CFR 47 FCC PART 2
CFR 47 FCC PART 22 H
CFR 47 FCC PART 24 E
CFR 47 FCC PART 27

TEST REPORT

For

Wireless POS

MODEL NUMBER: AF820

REPORT NUMBER: E04A25010071F00305

ISSUE DATE: March 14, 2025

FCC ID: 2BLHD-AF820

Prepared for

Beijing Shenzhou Anfu Technology Co.,Ltd
Room 1102, Block A, Longyu Center, Huilongguan, Changping District, Beijing, China

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	March 14, 2025	Initial Issue	

Summary of Test Results(LTE Band 2)			
Standard(s) Section	**Description**	**Requirements**	**Result**
FCC			
§2.1046, §24.232(c)	Effective (Isotropic) Radiated Power of Transmitter	EIRP ≤ 2 W	PASS
§24.232	Peak to Average Radio	Limit≤13 dB	PASS
§2.1049	Occupied Bandwidth	OBW: No limit EBW: No limit	PASS
§2.1051, §24.238(a)	Band Edge Compliance	≤ 43+10log10(P[W])/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	PASS
§2.1051, §24.238(a)	Spurious Emission at Antenna Terminal	≤ 43+10log10(P[W])/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	PASS
§2.1053, §24.238(a)	Radiated Spurious Emissions	≤ 43+10log10(P[W])	PASS
§2.1055(a)(1)(b), §2.1055(d)(1), §24.235	Frequency Stability	Within authorized bands of operation/frequency block.	PASS

Note:
1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 24 > when <Accuracy Method> decision rule is applied.

Summary of Test Results(LTE Band 4)			
Standard(s) Section	**Description**	**Requirements**	**Result**
FCC			
§2.1046, §27.50(d)(4)	Effective (Isotropic) Radiated Power of Transmitter	EIRP ≤ 1 W	PASS
§27.50	Peak to Average Radio	Limit≤13 dB	PASS
§2.1049	Occupied Bandwidth	OBW: No limit EBW: No limit	PASS
§2.1051, §27.53(h)(1) §27.53(h)(3)(i)	Band Edge Compliance	≤ 43+10log10(P[W])/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	PASS
§2.1051, §27.53(h)(1)	Spurious Emission at Antenna Terminal	≤ 43+10log10(P[W])/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	PASS
§2.1053, §27.53(h)(1)	Radiated Spurious Emissions	≤ 43+10log10(P[W])	PASS
§2.1055, §27.54	Frequency Stability	Within authorized bands of operation/frequency block.	PASS

Note:
1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 27 > when <Accuracy Method> decision rule is applied.

Summary of Test Results(LTE Band 5)			
Standard(s) Section	**Description**	**Requirements**	**Result**
FCC			
§2.1046, §22.913(a)(5)	Effective (Isotropic) Radiated Power of Transmitter	ERP ≤ 7 W	PASS
§22.913	Peak to Average Radio	Limit≤13 dB	PASS
§2.1049	Occupied Bandwidth	OBW: No limit EBW: No limit	PASS
§2.1051, §22.917(b)(1)	Band Edge Compliance	≤ 43+10log10(P[W])/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	PASS
§2.1051, §22.917(a)	Spurious Emission at Antenna Terminal	≤ 43+10log10(P[W])/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	PASS
§2.1053, §22.917(a)	Radiated Spurious Emissions	≤ 43+10log10(P[W])	PASS
§2.1055, §22.355	Frequency Stability	Within authorized bands of operation/frequency block.	PASS
Note: 1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China. 2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 22 > when <Accuracy Method> decision rule is applied.			

Summary of Test Results(LTE Band 7/38/41)			
Standard(s) Section	**Description**	**Requirements**	**Result**
FCC			
§2.1046, §27.50(h)	Effective (Isotropic) Radiated Power of Transmitter	EIRP ≤ 2 W	PASS
§27.50	Peak to Average Radio	Limit≤13 dB	PASS
§2.1049	Occupied Bandwidth	OBW: No limit EBW: No limit	PASS
§2.1051, §27.53(m)(4)	Band Edge Compliance	≤ 43+10log10(P[W])/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	PASS
§2.1051, §27.53(m)(4)	Spurious Emission at Antenna Terminal	≤ 43+10log10(P[W])/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	PASS
§2.1053, §27.53(m)(4)	Radiated Spurious Emissions	≤ 55+10log10(P[W])	PASS
§2.1055, §27.54	Frequency Stability	Within authorized bands of operation/frequency block.	PASS

Note:
1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 27 > when <Accuracy Method> decision rule is applied.

