



FCC/IC Test Report

FOR

Intel Corporation

Model Name: DZ110

**Product Description: Smartphone with GSM/GPRS/EDGE, UMTS/HSDPA/LTE+,
Wi-Fi, BT, NFC and GPS Radios**

FCC ID: O2Z-DZ110
IC ID: 1000W – DZ110

47 CFR Part 15

CHANNEL_PLAN_COMPLIANCE

TEST REPORT #: EMC_INTEL-039-14001_ CHANNEL_PLAN_COMPLIANCE

DATE: 2014-06-11



FCC :
Accredited

IC recognized #
3462B-1

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1 Assessment

The document 'DZ110 Operational Description' which will be filed under exhibit type 'Operational Description' contains the detail channel plan for the frequency range under investigation (2.4GHz/5GHz DTS and 5GHz UNII) as well as details about the implementation to meet the requirements and definitions regarding master and slave mode, related channel use permissions etc. as stipulated in FCC part 15.202, 15.247 and 15 E, and in associate FCC guidance provided through valid versions of KDBs 848637 and 594280.

The following equipment (and as identified in Ch.3 of this test report) has been verified to behave according to the Operational Description and meet the requirements of the above standards. No deviations were ascertained during the course of the tests performed.

Company	Description	Model #
Intel Corporation	Smartphone with GSM/GPRS/EDGE, UMTS/HSDPA/LTE+, Wi-Fi, BT, NFC and GPS Radios	DZ110

Responsible for Testing Laboratory:

Franz Engert			
2014-06-11	Compliance	(Manager Compliance)	
Date	Section	Name	Signature

Responsible for the Report:

Dan Le			
2014-06-11	Compliance	(EMC Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
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Telephone:	+1 (408) 586 6200
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Test Lab Manager:	Franz Engert
Responsible Project Leader:	Saman Rami

2.2 Identification of the Client

Applicant's Name:	Intel Corporation
Street Address:	2200 Mission College MS:SC1-20
City/Zip Code	Santa Clara, CA 94085
Country	USA
Contact Person:	Christine Ryan
Phone No.	+1 (408) 300-2167
e-mail:	Christine.m.ryan@intel.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as client.
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name / Model No:	DZ110
HW / SW Revision :	HW version PR2D.2 / SW version 4.4.2
FCC-ID / IC-ID:	O2Z-DZ110
Product Description:	Smartphone with GSM/GPRS/EDGE, UMTS/HSDPA/LTE+, Wi-Fi, BT, NFC and GPS Radios
Frequency Range:	2400 - 2483 MHz and 5725 – 5825 MHz
Wi-Fi subsystem Modes of Operation:	Wi-Fi (802.11 a/b/g/n/ac). BCM4339 architecture. - UNII-1 Client with passive scan for indoor use only - UNII-2-A, UNII-2-C Client with passive scan - UNII-3 Client with Active Scan, Hotspot and ad-hoc mode - DFS client only - TCP is not supported - Channels 12-14, 118 - 128, 138 – 144 are not supported - 1 transmit and 1 receive chain (no MIMO technology support) - 80+80MHz or 160MHz channels are not supported
Data rates used:	
Power supply	AA lithium battery pack (dedicated) Voltage Range 3.6V-4.35V DC Nominal Voltage 3.8V DC
operating temperature range	-10°C to 55°C
Prototype / Production unit	Prototype

3.2 Identification of the Equipment under Test (EUT)

EUT #	Serial Number	Sample	HW/FW Version	Notes
1	RHBEC244302204	Conducted	PR2.0 / RHB JB r42-85	The DUT was tested with “off the shelf” SW configuration including the Android operating system SW version 4.4.2 IFWI version 0003.00B4and Kernel version 3.10.20-262866.

4 Summary of measurement results

The equipment (as identified in Ch.3 of this test report) was evaluated against the behavior specified in “DZ110 Operational Description” concerning the implementation of default channel/mode support, USA channel/mode support, GEOLOCATION procedure, and possible error modes in the unlicensed bands of operation. No deviations were ascertained during the course of the tests performed.

The behavior of the DUT was found to be in full compliance with the mechanism described.

