

FCC Test Report

Report No.: AGC01825200802FE03

FCC ID	•	2AIGHA25
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	LENRUE A25 SPEAKER
BRAND NAME	ċ	N/A
MODEL NAME	:	A25
APPLICANT	Ģ	DONGGUAN LOYFUN INDUSTRIAL CO., LTD
DATE OF ISSUE	:	Sep. 09,2020
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	. /	Sep. 09,2020	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	DONGGUAN LOYFUN INDUSTRIAL CO., LTD	
Address	no1, Xikeng road, Puxin village, Shipai town, Dongguan, Guangdong, China.	
Manufacturer	DONGGUAN LOYFUN INDUSTRIAL CO., LTD	
Address	no1, Xikeng road, Puxin village, Shipai town, Dongguan, Guangdong, China.	
Factory	DONGGUAN LOYFUN INDUSTRIAL CO., LTD	
Address	no1, Xikeng road, Puxin village, Shipai town, Dongguan, Guangdong, China.	
Product Designation	LENRUE A25 SPEAKER	
Brand Name	N/A	
Test Model	A25	
Date of test	Aug. 19,2020 to Sep. 03,2020	
Deviation	No any deviation from the test method	
Condition of Test Sample	Normal	
Test Result	Pass	
Report Template	AGCRT-US-BR/RF	

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

Then Hurry

Thea Huang Project Engineer

Sep. 03,2020

Reviewed By

Max Zhan

Max Zhang Reviewer

Sep. 09,2020

Approved By

Forrest Lei Authorized Officer

Sep. 09,2020

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "LENRUE A25 SPEAKER". It is designed by way of utilizing the GFSK and π /4-DQPSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480 GHz
RF Output Power	0.973dBm (Max)
Bluetooth Version	V 5.0
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, □8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	79
Hardware Version	LF-A25-LED-V8.0
Software Version	V5.0
Antenna Designation	PCB Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	0.58dBi
Power Supply	DC 3.7V by battery or DC 5V by adapter

Note: 1. The EUT doesn't support 8DPSK and BLE.

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
	-C 1	2403 MHz
	38	2440 MHz
2402~2480MHz	39	2441 MHz
	40	2442 MHz
0° 60 d		
	77	2479 MHz
	78	2480 MHz

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2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHz, in every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally, the type of connection (e.g. single of multi slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also, the slave of the connection will use these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE

Example of a hopping sequence in data mode: 40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67 56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59 72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75 09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06 01, 51, 03, 55, 05, 04

2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection.

2. Internal master clock.

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24MSB's of the 48BD_ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For behavior action with other units only offset is used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us. The clock has a cycle of about one day(23h30). In most case it is implemented as 28 bits counter. For the deriving of the hopping sequence the entire. LAP (24 bits),4LSB's(4bits) (Input 1) and the 27MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. Due to the fact the

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Bluetooth clock has a different value, because the period between the two transmission is longer (and it Cannot be shorter) than the minimum resolution of the clock(312.5us). The hopping sequence will always differ from the first one.

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

This submittal(s) (test report) is intended for **FCC ID: 2AIGHA25** filing to comply with the FCC PART 15.247 requirements.

2.7. 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.

2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.10. 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 \pm 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%.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, $Uc = \pm 0.8$ dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %
- Uncertainty of Dwell Time: Uc = ± 2 %
- Uncertainty of Frequency: $Uc = \pm 2 \%$

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION	
1	Low channel GFSK	
2	Middle channel GFSK	
3	High channel GFSK	
4	Low channel π/4-DQPSK	
5	Middle channel π/4-DQPSK	
6	High channel π/4-DQPSK	
7	Hopping mode GFSK	
8	Hopping mode π/4-DQPSK	

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.