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Beijing Shenzhou Anfu Technology Co.,Ltd
Address:	Room 1102, Block A, Longyu Center, Huilongguan, Changping District, Beijing, China

Manufacturer Information

Company Name:	Beijing Shenzhou Anfu Technology Co.,Ltd
Address:	Room 1102, Block A, Longyu Center, Huilongguan, Changping District, Beijing, China

EUT Information

EUT Name:	Wireless POS
Model:	AF820
Brand:	ANFU
Sample Received Date:	January 6, 2025
Sample Status:	Normal
Sample ID:	A25010071 001
Date of Tested:	January 6, 2025 to February 28, 2025

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 22 H	**PASS**
CFR 47 FCC PART 24 E	**PASS**
CFR 47 FCC PART 27	**PASS**

Prepared By:

Checked By:

Alan He

Laboratory Leader

Approved By:

Shawn Wen

Laboratory Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26-2015, 971168 D01 Power Meas License Digital Systems v03r01, 971168 D02 Misc Rev Approv License Devices v02r01, 412172 D01 v01r01 Determining ERP and EIRP, CFR 47 FCC Part 2, Part 22 H, Part 24 E, Part 27.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 6947.01)** Guangdong Global Testing Technology Co., Ltd. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1343)** Guangdong Global Testing Technology Co., Ltd. has been recognized to perform compliance testing on equipment subject to Supplier's Declaration of Conformity (SDoC) and Certification rules **ISED (Company No.: 30714)** Guangdong Global Testing Technology Co., Ltd. has been registered and fully described in a report filed with ISED. The Company Number is 30714 and the test lab Conformity Assessment Body Identifier (CABID) is CN0148.

Note: All tests measurement facilities use to collect the measurement data are located at Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People’s Republic of China, 523808

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Items	k	Uncertainty
Occupied Bandwidth	2	±0.3 dB
Effective (Isotropic) Radiated Power Output Data	2	±0.3 dB
Conducted Spurious Emission	2	9 kHz-1 GHz: ± 0.2 dB 1GHz-12.75GHz: ± 0.3 dB 12.75 GHz-26.5 GHz: ± 0.5dB
Frequency Stability	2	±9.0 PPM
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.		

Test Item	Frequency Range	k	U(dB)
Conducted emissions from the AC mains power ports (AMN)	150 kHz ~ 30 MHz	2	3.37
Radiated emissions	9 kHz ~ 30 MHz	2	4.16
Radiated emissions	30 MHz ~ 1 GHz	2	3.79
Radiated emissions	1 GHz ~ 18 GHz	2	5.62
Radiated emissions	18 GHz ~ 40 GHz	2	5.54
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.			

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name		Wireless POS
Model		AF820
Hardware Version		V1.00
Software Version		V1.00
Ratings		DC 5V / Battery 3.7V
Battery1 Ratings		3.7V 4800mAh 17.76Wh
Battery2 Ratings		3.7V 5200mAh 19.24Wh
Power Supply	DC	5V
	Battery	3.7V
Type of Modulation		QPSK, 16QAM
Note		1. The Antenna Gain was provided by customer, and this information may affect the validity of the results, customer should be responsible for this.

5.2. TECHNICAL INFORMATION

E-UTRA Band	Characteristics				
	E-UTRA operating bands		Bandwidth		
	Transmit	Receive			
2	1850MHz -1910MHz	1930MHz -1990MHz	☒1.4MHz	☒3MHz	☒5MHz
			☒10MHz	☒15MHz	☒20MHz
4	1710MHz -1755MHz	2110MHz -2155MHz	☒1.4MHz	☒3MHz	☒5MHz
			☒10MHz	☒15MHz	☒20MHz
5	824MHz -849MHz	869MHz -894MHz	☒1.4MHz	☒3MHz	☒5MHz
			☒10MHz	☐15MHz	☐20MHz
7	2500MHz -2570MHz	2620MHz -2690MHz	☐1.4MHz	☐3MHz	☒5MHz
			☒10MHz	☒15MHz	☒20MHz

38	2570MHz -2620MHz	2570MHz -2620MHz	☐1.4MHz	☐3MHz	☒5MHz
			☒10MHz	☒15MHz	☒20MHz
41	2535MHz -2655MHz	2535MHz -2655MHz	☐1.4MHz	☐3MHz	☒5MHz
			☒10MHz	☒15MHz	☒20MHz

5.3. TEST CHANNEL CONFIGURATION

Band	Test Frequency ID	Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
Band 2	Low Range	1.4	18607	1850.7	607	1930.7
		3	18615	1851.5	615	1931.5
		5	18625	1852.5	625	1932.5
		10	18650	1855	650	1935
		15	18675	1857.5	675	1937.5
		20	18700	1860	700	1940
	Mid Range	1.4/3/5/10/15/20	18900	1880	900	1960
	High Range	1.4	19193	1909.3	1193	1989.3
		3	19185	1908.5	1185	1988.5
		5	19175	1907.5	1175	1987.5
		10	19150	1905	1150	1985
		15	19125	1902.5	1125	1982.5
		20	19100	1900	1100	1980

