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FCC Test Report

Report No.: AGC07105201204FE03

FCC ID	: 2ASG4-SAEEMI
APPLICATION PURPOSE	: Original Equipment
PRODUCT DESIGNATION	: Between Micro
BRAND NAME	: Status
MODEL NAME	: SAEE-MI
APPLICANT	: Status Audio LLC
DATE OF ISSUE	: Jan. 16, 2021
STANDARD(S)	: FCC Part 15.247
REPORT VERSION	: V1.0



nplian



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	. /	Jan. 16, 2021	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

· · · · · · · · · · · · · · · · · · ·		
Applicant	Status Audio LLC	
Address	2 Northside Piers 11E, Brooklyn, New York, 11249, United States	
Manufacturer	Dongguan Roker Electronics Co., Limited	
Address	6/F Guanghui Building Dongzheng Road, Changping, Dongguan, Guangdong, China, 523570	
Factory	Dongguan Roker Electronics Co., Limited	
Address	6/F Guanghui Building Dongzheng Road, Changping, Dongguan, Guangdong, China, 523570	
Product Designation	Between Micro	
Brand Name	Status	
Test Model	SAEE-MI	
Date of test	Jan. 08, 2021 to Jan. 16, 2021	
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

well chang

Cool Cheng (Project Engineer)

Max Zhans

Jan. 16, 2021

Reviewed By

Max Zhang (Reviewer)

Jan. 16, 2021

Approved By

fore

Forrest Lei (Authorized Officer)

Jan. 16, 2021

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "Between Micro". It is designed by way of utilizing the GFSK, Pi/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	-2.785dBm (Max)
Bluetooth Version	V5.1
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, □8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	79
Hardware Version	V1
Software Version	V1
Antenna Designation	Ceramic Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	1.2dBi
Power Supply	DC 3.7V by battery
Note: The EUT doesn't suppor	t 8DPSK and BLE.

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
AND NOU	1	2403 MHz
	38	2440 MHz
2402~2480MHz	39	2441 MHz
C c	40	2442 MHz
	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, 04, 15, 66, 56, 19, 78, 07, 28, 69, 55, 36, 45, 05, 13, 43, 74, 57, 35, 67, 76, 02, 34, 54, 63, 42, 11, 30, 06, 64, 25, 75, 48, 17, 33, 58, 01, 29, 14, 51, 72, 03, 31, 50, 61, 77, 18, 10, 47, 12, 68, 08, 49, 20, 00, 73, 09, 16, 60, 71, 41, 24, 53, 38, 26, 46, 37, 65, 32, 70, 52, 27, 59, 22, 62, 39

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.

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The second connection will be established. A new hopping sequence is generated. Due to the fact the 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: 2ASG4-SAEEMI** 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 ±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 = ±3.1 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±4.0 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: $Uc = \pm 2\%$
- 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

b(H)		
串口设置	配置数据发送成功!	
串 □ COM2 (USB-SERIAL CH340)	 reply data: 04 0E 04 01 01 FC 00 	
	return code: 0x0	
波特室 115200	配置数据发送成功!	
数据位 8	 reply data: 04 0E 04 01 01 FC 00 	
校验位None	✓ return code: 0x0	
	配置数据发送成功!	
停止位 1	reply data: 04 0E 04 01 01 FC 00	
流 控 NoFlow	return code: 0x0	
	配置数据发送成功!	
关闭	reply data: 04 0E 04 01 01 FC 00	
BR/EDR BLE	return code: 0x0	
DR/EDR BLE	配置数据发送成功!	
MODE TX	reply data: 04 0E 04 01 01 FC 00	
Channel	return code: 0x0	
	- 配置数据发送成功!	
Transmit_Power 10	reply data: 04 0E 04 01 01 FC 00	
Packet_Type 2-DH5	 return code: 0x0 	
Hopping OFF	配置数据发送成功!	
	reply data: 04 0E 04 01 01 FC 00	
Data_Types Pn9	return code: 0x0	
	配置数据发送成功!	
Send configuration	reply data: 04 0E 04 01 01 FC 00	
	return code: 0x0	
	配置数据发送成功!	
	reply data: 04 0E 04 01 01 FC 00	
	return code: 0x0	
	配置数据发送成功!	

