



PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21045 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctestlab.com



MEASUREMENT REPORT FCC Part 90

Applicant:

Panasonic Corporation of North America
Two Riverfront Plaza, 9th Floor
Newark, NJ 07102-5490
United States

Date of Testing:

12/10/2014 - 1/7/2015

Test Site/Location:

PCTEST Lab., Columbia, MD, USA

Test Report Serial No.:

0Y1412152303.ACJ

FCC ID:

ACJ9TGWW13B

APPLICANT:

PANASONIC CORPORATION OF NORTH AMERICA

Applicant Type:

Class II Permissive Change

FCC Classification:

PCS Licensed Transmitter (PCB)

FCC Rule Part:

§90.691

EUT Type:

Wireless Network Adapter

Model(s):

FZ-R1

Test Device Serial No.:

identical prototype [S/N: WWAN Model 5]

Class II Permissive Change:


See FCC change document

Original Grant Date:



08/4/2014

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.




Randy Ortanez
President

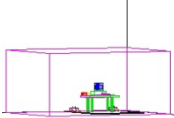


FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter	Page 1 of 13	

T A B L E O F C O N T E N T S

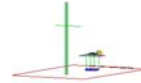
FCC PART 90 MEASUREMENT REPORT.....		3
1.0 INTRODUCTION.....		4
1.1 SCOPE.....		4
1.2 TESTING FACILITY.....		4
2.0 PRODUCT INFORMATION.....		5
2.1 EQUIPMENT DESCRIPTION.....		5
2.2 DEVICE CAPABILITIES.....		5
2.3 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS.....		5
3.0 DESCRIPTION OF TESTS.....		6
3.1 EVALUATION PROCEDURE.....		6
3.2 OCCUPIED BANDWIDTH.....		6
3.3 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.....		6
3.4 RADIATED POWER AND RADIATED SPURIOUS EMISSIONS.....		7
4.0 TEST EQUIPMENT CALIBRATION DATA.....		8
5.0 SAMPLE CALCULATIONS.....		9
6.0 TEST RESULTS.....		10
6.1 SUMMARY.....		10
6.2 RADIATED SPURIOUS EMISSIONS MEASUREMENTS.....		11
7.0 CONCLUSION.....		13

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter		Page 2 of 13



MEASUREMENT REPORT

BC10 CDMA

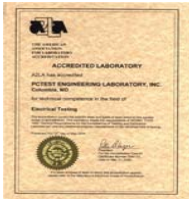


§2.1033 General Information



APPLICANT: Panasonic Corporation of North America
APPLICANT ADDRESS: Two Riverfront Plaza, 9th Floor
 Newark, NJ 07102-5490, United States
TEST SITE: PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS: 7185 Oakland Mills Road, Columbia, MD 21045 USA
BASE MODEL: FZ-R1
FCC CLASSIFICATION: PCS Licensed Transmitter Held to Ear (PCE)
MODE: CDMA
FREQUENCY TOLERANCE: $\pm 0.00025\%$ (2.5 ppm)
Test Device Serial No.: WWAN Model 5 Production Pre-Production Engineering
DATE(S) OF TEST: 12/10/2014 - 1/7/2015
TEST REPORT S/N: 0Y1412152303.ACJ

Test Facility / Accreditations

Measurements were performed at **PCTEST Engineering Lab. located in Columbia, MD 21045, 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.
- 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.
- 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.
- 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: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter		Page 3 of 13

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 Intern't'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 C63.4-2003 on February 15, 2012.