Band	Test Frequency ID	Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
Band 4	Low Range	1.4	19957	1710.7	1957	2110.7
		3	19965	1711.5	1965	2111.5
		5	19975	1712.5	1975	2112.5
		10	20000	1715	2000	2115
		15	20025	1717.5	2025	2117.5
		20	20050	1720	2050	2120
	Mid Range	1.4/3/5/10/15/20	20175	1732.5	2175	2132.5
	High Range	1.4	20393	1754.3	2393	2154.3
		3	20385	1753.5	2385	2153.5
		5	20375	1752.5	2375	2152.5
		10	20350	1750	2350	2150
		15	20325	1747.5	2325	2147.5
		20	20300	1745	2300	2145

Band	Test Frequency ID	Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
Band 5	Low Range	1.4	20407	824.7	2407	869.7
		3	20415	825.5	2415	870.5
		5	20425	826.5	2425	871.5
		10	20450	829	2450	874
	Mid Range	1.4/3/5/10	20525	836.5	2525	881.5
	High Range	1.4	20643	848.3	2643	893.3
		3	20635	847.5	2635	892.5
		5	20625	846.5	2625	891.5
		10	20600	844	2600	889

Band	Test Frequency ID	Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
Band 7	Low Range	5	20775	2502.5	2775	2622.5
		10	20800	2505	2800	2625
		15	20825	2507.5	2825	2627.5
		20	20850	2510	2850	2630
	Mid Range	5/10/15/20	21100	2535	3100	2655
	High Range	5	21425	2567.5	3425	2687.5
		10	21400	2565	3400	2685
		15	21375	2562.5	3375	2682.5
		20	21350	2560	3350	2680

Band	Test Frequency ID	Bandwidth [MHz]	EARFCN	Frequency (UL and DL) [MHz]
Band 38	Low Range	5	37775	2572.5
		10	37800	2575
		15	37825	2577.5
		20	37850	2580
	Mid Range	5/10/15/20	38000	2595
	High Range	5	38225	2617.5
		10	38200	2615
		15	38175	2612.5
		20	38150	2610

Band	Test Frequency ID	Bandwidth [MHz]	EARFCN	Frequency (UL and DL) [MHz]
Band 41	Low Range	5	39675	2498.5
		10	39700	2501
		15	39725	2503.5
		20	39750	2506
	Mid Range	5/10/15/20	40620	2593
	High Range	5	41565	2687.5
		10	41540	2685
		15	41515	2682.5
		20	41490	2680

5.4. MAXIMUM AVERAGE OUTPUT POWER

LTE Band 2

Part 24						
EIRP Limit(W)		2.00				
Antenna Gain (dBi)		1.85				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
1.4	QPSK	1850.7	1910.3	22.77	24.62	0.29
	16QAM			21.63	23.48	0.22
3	QPSK	1851.5	1908.5	22.86	24.71	0.30
	16QAM			21.92	23.77	0.24
5	QPSK	1852.5	1907.5	22.74	24.59	0.29
	16QAM			22.03	23.88	0.24
10	QPSK	1855.0	1905.0	22.67	24.52	0.28
	16QAM			21.76	23.61	0.23
15	QPSK	1857.5	1902.5	22.81	24.66	0.29
	16QAM			21.84	23.69	0.23
20	QPSK	1860.0	1900.0	22.94	24.79	0.30
	16QAM			21.83	23.68	0.23

LTE Band 4

Part 27						
EIRP Limit(W)		1.00				
Antenna Gain (dBi)		-1.32				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
1.4	QPSK	1710.7	1754.3	22.63	21.31	0.14
	16QAM			21.64	20.32	0.11
3	QPSK	1711.5	1753.5	22.72	21.4	0.14
	16QAM			22.1	20.78	0.12
5	QPSK	1712.5	1752.5	22.54	21.22	0.13
	16QAM			22.16	20.84	0.12
10	QPSK	1715	1750	22.61	21.29	0.13
	16QAM			21.52	20.2	0.10
15	QPSK	1717.5	1747.5	22.74	21.42	0.14
	16QAM			21.89	20.57	0.11
20	QPSK	1720	1745	22.83	21.51	0.14
	16QAM			21.9	20.58	0.11

LTE Band 5

Part 22H						
ERP Limit(W)		7.00				
Antenna Gain (dBi)		-3.11				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)
1.4	QPSK	824.7	848.3	23.13	20.02	0.10
	16QAM			22.13	19.02	0.08
3	QPSK	825.5	847.5	23.06	19.95	0.10
	16QAM			22.26	19.15	0.08
5	QPSK	826.5	846.5	23.13	20.02	0.10
	16QAM			22.5	19.39	0.09
10	QPSK	829	844	23.33	20.22	0.11
	16QAM			22.12	19.01	0.08

