



Test Report

Prepared for: Kenwood USA Corporation

Model: NX-200-K, NX-200S-K, NX-200-K2, TK-5220-K, TK-5220-K2

FCC ID: ALH378400

Description: VHF Digital Transceiver

To

FCC Part 80 – Class II Permissive Change

Date of Issue: July 17, 2012

On the behalf of the applicant:

Kenwood USA Corporation
Communications Division
3970 Johns Creek Court
Suite 100
Suwanee, GA 30024

Attention of:

Joel Berger, Research & Development
Ph: (678)474-4722
E-Mail: jberger@kenwoodusa.com

Prepared By
Compliance Testing, LLC
3356 N San Marcos Pl, Suite 107
Chandler, AZ 85225-7176
(866) 311-3268 phone / (480) 926-3598 fax
www.compliancetesting.com
Project No: p1250007

Greg Corbin
Project Test Engineer

This report may not be reproduced, except in full, without written permission from Compliance Testing
All results contained herein relate only to the sample tested



Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	July 17, 2012	Greg Corbin	Original Document



Table of Contents

<u>Description</u>	<u>Page</u>
Standard Test Conditions and Engineering Practices	6
Test Result Summary	8
Carrier Output Power (Conducted)	9
Conducted Spurious Emissions	10
Emission Masks (Occupied Bandwidth)	11
Necessary Bandwidth Calculations	13
Test Equipment Utilized	14



ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated January 2009)

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to <http://www.compliancetesting.com/labscope.html> for current scope of accreditation.

Testing Certificate Number: **2152.01**



FCC OATS Reg, #933597

IC Reg. #2044A-1

Non-accredited tests contained in this report:

N/A



The Applicant has been cautioned as to the following:

15.21: Information to the User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a): Special Accessories

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.



Test and Measurement Data

Sub-part

2.1033(c)(14):

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II, Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057, and the following individual Parts: 80.

Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing.

In accordance with ANSI/C63.4-2009, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Environmental Conditions		
Temp (°C)	Humidity (%)	Pressure (mbar)
21.9 – 24.0	50.1 – 56.6	967.6 – 968.7

Measurement results, unless otherwise noted, are worst-case measurements.

EUT Description: VHF Digital Transceiver

Models associated with FCC ID: ALH378400 - NX-200-K, NX-200S-K, NX-200-K2, TK-5220-K, TK-5220-K2

Model tested: NX-200-K2 (S/N:A8C01053)

Additional Information:

This report is for a C2PC to add Part 80 to the family of radios associated with FCC ID: ALH378400.

The Part 80 frequency band being added, 156 – 162 MHz is already a subset of the existing certified radio frequency range of 150 – 174 MHz.

There have been no changes to the radio since the original certification.

To show compliance, Conducted Output Power, Conducted Spurious Radiation and Emission Mask were measured on one frequency (156.8 MHz) inside the Part 80 frequency band.

EUT Operation during Tests

EUT was test under normal operating conditions.

The EUT was modulated with a 2500 KHz sinewave at 500 mv p-p for the emission mask and conducted spurious radiation.



Accessories:

Qty	Description	Mfg	Model	S/N
1	Audio Test Fixture	Kenwood	N/A	0306
1	Ni-MH Battery Pack	Kenwood	KNB-50NC	0417

Cables: None

Modifications: None

15.203: Antenna Requirement:

- The antenna is permanently attached to the EUT
- The antenna uses a unique coupling
- The EUT must be professionally installed
- The antenna requirement does not apply



Test Result Summary

Specification	Test Name	Pass, Fail, N/A	Comments
2.1046 80.215	Carrier Output Power (Conducted)	Pass	
2.1051 80.211(f)	Conducted Spurious Emission	Pass	
80.211(f)	Emission Masks (Occupied Bandwidth)	Pass	
2.202	Necessary Bandwidth Calculation	Pass	



Carrier Output Power (Conducted)

Name of Test: Carrier Output Power (Conducted)

Engineer: Greg Corbin

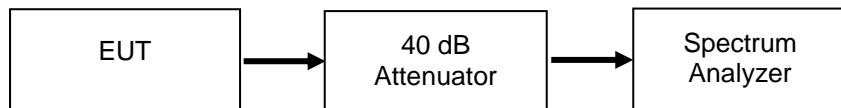
Test Equipment Utilized: i00331

Test Date: 7-16-2012

Measurement Procedure

The Equipment Under Test (EUT) was connected to a spectrum analyzer as shown in the test set-up. The attenuator and cable loss (40.2 dB) were input to the spectrum analyzer as reference level offsets before recording final measurements. The peak readings were taken and the result was then compared to the limit.