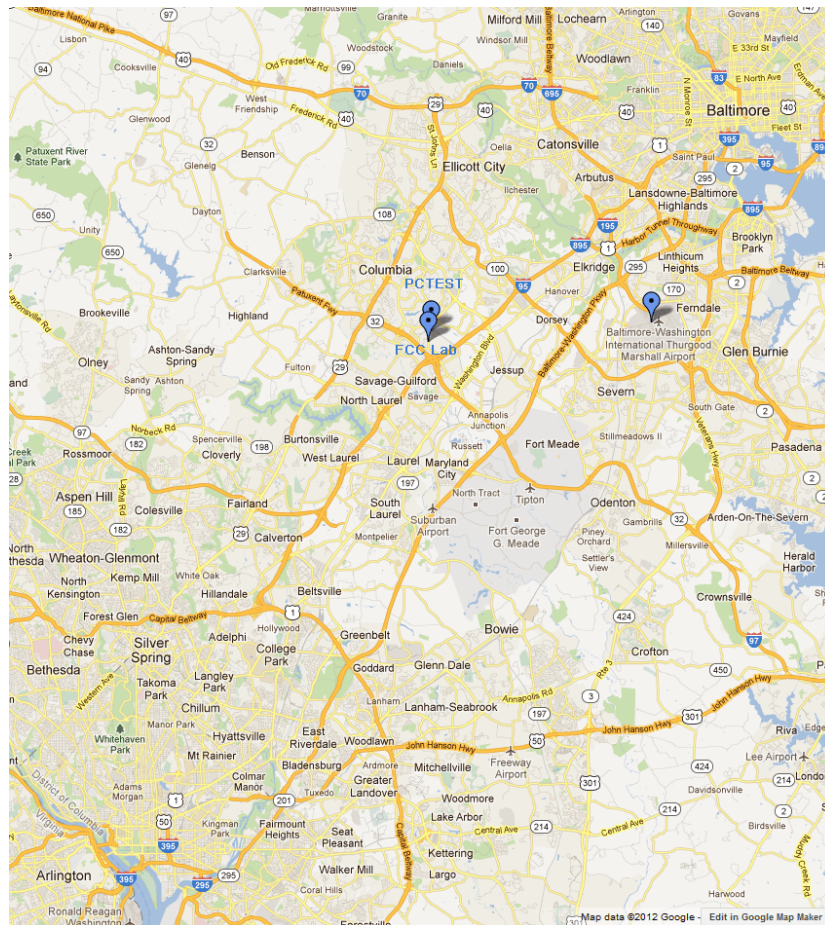




Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE	 Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter	Page 4 of 13

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Panasonic Wireless Network Adapter FCC ID: ACJ9TGWW13B**. The EUT consisted of the following component(s):

Trade Name / Base Model	FCC ID	Description
Panasonic / Model: FZ-R1	ACJ9TGWW13B	Wireless Network Adapter

Table 2-1. EUT Equipment Description

Note: All data contained in this report is applicable for the device operation in the BC10 (817 – 824 MHz). Test data shown supports the devices compliance with §90.691 of the FCC Rules and Regulation.

Note: The Panasonic Wireless Network Adapter FCC ID: ACJ9TGWW13B was integrated into a portable host tablet (Panasonic Model: FZ-R1). The tablet was tested per the guidance of ANSI C63.10-2009 and DA 00-705.



2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A (BC0, BC1, BC10), 850/1900 GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE

2.3 EMI Suppression Device(s)/Modifications

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

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter	Page 5 of 13	

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) was used in the measurement of the measurement of the **Panasonic Wireless Network Adapter FCC ID: ACJ9TGWW13B**.

3.2 Occupied Bandwidth

§2.1049

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.

3.3 Spurious and Harmonic Emissions at Antenna Terminal



§2.1051, §90.691

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 10th harmonic.

Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \text{ Log}_{10}(f/6.1)$ decibels or $50 + 10 \text{ Log}_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \text{ Log}_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter		Page 6 of 13

3.4 Radiated Power and Radiated Spurious Emissions

§2.1053, §90.635, §90.691

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. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Clause 5, Figure 5.7 of ANSI C63.4-2009. 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 ¾” (~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 while connected to its integral antenna 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 power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration band set to the emissions’ occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168.



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:

$$P_d \text{ [dBm]} = P_g \text{ [dBm]} - \text{cable loss} \text{ [dB]} + \text{antenna gain} \text{ [dBd/dBi]}$$

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 $P_g \text{ [dBm]} - \text{cable loss} \text{ [dB]}$.

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 $43 + 10\log_{10}(\text{Power} \text{ [Watts]})$ specified in 90.691.

For fundamental radiated power measurements, the guidance of KDB 971168 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-C-2004.

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE	 Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter	Page 7 of 13

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
-	RE3	Radiated Emissions Cable Set	7/7/2014	Annual	7/7/2015	N/A
Agilent	8447D	Broadband Amplifier	5/30/2014	Annual	5/30/2015	2443A01900
Anritsu	MT8820C	Radio Communication Analyzer	8/28/2014	Annual	8/28/2015	6201240328
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	6/26/2013	Biennial	6/26/2015	121034
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/8/2014	Biennial	4/8/2016	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	6/17/2014	Biennial	6/17/2016	135427
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2014	Biennial	3/12/2016	128337
K & L	13SH10-1000/U1000	N Type High Pass Filter	12/1/2014	Annual	12/1/2015	2
Mini-Circuits	SSG-4000HP	USB Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	PWR-SENS-4RMS	USB Power Sensor	4/17/2014	Annual	4/17/2015	11210140001
Mini-Circuits	TVA-11-422	RF Power Amp	N/A			QA1303002
Rhode & Schwarz	TS-PR18	Pre-Amplifier	6/12/2014	Annual	6/12/2015	101622
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	5/21/2014	Annual	5/21/2015	100348
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	11/21/2013	Biennial	11/21/2015	9105-2404
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	11/21/2013	Biennial	11/21/2015	9105-2403
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/28/2014	Biennial	1/28/2016	A051107
VWR	62344-734	Thermometer with Clock	2/20/2014	Biennial	2/20/2016	140140336

Table 4-1. Test Equipment

Notes:

1. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter	Page 8 of 13	

5.0 SAMPLE CALCULATIONS

Emission Designator

Emission Designator = 1M25F9W

CDMA BW = 1.25 MHz

F = Frequency Modulation



9 = Composite Digital Info

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

Spurious Radiated Emission – BC10

Example: Channel 476 CDMA BC10 Mode 3rd Harmonic (2453.70MHz)

The average 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 2453.70 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80) = 50.3 dBc.

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE	 Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter	Page 9 of 13

6.0 TEST RESULTS

6.1 Summary



Company Name: Panasonic Corporation of North America
 FCC ID: ACJ9TGWW13B
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): CDMA
 Band: Band Class 10 / Band 26

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
§2.1053, §90.691	Undesirable Emissions	$> 43 + 10\log_{10}(P[\text{Watts}])$ for all out-of-band emissions	RADIATED	PASS	Sections 6.2

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.

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter	Page 10 of 13	

6.2 Radiated Spurious Emissions Measurements

§2.1053, §90.691

Field Strength of SPURIOUS Radiation for CDMA BC10

OPERATING FREQUENCY: 817.90 MHz

CHANNEL: 476

MEASURED OUTPUT POWER: 23.58 dBm = 0.228 W

MODULATION SIGNAL: CDMA

DISTANCE: 3 meters



LIMIT: $43 + 10 \log_{10} (W)$ -13.00 dBm

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
1635.80	-51.01	3.64	-47.36	V	-34.4
2453.70	-53.92	3.55	-50.37	V	-37.4
3271.60	-58.50	5.58	-52.92	V	-39.9
4089.50	-60.94	6.81	-54.13	V	-41.1
4907.40	-60.43	7.79	-52.64	V	-39.6
5725.30	-61.82	8.61	-53.21	V	-40.2

Table 6-2. Radiated Spurious Data (Ch. 476)

NOTES:

1. For CDMA mode, this device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
2. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables above.

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter	Page 11 of 13	

Radiated Spurious Emissions Measurements

§2.1053, §90.691

Field Strength of SPURIOUS Radiation for CDMA BC10

OPERATING FREQUENCY: 823.10 MHz

CHANNEL: 684

MEASURED OUTPUT POWER: 23.64 dBm = 0.231 W

MODULATION SIGNAL: CDMA

DISTANCE: 3 meters



LIMIT: $43 + 10 \log_{10} (W)$ -13.00 dBm

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	[dBc]
1646.20	-52.49	3.60	-48.89	V	-35.9
2469.30	-54.80	3.54	-51.26	V	-38.3
3292.40	-58.17	5.62	-52.54	V	-39.5
4115.50	-61.16	6.86	-54.30	V	-41.3
4938.60	-61.43	7.86	-53.57	V	-40.6
5761.70	-62.16	8.62	-53.53	V	-40.5

Table 6-3. Radiated Spurious Data (Ch. 684)



NOTES:

- For CDMA mode, this device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables above.

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter	Page 12 of 13	

7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Panasonic Wireless Network Adapter FCC ID: ACJ9TGWW13B** complies with all the requirements of Parts 90 of the FCC rules.

FCC ID: ACJ9TGWW13B		PART 90 CDMA / EVDO MEASUREMENT REPORT CLASS II PERMISSIVE CHANGE		Reviewed by: Quality Manager
Test Report S/N: 0Y1412152303.ACJ	Test Dates: 12/10/2014 - 1/7/2015	EUT Type: Wireless Network Adapter		Page 13 of 13