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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:

EUT

Conducted Emission Configure:

EUT	AE

5.2. EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Between Micro	SAEE-MI	2ASG4-SAEEMI	EUT
2	Control Box	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	Not applicable

Note: The BT function cannot transmit when charging.

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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 Commun 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 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. 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	May 17, 2019	May 16, 2021
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

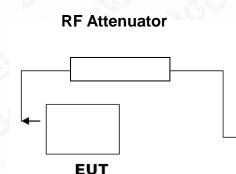
For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. 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.

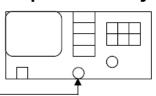
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

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

PEAK POWER TEST SETUP



Spectrum Analyzer



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	-3.126	21	Pass						
2.441	-3.198	21	Pass						
2.480	-3.512	21	Pass						

CH0



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Keysight Spectrum Analyzer - Swept SA X RL RF 50 Ω AC	CORREC SENSE				7 X
Center Freq 2.48000000	GHz	Avg Type: Lo		1 2 3 4 5 6 M	су
10 dB/div Ref 20.00 dBm	PNO: Fast ++- Irig: Free F IFGain:Low Atten: 30 d	в	DET Mkr1 2.479 83	PNNNN	Tune
10.0				Center 2.48000000	
.00	↓ 1			Star 2.47750000	
-20.0				Stop 2.48250000	
40.0				CF 500.00 <u>Auto</u>	F Ste 00 kH Ma
60.0				Freq	Offso 0⊦
-70.0 Center 2.480000 GHz			Span 5.0	000 MHz	
#Res BW 1.5 MHz	#VBW 5.0 MHz	Swe	eep 1.000 ms (1	001 pts)	
MSG			STATUS		

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PEAK OUTPUT POWER MEASUREMENT RESULT FOR II/4-DQPSK MODULATION										
Frequency (GHz)Peak Power (dBm)Applicable Limits (dBm)Pass or Fail										
2.402	-2.785	21	Pass							
2.441	-2.878	21	Pass							
2.480	-3.198	21	Pass							



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Keysight Spectrum Analyzer - Swept SA								
RL RF 50Ω AC Center Freq 2.480000000	CORREC SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	05:36:39 PM Jan 14, 2021 TRACE 1 2 3 4 5 6	Frequency				
	PNO: Fast +++ Trig: Free Run IFGain:Low Atten: 30 dB	Avg Hold: 100/100		Auto Tune				
10 dB/div Ref 20.00 dBm		Mkr1	2.479 900 GHz -3.198 dBm	Auto Tun				
10.0				Center Free				
	.1			2.480000000 GH				
0.00				Start Free 2.477500000 GH				
-10.0				2.477500000 GH				
-20.0				Stop Fre 2.482500000 GH				
30.0			^~	2.482500000 GH				
40.0				CF Ste 500.000 kH				
50.0				<u>Auto</u> Ma				
60.0				Freq Offse 0 H				
-70.0				UH				
Center 2.480000 GHz #Res BW 1.5 MHz	#VBW 5.0 MHz	Sweep 1.	Span 5.000 MHz 000 ms (1001 pts)					
SG STATUS								

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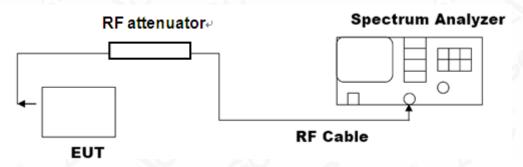


8. 20DB BANDWIDTH

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)

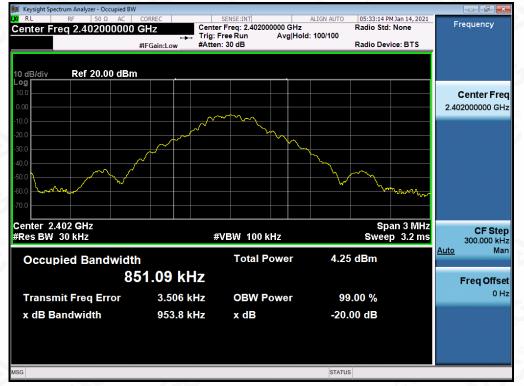


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8.3. LIMITS AND MEASUREMENT RESULTS

