



SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

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TEST REPORT

Application No.: ZEWM2306000892RG
Applicant: Spark Technology iQsim
Address of Applicant: 731 Rt 18 East Brunswick NJ USA 08816
Manufacturer: Shenzhen Huasifei Technology Co., Ltd
Address of Manufacturer: 1203, No.1 Langrong Road, Xinshi Community, Dalang Street, Longhua District, Shenzhen City, Guangdong Province, China
EUT Description: WIFI Router
Model No.: MR40
Trade Mark: HUASIFEI
FCC ID: 2BCEZ-MR40
Standards: FCC 47 CFR Part 2.1091
FCC KDB 447498 D01 v06
Date of Receipt: 2023/07/03
Date of Issue: 2023/08/02

Test Result:	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Ervin Li
Regulatory Manager



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1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023/08/02		Original

Prepared By	 (Jack Huang) / Test Engineer
Checked By	 (Daniel Wang) / Reviewer



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2 General Information

2.1 Client Information

Applicant:	Spark Technology iQsim
Address of Applicant:	731 Rt 18 East Brunswick NJ USA 08816
Manufacturer:	Shenzhen Huasifei Technology Co., Ltd
Address of Manufacturer:	1203, No.1 Langrong Road, Xinshi Community, Dalang Street, Longhua District, Shenzhen City, Guangdong Province, China

2.2 Test Facility

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

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

• **FCC –Designation Number: CN1336**

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch has been recognized as an accredited testing laboratory.

Designation Number: CN1336.

Test Firm Registration Number: 787754



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2.3 General Description of EUT

EUT Description:	WIFI Router			
Model No.:	MR40			
Trade Mark:	HUASIFEI			
Hardware Version:	WS1208 V2.0			
Software Version:	openwrt			
Power Supply:	12.0V-3.0A (DC Supply)			
Antenna Type:	<input checked="" type="checkbox"/> External, <input type="checkbox"/> Integrated			
EC25-AFZ; EC25-AFX MINIPICIE Antenna Gain:	WCDMA Band II:	4.00dBi	WCDMA Band IV:	4.00dBi
	WCDMA Band V:	4.00dBi		
	LTE Band 2:	4.00dBi	LTE Band 4:	4.00dBi
	LTE Band 5:	4.00dBi	LTE Band 12:	4.00dBi
	LTE Band 13:	4.00dBi	LTE Band 14:	4.00dBi
	LTE Band 66:	4.00dBi	LTE Band 71:	4.00dBi
RM502Q-AE Antenna Gain:	WCDMA Band II:	0.25dBi	WCDMA Band IV:	1.47dBi
	WCDMA Band V:	2.68dBi		
	LTE Band 2:	0.25dBi	LTE Band 4:	1.47dBi
	LTE Band 5:	2.68dBi	LTE Band 7:	0.55dBi
	LTE Band 12:	-0.20dBi	LTE Band 13:	1.54dBi
	LTE Band 14:	2.42dBi	LTE Band 17:	-0.20dBi
	LTE Band 25:	0.25dBi	LTE Band 26:	2.68dBi
	LTE Band 30:	-3.06dBi	LTE Band 38:	0.78dBi
	LTE Band 41:	0.78dBi	LTE Band 48:	-4.29dBi
	LTE Band 66:	1.47dBi	LTE Band 71:	1.22dBi
	NR Band n2:	0.25dBi	NR Band n5:	2.68dBi
	NR Band n7:	0.55dBi	NR Band n12:	-0.20dBi
	NR Band n25:	0.25dBi	NR Band n41:	0.78dBi
	NR Band n66:	1.47dBi	NR Band n71:	1.22dBi
	NR Band n77:	-4.11dBi		
	CA:			
	CA_2C;CA_5B;CA_7C;CA_38C;CA_41C;CA_66C;			
	ENDC:			
	DC_5A_n2A; DC_12A_n2A; DC_13A_n2A; DC_2A_n5A; DC_30A_n5A; DC_66A_n5A; DC_5A_n7A; DC_12A_n7A; DC_2A_n12A; DC_12A_n25A; DC_2A_n41A; DC_25A_n41A; DC_26A_n41A; DC_66A_n41A;			



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	DC_5A_n66A; DC_12A_n66A; DC_13A_n66A; DC_14A_n66A; DC_71A_n66A; DC_2A_n71A; DC_7A_n71A; DC_66A_n71A;
Feature:	UL 2*2 MIMO: NR Band n41; NR Band n77
HPUE Power Class:	NR Band n41; NR Band n77
MR40 Antenna Gain:	WIFI 2.4G: 2.1dBi(Ant0); 2.1dBi(Ant1)
	5G WIFI(U-NII-III); 6.13dBi(Ant0); 6.13dBi(Ant1);
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.
Remark: As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.	



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3 RF Exposure Evaluation

3.1 RF Exposure Compliance Requirement

3.1.1 Limits

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

F=frequency in MHz
 *=Plane-wave equivalent power density
 RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.



