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

No. 1 Workshop, M-10, Middle section, Science & Technology Park,
Shenzhen, Guangdong, China 518057
Telephone: +86 (0) 755 2601 2053
Fax: +86 (0) 755 2671 0594
Email: ee.shenzhen@sgs.com

RF Exposure Evaluation Report

Application No.:	SZEM1801000701CR
Applicant:	Hytera Communications Corporation Limited
Address of Applicant:	Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, China
Manufacturer:	Hytera Communications Corporation Limited
Address of Manufacturer:	Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, China
Factory:	Hytera Communications Corporation Limited Baolong Branch
Address of Factory:	Plant No.3, Hytera Hi-Tech Park, Baolong Industrial Area, Longgang District, Shenzhen, People's Republic of China
Product Name:	Digital Repeater
Model No.(EUT):	RD982S U(1) 100W, RD985S U(1) 100W, RD986S U(1) 100W, RD988S U(1) 100W, RD98XS U(1) 100W("X" Stand for 2, 5, 6, 8) ♣
♣	Please refer to section 4.1 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark:	Hytera
FCC ID:	YAMRD98XSU1H
Standards:	47 CFR Part 1.1307 (2016) 47 CFR Part 1.1310 (2016)
Date of Receipt:	2018-01-24
Date of Test:	2018-02-01 to 2018-02-02
Date of Issue:	2018-03-23
Test Result :	**PASS***

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Keny Xu
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2018-03-23		Original

Authorized for issue by:				
				
		Edison Li /Project Engineer		
				
		Eric Fu /Reviewer		

3 Contents

4 General Information

4.1 General Description of EUT

Product Name:	Digital Repeater
Model No.:	RD982S U(1) 100W
Trade Mark:	Hytera
Sample Type:	Fixed production
Antenna Gain:	15dBi
Power Supply:	DC 28V
Cable:	DC cable: 2900cm unshielded Control cable: 170cm unshielded Microphone: 100cm unshielded
Type of Modulation:	FM for Analog; 4FSK for Digital
Frequency Band:	400MHz to 470MHz.

Remark:

Model No.: RD982S U(1) 100W, RD985S U(1) 100W, RD986S U(1) 100W, RD988S U(1) 100W, RD98XS U(1) 100W(“X” Stand for 2, 5, 6, 8)

Only the model RD982S U(1) 100W was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference is the model number and the sales areas for marketing purpose.

4.2 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057
Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594
No tests were sub-contracted.

4.3 Test Facility

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

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory 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.

• **FCC –Designation Number: CN1178**

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

Designation Number: CN1178. Test Firm Registration Number: 406779.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3..

4.4 Deviation from Standards

None.

4.5 Abnormalities from Standard Conditions

None.

4.6 Other Information Requested by the Customer

None.

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4* Pi * R^2)$

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

The limit of MPE is f/300 mW/cm^2 . 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.

5.1.2 Test Procedure

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

4.1.3 EUT RF Exposure Evaluation

1) Test Results

The best case gain of the antenna is 15dBi. 15dB logarithmic terms convert to numeric result is nearly 31.62.

FM	**400~470MHz**						
Frequency (MHz)	Maximun Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Max Tune-up tolerance power (dBm)	Max Tune-up tolerance power (mW)	Power density (mW/cm^2)	Minimum Distance to Human body (cm)
400.025	15	31.62	49.65	50	100000.00	1.33	**434.40**
450.025	15	31.62	49.99	50	100000.00	1.50	409.56
459.125	15	31.62	49.66	50	100000.00	1.53	405.48
469.975	15	31.62	49.52	50	100000.00	1.57	400.77
400.025	15	31.62	36.95	37	5011.87	1.33	97.25
450.025	15	31.62	36.98	37	5011.87	1.50	91.69
459.125	15	31.62	36.95	37	5011.87	1.53	90.78
469.975	15	31.62	36.97	37	5011.87	1.57	89.72
4FSK	**400~470MHz**						
Frequency (MHz)	Maximun Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Max Tune-up tolerance power (dBm)	Max Tune-up tolerance power (mW)	Power density (mW/cm^2)	Minimum Distance to Human body (cm)
400.025	15	31.62	49.58	50	100000.00	1.33	434.40
450.025	15	31.62	49.54	50	100000.00	1.50	409.56
459.125	15	31.62	49.53	50	100000.00	1.53	405.48
469.975	15	31.62	49.45	50	100000.00	1.57	400.77
400.025	15	31.62	36.97	37	5011.87	1.33	97.25
450.025	15	31.62	36.99	37	5011.87	1.50	91.69
459.125	15	31.62	36.95	37	5011.87	1.53	90.78
469.975	15	31.62	36.93	37	5011.87	1.57	89.72

50.0 dBm is the declared maximum rated power, 37dBm is the declared low rated power by manufacturer.
To satisfy RF exposure requirements, a separation distance of 434.4 cm or more should be maintained between this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended.

End of Report