

FCC EMC Test Report

Applicant: Shenzhen HOPE Microelectronics Co., Ltd

Address of Applicant: 30th floor of 8th Building, C Zone Vanke Cloud City, Xili Sub-district, Nanshan Shenzhen, Guangdong China

Equipment Under Test (EUT)

Product Name: RFM380F32-433S2

Model No.: RFM380F32

Trade Mark: HOPERF

FCC ID: 2ASEORFM380F32

Applicable Standards: FCC CFR Title 47 Part 15B

Date of Sample Receipt: 29 Sep., 2022

Date of Test: 30 Sep., to 18 Oct., 2022

Date of report Issued: 31 Oct., 2022

Test Result: PASS

Tested by:	<u>Mike Ou</u> Test Engineer	Date:	<u>31 Oct., 2022</u>
Reviewed by:	<u>Wenwen Zhang</u> Project Engineer	Date:	<u>31 Oct., 2022</u>
Approved by:	<u>Mike Ou</u> Manager	Date:	<u>31 Oct., 2022</u>

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in above the application standard version. Test results reported herein relate only to the item(s) tested.

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1 Version

Version No.	Date	Description
00	19 Oct., 2022	Original
01	31 Oct., 2022	Update pages 4 and 10 to 13

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3 General Information

3.1 Client Information

Applicant:	Shenzhen HOPE Microelectronics Co., Ltd
Address:	30th floor of 8th Building, C Zone Vanke Cloud City, Xili Sub-district, Nanshan Shenzhen, Guangdong China
Manufacturer/Factory:	Shenzhen HOPE Microelectronics Co., Ltd
Address:	30th floor of 8th Building, C Zone Vanke Cloud City, Xili Sub-district, Nanshan Shenzhen, Guangdong China

3.2 General Description of E.U.T.

Product Name:	RFM380F32-433S2
Model No.:	RFM380F32
Power Supply:	DC 1.8V-3.6V
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

3.3 Test Mode

Operating Mode	Detail Description
Receiver mode	Keep the EUT in 433.92 Receiver mode
The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

3.4 Description of Test Auxiliary Equipment

N/A

3.5 Description of Cable Used

Cable Type	Description	Length	From	To
N/A	N/A	N/A	N/A	N/A

3.6 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Radiated Emission (30MHz ~ 1GHz) (3m SAC)	±4.45 dB
Radiated Emission (1GHz ~ 18GHz) (3m SAC)	±5.34 dB

Note: All the measurement uncertainty value were shown with a coverage $k=2$ to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

3.7 Additions to, Deviations, or Exclusions from the Method

No

3.8 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

● **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

3.9 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>

3.10 Test Instruments List

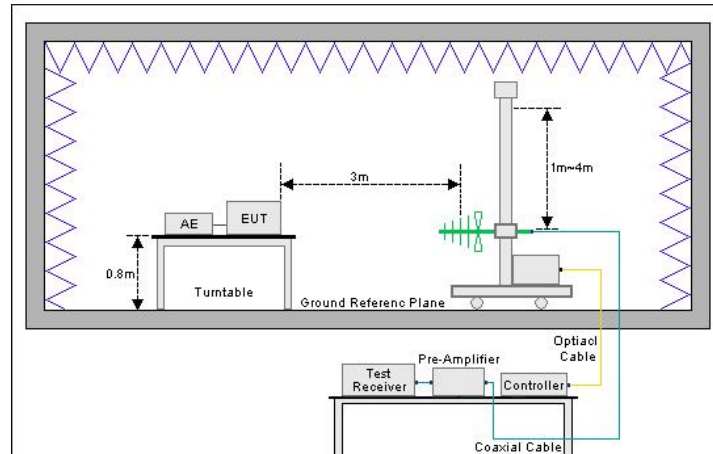
Radiated Emission(3m SAC):					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	ETS	9m*6m*6m	WXJ001-1	04-14-2021	04-13-2024
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	03-08-2022	03-07-2023
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	03-08-2022	03-07-2023
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXJ001-2	01-20-2022	01-19-2023
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXJ001-3	01-20-2022	01-19-2023
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	03-05-2022	03-04-2023
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	01-20-2022	01-19-2023
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-20-2022	01-19-2023
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	01-20-2022	01-19-2023
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		