Test Setup



High Power Transmitter Peak Output Power

Tuned Frequency (MHz)	Recorded Measurement		Limit (Watt)	Result
	(dBm)	(Watt)		
156.8	36.98	4.98	10	Pass



Conducted Spurious Emissions

Name of Test:

Conducted Spurious Emissions

Engineer: Greg Corbin

Test Equipment Utilized:

i00118, i00126, i00331

Test Date: 7-17-2012

Test Procedure

The EUT was connected as shown in the test set-up.

A tunable notch filter was utilized to ensure the fundamental did not put the spectrum analyzer into compression. The resolution bandwidth set for 100 kHz and the reference level was adjusted to ensure the system had sufficient dynamic range to measure spurious emissions.

A modulation frequency of 2.5 kHz at a level of 500 mVPP was input into the EUT

Per Part 80.211(f)(3) an average detector was used in recording the spurious emissions.

The frequency range from 30 MHz to the 10th harmonic of the fundamental transmitter was observed and plotted. No signal other than the fundamental was observed.

The highest noise floor reading from 30 MHz to 1568 MHz was recorded.

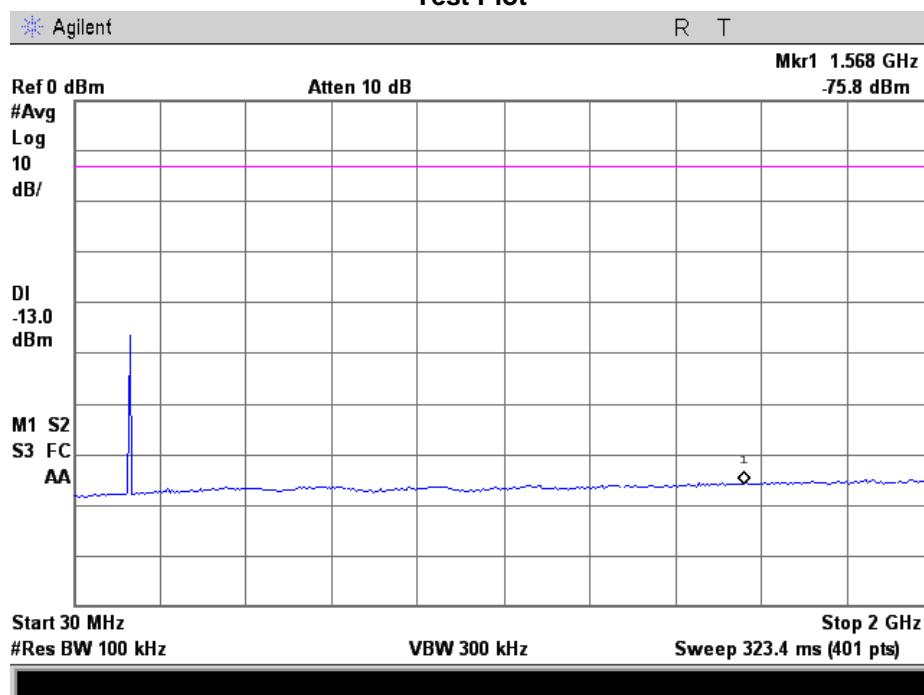
Test Setup



High Power Conducted Spurious Emissions Summary Test Table

Tuned Frequency (MHz)	Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Specification Limit (dBm)	Result
156.8 MHz	1568	-75.8	-13	Pass

Test Plot





Emission Masks (Occupied Bandwidth)

Name of Test:

Emission Masks (Occupied Bandwidth)

Engineer: Greg Corbin

Test Equipment Utilized:

i00118, i00331

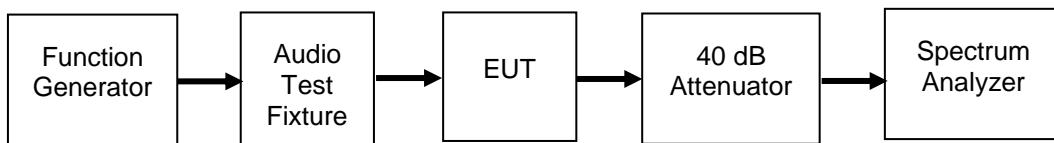
Test Date: 7-16-2012

Measurement Procedure

The EUT was connected as shown in the test set-up to verify that the EUT meets the required emissions mask per Part 80.211(f).