LTE Band 7

Part 27						
EIRP Limit(W)		2.00				
Antenna Gain (dBi)		-0.4				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
5	QPSK	2502.5	2567.5	18.35	17.95	0.06
	16QAM			17.64	17.24	0.05
10	QPSK	2505	2565	18.12	17.72	0.06
	16QAM			17.35	16.95	0.05
15	QPSK	2507.5	2562.5	18.43	18.03	0.06
	16QAM			17.32	16.92	0.05
20	QPSK	2510	2560	18.14	17.74	0.06
	16QAM			17.29	16.89	0.05

LTE Band 38

Part 27						
EIRP Limit(W)		2.00				
Antenna Gain (dBi)		0.55				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
5	QPSK	2572.5	2617.5	21.55	22.1	0.16
	16QAM			20.72	21.27	0.13
10	QPSK	2575	2615	21.48	22.03	0.16
	16QAM			20.95	21.5	0.14
15	QPSK	2577.5	2612.5	21.56	22.11	0.16
	16QAM			21	21.55	0.14
20	QPSK	2580	2610	22.74	23.29	0.21
	16QAM			21.83	22.38	0.17

LTE Band 41

Part 27						
EIRP Limit(W)		2.00				
Antenna Gain (dBi)		1.94				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
5	QPSK	2498.5	2687.5	21.89	23.83	0.24
	16QAM			21.31	23.25	0.21
10	QPSK	2501	2685	21.75	23.69	0.23
	16QAM			21.18	23.12	0.21
15	QPSK	2503.5	2682.5	21.86	23.8	0.24
	16QAM			21.3	23.24	0.21
20	QPSK	2506	2680	21.89	23.83	0.24
	16QAM			21.04	22.98	0.20

5.5. WORST-CASE CONFIGURATION AND MODE

During all testing, EUT is in link mode with base station emulator at maximum power level. The worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on QPSK, 16QAM. All testing was performed using QPSK and 16QAM modulations to represent the worst case.

The radiated spurious emissions measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT was investigated in three orthogonal orientations X,Y and Z. It was determined that Y orientation was the worst-case orientation.

Radiated spurious emissions were investigated below 30 MHz, 30 MHz - 1 GHz and above 1 GHz. There were no emissions found on below 30 MHz. the emissions between 30 MHz – 1 GHz were tested the highest transmitting power channel and the worse configuration.

Test Items	Worst case test configuration			
Description	Modulation	Channel	Bandwidth (MHz)	RB Configuration
Occupied Bandwidth	QPSK, 16QAM	L, M, H	1.4,3,5,10,15,20	Full RB
Band Edge Compliance	QPSK, 16QAM	L, M, H	1.4,3,5,10,15,20	Full RB
Spurious Emission at Antenna Terminal	QPSK, 16QAM	L, M, H	1.4,3,5,10,15,20	Full RB
Radiated Spurious Emissions	QPSK	L, M, H	The Maximum BW	RB size=1, RB Location= Low

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Band	Antenna Type	MAX Antenna Gain (dBi)
1	LTE Band 2	Internal antenna	1.85
1	LTE Band 4	Internal antenna	-1.32
1	LTE Band 5	Internal antenna	-3.11
1	LTE Band 7	Internal antenna	-0.4
1	LTE Band 38	Internal antenna	0.55
1	LTE Band 41	Internal antenna	1.94

Band	Transmit and Receive Mode	Description
LTE Band 2	☒1TX, 2RX	Main antenna can be used as transmitting/receiving antenna, DIV antenna can be used as receiving antenna
LTE Band 4	☒1TX, 2RX	Main antenna can be used as transmitting/receiving antenna, DIV antenna can be used as receiving antenna
LTE Band 5	☒1TX, 2RX	Main antenna can be used as transmitting/receiving antenna, DIV antenna can be used as receiving antenna
LTE Band 7	☒1TX, 2RX	Main antenna can be used as transmitting/receiving antenna, DIV antenna can be used as receiving antenna
LTE Band 38	☒1TX, 2RX	Main antenna can be used as transmitting/receiving antenna, DIV antenna can be used as receiving antenna
LTE Band 41	☒1TX, 2RX	Main antenna can be used as transmitting/receiving antenna, DIV antenna can be used as receiving antenna

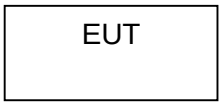
Note: The value of the antenna gain was declared by customer.

