FCC PART 22H, PART 24E

MEASUREMENT AND TEST REPORT

For

Xiamen Yeastar Information Technology Co., Ltd.

4th Floor,NO 29 Wanghai Road, 2nd Software Park,Xiamen,China

FCC ID: Z7C-TG800

Report Type:	Product Type:
Original Report	Gateway

Test Engineer:	Dean Liu
Report Number:	RXM150116051-00B
Report Date:	2015-01-27
Reviewed By:	Sula Huang RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Xiamen Yeastar Information Technology Co., Ltd.*'s product, model number: *NeoGate TG800 (FCC ID: Z7C-TG800) (*or the "EUT") in this report was a *Gateway,* which was measured approximately: 34 cm (L) x21.8 cm (W) x4.3 cm (H). rated input voltage: AC 120V/60Hz.

* All measurement and test data in this report was gathered from production sample serial number: 150116051(Assigned by BACL Dongguan). The EUT was received on 2015-01-19.

Objective

This report is prepared on behalf of *Xiamen Yeastar Information Technology Co., Ltd.* in accordance with Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communications Commission's rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, spurious radiated emission, frequency stability and band edge.

Related Submittal(s)/Grant(s)

FCC Part 15B JBP submissions with FCC ID: Z7C-TG800

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H – Public Mobile Services
Part 24 Subpart E – Personal Communication Services

Applicable Standards: TIA/EIA 603-D-2010, ANSI C63.4-2003.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp.(Dongguan).

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603-D-2010.

The test items were performed with the EUT operating at testing mode.

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

No exercise software was used in testing.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universal Radio Communication Tester	CMU200	109038

Configuration of Test Setup
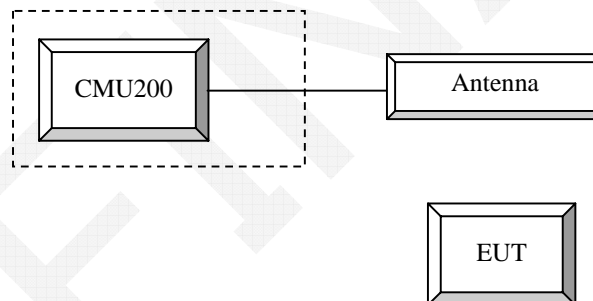
Block Diagram of Test Setup

CMU200

AC Mains

Antenna

EUT

Non-Conductive Table
150 cm above Ground Plane

1.0 Meter

1.5 Meter
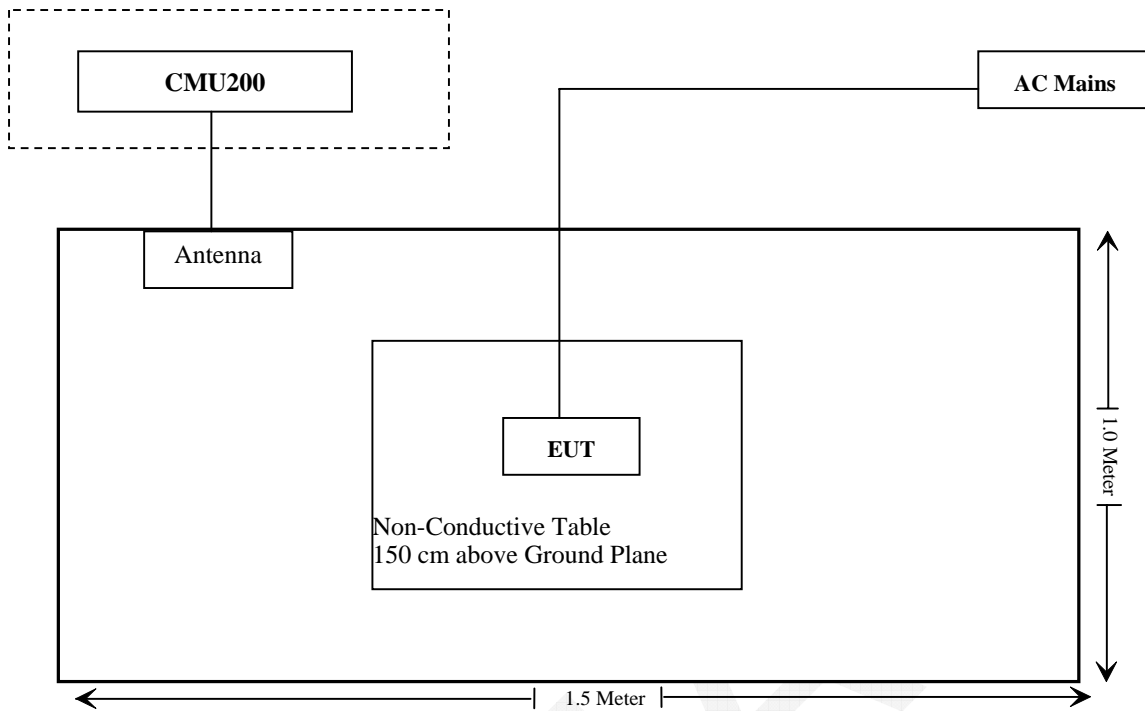
SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §2.1091	Maximum Permissible RF Exposure (MPE)	Compliance
§2.1046; § 22.913 (a); § 24.232 (c)	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Compliance*
§ 2.1049; § 22.905 § 22.917; § 24.238	Occupied Bandwidth	Compliance*
§ 2.1051, § 22.917 (a); § 24.238 (a)	Spurious Emissions at Antenna Terminal	Compliance*
§ 2.1053 § 22.917 (a); § 24.238 (a)	Field Strength of Spurious Radiation	Compliance
§ 22.917 (a); § 24.238 (a)	Out of band emission, Band Edge	Compliance*
§ 2.1055 § 22.355; § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance*

Note:
    Compliance*: the EUT has used 4 same certified modules (FCC ID: UDV-201314, certified on 2014-01-23), the test please refer to the module report.

FCC §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, 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.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	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;

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

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

The device contains 8 same RF modules, the rated output power and antenna gain in the below table:

Frequency Bands	Antenna Gain		Max. Conducted Output Power		P*G
	(dBi)	(numeric)	(dBm)	(mW)	(mW)
GSM 850	2.50	1.78	33.30	2137.96	3801.89
PCS 1900	3.00	2.00	28.70	741.31	1479.11

Note: the Max. Conducted output power was the total power contained Max. tune-up tolerance.

Power Density limit for GSM 850 is:
$$824.2/1500= 0.55 \text{ mW/cm2}$$

Power Density limit for PCS 1900 is:
$$1.0 \text{ mW/cm2}$$

The 4 modules can transmit simultaneously,

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

The worst mode is all of the 8 module working at GSM850 band,

$\Rightarrow P_1 * G_1/4\pi R^2 + P_2 * G_2/4\pi R^2 + P_3 * G_3/4\pi R^2 + P_4 * G_4/4\pi R^2 + P_5 * G_5/4\pi R^2 + P_6 * G_6/4\pi R^2 + P_7 * G_7/4\pi R^2 + P_8 * G_8/4\pi R^2 < 0.55$

$\Rightarrow 8*(3801.89)/4\pi R^2 < 0.55$

$\Rightarrow R^2 > 8*(3801.89)/(0.55*4\pi)$

$\Rightarrow R > 66.35 \text{ cm}$

Result: Result: The device meets MPE requirement for Devices Used by the General Public (Uncontrolled Environment) at the distance more than 66.35 cm.

FCC § 2.1046, § 22.913 (a) & § 24.232 (c) - RF OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications..

Test Procedure

GSM

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection   Press Signal Off to turn off the signal and change settings
Network Support > GSM + only
MS Signal
          > 33 dBm for GSM 850
          > 30 dBm for GSM 1900
BS Signal   Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset >   + 0 Hz
Mode >   BCCH and TCH
BCCH Level >   -85 dBm (May need to adjust if link is not stabe)
BCCH Channel >   choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]
Channel Type >   Off
P0 >   4 dB
TCH >   choose desired test channel
Hopping >   Off
AF/RF   Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection   Press Signal on to turn on the signal and change settings

GPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection   Press Signal Off to turn off the signal and change settings
Network Support > GSM + GPRS or GSM + EGSM
Main Service > Packet Data
Service selection > Test Mode A – Auto Slot Config. off
MS Signal   Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting
          > Slot configuration   > Uplink/Gamma
          > 33 dBm for GPRS 850
          > 30 dBm for GPRS 1900
BS Signal   Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset >   + 0 Hz
Mode >   BCCH and TCH
BCCH Level >   -85 dBm (May need to adjust if link is not stabe)
BCCH Channel >   choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type >   Off
P0 >   4 dB
Slot Config >   Unchanged (if already set under MS signal)
TCH >   choose desired test channel
Hopping >   Off
Main Timeslot >   3
Network   Coding Scheme >   CS4 (GPRS)
                        Bit Stream >   2E9-1 PSR Bit Stream
AF/RF   Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection   Press Signal on to turn on the signal and change settings

UMTS Rel 99

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	βc	Not Applicable
	βd	Not Applicable
	βec	Not Applicable
	βc/βd	8/15
	βhs	Not Applicable
	βed	Not Applicable

UMTS Rel 6 HSDPA

	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	HSUPA Test	Not Applicable			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βec	-	-	-	-
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	βed	Not Applicable			
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs = βhs/βc	30/15			

UMTS Rel 6 HSPA (HSDPA & HSUPA)

	Mode	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/βd	11/15	6/15	15/9	2/15	-
	βhs	22/15	12/15	30/15	4/15	5/15
	βed	1309/225	94/75	47/15 47/15	56/75	47/15
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	12
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	67
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

Radiated method:

ANSI/TIA 603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-19
Giga	Signal Generator	1026	320408	2014-05-09	2015-05-09
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2012-09-06	2015-09-06

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	387 %
ATM Pressure:	101.3 kPa

The testing was performed by Dean Liu on 2015-01-24.

ERP & EIRP

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM 850								
848.800	H	102.90	28.1	0.0	1	27.1	38.45	11.35
848.800	V	103.86	32.2	0.0	1	31.2	38.45	7.25
PCS 1900								
1909.800	H	84.67	13.3	11.8	1.4	23.7	33.0	9.3
1909.800	V	90.37	19.3	11.8	1.4	29.7	33.0	3.3

Note: Please refer to the certified module (FCC ID: UDV-201314) report for the antenna port output power.

FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, §22.917 and § 24.238.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = $43 + 10 \log_{10}$ (power out in Watts)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-19
Giga	Signal Generator	1026	320408	2014-05-09	2015-05-09
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2012-09-06	2015-09-06

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	20.4 °C
Relative Humidity:	61 %
ATM Pressure:	101.3 kPa

The testing was performed by Dean Liu on 2015-01-24.

EUT Operation Mode: Transmitting

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM850, Test Frequency:836.600MHz								
1673.200	H	53.59	-47.5	10.6	1.5	-38.4	-13.0	25.4
1673.200	V	59.88	-41.5	10.6	1.5	-32.4	-13.0	19.4
2509.800	H	50.14	-47.9	13.1	2.8	-37.6	-13.0	24.6
2509.800	V	55.68	-41.4	13.1	2.8	-31.1	-13.0	18.1
375.000	H	32.53	-65.9	0.0	0.6	-66.5	-13.0	53.5
375.000	V	34.68	-61.1	0.0	0.6	-61.7	-13.0	48.7
PCS 1900, Test Frequency:1880.000MHz								
3760.000	H	32.78	-61.5	13.8	2.9	-50.6	-13.0	37.6
3760.000	V	33.24	-59.8	13.8	2.9	-48.9	-13.0	35.9
415.000	H	33.62	-60.7	0.0	0.6	-61.3	-13.0	48.3
415.000	V	35.87	-56	0.0	0.6	-56.6	-13.0	43.6

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = SG Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

***** END OF REPORT *****