MEASUREMENT RESULT FOR GFSK MOUDULATION										
Applicable Limite		Measurement Result								
Applicable Limits	Test Data	Criteria								
	Low Channel	0.954	PASS							
N/A	Middle Channel	0.954	PASS							
	High Channel	0.956	PASS							



TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

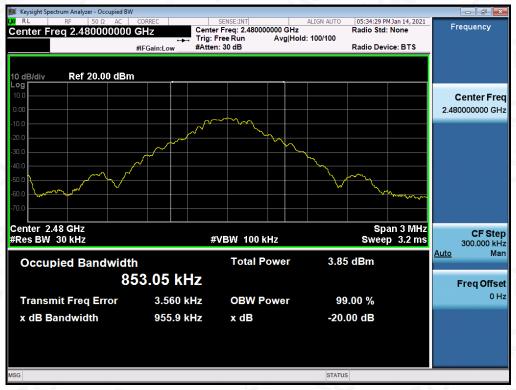
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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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MEASUREMENT RESULT FOR II /4-DQPSK MODULATION									
Annlinghin Limite		Measurement Result							
Applicable Limits	Test Data	(MHz)	Criteria						
	Low Channel	1.308	PASS						
N/A	Middle Channel	1.312	PASS						
	High Channel	1.310	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.
- 3. 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

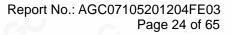
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

9.4. LIMITS AND MEASUREMENT RESULT

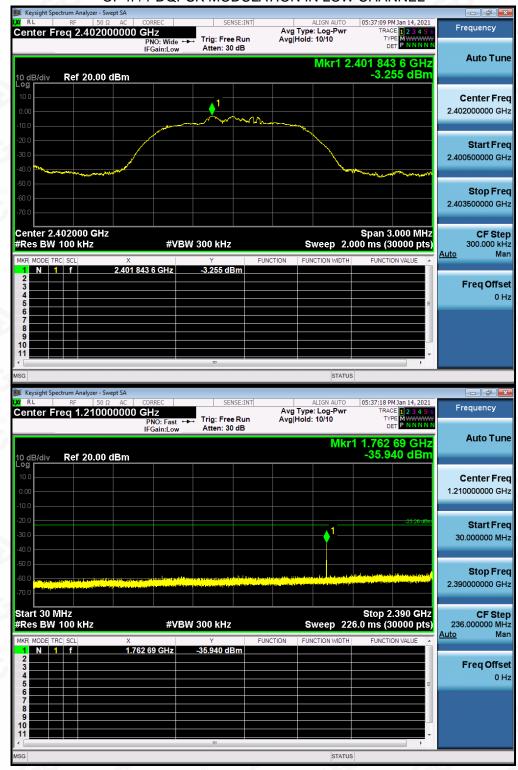
LIMITS AND MEASUREMENT RESULT											
Annlinghla Limita	Measurement Result										
Applicable Limits	Test Data	Criteria									
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency	At least -20dBc than the limit 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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			n Analyzer													
LXI RI		R		50Ω 4 47 4	AC 50000			SE	NSE:INT	Avo		ALIGN AUTO : Log-Pwr		M Jan 14, 2021 CE 1 2 3 4 5 6		Frequency
Cen	ler i	req	19114	511/S	50000	PNO: Fas		Trig: Fre Atten: 30				10/10	TYF			
		_		_		IFGain:Lo	w	Atten: 30								Auto Tune
10.11				20 d	B							WIKT		0 5 GHz 28 dBm		
10 dE Log	3/div	Re	ef 20.0	JUra	Зm									20 00/		
10.0																Center Freq
0.00															13	.741750000 GHz
-10.0																
-20.0														-23.26 dBm		Otort From
-30.0															2	Start Freq 483500000 GHz
-40.0														1	2.	483500000 GHZ
-40.0																
-60.0	a const			a church	A strange of the Designation	and the state of the		na, estaterane		dille et start						Stop Freq
	and Mar		and the second second	and in sector	and the particular sector of		and the second second		1						25.	.000000000 GHz
-70.0																
Star	t 2.43	8 GH	z							^			Stop 2	5.00 GHz		CF Step
#Re	s BW	100	kHz			#\	/BW	300 kHz				Sweep 2	2.152 s (3	0000 pts)		.251650000 GHz
	MODE T				х			Y		UNCTION	FUN	CTION WIDTH	FUNCTIO	DN VALUE	Aut	<u>o</u> Man
1 2	N	1 f			24.9	50 5 GHz		-47.028 di	Bm							
3		۲	i				i									Freq Offset
4		45												E		0 Hz
6																
78																
9 10																
11			کان											-		
•								m						•		
MSG												STATUS	\$			