5.7. SUPPORT UNITS FOR SYSTEM TEST

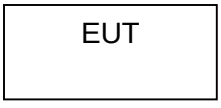
The EUT has been tested as an independent unit

5.8. SETUP DIAGRAM

Radiated Emission:



RF conducted:



6. MEASURING INSTRUMENT AND SOFTWARE USED

Test Equipment of Conducted RF					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Spectrum Analyzer	Rohde & Schwarz	FSV40	102257	2024/09/14	2025/09/13
Spectrum Analyzer	KEYSIGHT	N9020A	MY51285127	2024/09/14	2025/09/13
EXG Analog Signal Generator	KEYSIGHT	N5173B	MY61253075	2024/09/14	2025/09/13
Vector Signal Generator	Rohde & Schwarz	SMM100A	101899	2024/09/14	2025/09/13
RF Control box	MWRF-test	MW100-RFCB	MW220926GTG	2024/09/14	2025/09/13
Wideband Radio Communication Tester	Rohde & Schwarz	CMW270	102792	2024/09/14	2025/09/13
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	103235	2024/09/14	2025/09/13
temperature humidity chamber	Espec	SH-241	SH-241-2014	2024/09/14	2025/09/13
RF Test Software	MWRF-test	MTS8310E (Ver. V2/0)	N/A	N/A	N/A

Test Equipment of Radiated emissions below 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
3m Semi-anechoic Chamber	ETS	9m*6m*6m	Q2146	2022/08/30	2025/08/29
EMI Test Receiver	Rohde & Schwarz	ESCI3	101409	2024/09/14	2025/09/13
Spectrum Analyzer	KEYSIGHT	N9020A	MY51283932	2024/09/14	2025/09/13
Pre-Amplifier	HzEMC	HPA-9K0130	HYPA21001	2024/09/14	2025/09/13
Biconilog Antenna	Schwarzbeck	VULB 9168	01315	2022/10/10	2025/10/09
Biconilog Antenna	ETS	3142E	00243646	2022/03/23	2025/03/22
Loop Antenna	ETS	6502	243668	2022/03/30	2025/03/29
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE)	N/A	N/A	N/A

Test Equipment of Radiated emissions above 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
3m Semi-anechoic Chamber	ETS	9m*6m*6m	Q2149	2022/08/30	2025/08/29
Spectrum Analyzer	Rohde & Schwarz	FSV40	101413	2024/09/14	2025/09/13
Spectrum Analyzer	KEYSIGHT	N9020A	MY51283932	2024/09/14	2025/09/13
Pre-Amplifier	A-INFO	HPA-1G1850	HYPA21003	2024/09/14	2025/09/13
Horn antenna	A-INFO	3117	246069	2022/03/11	2025/03/10

Pre-Amplifier	ZKJC	HPA-184057	HYPA21004	2024/09/14	2025/09/13
Horn antenna	ZKJC	3116C	246265	2022/03/29	2025/03/28
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE+)	N/A	N/A	N/A

7. ANTENNA TERMINAL TEST RESULTS

7.1. EFFECTIVE (ISOTROPIC) RADIATED POWER OF TRANSMITTER

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50

LIMITS

22.913(a) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
24.232(c) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.
27.50(c) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.
27.50(d) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watts EIRP.
27.50(h) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

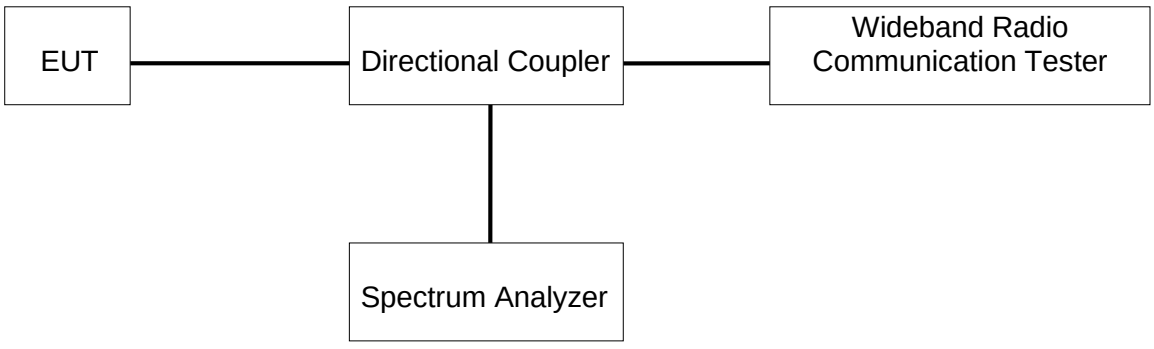
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

TEST PROCEDURE

Refer to ANSI C63.26:2015 and KDB 971168 D01 Section 5.6
ERP/ EIRP = PMeas + GT − LC
where:
ERP or EIRP = effective or equivalent isotropically radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB

The transmitter has a maximum radiated ERP / EIRP output powers as follows:

TEST SETUP



TEST ENVIRONMENT

Temperature	21.8°C	Relative Humidity	53%
Atmosphere Pressure	101kPa		

RESULTS

Please refer to section "Test Data" - Appendix A

7.2. PEAK TO AVERAGE RADIO

LIMITS

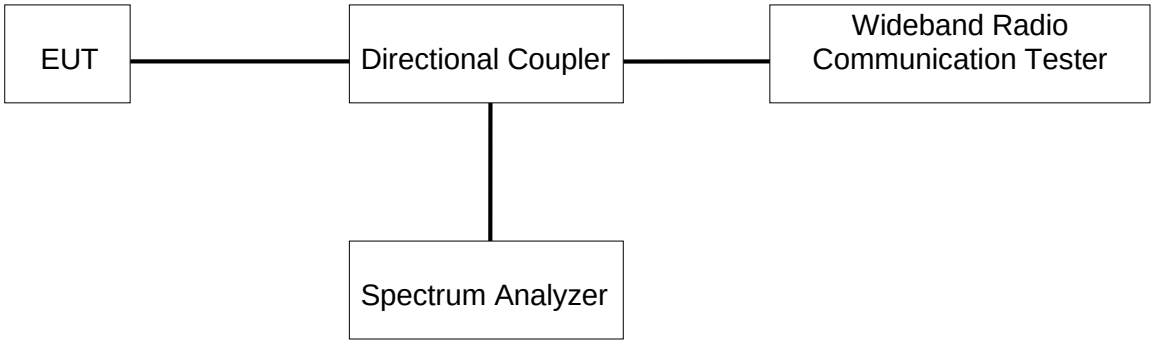
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

TEST PROCEDURE

Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01;

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The PAR was measured on the Spectrum Analyzer.

TEST SETUP



TEST ENVIRONMENT

Temperature	21.8°C	Relative Humidity	53%
Atmosphere Pressure	101kPa		

RESULTS

Please refer to section "Test Data" - Appendix A

7.3. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

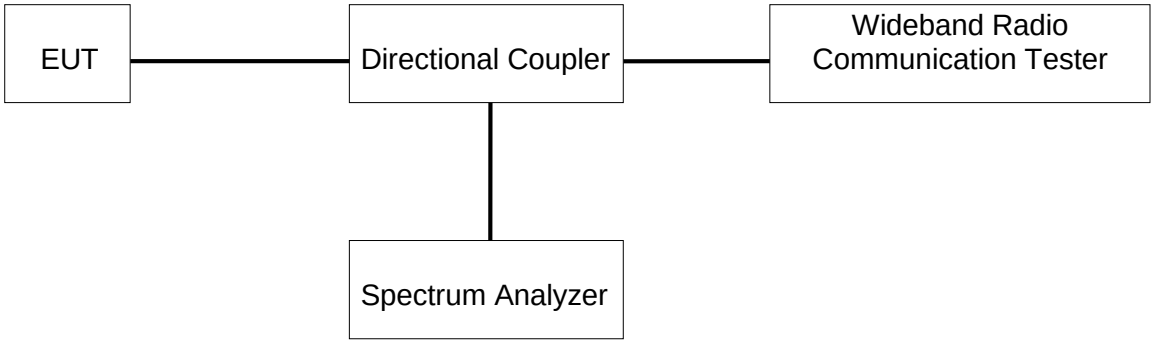
For reporting purposes only.

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

(Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01)

TEST SETUP



TEST ENVIRONMENT

Temperature	21.8°C	Relative Humidity	53%
Atmosphere Pressure	101kPa		

RESULTS

Please refer to section "Test Data" - Appendix A

7.4. BAND EDGE EMISSIONS

RULE PART(S)

FCC §2.1051, §22.917, §24.238, §27.53

LIMITS

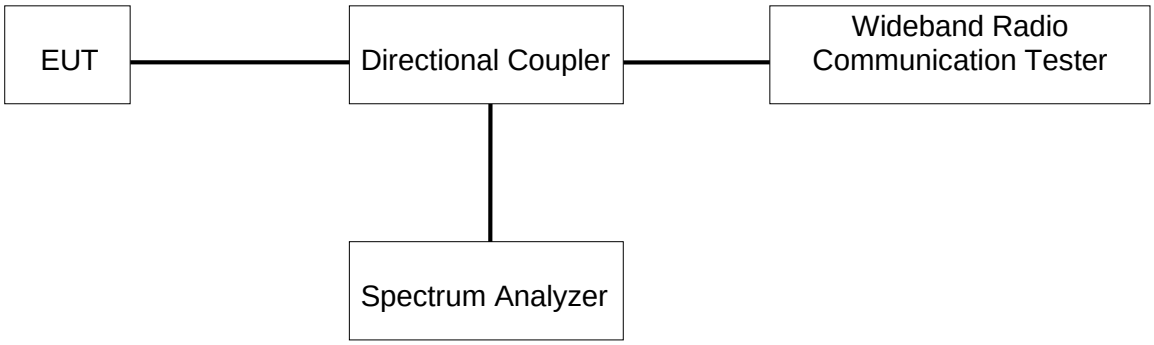
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01
The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

a) Set the RBW = 1 ~ 1.5 % of OBW (Typically limited to a minimum RBW of 1% of the OBW)
b) Set VBW ≥ 3 × RBW;
c) Set span ≥ 1.5 times the OBW;
d) Sweep time = Auto;
e) Detector = RMS;
f) Ensure that the number of measurement points ≥ 2*Span/RBW;
g) Trace mode = Average (100);

