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MEASUREMENT REPORT

FCC Part 90

Applicant:

Kyocera Corporation
9520 Towne Centre Drive, Suite 200
San Diego, CA 92121
United States

Date of Testing:

June 23 - July 06, 2015

Test Site/Location:

PCTEST Lab., Columbia, MD, USA

Test Report Serial No.:

0Y1506221314.V65

FCC ID:

V65E4281

APPLICANT:

KYOCERA CORPORATION

Applicant Type:

Certification

FCC Classification:

PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part:

§90.691

EUT Type:

Portable Handset

Model(s):

E4281

Test Device Serial No.:

identical prototype [S/N: 4281D033]

Mode	Tx Frequency (MHz)	Emission Designator	Cond. PWR	
			Max. Power (W)	Max. Power (dBm)
CDMA800 (BC10)	817.9 - 823.1	1M27F9W	0.293	24.67

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







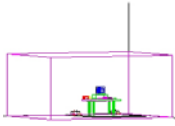
FCC ID: V65E4281		Part 90 CDMA / EVDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 1 of 21

TABLE OF CONTENTS

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 TEST CONFIGURATION.....	5
2.4 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
3.5 FREQUENCY STABILITY / TEMPERATURE VARIATION	8
4.0 TEST EQUIPMENT CALIBRATION DATA	9
5.0 SAMPLE CALCULATIONS	10
6.0 TEST RESULTS.....	11
6.1 SUMMARY.....	11
6.2 CONDUCTED POWER OUTPUT DATA	12
6.3 RADIATED SPURIOUS EMISSIONS MEASUREMENTS	13
6.4 FREQUENCY STABILITY / TEMPERATURE VARIATION	15
7.0 CDMA PLOTS OF EMISSIONS	17
8.0 CONCLUSION.....	21

FCC ID: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 2 of 21



MEASUREMENT REPORT

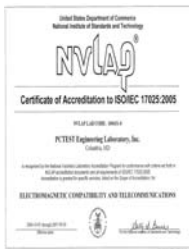
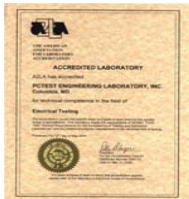
BC10 CDMA

§2.1033 General Information



APPLICANT: Kyocera Corporation
APPLICANT ADDRESS: 9520 Towne Centre Drive, Suite 200
 San Diego, CA 92121, United States
TEST SITE: PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS: 7185 Oakland Mills Road, Columbia, MD 21045 USA
BASE MODEL: E4281
FCC CLASSIFICATION: PCS Licensed Transmitter Held to Ear (PCE)
MODE: CDMA
FREQUENCY TOLERANCE: $\pm 0.00025\%$ (2.5 ppm)
Test Device Serial No.: 4281D033 ☐ Production ☒ Pre-Production ☐ Engineering
DATE(S) OF TEST: June 23 - July 06, 2015
TEST REPORT S/N: 0Y1506221314.V65

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: V65E4281	 Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		 Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset	Page 3 of 21

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.