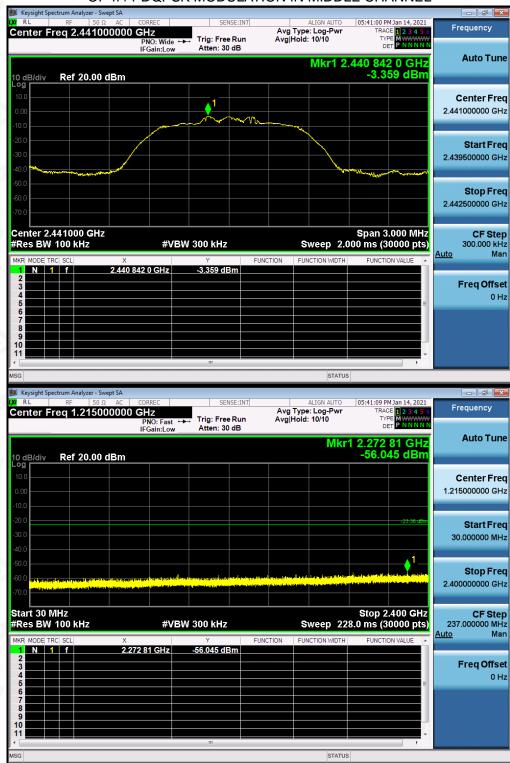
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 E-mail: agc@agc-cert.com





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

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🊺 Keysigh	nt Spect	trum A	nalyzer - S	wept SA											
LXI RL		RF			CORREC		SEI	NSE:INT			ALIGN AUTO		M Jan 14, 2021		Frequency
Center	r Fre	eq 1	3.741	7500	00 GHz	ast 🔸	, Trig: Free	e Run			: Log-Pwr 10/10	TRAC	CE 1 2 3 4 5 6 PE MWWWW		Trequency
					IFGain:L		Atten: 30								
											Mkr	1 23 58	1 4 GHz	1	Auto Tune
10 dB/d		Dof	7 20.00	dBm									62 dBm		
	IV	L COL	20.00												
10.0															Center Freq
0.00														1:	3.741750000 GHz
															5.1411000000 0112
-10.0															
-20.0		27											-23.36 dBm		Start Freq
-30.0															2.483500000 GHz
-40.0						هم							1		2.4855000000 0112
-50.0							فالترامير الاحتمادية					different de la company			Stop Freq
-60.0					inderlanden of films	(State Stat		Section 201	Start Contraction		and the second			20	5.000000000 GHz
-70.0														-	5.00000000000000
Start 2												Stop 2	5.00 GHz		CF Step
#Res E	3W 1	00	kHz			#VB₩	/ 300 kHz				Sweep 2	2.152 s (3	0000 pts)		2.251650000 GHz
MKR MOD	E TRC	SCL		Х			Y	FUN	NCTION	FUN	CTION WIDTH	FUNCTION	ON VALUE	Au	<u>ito</u> Man
1 N	1			2	3.581 4 GH	z	-47.362 dE	Bm							
2															Freq Offset
4	کا														0 Hz
5	ها					کی ک							E		0.112
6						225									
8	کت					کا گ									
9	ها					کی ک									
10	12														
•	_	_					III						•		
MSG				_							STATUS	3			