4 Measurement Setup and Procedure

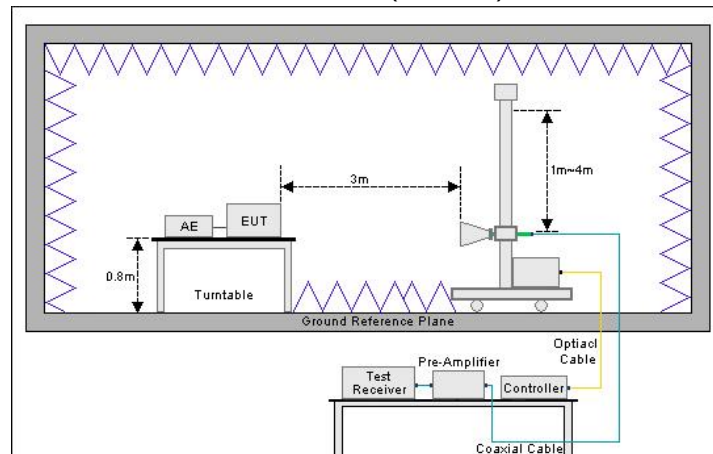
4.1 Test Setup

1) Radiated emission measurement:

Below 1GHz (3m SAC)



Above 1GHz (3m SAC)



4.2 Test Procedure

Test method	Test step
Radiated emission	For below 1GHz: 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data. For above 1GHz: 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.

5 Test Results

5.1 Summary

5.1.1 Clause and data summary

Test items	Standard clause	Test data	Result
Conducted Emission	Part 15.107	See Section 5.2	N/A
Radiated Emission	Part 15.109	See Section 5.3	Pass
Remark: 1. The EUT is a Class B digital device. 2. Pass: The EUT complies with the essential requirements in the standard. 3. N/A: Not Applicable.			
Test Method:	ANSI C63.4:2014		

5.1.2 Test Limit

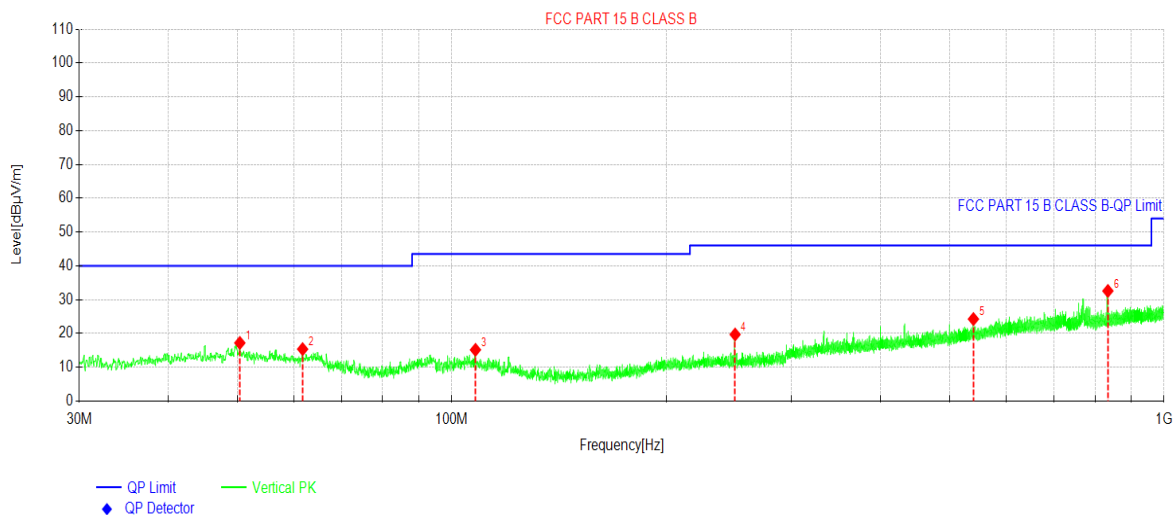
Size Test Limit

Test items	Limit				
Radiated Emission	Frequency (MHz)	Class A Limit (dBµV/m)		Class B Limit (dBµV/m)	
		Quasi-Peak @ 3m	Quasi-Peak @ 10m	Quasi-Peak @ 3m	Quasi-Peak @ 10m
	30 – 88	49.0	39.0	40.0	30.0
	88 – 216	53.5	43.5	43.5	33.5
	216 – 960	56.0	46.0	46.0	36.0
	960 – 1000	60.0	50.0	54.0	44.0
	Note: The more stringent limit applies at transition frequencies.				
	Frequency	Class A Limit (dBµV/m) @ 3m		Class B Limit (dBµV/m) @ 3m	
		Average	Peake	Average	Peake
	Above 1 GHz	60.0	80.0	54.0	74.0
	Note: The measurement bandwidth shall be 1 MHz or greater.				

