

FCC Test Report

Report No.: AGC03067201104FE02

FCC ID	÷	2AXZL-K8
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Beacon
BRAND NAME	:	KBeacon
MODEL NAME	i	K8, K3, K6, K7
APPLICANT	:	KKM Company Limited
DATE OF ISSUE	:	Nov. 16, 2020
STANDARD(S)	:	FCC Part 15.247
REPORT VERSION	:	V1.0





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Report No.: AGC03067201104FE02 Page 2 of 48

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0		Nov. 16, 2020	Valid	Initial Release

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TABLE OF CONTENTS

1. VERIFICATION OF COMPLIANCE	5
2. GENERAL INFORMATION	
2.1. PRODUCT DESCRIPTION	6
2.2. TABLE OF CARRIER FREQUENCYS	
2.3. RELATED SUBMITTAL(S)/GRANT(S)	
2.4. TEST METHODOLOGY	7
2.5. SPECIAL ACCESSORIES	7
2.6. EQUIPMENT MODIFICATIONS	
2.7. ANTENNA REQUIREMENT	
3. MEASUREMENT UNCERTAINTY	
4. DESCRIPTION OF TEST MODES	9
5. SYSTEM TEST CONFIGURATION	
5.1. CONFIGURATION OF TESTED SYSTEM	
5.2. EQUIPMENT USED IN TESTED SYSTEM	
5.3. SUMMARY OF TEST RESULTS	
6. TEST FACILITY	
7. PEAK OUTPUT POWER	
7.1. MEASUREMENT PROCEDURE	
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
7.3. LIMITS AND MEASUREMENT RESULT	
8. 6 DB BANDWIDTH	
8.1. MEASUREMENT PROCEDURE	
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
8.3. LIMITS AND MEASUREMENT RESULTS	
9. CONDUCTED SPURIOUS EMISSION	
9.1. MEASUREMENT PROCEDURE	
9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
9.3. MEASUREMENT EQUIPMENT USED	
9.4. LIMITS AND MEASUREMENT RESULT	
10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY . Any report having not been signed by authorized approver, or having been altered without authorization, or having not been	
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Report No.: AGC03067201104FE02 Page 4 of 48

10.1. MEASUREMENT PROCEDURE	
10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
10.3. MEASUREMENT EQUIPMENT USED	
10.4. LIMITS AND MEASUREMENT RESULT	25
11. RADIATED EMISSION	
11.1. MEASUREMENT PROCEDURE	
11.2. TEST SETUP	
11.3. LIMITS AND MEASUREMENT RESULT	
11.4. TEST RESULT	
12. FCC LINE CONDUCTED EMISSION TEST	
12.1. LIMITS OF LINE CONDUCTED EMISSION TEST	
12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST	
12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST	
12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST	
12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	40
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	41
APPENDIX B: PHOTOGRAPHS OF EUT	

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1. VERIFICATION OF COMPLIANCE

Applicant	KKM Company Limited	
Address	4B, Building 6, Baoneng Science & Technology Park, Qingxiang Rd, Longhua Street, Longhua District, Shenzhen City, Guangdong Province, China	
Manufacturer	KKM Company Limited	
Address	4B, Building 6, Baoneng Science & Technology Park, Qingxiang Rd, Longhua Street, Longhua District, Shenzhen City, Guangdong Province, China	
Factory	KKM Company Limited	
Address	4B, Building 6, Baoneng Science & Technology Park, Qingxiang Rd, Longhua Street, Longhua District, Shenzhen City, Guangdong Province, China	
Product Designation	Beacon	
Brand Name	KBeacon	
Test Model	К8	
Series Model	K3, K6, K7	
Difference Description	All the same except for the model name and appearance color.	
Date of test	Nov. 09, 2020 to Nov. 13, 2020	
Deviation	No any deviation from the test method	
Condition of Test Sample	Normal	
Test Result	Pass	
Report Template	AGCRT-US-BLE/RF	
Marken and the second for the sta		

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

John Zerry

John Zeng (Project Engineer)

Nov. 13, 2020

Max Zhans

Reviewed By

Max Zhang (Reviewer)

Nov. 16, 2020

Approved By

Forrest Lei (Authorized Officer)

Nov. 16, 2020

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as a "Beacon". 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	3.557dBm (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	PCB Antenna (Comply with requirements of the FCC part 15.203)	
Antenna Gain	0dBi	
Hardware Version	V1.1	
Software Version	V1.0.0	
Power Supply	DC 3V by battery	
Note: The EUT doesn't support	BR/EDR.	

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
		2404 MHz
2400~2483.5MHz		
200 .00	38	2478 MHz
	39	2480 MHz

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

This submittal(s) (test report) is intended for FCC ID: 2AXZL-K8 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 $\pm U$, 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 = ±3.1 dB
- Uncertainty of Radiated Emission below 1GHz, $Uc = \pm 4.0 \text{ dB}$
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, $Uc = \pm 0.8 dB$
- Uncertainty of RF power density, conducted, Uc = ±2.6 dB
- Uncertainty of spurious emissions, conducted, $Uc = \pm 2.7 dB$
- Uncertainty of Occupied Channel Bandwidth: $Uc = \pm 2 \%$

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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.
- 4. For battery operated equipment, the equipment tests are performed using a new battery.

