



# MPE TEST REPORT

## FCC Per 47 CFR 2.1091(b)

**Report Reference No** ..... **WE10100007**  
**FCC ID** ..... **YAMRD98XVHF**  
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 Date of issue.....: Oct 16, 2010  
**Testing Laboratory Name** ..... **Shenzhen Huatongwei International Inspection Co., Ltd**  
 Address.....: Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China

**Applicant's name**.....: **Hytera Communications Corporation Ltd.**  
 Address.....: HYT Tower,Hi-Tech Industrial Park North,Nanshan District,Shenzhen China.518057

**Test specification:**  
 Standard .....: **FCC Per 47 CFR 2.1091(b)**  
**OET Bulletin 65 Supplement C[June 2001]**  
 TRF Originator.....: Shenzhen Huatongwei International Inspection CO., Ltd  
 Master TRF.....: Dated 2006-06

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**Test item description** ..... : Digital Base Station Repeater  
 Trade Mark .....: **Hytera**  
 Manufacturer .....: **Hytera Communications Corporation Ltd.**  
 Model/Type reference.....: RD982 VHF/ RD985 VHF/ RD986 VHF/ RD988 VHF  
 Listed Models .....: /  
 Channel Separation.....: 12.5KHz&25KHz  
 Modulation .....: FM&4FSK  
 Ratings.....: DC 13.60 V  
 Frequency Range .....: From 136 MHz to 174 MHz  
 Rated Power .....: 5Watt(36.99dBm)-50Watt(46.99dBm) Continuous  
 Result.....: **Positive**

**M P E T E S T R E P O R T**

<b>FCC ID :</b>	<b>YAMRD98XVHF</b>	Oct 16, 2010
		Date of issue

Equipment under Test : Digital Base Station Repeater

Model /Type : RD982 VHF/ RD985 VHF/ RD986 VHF/ RD988 VHF

Listed Models : /

**Applicant** : **Hytera Communications Corporation Ltd.**

Address : HYT Tower,Hi-Tech Industrial Park North,Nanshan District,Shenzhen China.518057

**Manufacturer** : **Hytera Communications Corporation Ltd.**

Address : HYT Tower,Hi-Tech Industrial Park North,Nanshan District,Shenzhen China.518057

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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## 1. SUMMARY

### 1.1. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- - supplied by the lab

●	Power Cable	Length (m) :	3
		Shield :	Unshield
		Detachable :	Detachable
○	Multimeter	Manufacturer :	/
		Model No. :	/

### 1.2. Product Description

The Hytera Communications Corporation Ltd.'s Model: RD982 VHF/ RD985 VHF/ RD986 VHF/ RD988 VHF or the "EUT" as referred to in this report; more general information as follows:

Name of EUT	Digital Base Station Repeater	
Model Number	RD982 VHF/ RD985 VHF/ RD986 VHF/ RD988 VHF	
FCC ID	YAMRD98XVHF	
Rated Output Power	5Watt(36.99dBm)-50Watt(46.99dBm) Continuous	
Operation Type	The repeater cannot operate on multi-channels	
Support data rate	9.6kbps	
Modulation Type	FM for Analog Voice	
	4FSK for Digital Voice/Digital Data	
Emission Designator	Analog	16K0F3E for 25KHz Channel Separation
		11K0F3E for 12.5KHz Channel Separation
	Digital	7K60FXD for Digital Data only
		7K60FXW for Digital Data & Digital Voice
Channel Separation	Analog Voice	12.5KHz&25KHz
	Digital Voice/Data	12.5KHz
Antenna Type	External	
Frequency Range	From 400MHz to 470MHz	
Maximum Transmitter Power	Analog	61.94 W for 25 KHz Channel Separation
		61.94 W for 12.5 KHz Channel Separation
	Digital	61.38 W for 12.5 KHz Channel Separation

**Note:** The product has the same digital working characters when operating in both two digitized voice/data mode (7K60FXD and 7K60FXW). So only one set of test results for digital modulation modes are provided in this test report.

### 1.3. Equipment under Test

#### Power supply system utilised

Power supply voltage	:	<input type="radio"/> 120V / 60 Hz	<input type="radio"/> 115V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input checked="" type="radio"/> Other (specified in blank below)	

DC 13.60 V

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#### Test frequency list

Modulation Type	Test Channel	Test Frequency
Analog/FM	Low Channel	136.125 MHz
	Middle Channel	155.125 MHz
	High Channel	173.975 MHz
Digital/4FSK	Low Channel	136.125 MHz
	Middle Channel	155.125 MHz
	High Channel	173.975 MHz

### 1.4. Note

- The EUT is a V frequency band (136-174MHz) Digital Base Station Repeater, The functions of the EUT listed as below:

	Test Standards	Reference Report
Radio	FCC Part 90	WE10100006
MPE	FCC Oet 65	WE10100007

## **2. TEST ENVIRONMENT**

### **2.1. Address of the test laboratory**

Shenzhen Huatongwei International Inspection Co., Ltd  
Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China  
Phone: 86-755-26715686 Fax: 86-755-26748089

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2009) and CISPR Publication 22.

### **2.2. Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

### **2.3. Statement of the measurement uncertainty**

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.24 dB	(1)
Radiated Emission	1~18GHz	5.16 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.39 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## **3. Method of measurement**

### **3.1. Applicable Standard**

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

OET Bulletin 65 Supplement C [June 2001]: Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields

### 3.2. Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f)*	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

### 3.3. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S=PG/4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

From the peak EUT RF output power, the minimum mobile separation distance, R=3.5 m, as well as the maximum gain of the used antenna is 6.5 dBi, the RF power density can be obtained.

### TEST RESULTS

#### For FM Modulation @ 25 KHz Channel Separation @ Rated High Power

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Nemeric)	Power Density Limit (mW/cm <sup>2</sup> )	Power Density At 350 cm (mW/cm <sup>2</sup> )	Test Results
136.1250	350.00	47.82	60534.10	4.4668	1.000	0.1757	Compliance
155.1250	350.00	47.82	60534.10	4.4668	1.000	0.1757	Compliance
174.1250	350.00	47.92	61944.10	4.4668	1.000	0.1797	Compliance

#### For FM Modulation @ 12.5 KHz Channel Separation @ Rated High Power

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Nemeric)	Power Density Limit (mW/cm <sup>2</sup> )	Power Density At 350 cm (mW/cm <sup>2</sup> )	Test Results
136.1250	350.00	47.82	60.534.10	4.4668	1.000	0.1757	Compliance
155.1250	350.00	47.81	60394.90	4.4668	1.000	0.1752	Compliance
174.1250	350.00	47.92	61944.10	4.4668	1.000	0.1797	Compliance

**For 4FSK Modulation @ 12.5 KHz Channel Separation @ Rated High Power**

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Nemeric)	Power Density Limit (mW/cm <sup>2</sup> )	Power Density At 350 cm (mW/cm <sup>2</sup> )	Test Results
136.1250	350.00	47.79	60117.40	4.4668	1.000	0.1744	Compliance
155.1250	350.00	47.79	60117.40	4.4668	1.000	0.1744	Compliance
174.1250	350.00	47.88	61376.20	4.4668	1.000	0.1781	Compliance

**For FM Modulation @ 25 KHz Channel Separation @ Rated Low Power**

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Nemeric)	Power Density Limit (mW/cm <sup>2</sup> )	Power Density At 350 cm (mW/cm <sup>2</sup> )	Test Results
136.1250	350.00	37.82	6053.40	4.4668	1.000	0.0176	Compliance
155.1250	350.00	37.83	6067.40	4.4668	1.000	0.0176	Compliance
174.1250	350.00	37.90	6116.00	4.4668	1.000	0.0179	Compliance

**For FM Modulation @ 12.5 KHz Channel Separation @ Rated Low Power**

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Nemeric)	Power Density Limit (mW/cm <sup>2</sup> )	Power Density At 350 cm (mW/cm <sup>2</sup> )	Test Results
136.1250	350.00	37.81	6039.50	4.4668	1.000	0.0175	Compliance
155.1250	350.00	37.82	6053.40	4.4668	1.000	0.0176	Compliance
174.1250	350.00	37.80	6025.60	4.4668	1.000	0.0175	Compliance

**For 4FSK Modulation @ 12.5 KHz Channel Separation @ Rated Low Power**

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Nemeric)	Power Density Limit (mW/cm <sup>2</sup> )	Power Density At 350 cm (mW/cm <sup>2</sup> )	Test Results
136.1250	350.00	37.84	6081.40	4.4668	1.000	0.0176	Compliance
155.1250	350.00	37.85	6095.40	4.4668	1.000	0.0177	Compliance
174.1250	350.00	37.91	6180.20	4.4668	1.000	0.0179	Compliance

**4. Conclusion**

The measurement results comply with the FCC Limit per 47 CFR 2.1091 (b) for the controlled RF Exposure.

.....**End of Report**.....