Software Setting

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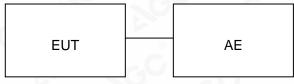
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com



5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:

EUT	S A	AE

5.2. EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	LENRUE A25 SPEAKER	A25	2AIGHA25	EUT
2	Adapter	TY0500100E1MN	N/A	AE
3	Charger line	G258	N/A	AE
4	control board	N/A	USB-TTL	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.247 (b)(1)	Peak Output Power	Compliant
15.247 (a)(1)	20 dB Bandwidth	Compliant
15.247 (d)	Conducted Spurious Emission	Compliant
15.209	Radiated Emission	Compliant
15.247 (a)(1)(iii)	Number of Hopping Frequency	Compliant
15.247 (a)(1)(iii)	Time of Occupancy	Compliant
15.247 (a)(1)	Frequency Separation	Compliant
15.207	Conducted Emission	Compliant

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd					
Location1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Communit Fuhai Street, Bao'an District, Shenzhen, Guangdong, China						
Designation Number 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

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 15, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03,2020	Jul. 02,2022
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, 2020	May 14, 2021	
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020	
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022	
Attenuator ZHINAN		E-002	N/A	N/A Sep. 09, 2019		
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 09, 2019	Sep. 08, 2021	
Active loop antenna ZHINAN (9K-30MHz)		ZN30900C	18051	May 22, 2020	May 21, 2022	
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021	
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 15, 2019	Oct. 16, 2020	
ANTENNA SCHWARZBECH		VULB9168	494	Jan. 09, 2019	Jan. 08, 2021	
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

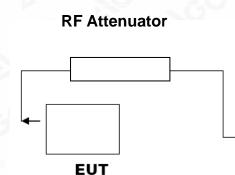
For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 3. RBW > 20 dB bandwidth of the emission being measured.
- 4. VBW \geq RBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

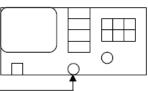
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

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

PEAK POWER TEST SETUP







RF Cable

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7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION					
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail		
2.402	0.245	30	Pass		
2.441	-0.079	30	Pass		
2.480	-0.362	30	Pass		

CH0



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Report No.: AGC01825200802FE03 Page 15 of 66





CH78



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Center 2.402000 GHz #Res BW 1.5 MHz

Ма

Freq Offset 0 Hz

Span 5.000 MHz Sweep 1.000 ms (1001 pts)

	PEAK OUTPUT POWER MEASUR FOR Π/4-DQPSK MODUL		
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	0.973	21	Pass
2.441	0.600	21	Pass
2.480	0.325	21	Pass



CH0

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#VBW 5.0 MHz





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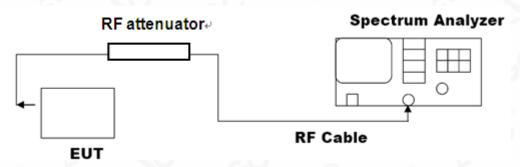


8. 20DB BANDWIDTH

8.1. 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 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.

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



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8.3. LIMITS AND MEASUREMENT RESULTS

MEASURI	MEASUREMENT RESULT FOR GFSK MOUDULATION						
Annicable Limite		Measurement Result					
Applicable Limits	Test Data	Test Data (MHz)					
	Low Channel	0.954	PASS				
N/A	Middle Channel	0.955	PASS				
	High Channel	0.952	PASS				

09:37:22 AM Aug 24, 2020 Radio Std: None Frequency Center Freq: 2.402000000 GHz 402000000 GHz Avg|Hold>100/100 Trig: Free Run #Atten: 30 dB Radio Device: BTS Ref 20.00 dBm **Center Freq** 2.402000000 GHz Center 2.402 GHz #Res BW 30 kHz Span 3 MHz Sweep 3.2 ms **CF** Step #VBW 100 kHz 300.000 kH <u>Auto</u> Ma Occupied Bandwidth **Total Power** 7.45 dBm 848.70 kHz Freq Offset 0 Hz 1.775 kHz **Transmit Freq Error OBW Power** 99.00 % x dB Bandwidth 954.0 kHz x dB -20.00 dB