Software Setting

eatures	× Direct Test Lode	e UART interface	
 2.4 GHz Front-End Tests 	Set up on	▼ Program	
TX carrier wave output	Con port COM6	Refresh list of com ports	
RX constant carrier/LO leakag	Je Node	Aeresh list of com ports	
TX/RX channel sweep	hode		
RX sensitivity	Transmit	Receive	
Bluetooth	Channel		
nRF8001 Configuration	Single	O Sweep	
Dispatcher			
Trace Translator Direct Test Mode	Channel	0	
nRF8002			
11110002	Payload model	PRBS9 🛩	
evice Manager	× Payload length	1 bytes 🗘	
Motherboards	Packets received	N/A	
nRF5x Programming		Stop test	
nRF5x Bootloader			
nRF24LU1+ Bootloaders			
og			
		to install the newest version.	

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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF TESTED 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	Beacon	К8	2AXZL-K8	EUT
2	Control Box	N/A	USB-TTL	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		Not applicable

Note: The conducted emission tests at AC port are not required for devices which only employ battery power for operation.

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd						
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, 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. 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	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. 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

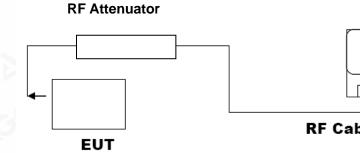
7.1. MEASUREMENT PROCEDURE

For peak power test:

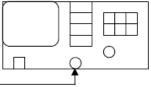
- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. RBW≥DTS bandwidth
- 3. VBW≥3*RBW.
- 4. SPAN≥VBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

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



Spectrum Analyzer



RF Cable

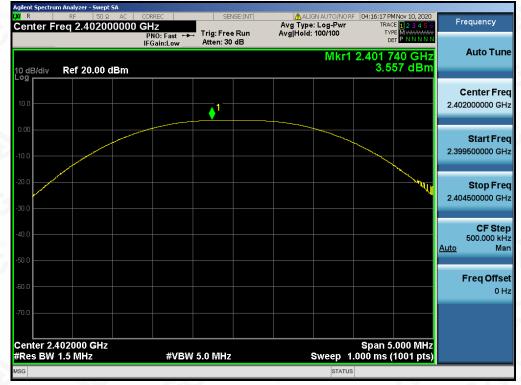
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7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT								
	FOR GFSK MOUDULATION							
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail					
2.402	3.557	30	Pass					
2.440	3.493	30	Pass					
2.480	3.484	30	Pass					

CH0



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Report No.: AGC03067201104FE02 Page 14 of 48





CH39

Agilent Spectrum Analyzer - Swept SA XI R RF 50 Ω AC Center Freq 2.48000000	CORREC 0 GHz PNO: Fast +++ T	SENSE:INT	ALIG		TRAC TYP	E 1 2 3 4 5 6	Frequency
10 dB/div Ref 20.00 dBm		tten: 30 dB			2.479 7	90 GHz 84 dBm	Auto Tur
10.0		↓1					Center Fre 2.480000000 GF
.10.0							Start Fre 2.477500000 GF
20.0						لالم	Stop Fr 2.482500000 GI
40.0							CF Sto 500.000 k Auto M
60.0							Freq Off s 0
-70.0 Center 2.480000 GHz					Span 5	.000 MHz	
#Res BW 1.5 MHz	#VBW 5.0			status	00 ms (1001 pts)	

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8.6 DB 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 SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW≥3×RBW.
- 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

LIMITS AND MEASUREMENT RESULT						
Annliaghla Limita	Applicable Limits					
Applicable Limits	Test Data	Criteria				
>500KHZ	Low Channel	690.8	PASS			
	Middle Channel	689.4	PASS			
	High Channel	688.7	PASS			

SENSE:INT ALIGN AUTO/NORF Center Freq: 2.402000000 GHz Trig: Free Run Avg|Hold>100/100 #Atten: 30 dB 04:16:04 PMNov 10, 2020 Frequency Radio Std: None Radio Device: BTS #IFGain:Low Ref 20.00 dBm **Center Frea** 2.402000000 GHz Center 2.402 GHz #Res BW 100 kHz Span 3 MHz **CF** Step #VBW 300 kHz Sweep 1 ms 300.000 kHz Auto Mar Total Power 9.98 dBm **Occupied Bandwidth** 1.0608 MHz Freq Offset 0 Hz Transmit Freq Error 26.492 kHz **OBW Power** 99.00 % x dB Bandwidth 690.8 kHz x dB -6.00 dB

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

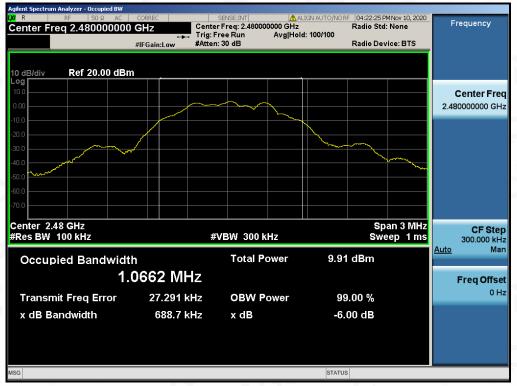
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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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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.

