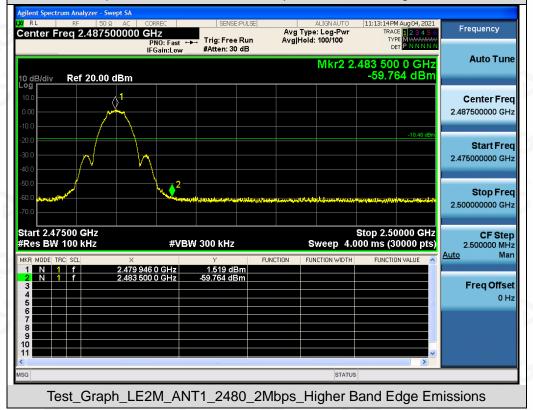
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Test_Graph_LE2M_ANT1_2402_2Mbps_Lower Band Edge Emissions



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10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1. MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set the SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the KDB 558074 item 8.4 was used in this testing.

10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer to Section 7.2.

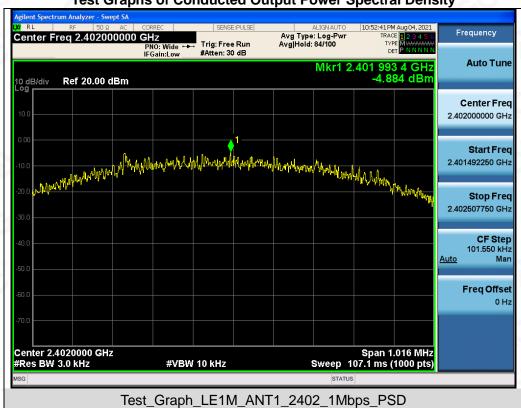
10.3. MEASUREMENT EQUIPMENT USED

Refer to Section 6.

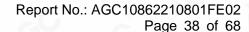
10.4. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power Spectral Density					
Test Mode Test Channel Power density Limit (MHz) (dBm/3kHz) Pass or Fail					
100	2402	-4.884	≤8	Pass	
GFSK 1M	2440	-6.399	≪8	Pass	
2G ®	2480	-5.515	≪8	Pass	

Test Graphs of Conducted Output Power Spectral Density

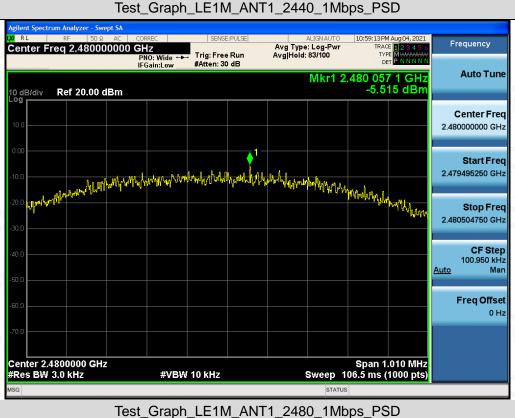


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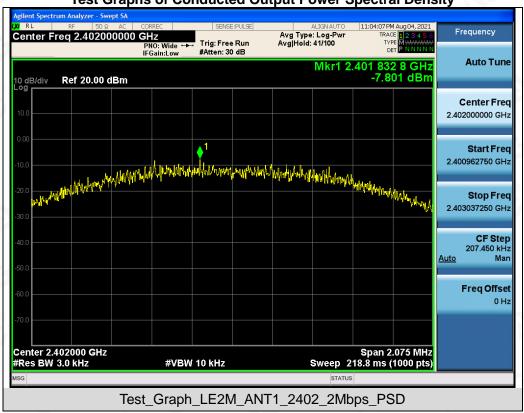


Page 39 of 68

he test results the test report.

Test Data of Conducted Output Power Spectral Density					
Test Mode Test Channel Power density Limit (MHz) (dBm/3kHz) Pass or Fail					
	2402	-7.801	≪8	Pass	
GFSK 2M	2440	-8.356	≪8	Pass	
	2480	-10.132	≤8	Pass	

Test Graphs of Conducted Output Power Spectral Density



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