5.2 Radiated Emission

Below 1GHz:

Product Name:	RFM380F32-433S2	Product Model:	RFM380F32
Test By:	Mike	Test mode:	Receiver mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



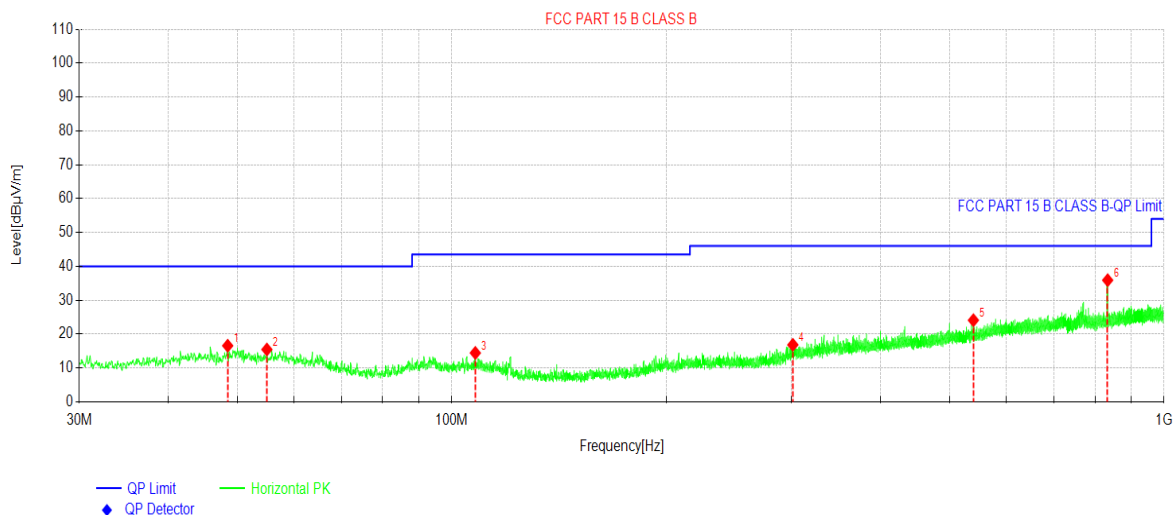
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	50.4185	30.01	17.20	-12.81	40.00	22.80	PK	Vertical
2	61.7675	29.89	15.38	-14.51	40.00	24.62	PK	Vertical
3	107.988	29.90	15.17	-14.73	43.50	28.33	PK	Vertical
4	249.996	33.70	19.70	-14.00	46.00	26.30	PK	Vertical
5	540.026	32.40	24.27	-8.13	46.00	21.73	PK	Vertical
6	834.130	36.22	32.59	-3.63	46.00	13.41	PK	Vertical

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	RFM380F32-433S2	Product Model:	RFM380F32
Test By:	Mike	Test mode:	Receiver mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



Suspected Data List

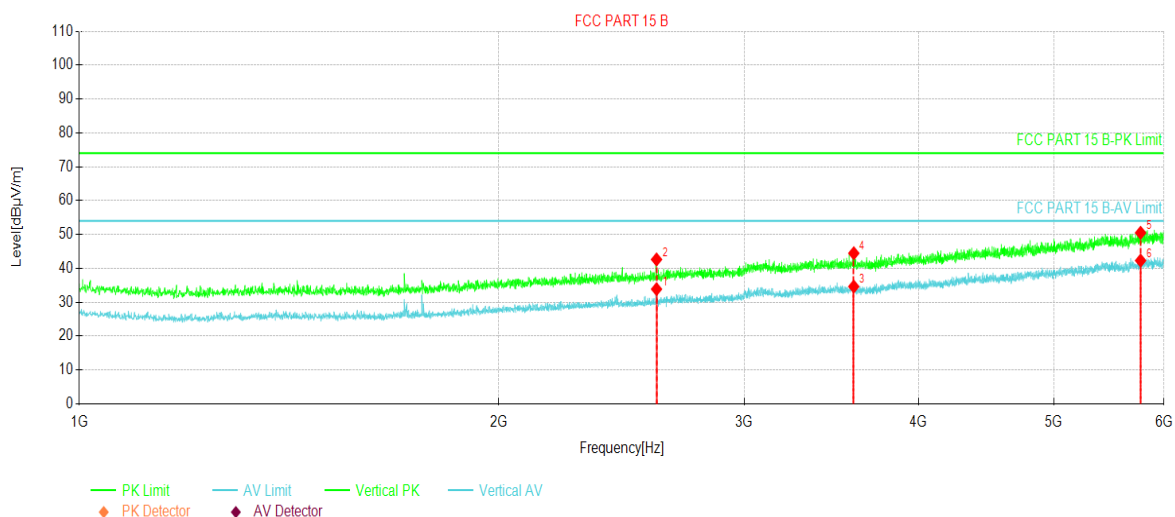
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	48.4785	29.35	16.57	-12.78	40.00	23.43	PK	Horizontal
2	55.0260	28.66	15.46	-13.20	40.00	24.54	PK	Horizontal
3	107.939	29.17	14.45	-14.72	43.50	29.05	PK	Horizontal
4	301.260	29.87	16.84	-13.03	46.00	29.16	PK	Horizontal
5	540.026	32.23	24.10	-8.13	46.00	21.90	PK	Horizontal
6	833.548	39.56	35.92	-3.64	46.00	10.08	PK	Horizontal