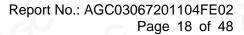
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT							
	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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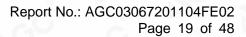






TEST RESULT FOR ENTIRE FREQUENCY RANGE GFSK MODULATION IN LOW CHANNEL

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Agilent Spectrum Analyzer - Swept SA				
💢 R RF 50Ω AC		IGN AUTO/NORF 04:17:54 F		Frequency
Center Freq 13.74175000	00 GHz PNO: Fast ↔ Trig: Free	e:Log-Pwr TRA : 10/10 T		Troquerrey
	IFGain:Low Atten: 30	. 10/10		
	ii out	Miked 7 00		Auto Tune
		Mkr1 7.20	5 4 GHZ 98 dBm	
10 dB/div Ref 20.00 dBm		-47.0	98 dBm	
10.0				
10.0				Center Freq
0.00			1;	3.741750000 GHz
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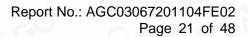
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com



Agilent Spectrum Analyzer - Swej					
Center Freq 2.4400		SENSE:INT	Avg Type: Log-Pwr	F 04:20:48 PM Nov 10, 2020 TRACE 2 3 4 5 6	Frequency
	PNO: Wide ↔ IFGain:Low	 Trig: Free Run Atten: 30 dB 	Avg Hold: 10/10		
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8					
10				<u>_</u>	
MSG			STATUS		
Agilent Spectrum Analyzer - Swej	ot SA				
Center Freq 1.2150		SENSE:INT	ALIGN AUTO/NOR Avg Type: Log-Pwr	F 04:20:57 PM Nov 10, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast ↔ IFGain:Low	 Trig: Free Run Atten: 30 dB 	Avg Hold: 10/10	TYPE MWWWWW DET PNNNNN	
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-40.0	×	Y FI		8.0 ms (30000 pts)	Stop Freq 2.40000000 GHz CF Step 237.000000 MHz Auto Man
-40.0 -60.0	×	Y FI		8.0 ms (30000 pts)	Stop Freq 2.40000000 GHz CF Step 237.000000 MHz Auto Man Freq Offset
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GFSK MODULATION IN MIDDLE CHANNEL

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Agilent Spectrum Analyzer - Swept SA				
🗶 R RF 50 Ω AC	CORREC SENS			Frequency
Center Freq 13.74175000	00 GHz PNO: Fast +++ Trig: Free I	Avg Type: Run Avg Hold:	Log-Pwr Inac 10/10 TYl	Delta 123456 Frequency PEMWWWWW Frequency ETPNNNNN Frequency
	IFGain:Low Atten: 30 d		DI	ET P NNNNN
			Mkr1 24.79	Auto Tune
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10.0				Center Freq
0.00				13.741750000 GHz
-10.0				-16.57 dBm
-20.0				Start Freq
-30.0				
				2.483500000 GHz
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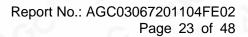
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com



