



# TEST REPORT

**Report Reference No. :** TRE1405009002 **R/C.....:** 40766  
**Applicant's name.....:** Hytera Communications Co.,Ltd  
**Address.....:** HYT Tower, Hi-Tech Industrial Park North, Nanshan District, Shenzhen China  
**Manufacturer.....:** Hytera Communications Co.,Ltd  
**Address.....:** HYT Tower, Hi-Tech Industrial Park North, Nanshan District, Shenzhen China  
**Test item description .....** Digital Mobile Radio  
**Trade Mark .....** Hytera  
**Model/Type reference.....:** MD650 VHF  
**Listed Model(S) .....** MD652 VHF, MD655 VHF, MD656 VHF, MD658 VHF  
**Standard .....** FCC Per 47 CFR 2.1091(b)  
KDB447498 v05r01  
**Date of receipt of test sample.....:** May 10, 2014  
**Date of testing.....:** May 10, 2014- Jun 05, 2014  
**Date of issue.....:** Jun 05, 2014  
**Result.....:** PASS

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# 1. SUMMARY

## 1.1. Client Information

Applicant:	Hytera Communications Co.,Ltd
Address:	HYT Tower,Hi-Tech Industrial Park North, Nanshan District, Shenzhen China
Manufacturer:	Hytera Communications Co.,Ltd
Address:	HYT Tower,Hi-Tech Industrial Park North, Nanshan District, Shenzhen China

## 1.2. Product Description

The **Hytera Communications Corporation Ltd.**'s Model: MD650 VHF or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Digital Mobile Radio	
Model Number	MD650 VHF	
FCC ID	YAMMD65XVHF	
Support data rate	9.6kbps	
Modulation Type	FM for Analog Voice	
	4FSK for Digital Voice/Digital Data	
	4FSK for Digital Data	
	Analog	11K0F3E for 12.5KHz Channel Separation
	Digital	7K60FXD for Digital Data only 7K60FXW for Digital Data & Digital Voice
Channel Separation	Analog Voice	12.5KHz
	Digital Voice/Data	12.5KHz
	Digital Data	12.5KHz
Antenna Type	External	
Frequency Range	From 136 MHz to 174 MHz	
Maximum Transmitter Power	Analog	26.92W for 12.5 KHz Channel Separation
	Digital	28.97W 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.

### Test frequency list

Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)
Analog/FM	12.5KHz	Ch1	136.5
		Ch2	155.0
		Ch3	173.5
Digital/4FSK	12.5KHz	Ch1	136.5
		Ch2	155.0
		Ch3	173.5

Note:

1. Analog/FM was set at Area 1 and Digital/4FSK was set to Area 2 for test sample.
2. In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above listed frequency for testing.

## 1.3. EUT operation mode

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal

operating mode. The TX frequency was fixed which was for the purpose of the measurements.

EUT operation mode no.	Description of operation mode	Additional information
Op 1	FM+BW12.5KHz+TX	The equipment is set with FM modulation and 12.5KHz bandwidth at maximum rated power for transmitter, powered by DC 13.60V
Op 2	FM+BW12.5KHz+TX	The equipment is set with FM modulation and 12.5KHz bandwidth at minimum rated power for transmitter, powered by DC 13.60V
Op 3	4FSK+BW12.5KHz+TX	The equipment is set with 4FSK modulation and 12.5KHz bandwidth at maximum rated power for transmitter, powered by DC 13.60V
Op 4	4FSK+BW12.5KHz+TX	The equipment is set with 4FSK modulation and 12.5KHz bandwidth at minimum rated power for transmitter, powered by DC 13.60V
Op 5	FM+BW12.5KHz+RX	The equipment is set with FM modulation and 12.5KHz bandwidth at receiver or standby, powered by DC 13.60V
Op 6	4FSK+BW12.5KHz+RX	The equipment is set with 4FSK modulation and 12.5KHz bandwidth receiver or standby, powered by DC 13.60V

#### 1.4. Note

- The EUT is a V frequency band (136-174MHz) Digital Mobile Radio with GPS function, The functions of the EUT listed as below:

	Test Standards	Reference Report
Radio	FCC Part 90	TRE1311014701
MPE	FCC Part 2.1093	TRE1311014702
MPE	FCC Part 2.1093	TRE1311014703

## **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:	<u>15-35 ° C</u>
Humidity:	<u>30-60 %</u>
Atmospheric pressure:	<u>950-1050mbar</u>

### **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 TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " 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:

<b>Test Items</b>	<b>Measurement Uncertainty</b>	<b>Notes</b>
Transmitter power conducted	0.57 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

## **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.

KDB447498 v05r01:Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies

### 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 <sup>2</sup> )*	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 <sup>2</sup> )*	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

As declared by the Applicant, the EUT transmits with the maximum source-based Duty Cycle of 100%-see the User manual, and the EUT is a wireless device used in a mobile application, at least 108 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum mobile separation distance,  $r=108\text{cm}$ , as well as the gain of the used antenna is 5.50dBi, the RF power density can be obtained.

### TEST RESULTS

#### For Op 1

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Numeric)	Power Density At 108 cm (mW/cm <sup>2</sup> )	Power Density Limit (mW/cm <sup>2</sup> )	Test Results
136.5	108.00	43.76	23768.40	3.5481	0.5757	1.00	PASS
155.0	108.00	44.13	25882.13	3.5481	0.6268	1.00	PASS
173.5	108.00	44.30	26915.35	3.5481	0.6519	1.00	PASS

**For Op 2**

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Numeric)	Power Density At 108 cm (mW/cm <sup>2</sup> )	Power Density Limit (mW/cm <sup>2</sup> )	Test Results
136.5	108.00	30.55	1135.01	3.5481	0.0275	1.00	PASS
155.0	108.00	30.31	1073.99	3.5481	0.0260	1.00	PASS
173.5	108.00	30.46	1111.73	3.5481	0.0269	1.00	PASS

**For Op 3**

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Numeric)	Power Density At 108 cm (mW/cm <sup>2</sup> )	Power Density Limit (mW/cm <sup>2</sup> )	Test Results
136.5	108.00	43.76	23768.40	3.5481	0.5757	1.00	PASS
155.0	108.00	44.62	28973.44	3.5481	0.7017	1.00	PASS
173.5	108.00	44.46	27925.44	3.5481	0.6763	1.00	PASS

**For Op 4**

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Numeric)	Power Density At 108 cm (mW/cm <sup>2</sup> )	Power Density Limit (mW/cm <sup>2</sup> )	Test Results
136.5	108.00	30.56	1137.63	3.5481	0.0276	1.00	PASS
155.0	108.00	30.36	1086.43	3.5481	0.0263	1.00	PASS
173.5	108.00	30.14	1032.76	3.5481	0.0250	1.00	PASS

According to the tune up procedure, the maximum rated power is 44.8dBm, so the power density is below:

Minimum Separation Distance (cm)	Output Power (dBm)	Output Power (mW)	Antenna Gain (Numeric)	Power Density At 108 cm (mW/cm <sup>2</sup> )	Power Density Limit (mW/cm <sup>2</sup> )	Test Results
108.00	44.80	30199.52	3.5481	0.731	1.00	PASS

**4. Conclusion**

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

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