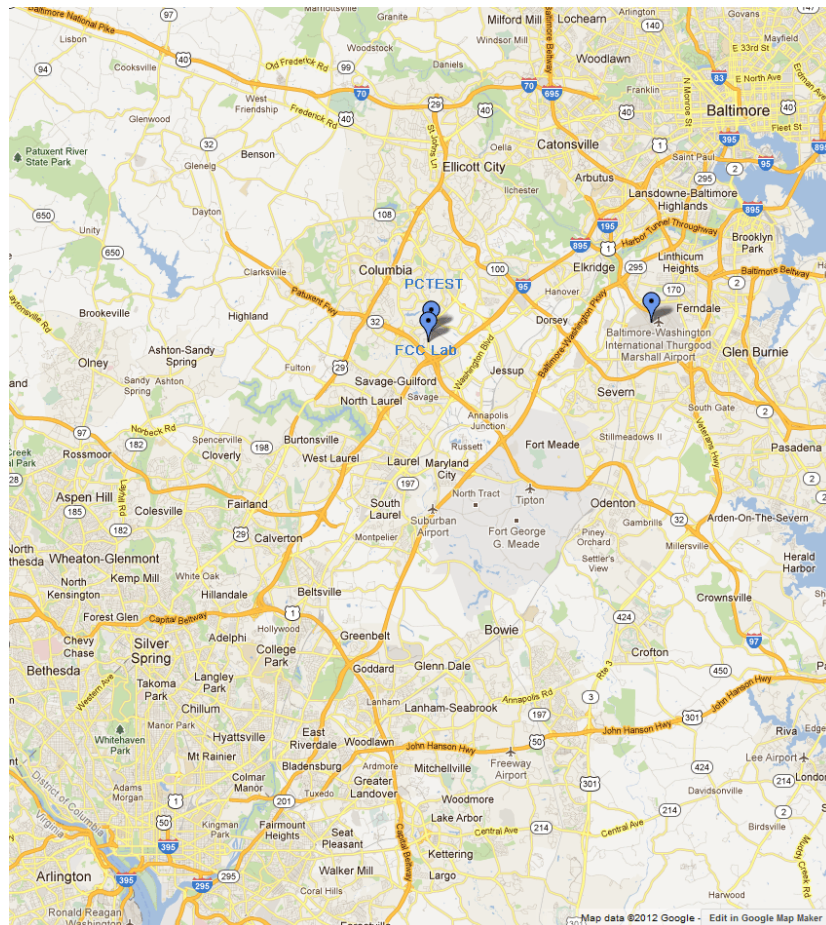


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: V65E4281	PCTEST ENGINEERING LABORATORY, INC.	Part 90 CDMA / EDO MEASUREMENT REPORT CERTIFICATION	KYOCERA	Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 4 of 21

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Kyocera Portable Handset FCC ID: V65E4281**. The EUT consisted of the following component(s):

Trade Name / Base Model	FCC ID	Description
Kyocera / Model: E4281	V65E4281	Portable Handset

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.

2.2 Device Capabilities

This device contains the following capabilities:



850/1900 CDMA/EvDO Rev0/A (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, Bluetooth (1x, EDR)

2.3 Test Configuration

The Kyocera Portable Handset FCC ID: V65E4281 was tested per the guidance of ANSI/TIA-603-C-2004 and KDB 971168 v02r02. See Section 6.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 5 of 21

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 **Kyocera Portable Handset FCC ID: V65E4281**.

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 $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ 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 $43 + 10 \log_{10}(P)$ 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: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 6 of 21

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:

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

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

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 $43 + 10\log_{10}(\text{Power [Watts]})$ 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: V65E4281	 Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION 		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset	Page 7 of 21

3.5 Frequency Stability / Temperature Variation

§2.1055, 90.213(a)



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 90.213, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 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.


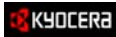
FCC ID: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 8 of 21

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)	10/24/2014	Annual	10/24/2015	N/A
-	LTx2	Licensed Transmitter Cable Set	10/16/2014	Annual	10/16/2015	N/A
Agilent	8447D	Broadband Amplifier	6/12/2015	Annual	6/12/2016	1937A03348
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/28/2014	Annual	10/28/2015	3613A00815
Agilent	E5515C	Wireless Communications Test Set	2/23/2015	Biennial	2/23/2017	GB41450275
Agilent	N9038A	MXE EMI Receiver	3/24/2015	Annual	3/24/2016	MY51210133
Agilent	N9030A	PXA Signal Analyzer (26.5GHz)	7/8/2014	Annual	7/8/2015	MY49432391
Anritsu	ML2495A	Power Meter	10/31/2013	Biennial	10/31/2015	941001
Anritsu	MA2411B	Pulse Sensor	4/8/2014	Biennial	4/8/2016	846215
Com-Power	PAM-118A	Pre-Amplifier	4/10/2015	Annual	4/10/2016	551042
Emco	6502	Active Loop Antenna (10k - 30 MHz)	6/24/2014	Biennial	6/24/2016	267
Espec	ESX-2CA	Environmental Chamber	3/17/2015	Annual	3/17/2016	17620
K & L	13SH10-1000/U1000	N Type High Pass Filter	12/1/2014	Annual	12/1/2015	4
K & L	11SH10-3075/U18000	High Pass Filter	12/1/2014	Annual	12/1/2015	3
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	11/1/2013	Biennial	11/1/2015	91052522TX
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	11/1/2013	Biennial	11/1/2015	91052523RX
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	7/19/2013	Biennial	7/19/2015	A050307
Sunol	DRH-118	Horn Antenna (1-18 GHz)	7/19/2013	Biennial	7/19/2015	A042511
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	140140420

Table 4-1. Test Equipment

FCC ID: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 9 of 21

5.0 SAMPLE CALCULATIONS

Emission Designator

Emission Designator = 1M25F9W

CDMA BW = 1.25 MHz

F = Frequency Modulation


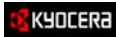
9 = Composite Digital Info

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: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 10 of 21