R RF 50	Ω AC CORREC			RF 04:23:40 PM Nov 10, 2020	
enter Freq 2.4800		SENSE:INT	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN	Frequency
	IFGain:Low	Atten: 30 dB			Auto Tun
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RF 50	Ω AC CORREC				
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		Talas France Dava	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456 TYPE MWWWWW DET P NNNNN 1 2.351 89 GHz	Frequency Auto Tune
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B/div Ref 20.00	PNO: Fast ↔ IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456 TYPE MWWWWW DET P NNNNN 1 2.351 89 GHz	Auto Tune
	PNO: Fast ↔ IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456 TYPE MWWWWW DET P NNNNN 1 2.351 89 GHz	
B/div Ref 20.00	PNO: Fast ↔ IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456 TYPE MWWWWW DET P NNNNN 1 2.351 89 GHz	Auto Tune Center Free
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	PNO: Fast ↔ IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	12.345 6 TYPE MWWWWWW DET PNNNNN 12.351 89 GHz -48.733 dBm	Auto Tune Center Free 1.21500000 GH Start Free
	PNO: Fast ↔ IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	12.345 6 TYPE MWWWWWW DET PNNNNN 12.351 89 GHz -48.733 dBm	Auto Tun Center Free 1.215000000 GH Start Free 30.000000 MH
	PNO: Fast ↔ IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	12.345 6 TYPE MWWWWWW DET PNNNNN 12.351 89 GHz -48.733 dBm	Auto Tune Center Free 1.215000000 GH Start Free 30.000000 MH Stop Free
	PNO: Fast ↔ IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	12.345 6 TYPE MWWWWWW DET PNNNNN 12.351 89 GHz -48.733 dBm	Auto Tune Center Free 1.215000000 GH Start Free 30.000000 MH Stop Free
J	PNO: Fast → IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 11 28 4 5 6 TYPE MUMOU DET PINNNN 1 2.351 89 GHz -48.733 dBm -16 58 dBm	Auto Tune Center Free 1.215000000 GH Start Free 30.000000 MH Stop Free 2.400000000 GH CF Step
4 4 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7	PNO: Fast → IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10 Mkt	TRACE 11 23 4 5 6 TYPE MUNICIPAL DET PINNING 1 2.351 89 GHz -48.733 dBm -16.59 dBm -16.59 dBm -16.59 dBm -18.59 dBm -	Auto Tune Center Free 1.21500000 GH Start Free 30.00000 MH Stop Free 2.40000000 GH CF Ster 237.00000 MH
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rt 30 MHz BW 100 KHz BW 100 KHz	PNO: Fast → IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10 Mkt	TRACE 11 23 4 5 6 TYPE MUNICIPAL DET PINNING 1 2.351 89 GHz -48.733 dBm -16.59 dBm -16.59 dBm -16.59 dBm -18.59 dBm -	Start Free 30.00000 GH Start Free 30.00000 GH Stop Free 2.40000000 GH CF Step 237.00000 MH Auto Mar Freq Offse
rt 30 MHz es BW 100 KHz	PNO: Fast → IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10 Mkt	TRACE 11 23 4 5 6 TYPE MUNICIPAL DET PINNING 1 2.351 89 GHz -48.733 dBm -16.59 dBm -16.59 dBm -16.59 dBm -18.59 dBm -	Start Free 30.00000 GH Start Free 30.00000 GH Stop Free 2.40000000 GH CF Step 237.00000 MH Auto Mar Freq Offse
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9 9 10 10 10 10 10 10 10 10 10 10	PNO: Fast → IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10 Mkt	TRACE 12 3 4 5 6 TYPE MUNICIPAL DET PINNING 1 2.351 89 GHz -48.733 dBm -16.50 dBm -16.50 dBm -16.50 dBm -18.50 dBm -1	Start Free 30.00000 GH; Start Free 30.000000 GH; Stop Free 2.400000000 GH; CF Step 237.000000 MH; Auto Mar Freq Offse
99	PNO: Fast → IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10 Mkt	TRACE 12 3 4 5 6 TYPE MUNICIPAL DET PINNING 1 2.351 89 GHz -48.733 dBm -16.50 dBm -16.50 dBm -16.50 dBm -18.50 dBm -1	Start Free 30.00000 GH; Start Free 30.000000 GH; Stop Free 2.400000000 GH; CF Step 237.000000 MH; Auto Mar Freq Offse

GFSK MODULATION IN HIGH CHANNEL

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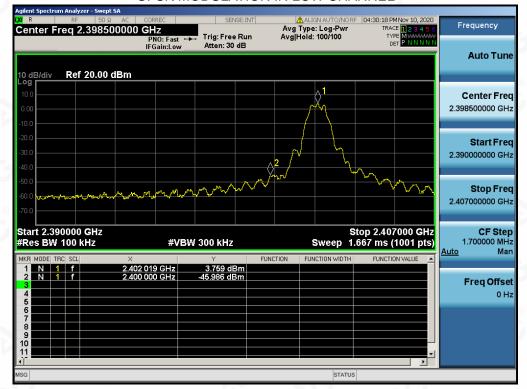


Agilent Spectrun	<u> </u>										
Center Fr	_{RF}	50 Ω 3.7500		IREC		NSE:INT	Avg	<u>1</u> ALIGN AUTO/NO Type: Log-Pwi	TRA	MNov 10, 2020 CE 123456	Frequency
			PI	NO: Fast ↔ Gain:Low	Trig: Free Atten: 30		Avg F	lold: 10/10	TY		
10 dB/div Log	Ref	20.00 d	IBm					M	kr1 2.60 -48.6	8 0 GHz 54 dBm	Auto Tune
10.0 0.00											Center Freq 13.750000000 GHz
-20.0 -30.0 -40.0 <mark>/ 1</mark> —										-16.58 dBm	Start Freq 2.500000000 GHz
-50.0 -60.0 -70.0		jal, sheteketa sia Manaka sa kata s									Stop Freq 25.00000000 GHz
Start 2.50 #Res BW	100		X	#VBV	N 300 kHz Y		CTION	Sweep	2.152 s (3	25.00 GHz 00000 pts)	CF Step 2.25000000 GHz <u>Auto</u> Man
1 N 1 2 3 - 3 - - 5 - - 6 - - 7 - - 9 - - 10 - - 11 - -	f		2.608 () GHz	-48.654 dE	3m					Freq Offset 0 Hz
MSG								STAT	US		

Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit.

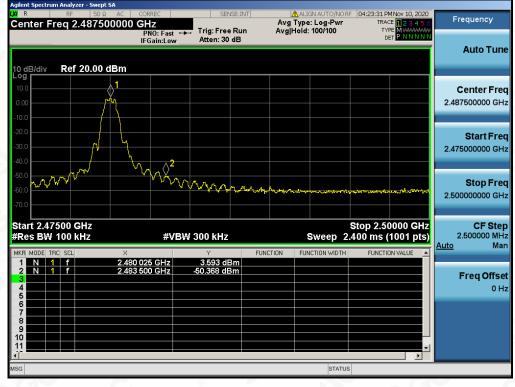
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TEST RESULT FOR BAND EDGE GFSK MODULATION IN LOW CHANNEL

GFSK MODULATION IN HIGH CHANNEL



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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 10.2 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.