TEST SETUP



TEST ENVIRONMENT

Temperature	21.5°C	Relative Humidity	51%
Atmosphere Pressure	101kPa		

RESULTS

Please refer to section "Test Data" - Appendix A

7.5. SPURIOUS EMISSION AT ANTENNA TERMINAL

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238, §27.53

LIMITS

FCC: §22.901, §22.917, §24.238
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

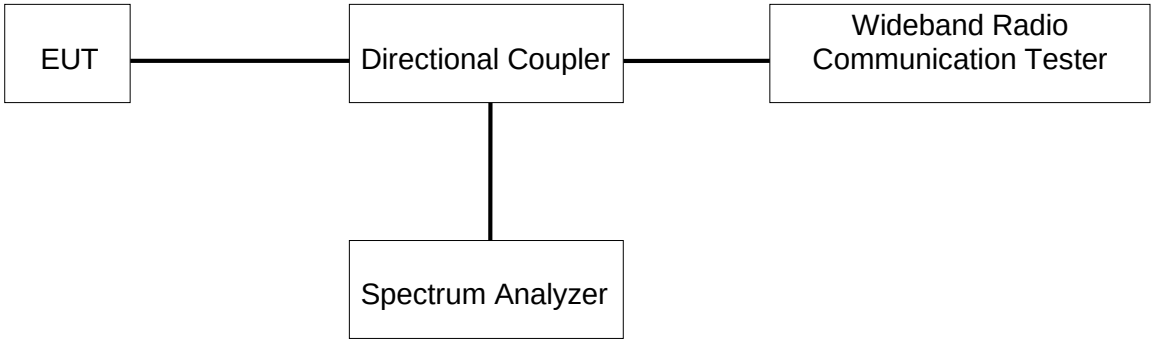
TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01
The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

a) Set the RBW = 100 kHz for emission below 1GHz and 1MHz for emissions above 1GHz (Tests were performed 1 MHz [Worst case], to sweep 1 time for all frequency range)
b) Set VBW ≥ 3 × RBW;
c) Set span ≥ 1.5 times the OBW;
d) Sweep time = auto couple;
e) Detector = rms;
f) Ensure that the number of measurement points = Max (40001);
g) Trace mode = average (LTE Band 5), Maxhold (LTE Band 7);

Note: Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

TEST SETUP



TEST ENVIRONMENT

Temperature	21.5°C	Relative Humidity	51%
Atmosphere Pressure	101kPa		

RESULTS

Please refer to section "Test Data" - Appendix A

7.6. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54

LIMITS

§24.235 The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

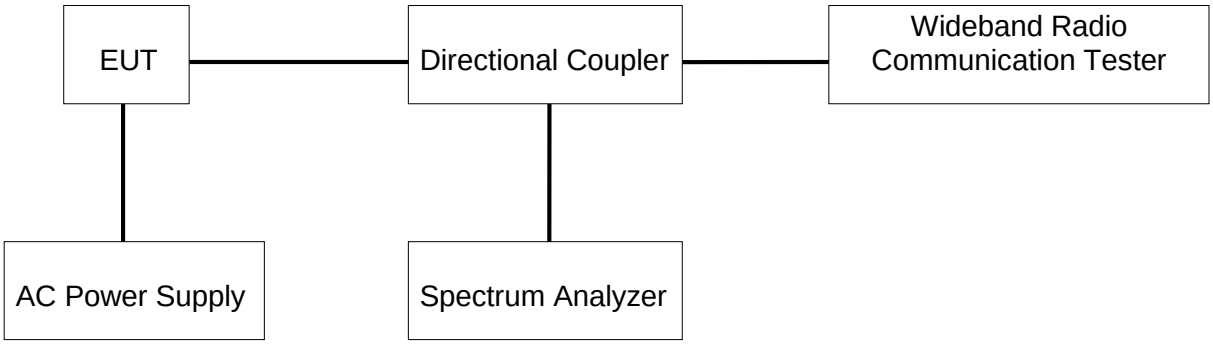
§24.235 and §27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01.

	Normal Test Conditions	Extreme Test Conditions
Relative Humidity	45 % - 75 %	/
Atmospheric Pressure	100 kPa ~102 kPa	/
Temperature	T_N (Normal Temperature): 24.2 °C	T_L (Low Temperature): -10 °C
		T_H (High Temperature): 50 °C
Supply Voltage	V_N (Normal Voltage): DC 3.7 V	V_L (Low Voltage): DC 3.14V
		V_H (High Voltage): DC 4.26V

TEST SETUP



RESULTS

Please refer to section "Test Data" - Appendix A

7.7. RADIATED SPURIOUS EMISSIONS

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53

LIMIT

§24.238
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

§27.53(h)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 l0g (P) dB.