6.0 TEST RESULTS

6.1 Summary



Company Name: Kyocera Corporation
 FCC ID: V65E4281
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): CDMA
 Band: Band Class 10

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
§90.691	Band Edge / Conducted Spurious Emissions	$> 50 + 10\log_{10}(P[\text{Watts}])$ at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge	CONDUCTED	PASS	Section 7.0
§90.635	Conducted Power	< 100 Watts		PASS	Section 6.2
§90.213	Frequency Stability	< 2.5 ppm		PASS	Section 6.4
§90.691	Undesirable Emissions	$> 43 + 10\log_{10}(P[\text{Watts}])$ for all out-of-band emissions	RADIATED	PASS	Sections 6.3

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 taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT 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 cables, attenuators, and couplers.

FCC ID: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset	Page 11 of 21	



6.2 Conducted Power Output Data

§90.635

Frequency [MHz]	BC10 [Channel]	Battery Type	Cond. PWR [dBm]	Cond. PWR [Watts]	Cond. PWR Limit [dBm]	Margin [dB]
817.90	476	Standard	24.64	0.291	50.00	-25.36
823.10	684	Standard	24.67	0.293	50.00	-25.33

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. This unit was tested with its standard battery.

FCC ID: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 12 of 21

6.3 Radiated Spurious Emissions Measurements

OPERATING FREQUENCY: 817.90 MHz

CHANNEL: 476

MODULATION SIGNAL: CDMA

DISTANCE: 3 meters


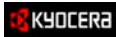
LIMIT: -13.00 dBm

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	Margin [dB]
1635.80	-58.40	6.43	-51.97	V	-39.0
2453.70	-49.62	6.63	-42.99	V	-30.0
3271.60	-61.35	6.93	-54.42	V	-41.4

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: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 13 of 21

OPERATING FREQUENCY: 823.10 MHz

CHANNEL: 684

MODULATION SIGNAL: CDMA

DISTANCE: 3 meters



LIMIT: -13.00 dBm

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	Margin [dB]
1646.20	-59.92	6.36	-53.56	V	-40.6
2469.30	-51.35	6.60	-44.75	V	-31.7
3292.40	-61.31	6.96	-54.35	V	-41.3

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

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: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 14 of 21