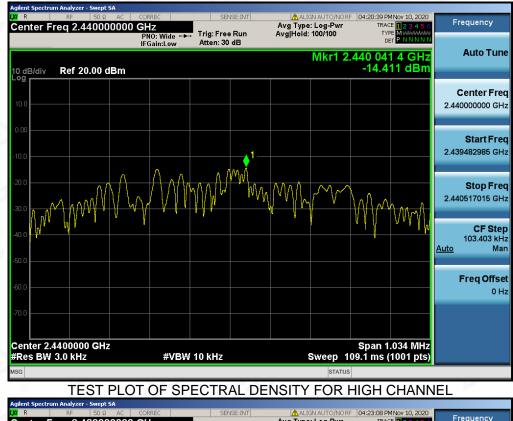
10.4. LIMITS AND MEASUREMENT RESULT

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-14.506	8	Pass
Middle Channel	-14.411	8	Pass
High Channel	-14.251	8	Pass

TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



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TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



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11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

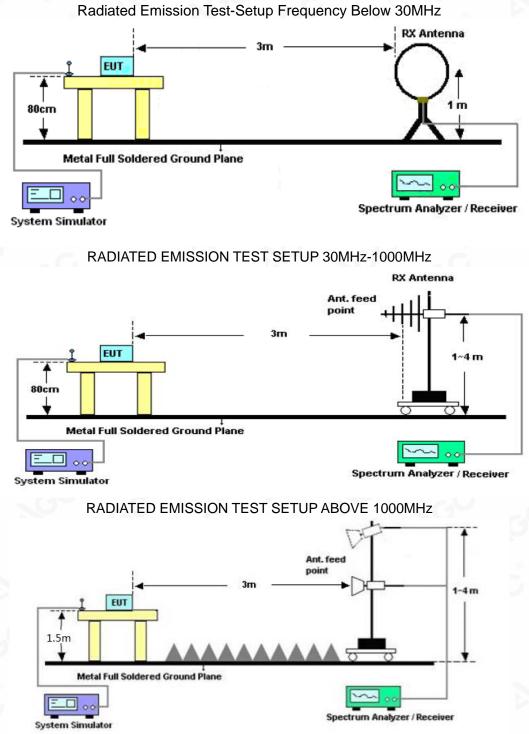
- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated 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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Report No.: AGC03067201104FE02 Page 28 of 48

11.2. TEST SETUP



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11.3. 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.

11.4. 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.

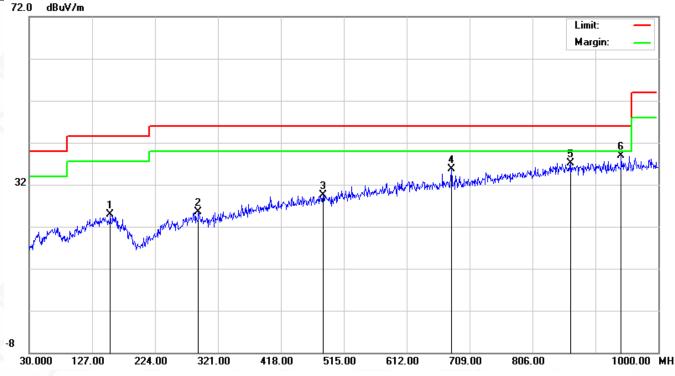
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Report No.: AGC03067201104FE02 Page 30 of 48

RADIATED EMISSION BELOW 1GHZ

EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		155.1300	5.67	19.20	24.87	43.50	-18.63	peak
2		290.9300	5.89	19.68	25.57	46.00	-20.43	peak
3		482.9900	4.84	24.65	29.49	46.00	-16.51	peak
4		680.8700	7.76	27.92	35.68	46.00	-10.32	peak
5		865.1700	5.89	31.25	37.14	46.00	-8.86	peak
6	*	942.7700	6.82	32.07	38.89	46.00	-7.11	peak

RESULT: PASS

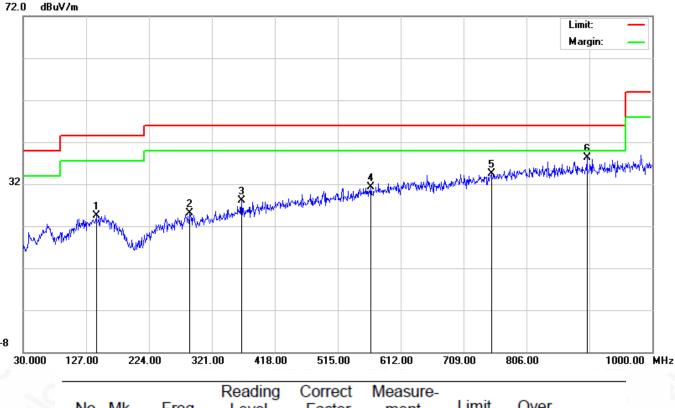
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Report No.: AGC03067201104FE02 Page 31 of 48

EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical



No.	Mk.	Freq.	Level	Factor	ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		142.5200	5.31	19.22	24.53	43.50	-18.97	peak
2		287.0500	5.24	19.77	25.01	46.00	-20.99	peak
3		366.5900	6.29	21.81	28.10	46.00	-17.90	peak
4		566.4099	4.94	26.29	31.23	46.00	-14.77	peak
5		751.6800	5.18	29.32	34.50	46.00	-11.50	peak
6	*	899.1200	6.61	31.69	38.30	46.00	-7.70	peak

RESULT: PASS Note:

- 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
- 2. All test modes had been tested. The mode 1 is the worst case and recorded in the report.

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Report No.: AGC03067201104FE02 Page 32 of 48

RADIATED EMISSION ABOVE 1GHZ

EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
44.26	0.08	44.34	74	-29.66	peak
35.14	0.08	35.22	54	-18.78	AVG
41.27	2.21	43.48	74	-30.52	peak
31.55	2.21	33.76	54 💿	-20.24	AVG
8			- 6	0	
	(C)			- Ci	(3)
	(dBµV) 44.26 35.14 41.27	(dBµV) (dB) 44.26 0.08 35.14 0.08 41.27 2.21	(dBµV) (dB) (dBµV/m) 44.26 0.08 44.34 35.14 0.08 35.22 41.27 2.21 43.48	(dBµV) (dB) (dBµV/m) (dBµV/m) 44.26 0.08 44.34 74 35.14 0.08 35.22 54 41.27 2.21 43.48 74	(dBµV) (dB) (dBµV/m) (dBµV/m) (dB) 44.26 0.08 44.34 74 -29.66 35.14 0.08 35.22 54 -18.78 41.27 2.21 43.48 74 -30.52

EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
43.81	0.08	43.89	74	-30.11	peak
34.34	0.08	34.42	54	-19.58	AVG
40.72	2.21	42.93	74	-31.07	peak
31.76	2.21 💿	33.97	54	-20.03	AVG
	C			6 6	
©		6.0		8	
	(dBµV) 43.81 34.34 40.72	(dBµV) (dB) 43.81 0.08 34.34 0.08 40.72 2.21	(dBµV) (dB) (dBµV/m) 43.81 0.08 43.89 34.34 0.08 34.42 40.72 2.21 42.93	(dBµV) (dB) (dBµV/m) (dBµV/m) 43.81 0.08 43.89 74 34.34 0.08 34.42 54 40.72 2.21 42.93 74	(dBµV) (dB) (dBµV/m) (dBµV/m) (dB) 43.81 0.08 43.89 74 -30.11 34.34 0.08 34.42 54 -19.58 40.72 2.21 42.93 74 -31.07

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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Report No.: AGC03067201104FE02 Page 33 of 48

EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
) (MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4880.000	45.79	0.14	45.93	74	-28.07	peak
4880.000	36.42	0.14	36.56	54	-17.44	AVG
7320.000	42.17	2.36	44.53	74	-29.47	peak
7320.000	32.52	2.36	34.88	54	-19.12	AVG
	0			0	8	
emark:	- 6	8			- 6	0
ctor = Anter	nna Factor + Cable	Loss – Pre-	amplifier.			- 6

EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4880.000	45.04	0.14	45.18	74	-28.82	peak
4880.000	36.09	0.14	36.23	54	-17.77	AVG
7320.000	41.83	2.36	44.19	74	-29.81	peak
7320.000	32.15	2.36	34.51	54	-19.49	AVG
0		<u></u>				
emark:	8					

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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Report No.: AGC03067201104FE02 Page 34 of 48

EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
) (MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	47.52	0.22	47.74	74	-26.26	peak
4960.000	37.86	0.22	38.08	54	-15.92	AVG
7440.000	44.28	2.64	46.92	74	-27.08	peak
7440.000	33.59	2.64	36.23	54	-17.77	AVG
	0		9 69		6	
emark:	- 6	8			- 6	8
ctor = Anter	nna Factor + Cable	Loss – Pre-	amplifier.			

EUT	Beacon	Model Name	K8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
4960.000	46.64	0.22	46.86	74	-27.14	peak
4960.000	37.29	0.22	37.51	54	-16.49	AVG
7440.000	43.51	2.64	46.15	74	-27.85	peak
7440.000	34.43	2.64	37.07	54	-16.93	AVG
mark:		- GÖ			<u> </u>	0

Factor = Antenna Factor + Cable Loss – Pre-amplifier

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.

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EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS

PK



AV



RESULT: PASS

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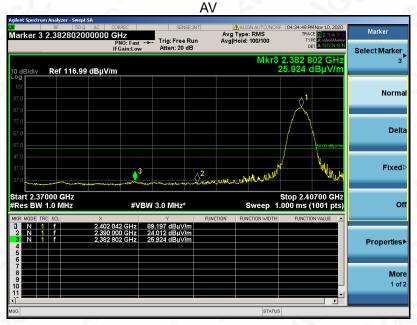


Report No.: AGC03067201104FE02 Page 36 of 48

EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical



/



RESULT: PASS

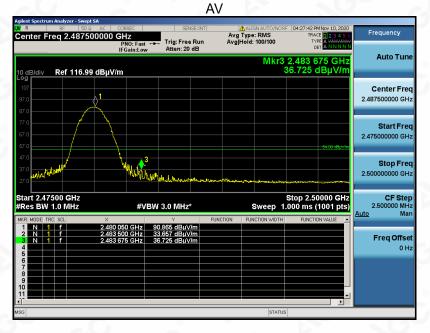
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Report No.: AGC03067201104FE02 Page 37 of 48

EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal





RESULT: PASS

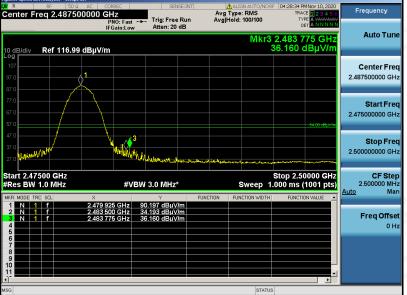
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Report No.: AGC03067201104FE02 Page 38 of 48

EUT	Beacon	Model Name	К8
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical





RESULT: PASS Note: The factor had been edited in the "Input Correction" of the Spectrum Analyzer.

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12. FCC LINE CONDUCTED EMISSION TEST

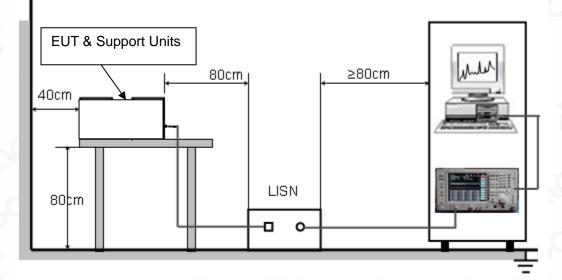
12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Franciscov	Maximum RF Line Voltage		
Frequency	Q.P.(dBuV)	Average(dBuV)	
150kHz~500kHz	66-56	56-46	
500kHz~5MHz	56	46	
5MHz~30MHz	60	50	

Note:

- 1. The lower limit shall apply at the transition frequency.
- 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support equipment received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from a LISN.
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less – 2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.

12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

N/A

Note: The conducted emission tests at AC port are not required for devices which only employ battery power for operation.

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Report No.: AGC03067201104FE02 Page 41 of 48

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 1GHZ



RADIATED EMISSION TEST SETUP ABOVE 1GHZ

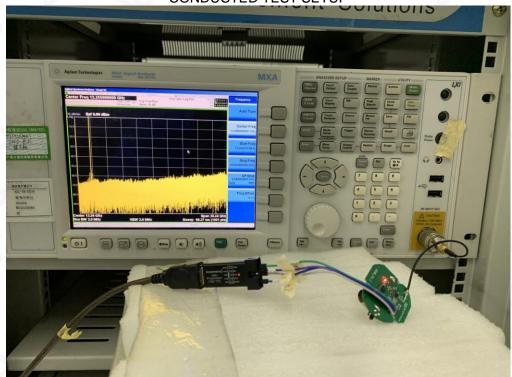


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Report No.: AGC03067201104FE02 Page 42 of 48



CONDUCTED TEST SETUP

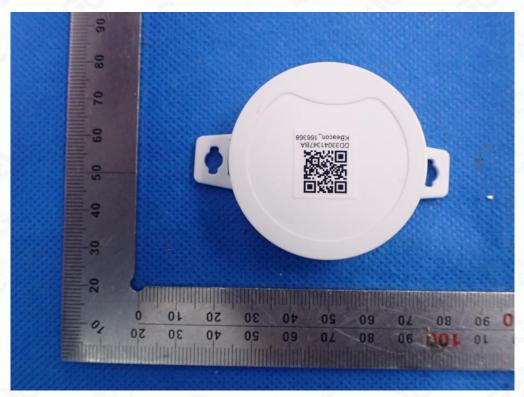
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Report No.: AGC03067201104FE02 Page 43 of 48

APPENDIX B: PHOTOGRAPHS OF EUT EXTERNAL VIEW-1 OF EUT

EXTERNAL VIEW-2 OF EUT



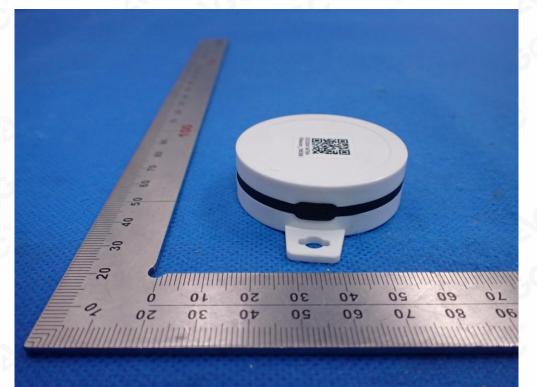
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Report No.: AGC03067201104FE02 Page 44 of 48

EXTERNAL VIEW-3 OF EUT



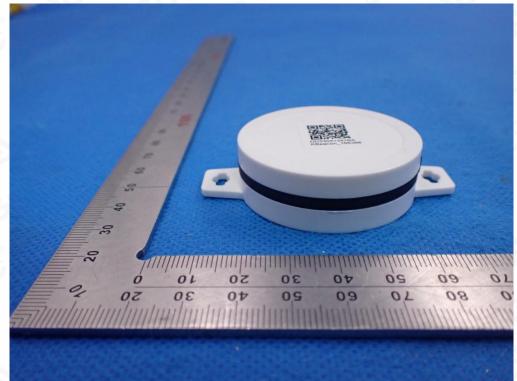
EXTERNAL VIEW-4 OF EUT



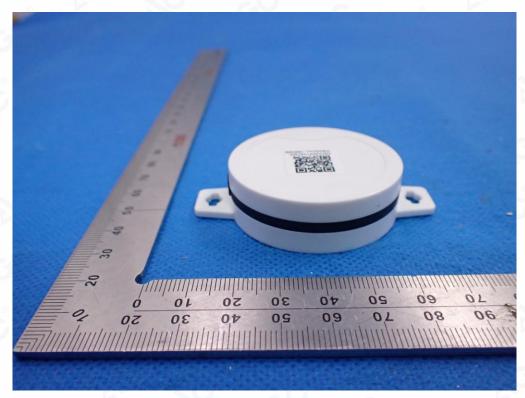
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Report No.: AGC03067201104FE02 Page 45 of 48



EXTERNAL VIEW-6 OF EUT

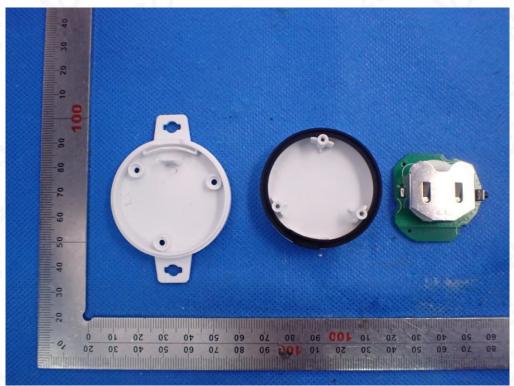


INTERNAL VIEW-1 OF EUT

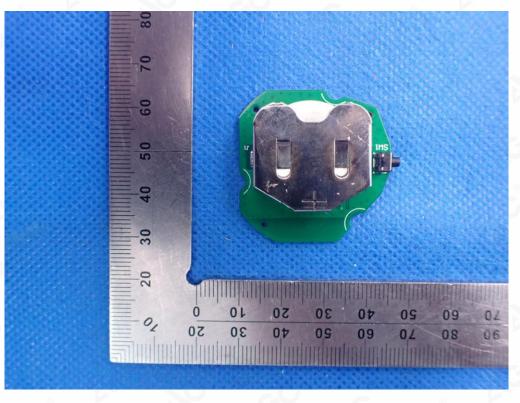
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Report No.: AGC03067201104FE02 Page 46 of 48



INTERNAL VIEW-2 OF EUT

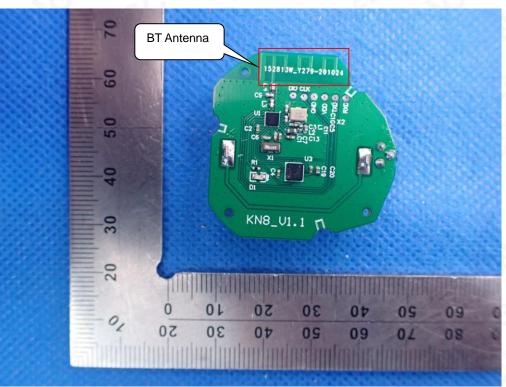


INTERNAL VIEW-3 OF EUT

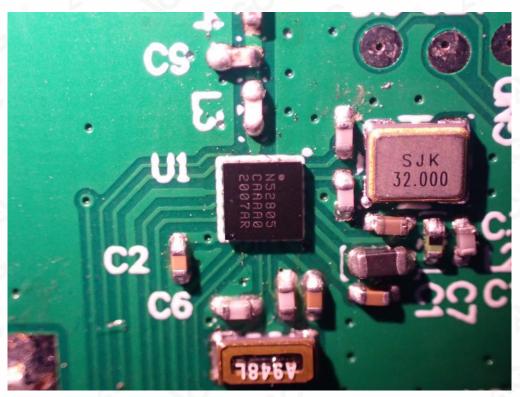
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Report No.: AGC03067201104FE02 Page 47 of 48



INTERNAL VIEW-4 OF EUT

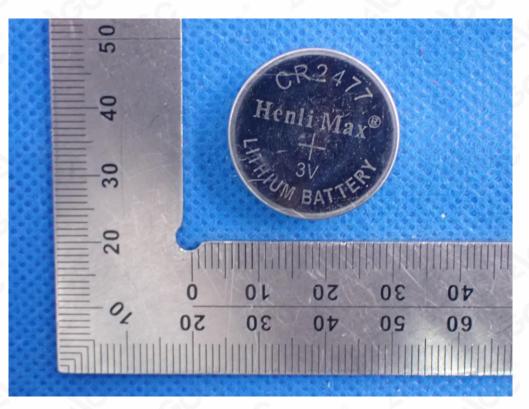


INTERNAL VIEW-5 OF EUT

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Report No.: AGC03067201104FE02 Page 48 of 48



----END OF REPORT----

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the Bedicated Pesting/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written approver, or having not been stamped by the Bedicated Pesting/Inspection presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15day after the issuerce of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.



Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.

5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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