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

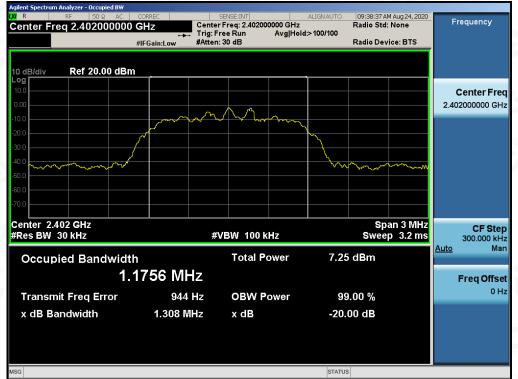


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MEASUREMENT RESULT FOR ${\rm I\!I}$ /4-DQPSK MODULATION							
Annlinghig Limite		Measurement Result					
Applicable Limits	Test Data	Test Data (MHz)					
	Low Channel	1.308	PASS				
N/A	Middle Channel	1.313	PASS				
	High Channel	1.315	PASS				

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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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.
- Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
 RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

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

The same as described in section 8.2

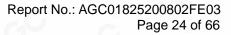
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT								
Annlinghta Limita	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	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS						
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. In addition, radiation emissions 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))	At least -20dBc than the limit Specified on the TOP Channel	PASS						

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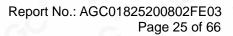




TEST RESULT FOR ENTIRE FREQUENCY RANGE TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF π /4-DQPSK MODULATION IN LOW CHANNEL



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Agilent Spectrum Analyzer - Swept SA					
M R RF 50Ω AC Center Freq 13.74175000	00 GHz		e: Log-Pwr	9:41:41 AM Aug 24, 2020 TRACE 1 2 3 4 5 6 TYPE MUMANANANA	Frequency
10 dB/div Ref 20.00 dBm	PNO: Fast Trig: Fre IFGain:Low Atten: 30		Mkr1	4.804 3 GHz -46.731 dBm	Auto Tune
Log 10.0 0.00					Center Freq 13.741750000 GHz
-20.0				-19.91 dBm	Start Freq 2.483500000 GHz
-50.0 -60.0 -70.0					Stop Freq 25.000000000 GHz
Start 2.48 GHz #Res BW 100 kHz MKR MODE TRC SCL 1 N 1 N	#VBW 300 kHz	FUNCTION FU		Stop 25.00 GHz 52 s (30000 pts) FUNCTION VALUE	CF Step 2.251650000 GHz <u>Auto</u> Man
2 3 4 5					Freq Offset 0 Hz
6 7 8 9 10					
MSG			STATUS		

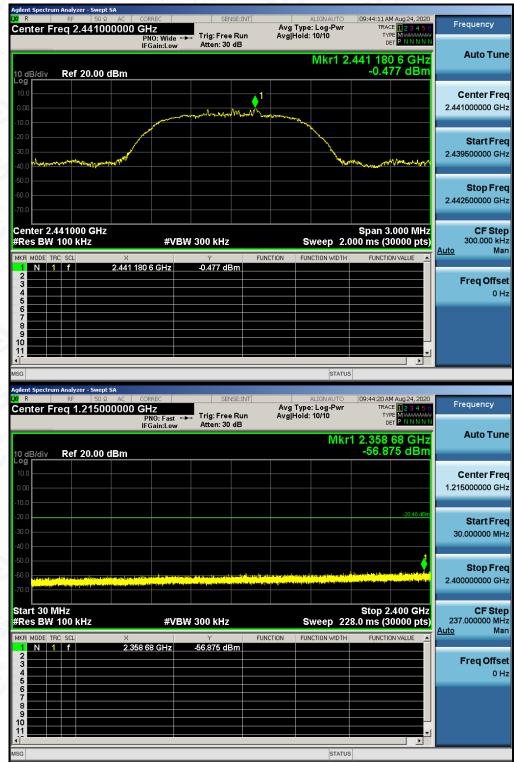
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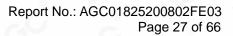
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com