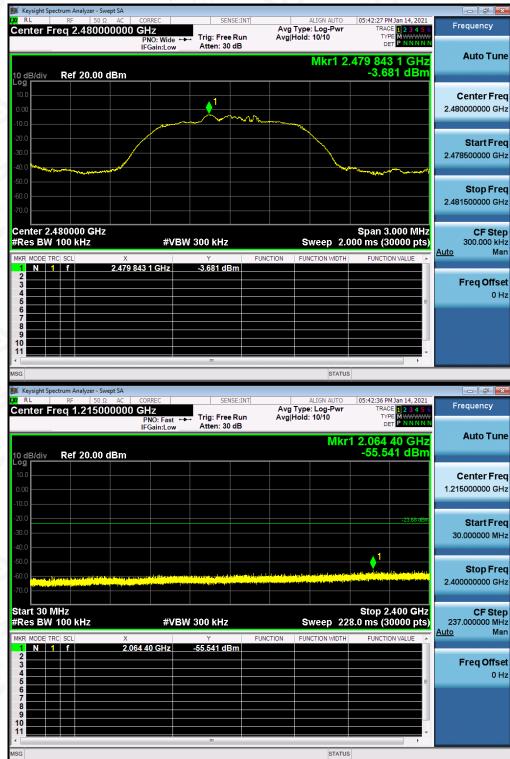
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 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com





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

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		ectrum	Analyzer - S										
LXI RL		R		Ω AC			SENSE:	INT	AvaT	ALIGN AUTO		4 Jan 14, 2021 E 1 2 3 4 5 6	Frequency
Cent		req	15.750		PNO: Fas IFGain:Lo		: Free Ru en: 30 dE			old: 10/10	TYF		
10 dE	3/div	Re	f 20.00	dBm						Mkr	1 24.984 -47.3	4 2 GHz 35 dBm	Auto Tune
Log 10.0 0.00 -10.0													Center Freq 13.750000000 GHz
-20.0 -30.0 -40.0												-23.68 dBm	Start Freq 2.50000000 GHz
-50.0 -60.0 -70.0													Stop Freq 25.00000000 GHz
#Res		100	kHz		#\	/BW 300	kHz	51110			2.152 s (3	5.00 GHz 0000 pts)	CF Step 2.25000000 GHz <u>Auto</u> Man
	NODE TI			× 24	984 2 GHz	-47.3	35 dBm	FUNC	TION	FUNCTION WIDTH	FUNCTION	ON VALUE	
2 3 4 5												E	Freq Offset 0 Hz
6 7 8 9 10													
11							1						
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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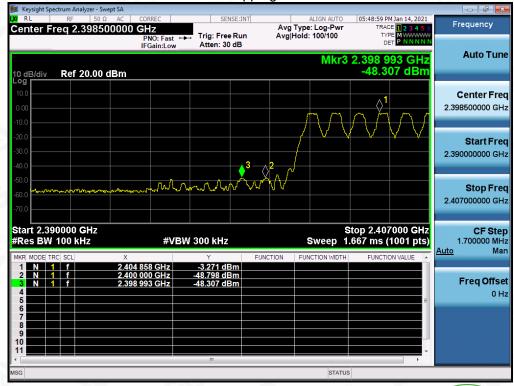
05:33:31 PM Jan 14, 2021 Frequency Avg Type: Log-Pwr Avg|Hold: 100/100 IOOO GHz PNO: Fast IFGain:Low Cente Trig: Free Run Atten: 30 dB DE Auto Tune Mkr3 2.399 112 GH -46.889 dBm Ref 20.00 dBm **Center Freq** 2.398500000 GHz Start Fred 2.39000000 GHz 3 Stop Freq 2.407000000 GHz Stop 2.407000 GHz Sweep 1.667 ms (1001 pts) Start 2.390000 GHz **CF** Step #Res BW 100 kHz #VBW 300 kHz 1.700000 MH <u>Auto</u> Mar FUNCTION Freq Offset 0 Hz STATUS

TEST RESULT FOR BAND EDGE

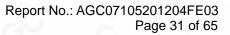
GFSK MODULATION IN LOW CHANNEL

Hopping off

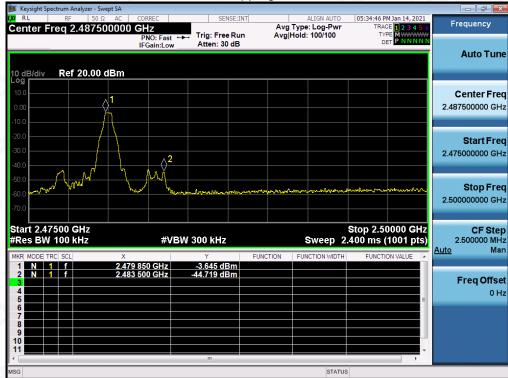
Hopping on



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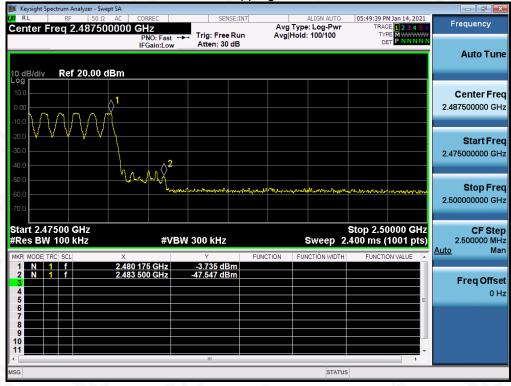




GFSK MODULATION IN HIGH CHANNEL

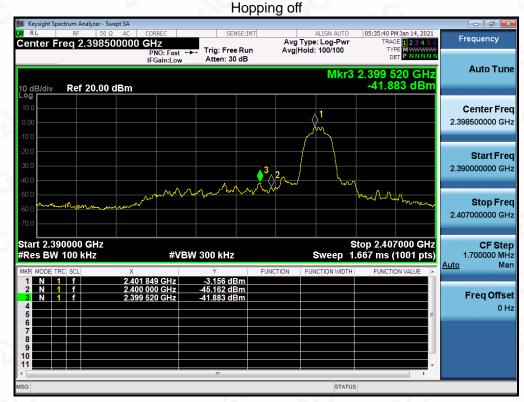
Hopping off

Hopping on



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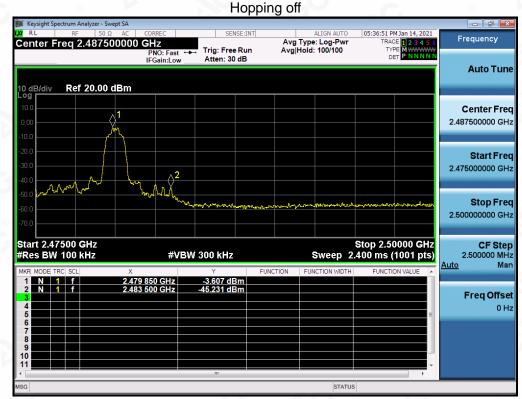
π /4-DQPSK MODULATION IN LOW CHANNEL

Hopping on



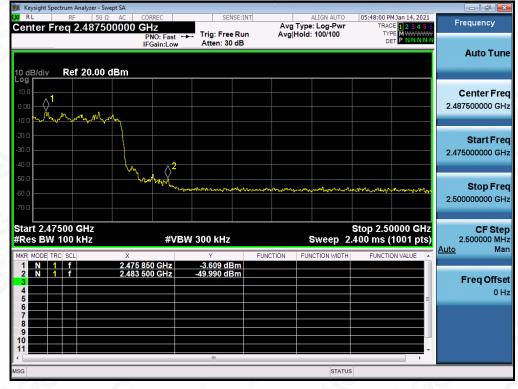
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π /4-DQPSK MODULATION IN HIGH CHANNEL

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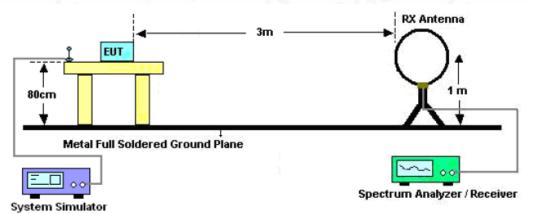
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com

Web: http://cn.agc-cert.com/

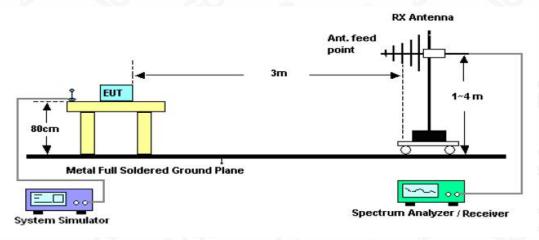


10.2. TEST SETUP

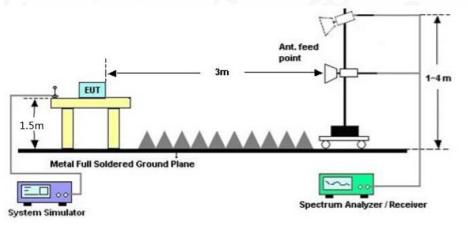
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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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	Between Micro	Model Name	SAEE-MI
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal



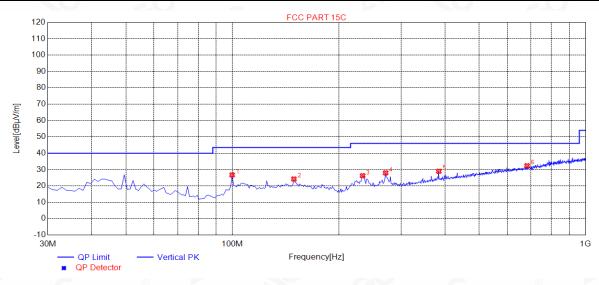
NO.	Freq. [MHz]	Level [dBµV/ m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	48.4300	27.08	11.71	40.00	12.92	100	5	Horizontal
2	99.8400	28.51	11.30	43.50	14.99	100	248	Horizontal
3	216.2400	29.52	13.05	46.00	16.48	100	224	Horizontal
4	271.5300	28.50	15.55	46.00	17.50	100	333	Horizontal
5	315.1800	26.20	16.48	46.00	19.80	100	341	Horizontal
6	677.9600	32.76	25.59	46.00	13.24	100	80	Horizontal

RESULT: PASS

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EUT	Between Micro	Model Name	SAEE-MI
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	99.8400	26.74	11.30	43.50	16.76	100	260	Vertical
2	149.3100	24.26	14.88	43.50	19.24	100	270	Vertical
3	233.7000	26.25	14.33	46.00	19.75	100	207	Vertical
4	271.5300	28.00	15.55	46.00	18.00	100	179	Vertical
5	384.0500	29.00	19.23	46.00	17.00	100	314	Vertical
6	682.8100	32.40	25.67	46.00	13.60	100	98	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	Between Micro	Model Name	SAEE-MI
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	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	45.86	0.08	45.94	74	-28.06	peak 💿
4804.000	38.67	0.08	38.75	54	-15.25	AVG
7206.000	41.31	2.21	43.52	74	-30.48	peak
7206.000	33.45	2.21	35.66	54	-18.34	AVG
<u> </u>	2.0	<u> </u>			-0	
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actor = Anter	nna Factor + Cable	Loss – Pre-	amplifier.	®		

EUT	Between Micro	Model Name	SAEE-MI
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	44.65	0.08	44.73	74	-29.27	peak
4804.000	36.48	0.08	36.56	54	-17.44	AVG
7206.000	40.57	2.21	42.78	74	-31.22	peak
7206.000	32.14	2.21	34.35	54	-19.65	AVG
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Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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