5 Test Setup

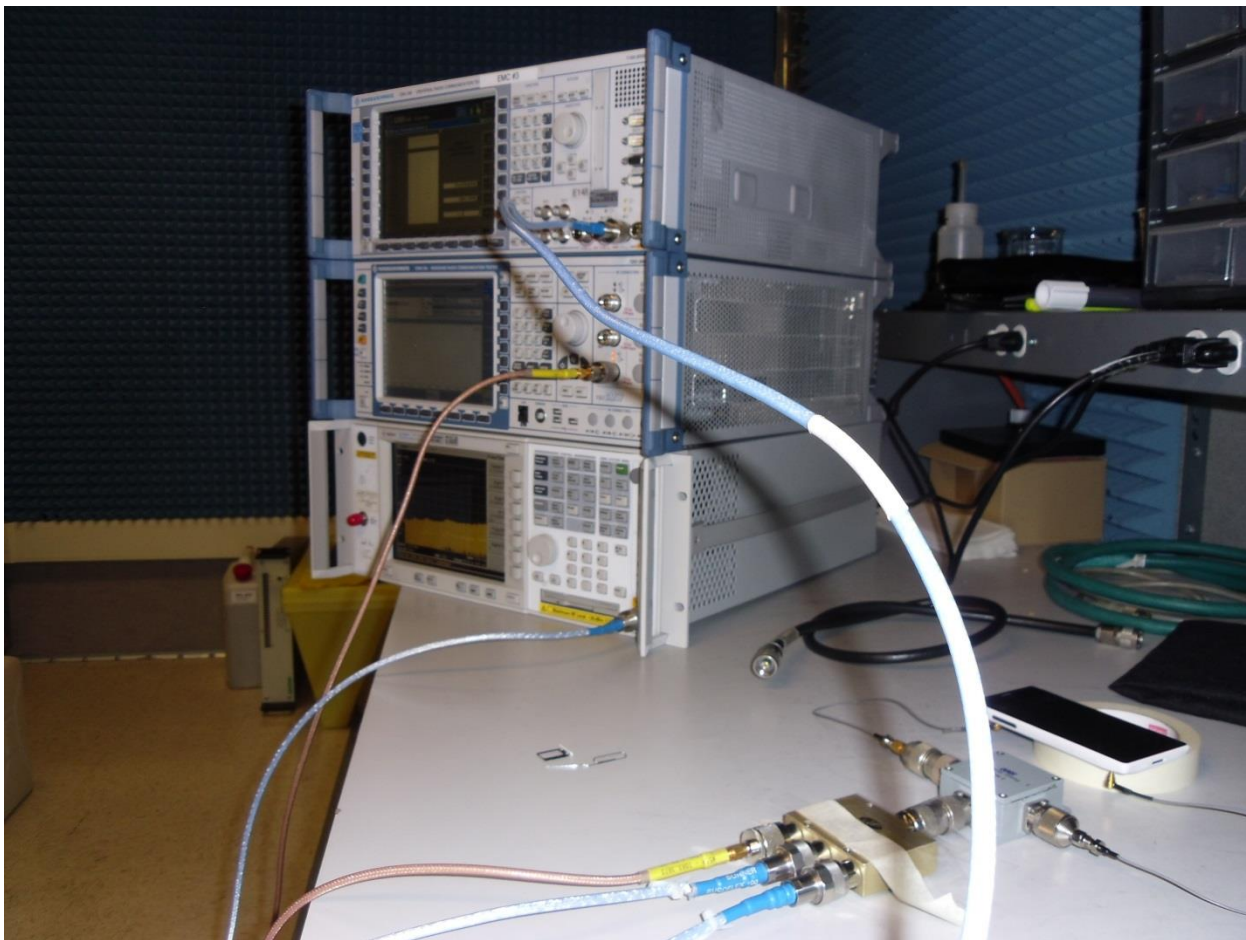
5.1 Configuration

R&S CMU200 to establish a GSM connection to update MCC, MNC

R&S CMW500 to establish a Wi-Fi link with the DUT

R&S FSU spectrum analyzer to measure power density of DUT

The DUT is connected to the Wi-Fi radio, spectrum analyzer and to the cellular radio via cable through a 1x3 divider and a 1x2 divider is used to connect to the 50Ohm connector for cellular radio and the 50Ohm connector for WiFi radio.



5.2 Environmental conditions during Test:

The following environmental conditions were maintained during the course of testing:

Ambient Temperature: 20-25°C

Relative humidity: 40-60%

5.3 Dates of Testing:

05/19/2014 – 05/20/2014

6 Measurements

6.1 Test 1

6.1.1 Function/mode under test:

The DUT is used as Wi-Fi client in default mode (without geo-location known). It is tested whether it will associate to an AP, or transmit in the attempt to associate on one of the channels that are not part of the default channel plan as described in “DZ110 Operational Description”.

6.1.2 Procedure:

Set Wi-Fi channel on CMW to 12. Set DUT into airplane mode to ensure that it will not retrieve MCC/MNC. Power cycle the DUT to set it into default mode. Activate Wi-Fi client mode through the settings menu and leave DUT in airplane mode. Wait for DUT to associate to CMW. Monitor on spectrum analyzer for power emitted from DUT on ch12. Repeat for channel 14, 52 and 140. Verify test setup by attempting a connection on ch11.