6.4 Frequency Stability / Temperature Variation



OPERATING FREQUENCY: 817,900,000 Hz

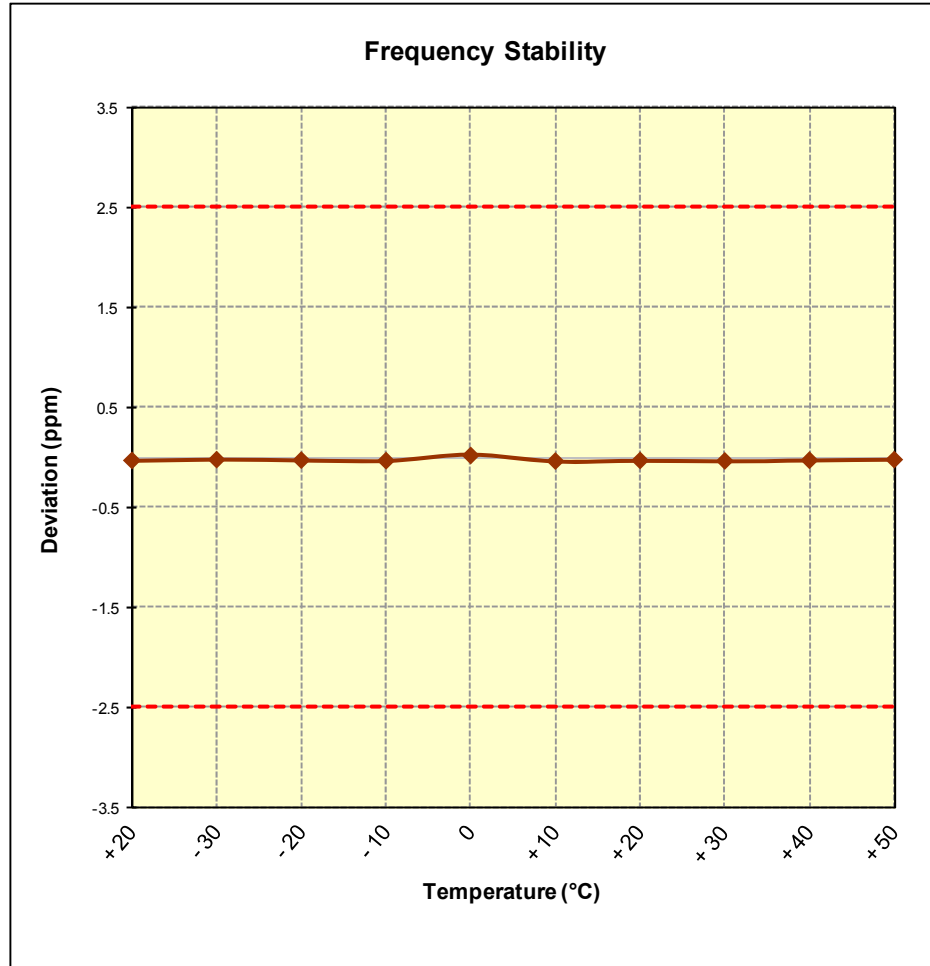
CHANNEL: 476


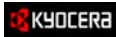
REFERENCE VOLTAGE: 3.70 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

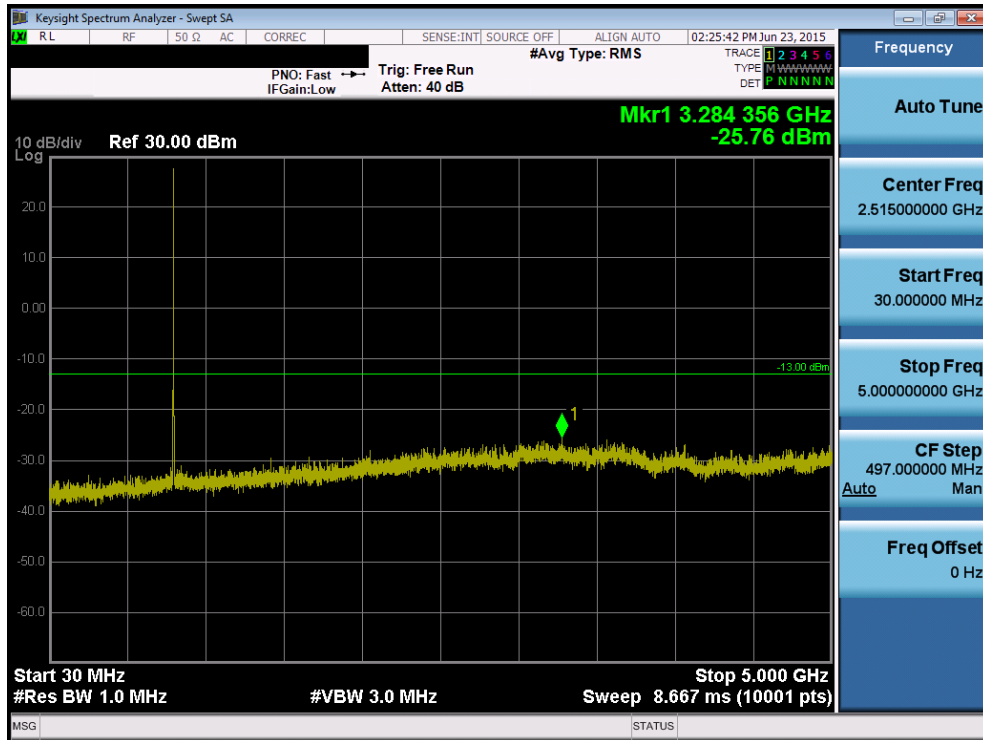
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.70	+ 20 (Ref)	817,899,971	-29	-0.0000035
100 %		- 30	817,899,978	-22	-0.0000027
100 %		- 20	817,899,974	-26	-0.0000032
100 %		- 10	817,899,969	-31	-0.0000038
100 %		0	817,900,012	12	0.0000015
100 %		+ 10	817,899,966	-34	-0.0000042
100 %		+ 20	817,899,971	-29	-0.0000035
100 %		+ 30	817,899,967	-33	-0.0000040
100 %		+ 40	817,899,973	-27	-0.0000033
100 %		+ 50	817,899,978	-22	-0.0000027
BATT. ENDPOINT	3.30	+ 20	817,899,961	-39	-0.0000048

FCC ID: V65E4281	 Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION 		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset	Page 15 of 21