§22.917(a)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 10g (P) dB.

§27.53 (m)
At least 55+10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

TEST PROCEDURE

KDB 971168 D01 Section 7

Below 1GHz test procedure as below:

1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

Where:

Pd is the dipole equivalent power, Pg is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to Pg [dBm] – cable loss [dB]. The calculated Pd levels are then compared to the absolute spurious emission limit of -13 dBm which is equivalent to the required minimum attenuation of 43 + 10log10(Power [Watts]).

Above 1GHz test procedure as below:

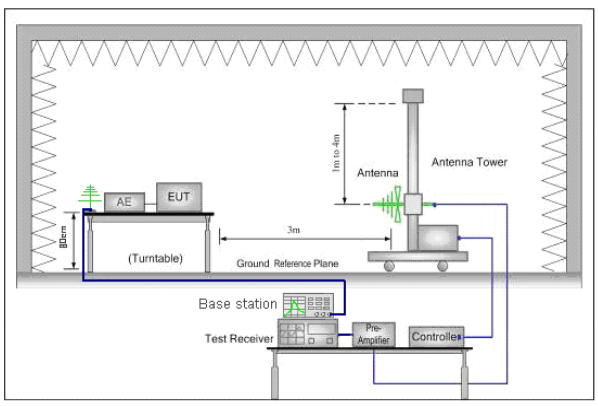
1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. Calculate power in dBm by the following formula:
EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)
EIRP=ERP+2.15dB
Where: Pg is the generator output power into the substitution antenna.
11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
= P(W)- [43 + 10log(P)] (dB)
= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
= -13dBm.

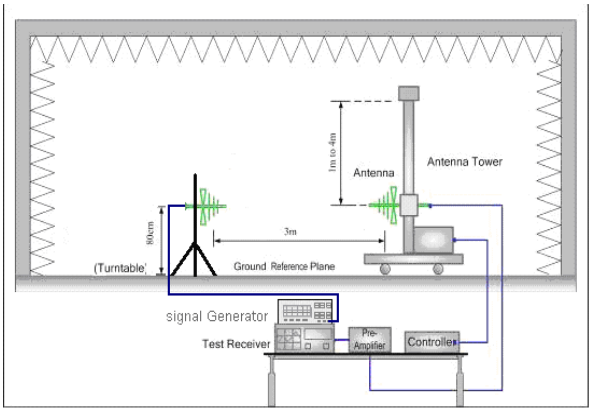
NOTE 1: Radiated spurious emissions were investigated below 30 MHz, 30 MHz – 1 GHz and above 1 GHz. There were no emissions found on below 30 MHz and 30 MHz – 1 GHz.
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

NOTE 2: Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

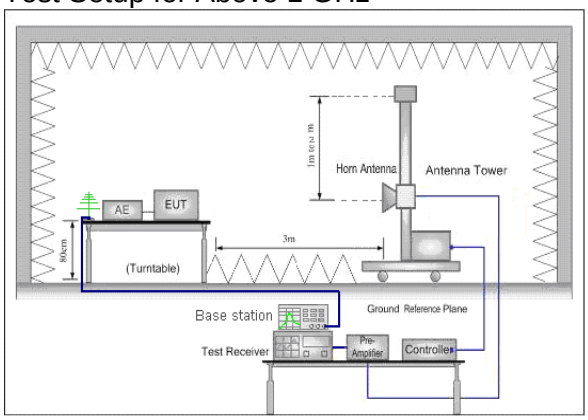
TEST SETUP

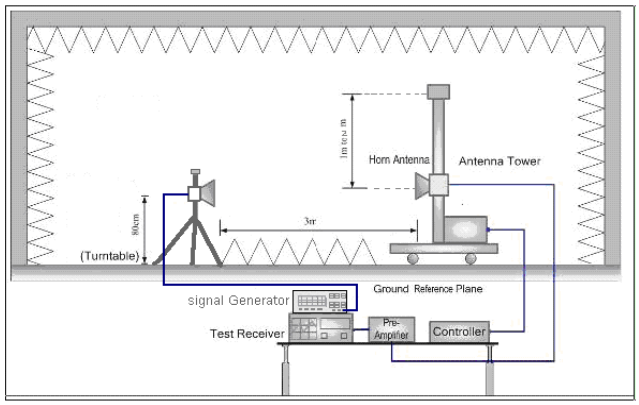
Test Setup for Below 1 GHz





Test Setup for Above 1 GHz





TEST ENVIRONMENT

Temperature	23.1°C	Relative Humidity	51%
Atmosphere Pressure	101kPa		

RESULTS

Please refer to section "Test Data" - Appendix B

END OF REPORT