TEST PLOT OF OUT OF BAND EMISSIONS OF π /4-DQPSK MODULATION IN MIDDLE CHANNEL

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Agilent Spectrum Analyzer - Swept SA	
X RF 50 Ω AC CORREC SENSE:INT ALIGN AUTO 09:44:45 AM Aug 24, 2020 Center Freq 13 7/1750000 GHz Avg Type: Log-Pwr TRACE D2:34:56 D2:34:56	Frequency
Center Freq 13.741750000 GHz PNO: Fast	
IFGain:Low Atten: 30 dB	
Mkr1 4.882 3 GHz	Auto Tune
10 dB/div Ref 20.00 dBm -45.446 dBm	
10.0	Center Freq
0.00	13.741750000 GHz
-10.0	
-20.0	Start Freq
-30.0	2.483500000 GHz
-40.0	
-50.0	
	Stop Freq
	25.00000000 GHz
-70.0	
Start 2.48 GHz Stop 25.00 GHz	OF Otom
Start 2.48 GHz Stop 25.00 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.152 s (30000 pts)	CF Step 2.251650000 GHz
	Auto Man
MKR MODE TRC SCL X Y FUNCTION WIDTH FUNCTION VALUE	
1 N 1 f 4.882 3 GHz -45.446 dBm	
3	Freq Offset
5	0 Hz
9	
MSG STATUS	

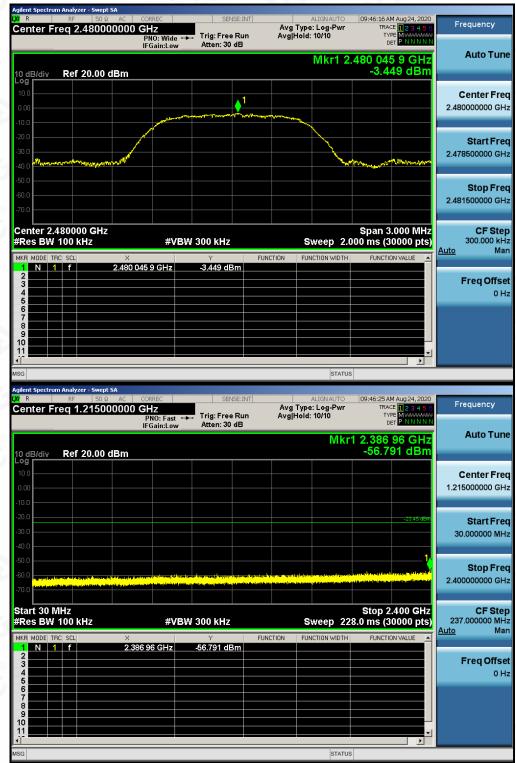
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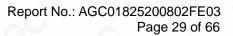
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 E-mail: agc@agc-cert.com





TEST PLOT OF OUT OF BAND EMISSIONS OF π /4-DQPSK MODULATION IN HIGH CHANNEL

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	Spectrum	n Analy	yzer - Swept												
l XI R		RF	00 11		CORREC	_	SEN	VSE:INT			ALIGN AUTO		M Aug 24, 2020	Frequenc	N/
Cent	er Fr	eq ′	13.750	000000			Trig: Free	Run			: Log-Pwr 10/10	1RAC TY	CE 123456		y
					PNO: Fast IFGain:Lov		Atten: 30		0.81	nona.	10/10	D			
										-	ML			Auto	Tune
											IVIN	4.90	0 1 GHz 74 dBm		
10 dB Log r	/div	Re	f 20.00	dBm								-40.1	74 abm		
10.0														Conton	F
														Center	
0.00														13.75000000	0 GHz
-10.0															
-20.0													-23.45 dBm		
-30.0														Start	
			. 1											2.50000000	0 GHz
-40.0			<u> </u>												
-50.0									1.		Second States	Marillow Coldman	In the part of the		
-60.0	and the state	10100	a da a dikensi ka d	and the Hugens	and the state	and a star	de Jonte de	and the state of				(hite of the second	all set and a set of the		Freq
4	All all and the second second	-1	All and the second second	College State		and the second second								25.00000000	0 GHz
-70.0															
	0.50											Otom 0	5 00 011-	05	0 4
	t 2.50				-#3	(D)M 4					Ouroon (5.00 GHz	2.25000000	Step
#Rea	BW 1	100	KHZ		#V	BW -	300 kHz				sweep	2.152 5 (5	0000 pts)	Auto	Man
	IODE TRO	C SCL		×	1		Y		UNCTION	FUN	ICTION WIDTH	FUNCTIO	DN VALUE	Auto	mar
	N 1	f		4.9	60 1 GHz		46.174 dE	3m							
2	==													Freq O	offset
4															0 Hz
5					كملعظ	<u>التار</u>									
6															
8	ه ک														
9 10					کھ										
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MSG	_										STATUS	3			

Note: The π /4-DQPSK modulation is the worst case and only those data recorded in the report.