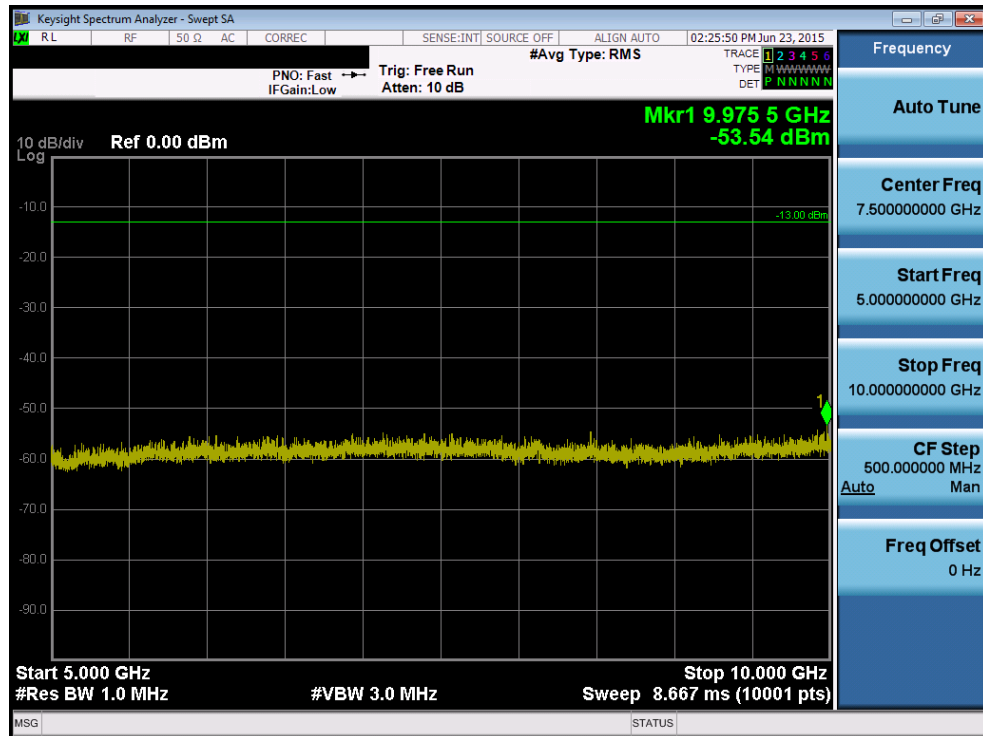


FCC ID: V65E4281	 Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION 		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset	Page 16 of 21

7.0 CDMA PLOTS OF EMISSIONS

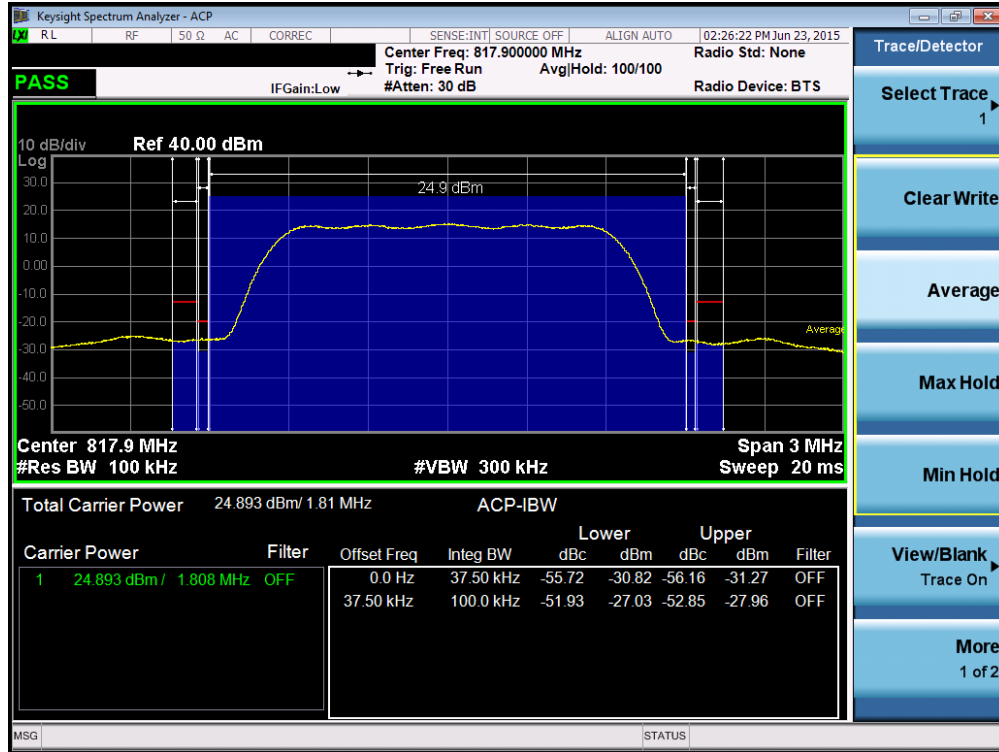


Plot 7-1. Conducted Spurious Plot (Ch. 476)

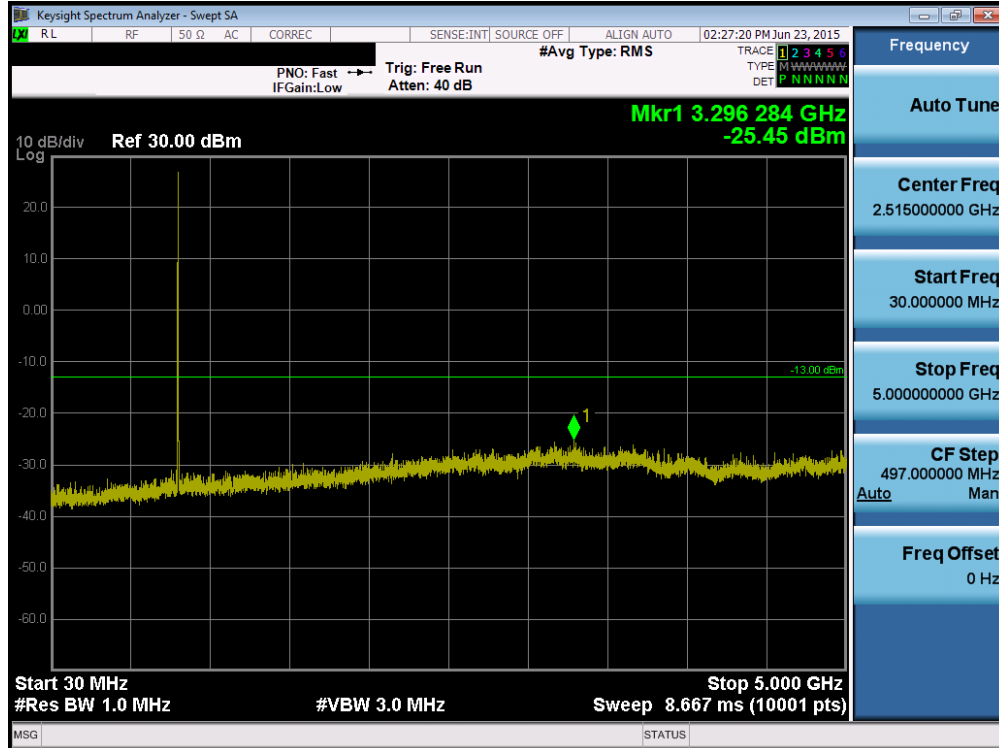


Plot 7-2. Conducted Spurious Plot (Ch. 476)

FCC ID: V65E4281	PCTEST ENGINEERING LABORATORY, INC.	Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	KYOCERA	Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 17 of 21

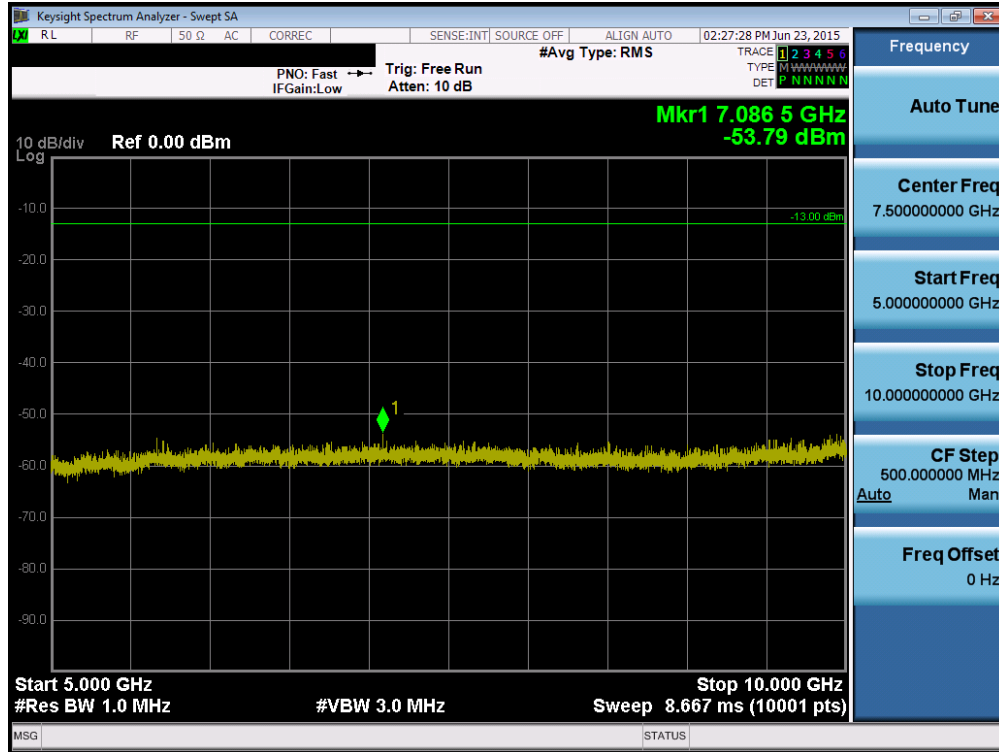


Plot 7-3. Channel Edge Plot (Ch. 476)

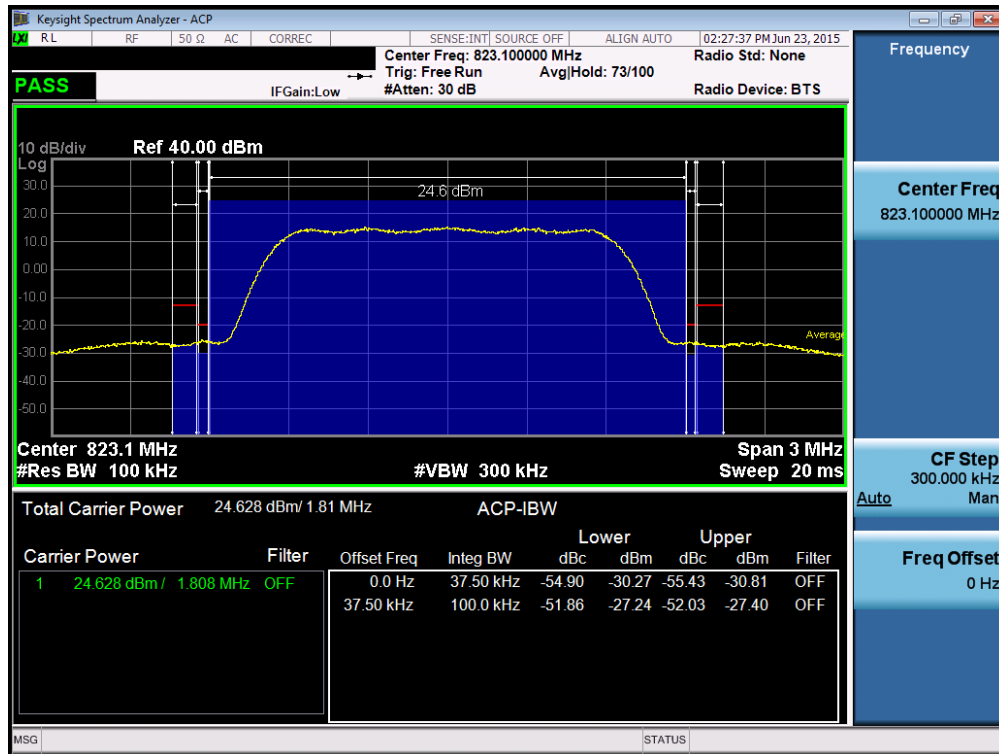


Plot 7-4. Conducted Spurious Plot (Ch. 684)

FCC ID: V65E4281	PCTEST ENGINEERING LABORATORY, INC.	Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	KYOCERA	Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 18 of 21