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3.1.2 Test Procedure

Software provided by client enabled the EUT to transmit data at lowest, middle and highest channel individually

3.1.3 EUT RF Exposure Evaluation

Output Power Into Antenna & RF Exposure Evaluation Distance:

This confirmed that the device comply with MPE limit.

Model No.: EC25-AFZ;EC25-AFX MINIPICIE:

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Max Conducted Power (dBm)	EIRP(ERP) (dBm)	EIRP(ERP) Limit (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Gain according to EIRP(ERP) (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	conclusion
WCDMA B2	1852.4	4.00	25.00	29.00	33.00	0.1580	1.0000	8.00	12.01	8.00	Pass
WCDMA B4	1712.4	4.00	25.00	29.00	33.00	0.1580	1.0000	8.00	12.01	8.00	Pass
WCDMA B5	826.4	4.00	25.00	26.85	38.45	0.1580	0.5509	15.60	9.42	9.42	Pass
LTE Band 2	1850.7	4.00	25.00	29.00	33.00	0.1580	1.0000	8.00	12.01	8.00	Pass
LTE Band 4	1710.7	4.00	25.00	29.00	30.00	0.1580	1.0000	5.00	12.01	5.00	Pass
LTE Band 5	824.7	4.00	25.00	26.85	38.45	0.1580	0.5498	15.60	9.41	9.41	Pass
LTE Band 12	699.7	4.00	25.00	26.85	34.77	0.1580	0.4665	11.92	8.70	8.70	Pass
LTE Band 13	779.5	4.00	25.00	26.85	34.77	0.1580	0.5197	11.92	9.16	9.16	Pass
LTE Band 14	790.5	4.00	25.00	26.85	34.77	0.1580	0.5270	11.92	9.23	9.23	Pass
LTE Band 66	1710.7	4.00	25.00	29.00	30.00	0.1580	1.0000	5.00	12.01	5.00	Pass
LTE Band 71	665.5	4.00	25.00	26.85	34.77	0.1580	0.4437	11.92	8.48	8.48	Pass



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Model No.: RM502Q-AE:

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Max Conducted Power (dBm)	EIRP(ERP) (dBm)	EIRP(ERP) Limit (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Gain according to EIRP(ERP) (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	conclusion
WCDMA B2	1852.4	0.25	25.00	25.25	33.00	0.0666	1.0000	8.00	12.01	8.00	Pass
WCDMA B4	1712.4	1.47	25.00	26.47	33.00	0.0883	1.0000	8.00	12.01	8.00	Pass
WCDMA B5	826.4	2.68	25.00	25.53	38.45	0.1166	0.5509	15.60	9.41	9.42	Pass
LTE/CA Band 2	1850.7	0.25	25.00	25.25	33.00	0.0666	1.0000	8.00	12.01	8.00	Pass
LTE Band 4	1710.7	1.47	25.00	26.47	30.00	0.0883	1.0000	5.00	12.01	5.00	Pass
LTE/CA Band 5	824.7	2.68	25.00	25.53	38.45	0.1166	0.5498	15.60	9.41	9.41	Pass
LTE/CA Band 7	2502.5	0.55	25.00	25.55	33.00	0.0714	1.0000	8.00	12.01	8.00	Pass
LTE Band 12	699.7	-0.20	25.00	22.65	34.77	0.0601	0.4665	11.92	8.70	8.70	Pass
LTE Band 13	779.5	1.54	25.00	24.39	34.77	0.0897	0.5197	11.92	9.16	9.16	Pass
LTE Band 14	790.5	2.42	25.00	25.27	34.77	0.1098	0.5270	11.92	9.23	9.23	Pass
LTE Band 17	706.5	-0.20	25.00	22.65	34.77	0.0601	0.4710	11.92	8.74	8.74	Pass
LTE Band 25	1852.5	0.25	25.00	25.25	33.00	0.0666	1.0000	8.00	12.01	8.00	Pass
LTE Band 26 (814-824)	814.7	2.68	25.00	NA	NA	0.1166	0.5431	NA	9.36	9.36	Pass
LTE Band 26 (824-849)	824.7	2.68	25.00	25.53	38.45	0.1166	0.5498	15.60	9.41	9.41	Pass
LTE Band 30	2307.5	-3.06	25.00	21.94	23.98	0.0311	1.0000	-1.02	12.01	-1.02	Pass
LTE/CA Band 38	2572.5	0.78	28.00	28.78	33.00	0.1502	1.0000	5.00	9.01	5.00	Pass
LTE/CA Band 41	2498.5	0.78	28.00	28.78	33.00	0.1502	1.0000	5.00	9.01	5.00	Pass
LTE Band 48	3552.5	-4.29	22.00	17.71	23.00	0.0117	1.0000	1.00	15.01	1.00	Pass
LTE/CA Band 66	1710.7	1.47	25.00	26.47	30.00	0.0883	1.0000	5.00	12.01	5.00	Pass
LTE Band 71	665.5	1.22	25.00	24.07	34.77	0.0833	0.4437	11.92	8.48	8.48	Pass