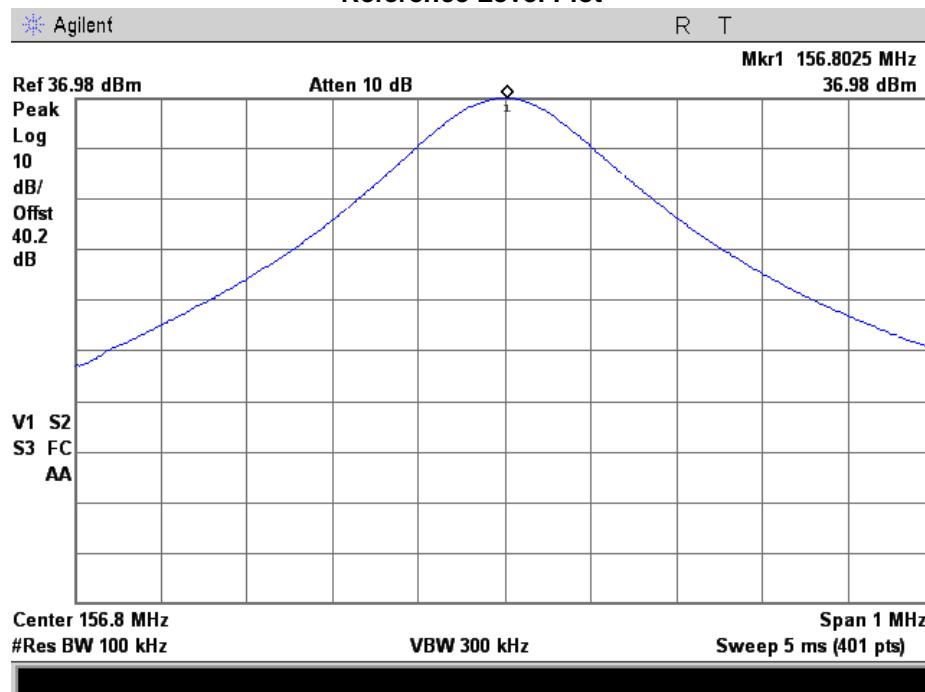
A reference level plot is provided to verify that the peak power was established prior to testing the mask. A modulation frequency of 2.5 kHz at a level of 500 mVPP was input into the EUT.

Test Setup



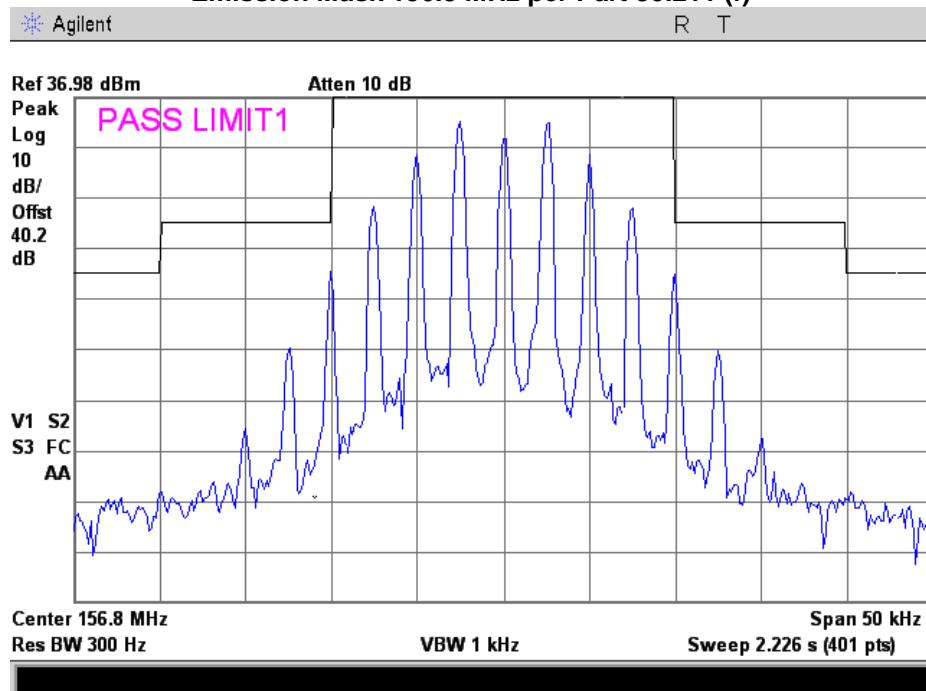
Occupied Bandwidth Plots

Reference Level Plot





Emission Mask 156.8 MHz per Part 80.211 (f)





Necessary Bandwidth Calculations

Name of Test: Necessary Bandwidth Calculations
Test Equipment Utilized: 2.202

Engineer: Greg Corbin
Test Date: 7-16-2012

Modulation = 16K0F3E	
Necessary Bandwidth Calculation:	
Maximum Modulation (M) kHz	= 3
Maximum Deviation (D), kHz	= 5
Constant Factor (K)	= 1
Necessary Bandwidth (B _N), kHz	= $(2 \times M) + (2 \times D \times K)$
	= 16.0



Test Equipment Utilized

Description	Manufacturer	Model Number	CT Asset #	Last Cal Date	Cal Due Date
Function Generator	HP	33120A	i00118	Verified on: 7-16-2012	
Tunable Notch Filter	Eagle	TNF-1-(100-500MHz)	i00126	Verified on: 7-16-2012	
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	11/5/11	11/5/12
Spectrum Analyzer	Agilent	E4407B	i00331	4/20/12	4/20/13

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT