## PCTEST ENGINEERING LABORATORY, INC.



7185 Oakland Mills Road, Columbia, MD 21046 USA Tel. 410.290.6652 / Fax 410.290.6654 http://www.pctestlab.com



## MEASUREMENT REPORT FCC Part 22

Applicant Name: Tecore Networks 7030 Hi Tech Drive Hanover, MD 21076 USA **Date of Testing:** 11/19 - 11/21/2012 **Test Site/Location:** 

PCTEST Lab., Columbia, MD, USA

Test Report Serial No.: 0Y1211211700.QLJ

FCC ID: QLJ900-100523-210

APPLICANT: TECORE NETWORKS

Application Type: Certification

Model(s): MilSec-RDS UMTS

EUT Type: Amplifier

FCC Classification: Amplifier (AMP)
FCC Rule Part(s): \$2; \$22(H)

Test Procedure(s): ANSI/TIA-603-C-2004, KDB 971168

**Test Device Serial No.:** identical prototype [S/N: N/A]

			ERP/	EIRP
Mode	Tx Frequency	Emission	Max.	Max.
iviode	(MHz)	Designator	Power	Power
			(W)	(dBm)
WCDMA850	871.4 - 891.6	4M18F9W	23.878	43.78

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.







FCC ID: QLJ900-100523-210	PETEST	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 1 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	rage 1 01 20	

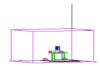


# TABLE OF CONTENTS

FCC	PART 2	22 MEASUREMENT REPORT	3
1.0	INTE	RODUCTION	4
	1.1	SCOPE	4
	1.2	TESTING FACILITY	4
2.0	PRC	DDUCT INFORMATION	5
	2.1	EQUIPMENT DESCRIPTION	5
	2.2	TEST CONFIGURATION	5
	2.3	EMI SUPPRESSION DEVICE(S)/MODIFICATIONS	5
3.0	DES	SCRIPTION OF TESTS	6
	3.1	EVALUATION PROCEDURE	6
	3.2	CELLULAR - BASE FREQUENCY BLOCKS	6
	3.3	CELLULAR - MOBILE FREQUENCY BLOCKS	
	3.4	OCCUPIED BANDWIDTH	
	3.5	SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL	
	3.6	RADIATED SPURIOUS EMISSIONS	
	3.7	FREQUENCY STABILITY / TEMPERATURE VARIATION	
4.0	TES	T EQUIPMENT CALIBRATION DATA	9
5.0	SAM	IPLE CALCULATIONS	10
6.0	TES	T RESULTS	11
	6.1	SUMMARY	11
	6.2	CONDUCTED POWER OUTPUT DATA	12
	6.3	CELLULAR WCDMA RADIATED MEASUREMENTS	14
	6.4	CELLULAR WCDMA FREQUENCY STABILITY MEASUREMENTS	17
7.0	PLO	T(S) OF EMISSIONS	19
8.0	CON	NCLUSION	26

Test Report S/N: Test Date:				
rest report s/N.	s: EUT Type	:	Page 2 of 26	
0Y1211211700.QLJ 11/19 - 11/	/21/2012 Amplifier		Faye 2 01 20	





# MEASUREMENT REPORT FCC Part 22



### §2.1033 General Information

**APPLICANT:** Tecore Networks **APPLICANT ADDRESS:** 7030 Hi Tech Drive

Hanover, MD 21076, USA

**TEST SITE**: PCTEST ENGINEERING LABORATORY, INC. **TEST SITE ADDRESS**: 7185 Oakland Mills Road, Columbia, MD 21046 USA

FCC RULE PART(S): §2; §22(H)

BASE MODEL: MilSec-RDS UMTS
FCC ID: QLJ900-100523-210
FCC CLASSIFICATION: Amplifier (AMP)

MODE: WCDMA

FREQUENCY TOLERANCE: ±0.00025 % (2.5 ppm)

Test Device Serial No.: N/A ☐ Production ☐ Production ☐ Engineering

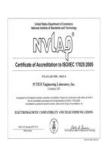
**DATE(S) OF TEST:** 11/19 - 11/21/2012 **TEST REPORT S/N:** 0Y1211211700.QLJ

### **Test Facility / Accreditations**

Measurements were performed at PCTEST Engineering Lab. located in Columbia, MD 21046, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451B-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451B-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.





FCC ID: QLJ900-100523-210	PCTEST INGINEERING LABORATORY, INC.	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 3 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	rage 3 of 20	



#### 1.0 INTRODUCTION

## 1.1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

#### 1.2 Testing Facility

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on February 15, 2012.

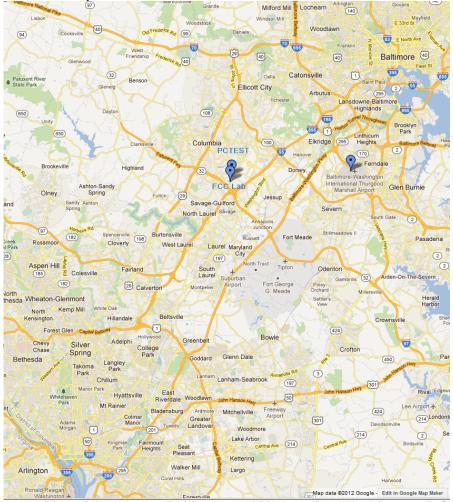


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: QLJ900-100523-210	PCTEST' INGINEERING LABORATORY, INC.	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:	Page 4 of 26				
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Page 4 01 20				
COMO POTENTE : : : I I I I I I							



### 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Tecore Amplifier FCC ID: QLJ900-100523-210**. The single input, single output amplifier operates together with a separately certified nodeB WCDMA base station simulator. The nodeB generates an 850MHz band WCDMA signal set to -30dBm that is fed via a low loss cable to the input of the amplifier. All of the settings in the nodeB are set through a connection to a laptop PC.

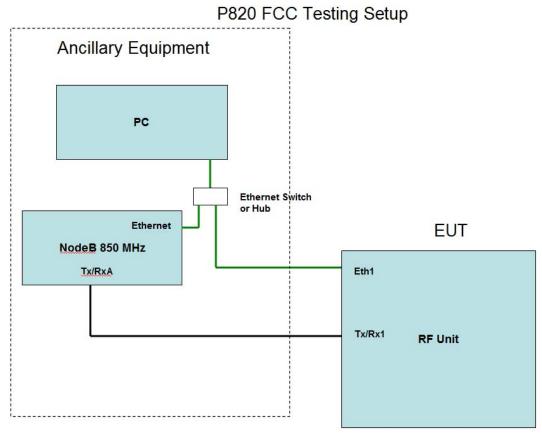


Figure 2-1. Test Setup for Amplifier

### 2.2 Test Configuration

The Tecore Amplifier FCC ID: QLJ900-100523-210 was tested per the guidance of ANSI/TIA-603-C-2004 and KDB 971168. See Section 3.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

# 2.3 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

FCC ID: QLJ900-100523-210	PCTEST' INGINEERING LABORATORY, INC.	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:	Page 5 of 26			
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Fage 5 01 26			
© 2012 DCTEST Engineering Laboratory, Inc.						



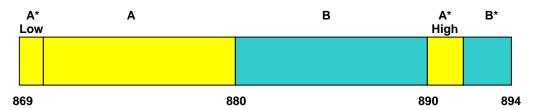
### 3.0 DESCRIPTION OF TESTS

#### 3.1 Evaluation Procedure

The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-C-2004) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" were used in the measurement of the measurement of the **Tecore Amplifier FCC ID: QLJ900-100523-210.** 

Deviation from Measurement Procedure......None

#### 3.2 Cellular - Base Frequency Blocks



BLOCK 1: 869 - 880 MHz (A\* Low + A)

BLOCK 3: 890 - 891.5 MHz (A\* High)

BLOCK 2: 880 - 890 MHz (B)

BLOCK 4: 891.5 - 894 MHz (B\*)

#### 3.3 Cellular - Mobile Frequency Blocks



BLOCK 1: 824 - 835 MHz (A\* Low + A)

BLOCK 3: 845 - 846.5 MHz (A\* High)

BLOCK 2: 835 - 845 MHz (B)

BLOCK 4: 846.5 – 849 MHz (B\*)

# 3.4 Occupied Bandwidth §2.1049, RSS-Gen (4.6.1)

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The spectrum analyzers' "occupied bandwidth" measurement function was used to record the occupied bandwidth in accordance with KDB 971168.

FCC ID: QLJ900-100523-210	ENGINEERING LABORATORY, INC.	(CERTIFICATION)	networks	Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 6 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Faye 0 01 20	



# 3.5 Spurious and Harmonic Emissions at Antenna Terminal §2.1051, 22.917(a)

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

# 3.6 Radiated Spurious Emissions 22.917(a)

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. A 78cm high PVC support structure is placed on top of the turntable. A 3/4" (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.

The equipment under test was transmitting with its output port terminated in  $50\Omega$  and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated spurious emission levels are also investigated with the receive antenna horizontally and vertically polarized.

Per the guidance of ANSI/TIA-603-C-2004, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_{d [dBm]} = P_{g [dBm]} - cable loss_{[dB]} + antenna gain_{[dBd/dBi]}$$

Where,  $P_d$  is the dipole equivalent power,  $P_g$  is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to  $P_{g [dBm]}$  – cable loss [dB].

The calculated  $P_d$  levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 +  $10log_{10}$  (Power <sub>[Watts]</sub>) specified in 22.917(a).

FCC ID: QLJ900-100523-210	PCTEST' INGINEERING LABORATORY, INC.	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 7 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Page 7 01 26	
O 0040 DOTEOT E				DEV 4 70E



# 3.7 Frequency Stability / Temperature Variation §2.1055, 22.355

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-C-2004. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification – For Part 22, the frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency.

#### **Time Period and Procedure:**

- 1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A sufficient stabilization period at each temperature shall be used prior to each frequency requirement.

FCC ID: QLJ900-100523-210	PETEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 8 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Fage 6 01 20	



# 4.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	7/10/2012	Annual	7/10/2013	N/A
-	RE2	Radiated Emissions Cable Set (VHF/UHF)	2/13/2012	Annual	2/13/2013	N/A
Agilent	8447D	Broadband Amplifier	5/8/2012	Annual	5/8/2013	1937A03348
Agilent	E8267C	Vector Signal Generator	10/10/2011	Biennial	10/10/2013	US42340152
Agilent	N9020A	MXA Signal Analyzer	10/9/2012	Annual	10/9/2013	US46470561
Espec	ESX-2CA	Environmental Chamber	4/4/2012	Annual	4/4/2013	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/22/2011	Biennial	7/22/2013	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	5/30/2012	Biennial	5/30/2014	135427
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	11/7/2012	Biennial	11/7/2014	128338
Mini-Circuits	VHF-1200+	High Pass Filter	1/15/2012	Annual	1/15/2013	30923
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	6/26/2012	Annual	6/26/2013	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/30/2012	Annual	5/30/2013	100040
Rohde & Schwarz	ESU26	EMI Test Receiver	12/15/2011	Annual	12/15/2012	100342
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	10/3/2011	Biennial	10/3/2013	91052522TX
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	10/3/2011	Biennial	10/3/2013	91052523RX
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/26/2012	Biennial	1/26/2014	A051107

Table 4-1. Test Equipment

FCC ID: QLJ900-100523-210	PCTEST'	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 9 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Fage 9 01 20	



## 5.0 SAMPLE CALCULATIONS

### **Emission Designator**

Emission Designator = 4M25F9W

WCDMA BW = 4.25 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data) (Measured at the 99.75% power bandwidth)

#### **Spurious Radiated Emission**

Example: Channel 4407 WCDMA Mode 2<sup>nd</sup> Harmonic (1762.8 MHz)

The receive spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1762.8 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm - (-24.80) = 50.3 dBc.

FCC ID: QLJ900-100523-210	PCTEST'	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 10 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Fage 10 01 26	



## 6.0 TEST RESULTS

## 6.1 Summary

Company Name: <u>Tecore Networks</u>

FCC ID: QLJ900-100523-210

FCC Classification: <u>Amplifier (AMP)</u>

Mode(s): WCDMA

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MO	DDE (Tx)				
2.1049, 22.917(a)	Occupied Bandwidth	N/A		PASS	Section 7.0
2.1051, 22.917(a)	Band Edge / Conducted Spurious Emissions	< 43 + 10log <sub>10</sub> (P[Watts]) at Band Edge and for all out-of-band emissions	CONDUCTED	PASS	Section 7.0
2.1046	Transmitter Conducted Output Power	N/A		PASS	Section 6.2
2.1053, 22.917(a)	Undesirable Emissions	< 43 + 10log <sub>10</sub> (P[Watts]) for all out- of-band emissions		PASS	Section 6.3
2.1055, 22.355	Frequency Stability	< 2.5 ppm	RADIATED	PASS	Section 6.4

Table 6-1. Summary of Test Results

#### Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in Section 7.0 were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, filters, and attenuators used as part of the system at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cable, filters, and attenuators.

FCC ID: QLJ900-100523-210	PCTEST' ENGINEERING LABORATORY, INC.	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 11 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	rage 11 01 20	



# 6.2 Conducted Power Output Data §2.1046

The amplifier was connected to a nodeB that was set through a laptop PC to transmit in WCDMA mode at -30dBm. A nodeB output power level of -30dBm was used to ensure that the amplifier would operate in its linear region. The output of the amplifier was connected through a calibrated cable and 36dB of external attenuation to a signal analyzer. The signal analyzers' "Channel Power" function was used to measure the conducted output powers in accordance to the guidance of KDB 971168.

Frequency [MHz]	Mode	Conducted Power [dBm]	Conducted Power [Watts]	
871.40	WCDMA850	43.19	20.845	
881.40	WCDMA850	43.78	23.878	
891.60	WCDMA850	43.04	20.137	

Table 6-2. Maximum Average Conducted Power



Plot 6-1. Maximum Conducted Power (Low Ch – 871.4MHz)

FCC ID: QLJ900-100523-210	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)		Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 12 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Fage 12 01 20	



Conducted Power Output Data (Cont'd) §2.1046



Plot 6-2. Maximum Conducted Power (Mid Ch – 881.4MHz)



Plot 6-3. Maximum Conducted Power (High Ch – 891.6MHz)

FCC ID: QLJ900-100523-210	PCTEST INC.	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Page 13 of 26		
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Fage 13 01 26		
© COMO POTEOT Facility and a Laboratory Lab					



# 6.3 Cellular WCDMA Radiated Measurements §2.1053, 22.917(a)

### Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 871.40 MHz

CHANNEL: 4357

MODULATION SIGNAL: WCDMA

DISTANCE: 3 meters
LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
1742.80	-32.58	1.62	-30.96	Н	-17.96
2614.20	-38.10	3.78	-34.32	Н	-21.32
3071.92	-56.95	5.18	-51.78	Н	-38.78
3485.00	-45.85	6.19	-39.65	Η	-26.65
4357.00	-31.24	7.25	-23.99	Н	-10.99

Table 6-3. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4357)

#### **NOTES:**

- 1. This unit was tested while powered by an AC power source.
- 2. The output of the amplifier was terminated in  $50\Omega$  for radiated spurious emissions testing.
- 3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the amplifier lying flat on the test table. The data reported in the table above was measured in this test setup.

FCC ID: QLJ900-100523-210	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)		Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 14 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Fage 14 01 20	



# Cellular WCDMA Radiated Measurements (Cont'd) §2.1053, 22.917(a)

#### Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 881.40 MHz

CHANNEL: 4407

MODULATION SIGNAL: WCDMA

DISTANCE: 3 meters
LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
1762.80	-28.93	1.66	-27.26	Н	-14.26
2644.20	-33.39	4.04	-29.35	Н	-16.35
3525.60	-42.81	6.25	-36.56	Н	-23.56
4407.00	-43.23	7.25	-35.98	Н	-22.98
6169.80	-45.69	8.42	-37.27	Н	-24.27

Table 6-4. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4407)

#### **NOTES:**

- 1. This unit was tested while powered by an AC power source.
- 2. The output of the amplifier was terminated in  $50\Omega$  for radiated spurious emissions testing.
- 3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the amplifier lying flat on the test table. The data reported in the table above was measured in this test setup.

FCC ID: QLJ900-100523-210	PCTEST'	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 15 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Fage 15 01 26	



# Cellular WCDMA Radiated Measurements (Cont'd) §2.1053, 22.917(a), RSS-129 (8.1.1)

### Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 891.60 MHz

CHANNEL: 4458

MODULATION SIGNAL: WCDMA

DISTANCE: 3 meters
LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	MARGIN (dB)
1783.20	-32.66	1.85	-30.81	Н	-17.81
2674.80	-33.43	4.31	-29.12	Н	-16.12
3566.40	-47.25	6.25	-41.00	Н	-28.00
4458.00	-36.05	7.25	-28.80	Η	-15.80
5349.60	-92.21	8.27	-83.94	Н	-70.94

Table 6-5. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4458)

#### **NOTES:**

- 1. This unit was tested while powered by an AC power source.
- 2. The output of the amplifier was terminated in  $50\Omega$  for radiated spurious emissions testing.
- 3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found with the amplifier lying flat on the test table. The data reported in the table above was measured in this test setup.

FCC ID: QLJ900-100523-210	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)		Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 16 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	rage 10 01 20	



# 6.4 Cellular WCDMA Frequency Stability Measurements §2.1055, 22.355

OPERATING FREQUENCY: 881,400,000 Hz

CHANNEL: 4407

REFERENCE VOLTAGE: 120 VAC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	120.00	+ 20 (Ref)	881,399,992	-8	-0.000001
100 %		- 30	881,399,983	-17	-0.000002
100 %		- 20	881,400,006	6	0.000001
100 %		- 10	881,400,019	19	0.000002
100 %		0	881,400,010	10	0.000001
100 %		+ 10	881,400,015	15	0.000002
100 %		+ 20	881,399,998	-2	0.000000
100 %		+ 30	881,399,996	-4	0.000000
100 %		+ 40	881,400,012	12	0.000001
100 %		+ 50	881,400,018	18	0.000002
115 %	138.00	+ 20	881,400,009	9	0.000001
85 %	102.00	+ 20	881,400,010	10	0.000001

Table 6-6. Frequency Stability Data (Cellular WCDMA Mode – Ch. 4407)

#### Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain inband when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: QLJ900-100523-210	PCTEST INGINIERING LABORATORY, IRC.	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 17 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	rage 17 01 20	



# Cellular WCDMA Frequency Stability Measurements (Cont'd) §2.1055, 22.355, RSS-129 (9.2.1)

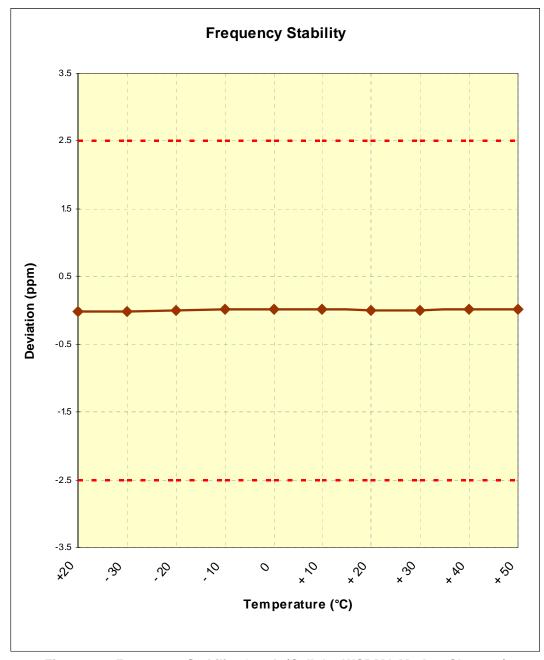


Figure 6-1. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4407)

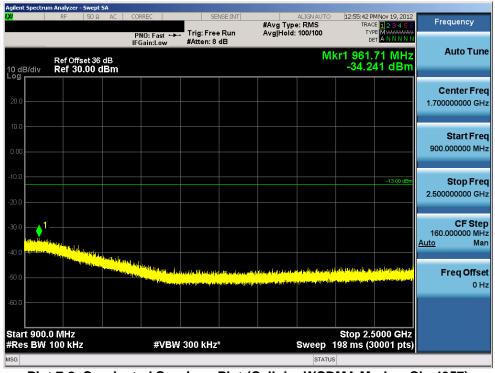
FCC ID: QLJ900-100523-210	PETEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 18 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Fage 10 01 20	



# 7.0 PLOT(S) OF EMISSIONS



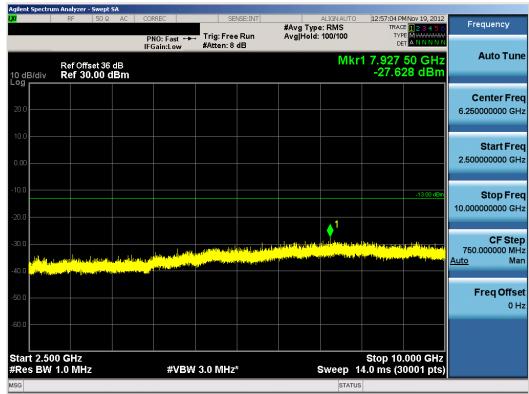
Plot 7-1. Conducted Spurious Plot (Cellular WCDMA Mode - Ch. 4357)



Plot 7-2. Conducted Spurious Plot (Cellular WCDMA Mode – Ch. 4357)

FCC ID: QLJ900-100523-210	PCTEST'	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 19 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Page 19 01 26	
@ 0040 DOTEOT Facility and all all and	town bear			DEV 4 70EL





Plot 7-3. Conducted Spurious Plot (Cellular WCDMA Mode - Ch. 4357)



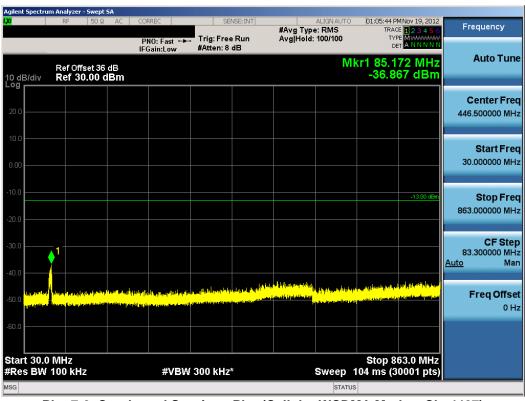
Plot 7-4. Band Edge Plot (Cellular WCDMA Mode - Ch. 4357)

FCC ID: QLJ900-100523-210	PCTEST'	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 20 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Page 20 01 26	





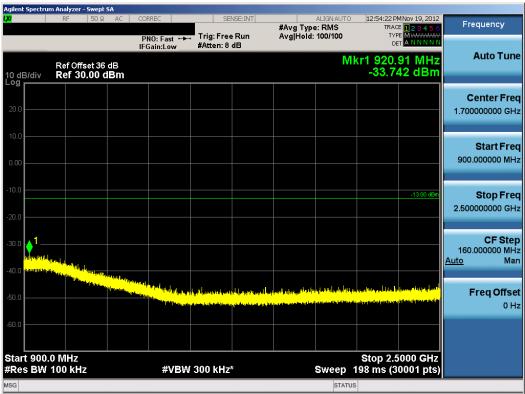
Plot 7-5. 4MHz Span Plot (Cellular WCDMA Mode - Ch. 4357)



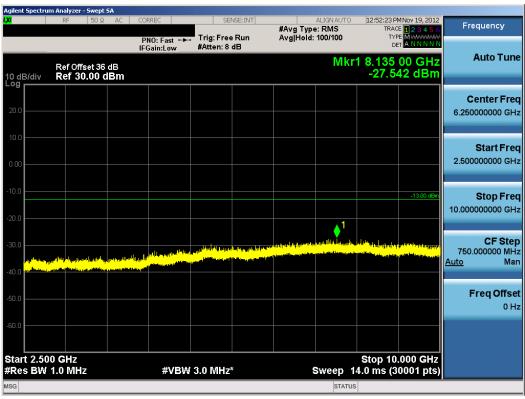
Plot 7-6. Conducted Spurious Plot (Cellular WCDMA Mode - Ch. 4407)

FCC ID: QLJ900-100523-210	PCTEST' INGINEERING LABORATORY, INC.	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 21 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Page 21 of 26	
© COLO DOTEOTE : : ! ! !				DEV 4 70E





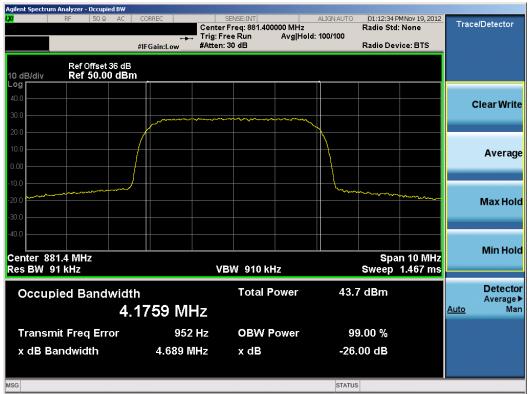
Plot 7-7. Conducted Spurious Plot (Cellular WCDMA Mode - Ch. 4407)



Plot 7-8. Conducted Spurious Plot (Cellular WCDMA Mode - Ch. 4407)

FCC ID: QLJ900-100523-210	PCTEST'	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 22 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Page 22 of 26	
© COLO DOTEOTE : : ! ! !				DEV 4 70E





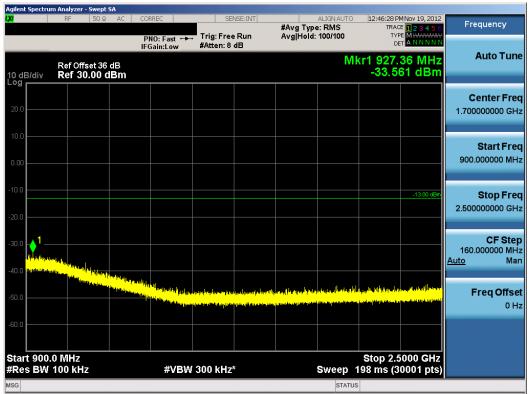
Plot 7-9. Occupied Bandwidth Plot (Cellular WCDMA Mode - Ch. 4407)



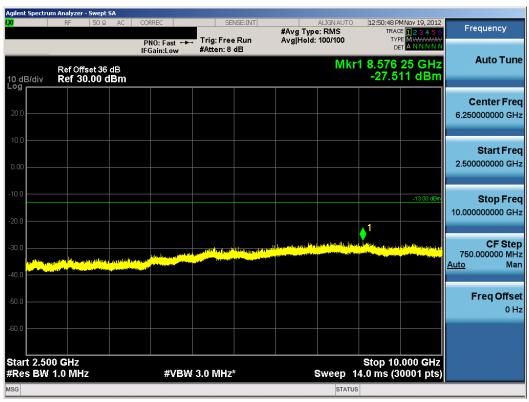
Plot 7-10. Conducted Spurious Plot (Cellular WCDMA Mode – Ch. 4458)

FCC ID: QLJ900-100523-210	PCTEST'	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 22 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Page 23 of 26	
C COLLO DOTTOT F : : ! ! !				DEV 4 7051





Plot 7-11. Conducted Spurious Plot (Cellular WCDMA Mode – Ch. 4458)



Plot 7-12. Conducted Spurious Plot (Cellular WCDMA Mode – Ch. 4458)

Test Report S/N: Test Da				
rest report o/N.	ates:	EUT Type:	Page 24 of 26	
0Y1211211700.QLJ 11/19 -	- 11/21/2012	Amplifier	Page 24 of 26	





Plot 7-13. Band Edge Plot (Cellular WCDMA Mode - Ch. 4458)



Plot 7-14. 4MHz Span Plot (Cellular WCDMA Mode - Ch. 4458)

FCC ID: QLJ900-100523-210	PCTEST'	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 25 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Page 25 01 26	



# 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Tecore Amplifier FCC ID**: **QLJ900-100523-210** complies with all the requirements of Parts 2 and 22 of the FCC rules.

FCC ID: QLJ900-100523-210	PCTEST'	FCC Pt. 22 WCDMA MEASUREMENT REPORT (CERTIFICATION)	Tecore	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 26 of 26	
0Y1211211700.QLJ	11/19 - 11/21/2012	Amplifier	Fage 20 01 20	