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Above 1GHz:

Product Name:	RFM380F32-433S2	Product Model:	RFM380F32
Test By:	Mike	Test mode:	Receiver mode
Test Frequency:	1000 MHz ~ 6000 MHz	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



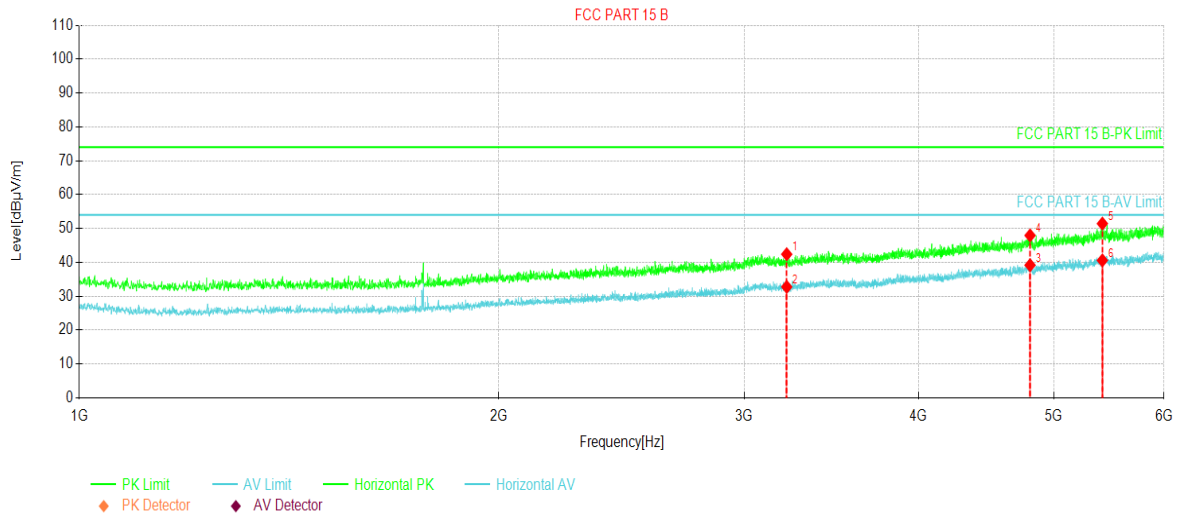
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	2595.00	52.08	-18.21	33.87	54.00	20.13	AV	Vertical
2	2595.00	60.83	-18.21	42.62	74.00	31.38	PK	Vertical
3	3594.37	49.30	-14.67	34.63	54.00	19.37	AV	Vertical
4	3594.37	59.13	-14.67	44.46	74.00	29.54	PK	Vertical
5	5772.50	55.37	-4.87	50.50	74.00	23.50	PK	Vertical
6	5772.50	47.18	-4.87	42.31	54.00	11.69	AV	Vertical

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	RFM380F32-433S2	Product Model:	RFM380F32
Test By:	Mike	Test mode:	Receiver mode
Test Frequency:	1000 MHz ~ 6000 MHz	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	3217.50	58.07	-15.67	42.40	74.00	31.60	PK	Horizontal
2	3217.50	48.43	-15.67	32.76	54.00	21.24	AV	Horizontal
3	4809.37	47.84	-8.67	39.17	54.00	14.83	AV	Horizontal
4	4809.37	56.62	-8.67	47.95	74.00	26.05	PK	Horizontal
5	5419.37	57.43	-5.98	51.45	74.00	22.55	PK	Horizontal
6	5419.37	46.57	-5.98	40.59	54.00	13.41	AV	Horizontal

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

-----End of report-----