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Operating Band	Frequency (MHz)	Antenna Gain (dBi)	MIMO Directional gain	Max Conducted Power (dBm)	EIRP(ERP) (dBm)	EIRP(ERP) Limit (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Gain according to EIRP(ERP) (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	conclusion
NR Band n2	1852.5	0.25	N/A	25.00	25.25	33.00	0.0666	1.0000	8.00	12.01	8.00	Pass
NR Band n5	826.5	2.68	N/A	25.00	25.53	38.45	0.1166	0.5510	15.60	9.42	9.42	Pass
NR Band n7	2502.5	0.55	N/A	25.00	25.55	33.00	0.0714	1.0000	8.00	12.01	8.00	Pass
NR Band n12	701.5	-0.20	N/A	25.00	22.65	34.77	0.0601	0.4677	11.92	8.71	8.71	Pass
NR Band n25	1852.5	0.25	N/A	25.00	25.25	33.00	0.0666	1.0000	8.00	12.01	8.00	Pass
NR Band n41	2506.02	0.78	N/A	25.00	25.78	33.00	0.0753	1.0000	8.00	12.01	8.00	Pass
NR Band n41 (HPUE)	2506.02	0.78	N/A	28.00	28.78	33.00	0.1502	1.0000	5.00	9.01	5.00	Pass
NR Band n41 (MIMO)	2506.02	0.78	0.78	28.00	28.78	33.00	0.1502	1.0000	5.00	9.01	5.00	Pass
NR Band n66	1712.5	1.47	N/A	25.00	26.47	30.00	0.0883	1.0000	5.00	12.01	5.00	Pass
NR Band n71	665.5	1.22	N/A	25.00	24.07	34.77	0.0833	0.4437	11.92	8.48	8.48	Pass
NR Band n77 (3450-3550)	3500.01	-4.11	N/A	25.00	20.89	30.00	0.0244	1.0000	5.00	12.01	5.00	Pass
NR Band n77 (3450-3550) (HPUE)	3500.01	-4.11	N/A	27.00	22.89	30.00	0.0387	1.0000	3.00	10.01	3.00	Pass
NR Band n77 (3450-3550) (MIMO)	3500.01	-4.11	-4.11	27.00	22.89	30.00	0.0387	1.0000	3.00	10.01	3.00	Pass
NR Band n77 (3700-3980)	3750.0	-4.11	N/A	25.00	20.89	30.00	0.0244	1.0000	5.00	12.01	5.00	Pass
NR Band n77 (3700-3980) (HPUE)	3750.0	-4.11	N/A	27.00	22.89	30.00	0.0387	1.0000	3.00	10.01	3.00	Pass
NR Band n77 (3700-3980) (MIMO)	3750.0	-4.11	-4.11	27.00	22.89	30.00	0.0387	1.0000	3.00	10.01	3.00	Pass



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Model No.:MR40:

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	MIMO Directional gain	Max Conducted Power (dBm)	EIRP(ERP) (dBm)	EIRP(ERP) Limit (dBm)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Gain according to EIRP(ERP) (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	conclusion
2.4GWIFI	2412.0	2.1	N/A	20.00	22.10	30.00	0.0323	1.0000	N/A	N/A	N/A	Pass
5GWIFI	5745.0	6.13	N/A	20.00	26.13	30.00	0.0816	1.0000	N/A	N/A	N/A	Pass
2.4GWIFI (MIMO)	2412.0	2.1	2.1	20.00	22.10	30.00	0.0323	1.0000	N/A	N/A	N/A	Pass
5GWIFI (MIMO)	5745.0	6.13	6.13	20.00	26.13	30.00	0.0816	1.0000	N/A	N/A	N/A	Pass



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Due to the EUT(**Model No.: RM502Q-AE**) support NR ENDC and CA

Both LTE and NR/LTE band can transmit simultaneously, the formula of the calculated the MPE is:

$$\sum_{i=1}^n \frac{S_{E_i}(\text{duty factor})}{MPE_{E_i}} < 1$$

NOTE The corresponding MEs must be expressed in terms of power density in the above summation
Therefore, the worst-case(CA_5B) situation is $0.212+0.212=0.424$, which is less than "1",
this confirmed that the device comply with MPE limit.



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3.1.4 Exposure calculations for multiple sources

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE in accordance with the provisions of Table(A) and Table(B). To comply with the MPE, the fraction of the MPE in terms of E2, H2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity.

In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

The product also has multiple transmitters The Simultaneous Transmission Possibilities are as below:

Simultaneous Tx Combination	Configuration
1	LTE(EC25-AFZ;EC25-AFX MINIPCIE)+NR(RM502Q-AE)+WIFI2.4G MIMO +WIFI 5G MIMO

No.	Mode	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	Result Ratio	Total Ratio	Limit	Result
1	LTE Band 71	0.1580	0.4437	0.3561	0.6816	1.0000	Pass
	NR Band n5	0.1166	0.5510	0.2116			
	WiFi 2.4G MIMO	0.0323	1.0000	0.0323			
	WiFi 5G MIMO	0.0816	1.0000	0.0816			

Remark: This WWAN Band was recalculated on worst Band.

---End of Report---



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