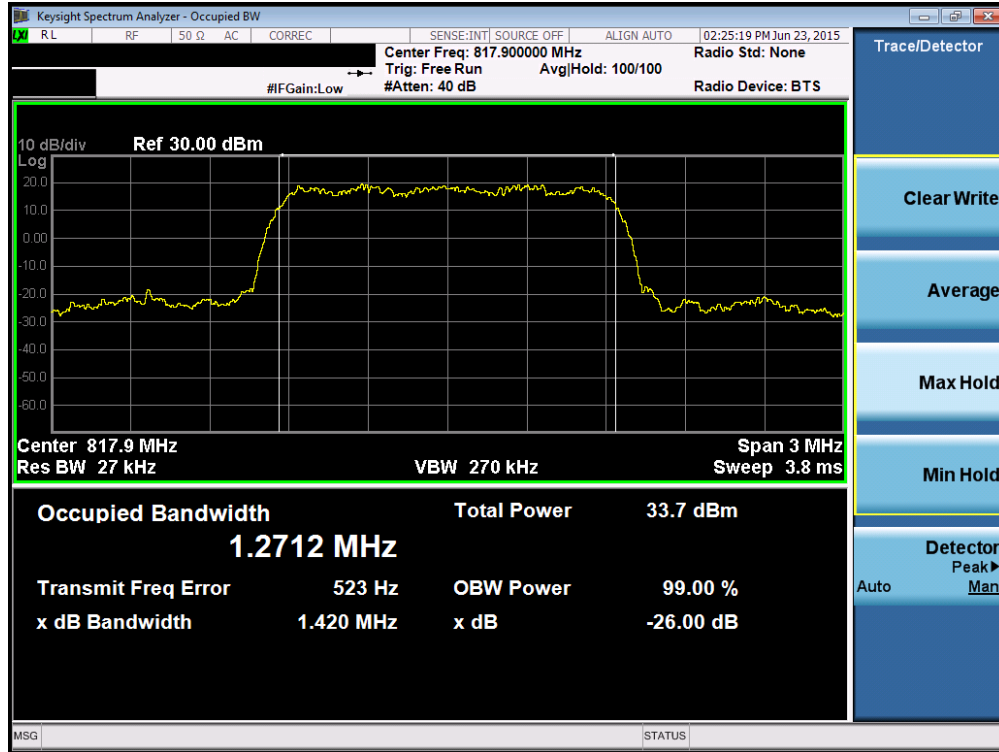


Plot 7-5. Conducted Spurious Plot (Ch. 684)

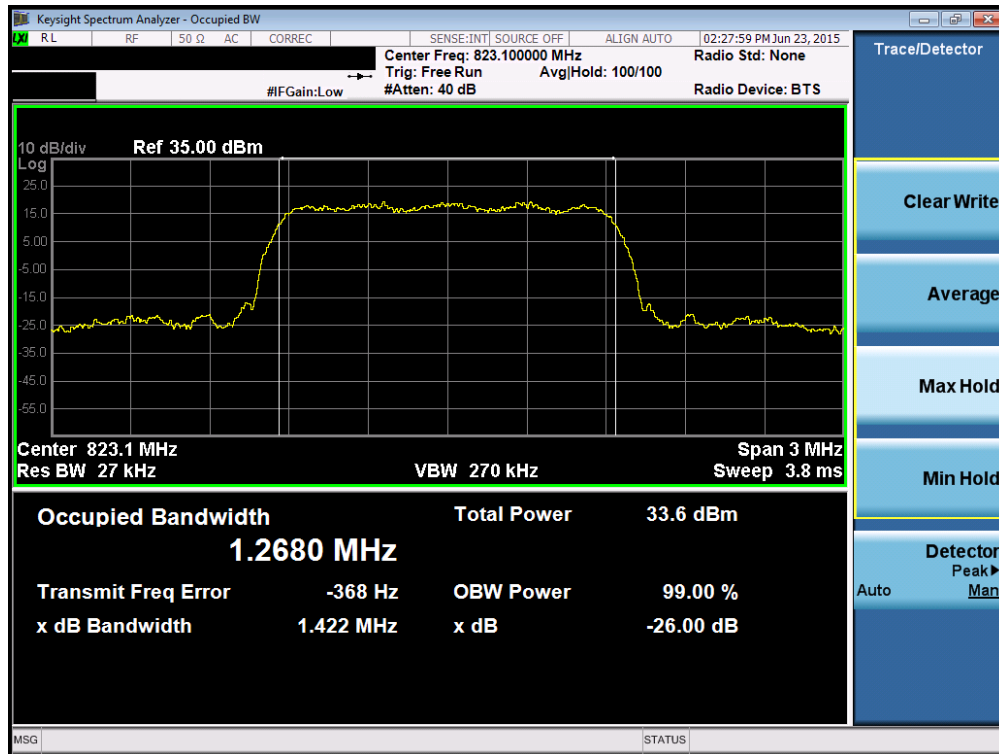


Plot 7-6. Channel Edge Plot (Ch. 684)

FCC ID: V65E4281	PCTEST ENGINEERING LABORATORY, INC.	Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	KYOCERA	Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 19 of 21



Plot 7-7. Occupied Bandwidth Plot (Ch. 476)


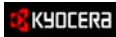


Plot 7-8. Occupied Bandwidth Plot (Ch. 684)

FCC ID: V65E4281	PCTEST ENGINEERING LABORATORY, INC.	Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	KYOCERA	Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 20 of 21

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Kyocera Portable Handset FCC ID: V65E4281** complies with all the requirements of Parts 90 of the FCC rules.

FCC ID: V65E4281		Part 90 CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1506221314.V65	Test Dates: June 23 - July 06, 2015	EUT Type: Portable Handset		Page 21 of 21