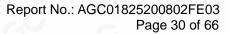
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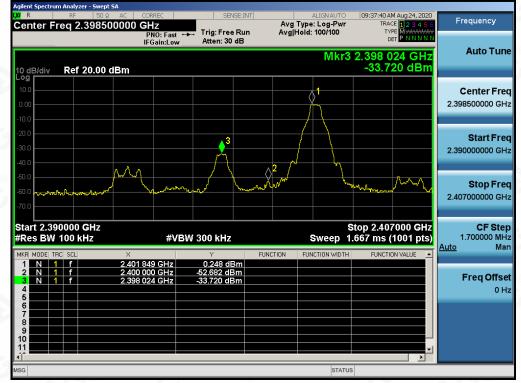




TEST RESULT FOR BAND EDGE

GFSK MODULATION IN LOW CHANNEL

Hopping off

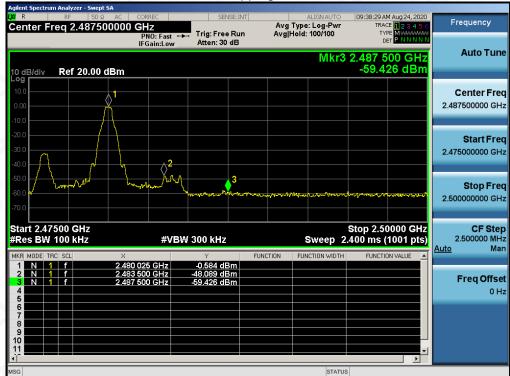


Hopping on



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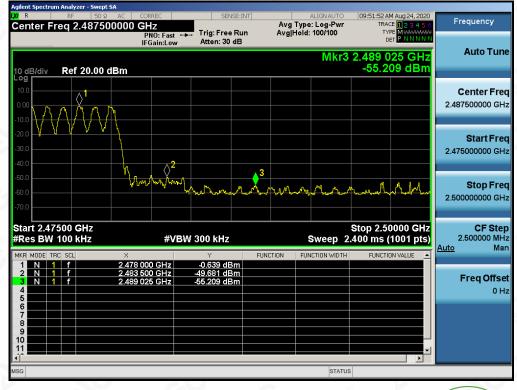




GFSK MODULATION IN HIGH CHANNEL

Hopping off

Hopping on



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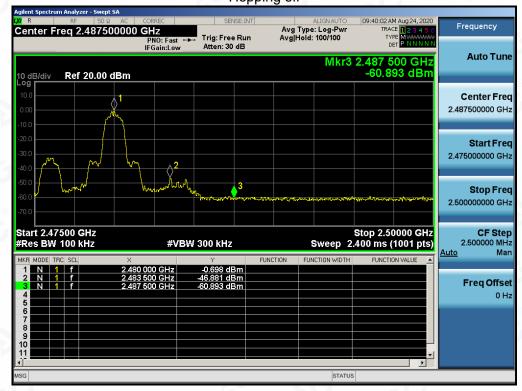
π /4-DQPSK MODULATION IN LOW CHANNEL Hopping off

Hopping on



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π /4-DQPSK MODULATION IN HIGH CHANNEL Hopping off

Hopping on



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10. RADIATED EMISSION

10.1. MEASUREMENT PROCEDURE

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

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The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting			
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP			
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP			
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP			
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average			

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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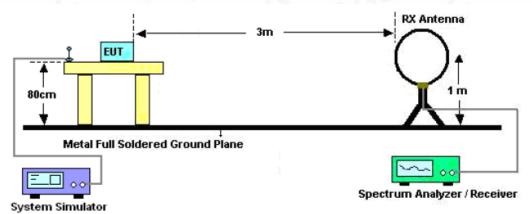
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 E-mail: agc@agc-cert.com
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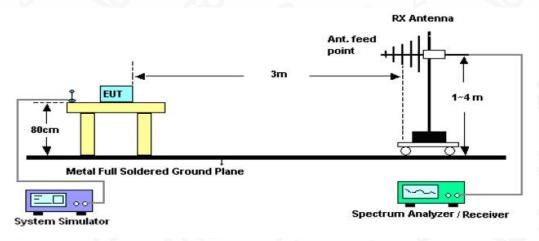


10.2. TEST SETUP

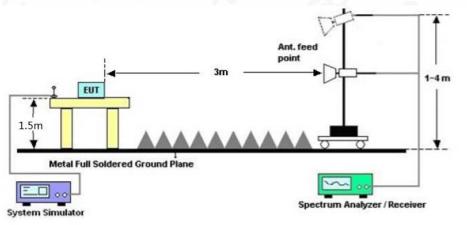
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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Attestation of Global Compliance(Shenzhen)Co., Ltd Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Web: http://cn.agc-cert.com/

10.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

10.4. TEST RESULT

RADIATED EMISSION BELOW 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

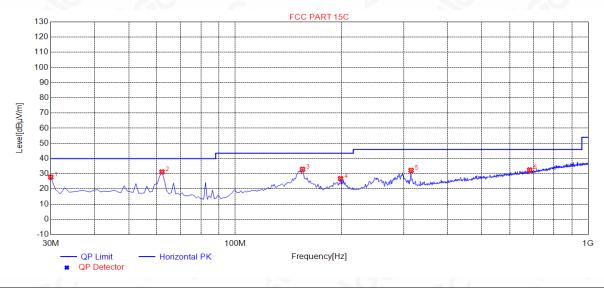
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RADIATED EMISSION BELOW 1GHz

EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	30.0000	27.77	9.85	40.00	12.23	200	302	Horizontal
2	62.0100	31.22	10.58	40.00	8.78	100	273	Horizontal
3	155.130	32.93	14.93	43.50	10.57	200	187	Horizontal
4	198.780	26.84	12.11	43.50	16.66	200	190	Horizontal
5	315.180	32.21	16.48	46.00	13.79	100	343	Horizontal
6	682.810	32.52	25.67	46.00	13.48	100	8	Horizontal

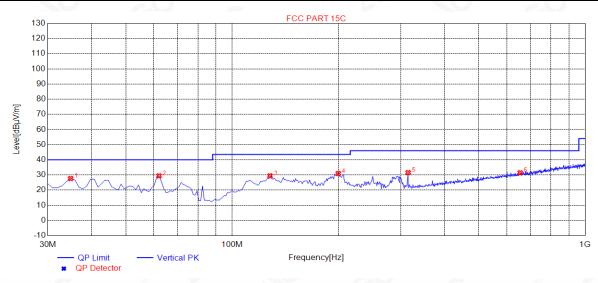
RESULT: PASS

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EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	34.8500	27.65	10.70	40.00	12.35	100	37	Vertical
2	62.0100	29.41	10.58	40.00	10.59	100	313	Vertical
3	127.970	29.40	14.01	43.50	14.10	100	64	Vertical
4	199.750	30.96	12.07	43.50	12.54	100	349	Vertical
5	315.180	31.55	16.48	46.00	14.45	100	177	Vertical
6	654.680	31.43	25.23	46.00	14.57	100	150	Vertical

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. All test modes had been pre-tested. The mode 4 is the worst case and recorded in the report.

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RADIATED EMISSION ABOVE 1GHz

EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	- Value Type
4804.000	45.78	0.08	45.86	74	-28.14	peak
4804.000	37.41	0.08	37.49	54	-16.51	AVG
7206.000	40.35	2.21	42.56	74	-31.44	peak
7206.000	32.54	2.21	34.75	54	-19.25	AVG
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actor = Anter	nna Factor + Cab	le Loss – Pre-	amplifier.	8		

EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	44.68	0.08	44.76	74	-29.24	peak
4804.000	36.24	0.08	36.32	54	-17.68	AVG
7206.000	39.51	2.21	41.72	74	-32.28	peak
7206.000	30.2	2.21	32.41	54	-21.59	AVG
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EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Tree
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4882.000	45.57	0.14	45.71	74	-28.29	peak
4882.000	38.42	0.14	38.56	54	-15.44	AVG
7323.000	41.3	2.36	43.66	74	-30.34	peak
7323.000	34.61	2.36	36.97	54	-17.03	AVG
0				() ()		

EUT LENRUE A25 SPEAKER Model Name A25 Temperature 25°C **Relative Humidity** 55.4% Pressure 960hPa **Test Voltage** Normal Voltage **Test Mode** Mode 5 Vertical Antenna

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Malue Terr
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4882.000	45.85	0.14	45.99	74	-28.01	peak
4882.000	37.42	0.14	37.56	54	-16.44	AVG
7323.000	40.26	2.36	42.62	74	-31.38	peak
7323.000	31.51	2.36	33.87	54	-20.13	AVG
®						
- 6						(2)
emark:	e.G	ß			C I	
actor = Anter	nna Factor + Cable	loss – Pre-a	molifier			

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EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Horizontal

Meter Reading	Factor	Emission Level	Limits	Margin	
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	- Value Type
46.45	0.22	46.67	74	-27.33	peak
38.39	0.22	38.61	54	-15.39	AVG
41.12	2.64	43.76	74	-30.24	peak
32.57	2.64	35.21	54	-18.79	AVG
© P			0	6	
- 61	3		100	- 6	8
na Factor + Cable	Loss – Pre-	amplifier.			- C
	(dBµV) 46.45 38.39 41.12 32.57	(dBµV) (dB) 46.45 0.22 38.39 0.22 41.12 2.64 32.57 2.64	(dBµV) (dB) (dBµV/m) 46.45 0.22 46.67 38.39 0.22 38.61 41.12 2.64 43.76	(dBµV) (dB) (dBµV/m) (dBµV/m) 46.45 0.22 46.67 74 38.39 0.22 38.61 54 41.12 2.64 43.76 74 32.57 2.64 35.21 54	(dBµV) (dB) (dBµV/m) (dBµV/m) (dB) 46.45 0.22 46.67 74 -27.33 38.39 0.22 38.61 54 -15.39 41.12 2.64 43.76 74 -30.24 32.57 2.64 35.21 54 -18.79

EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Vertical

T 🥟 T	8.)				
Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
45.53	0.22	45.75	74	-28.25	peak
38.21	0.22	38.43	54	-15.57	AVG
41.19	2.64	43.83	74	-30.17	peak
33.52	2.64	36.16	54	-17.84	AVG
	<u> </u>	0			G
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-	45.53 38.21 41.19	(dBµV) (dB) 45.53 0.22 38.21 0.22 41.19 2.64	(dBµV) (dB) (dBµV/m) 45.53 0.22 45.75 38.21 0.22 38.43 41.19 2.64 43.83	(dBµV) (dB) (dBµV/m) (dBµV/m) 45.53 0.22 45.75 74 38.21 0.22 38.43 54 41.19 2.64 43.83 74	(dBµV) (dB) (dBµV/m) (dBµV/m) (dB) 45.53 0.22 45.75 74 -28.25 38.21 0.22 38.43 54 -15.57 41.19 2.64 43.83 74 -30.17

RESULT: PASS

Note:

The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

All test modes had been tested. The π /4-DQPSK modulation is the worst case and recorded in the report.

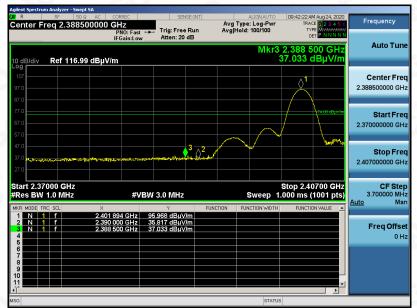
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TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS

EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal

PK



AV



RESULT: PASS

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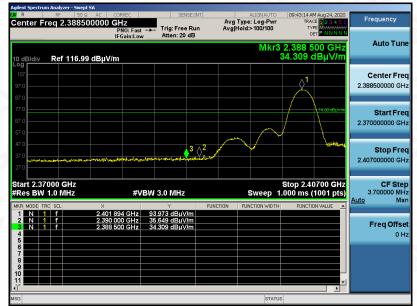
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EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical

PK



AV



RESULT: PASS

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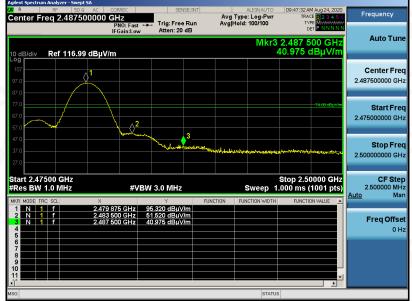
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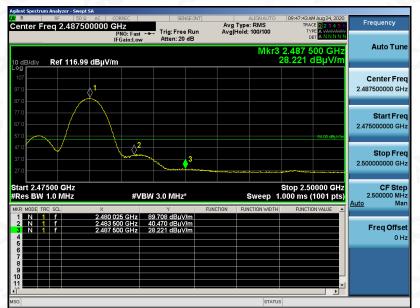
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EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Horizontal

PK



AV



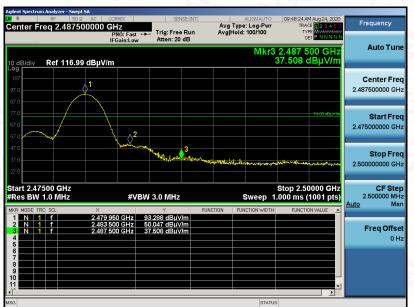
RESULT: PASS

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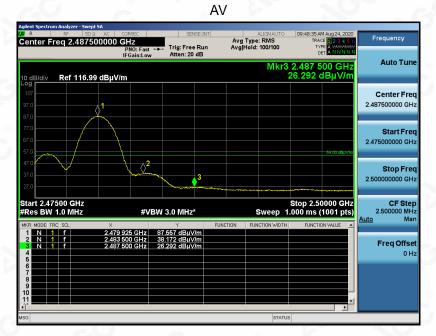


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EUT	LENRUE A25 SPEAKER	Model Name	A25
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Vertical



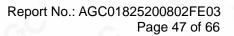
PK



RESULT: PASS

Note: The factor had been edited in the "Input Correction" of the Spectrum Analyzer. The π /4-DQPSK, modulation is the worst case and recorded in the report.

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11. NUMBER OF HOPPING FREQUENCY

11.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.

2. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

3. VBW \geq RBW. Sweep: Auto. Detector function: Peak. Trace: Max hold.

4. Allow the trace to stabilize.

11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

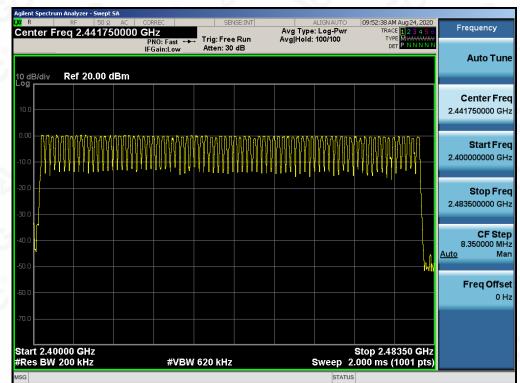
Same as described in section 8.2

11.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

11.4. LIMITS AND MEASUREMENT RESULT

TOTAL NO. OF HOPPING CHANNEL	LIMIT (NO. OF CH)	MEASUREMENT (NO. OF CH)	RESULT
	>=15	79	PASS



TEST PLOT FOR NO. OF TOTAL CHANNELS

Note: The π /4-DQPSK, modulation is the worst case and recorded in the report.

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12. TIME OF OCCUPANCY (DWELL TIME)

12.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Zero span, centered on a hopping channel.

2. RBW shall be \leq channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.

3. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.

4. Detector function: Peak. Trace: Max hold.

5. Use the marker-delta function to determine the transmit time per hop.

6. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) \times (period specified in the requirements / analyzer sweep time)

7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

12.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

12.4. LIMITS AND MEASUREMENT RESULT

Channel	Time of Pulse for DH5 (ms)	Number of hops in the period specified in the requirements	Sweep Time (ms)	Limit (ms)
Low	2.879	25*4	287.900	400
Middle	2.879	26*4	299.416	400
High	2.879	25*4	287.900	400

Note: The π /4-DQPSK, modulation is the worst case and recorded in the report.

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