6.1.3 Pass criterion:

The DUT shall not associate to channel 12-14 and channel 52-140 and shall not transmit in the attempt to associate. A connection on ch11 must be successful.

6.1.4 Result:

PASS. No connection possible to channel 12-14, no connection possible to channel 52-140. No power from DUT captured on Spectrum Analyzer. On ch11 connection is successful.

6.2 Test 2

6.2.1 Function/mode under test:

The DUT is used as Wi-Fi client in USA mode.

It is tested whether it will associate to an AP or transmit in the attempt to associate on one of the channels that are not part of the USA channel plan as described in “DZ110 Operational Description”.

6.2.2 Procedure:

Set Wi-Fi channel on CMW to 11. Set CMU to MCC310 MNC 030 to simulate USA. Attach DUT to CMU via GSM. Activate Wi-Fi client mode through the settings menu and wait for DUT to associate to ch11. Monitor on spectrum analyzer for power emitted from DUT on ch11. Change Wi-Fi channel to 12, 13 14, 118, 122, 128.

6.2.3 Pass criterion:

The DUT shall not associate to channel 12, 13, 14, 118, 122 and 128 and shall not transmit in the attempt to associate.

6.2.4 Result:

PASS. No power from DUT captured on Spectrum Analyzer.

6.3 Test 3

6.3.1 Function/mode under test:

The DUT is used as Wi-Fi AP in default mode (without geo-location known).

It is tested whether it transmits any beacons on one of the channels that are not part of the default channel plan as described in “DZ110 Operational Description”.

6.3.2 Procedure:

Disconnect CMW. Set DUT into airplane mode to ensure that it will not retrieve MCC/MNC. Power cycle the DUT to set it into default mode. Activate Wi-Fi hot-spot mode through the settings menu and leave DUT in airplane mode. Check with the spectrum analyzer whether DUT transmits any beacons on the selected channel. Attempt to set the hot-spot to any channel not supported in default mode according to “DZ110 Operational Description”. Verify the test setup by setting up a hotspot on channel 11 with a Wi-Fi monitoring tool.

6.3.3 Pass criterion:

It shall not be possible to set the DUT into hot-spot mode on channel 12-14 and channel 52-140. Setting up a hotspot on channel 11 must work.

6.3.4 Result:

PASS. Configuration of hot spot on channel 12-14 and on any 5GHz channel was not possible via SW-menu. Setting up hotspot on channel 11 was successful.

6.4 Test 4

6.4.1 Function under test:

The DUT is used as Wi-Fi station in default mode. It is tested that the DUT in default mode (without geo-location known) will not transmit using active scan.

6.4.2 Procedure:

Disconnect CMW. Set DUT into airplane mode to ensure that it will not retrieve MCC/MNC. Power cycle the DUT to set it into default mode. Activate Wi-Fi-client mode through the settings menu and leave DUT in airplane mode. Check with the spectrum scanning 2.4GHz to 2.483GHz range on peak hold whether any signal from DUT can be received. Switch the Wi-Fi client mode on and off 5 times. Repeat this procedure while monitoring the 5.15 to 5.825 GHz range.

6.4.3 Pass criterion:

No signal detected on the spectrum analyzer.

6.4.4 Result:

PASS. Only noise floor is visible on spectrum analyzer.

6.5 Test 5

6.5.1 Function under test:

It is tested whether removing the SIM card sets the DUT into default mode.

6.5.2 Procedure:

The CMU is configured to MCC 262 MNC 01 to simulate a location in Germany. Attach the DUT to the CMU via GSM. Set the CMW to channel 13 and associate the DUT. Terminate the Wi-Fi connection by pressing dis-associate button on CMW and remove the SIM card without power cycling the DUT. Wait for 2 minutes for DUT to re-associate to channel 13. Verify the setup by then attempting to re-associate to channel 11.

6.5.3 Pass criterion:

Connection to channel 13 shall be possible with German geo-location. Connection to channel 13 shall not be possible after removing SIM card. Connection to channel 11 shall be possible after removing SIM card.

6.5.4 Result:

PASS.

6.6 Test 6

6.6.1 Function under test:

The DUT is used as Wi-Fi station in default mode. It is tested that the DUT in default mode (without geo-location known) and USA mode (with geo-location known) will not transmit with power densities higher than FCC regulative Power. This is required as the powers densities in the 15.247 and 15.407 reports have been measured by stimulating the TX with a tool that is not subject of the control of the mechanisms of the DUT SW.

6.6.2 Procedure:

Set Wi-Fi channel on CMW to 1. Set DUT into airplane mode to ensure that it will not retrieve MCC/MNC. Power cycle the DUT to set it into default mode. Activate Wi-Fi client mode through settings menu and leave DUT in airplane mode. Wait for 2 minutes for DUT to associate to CMW. Measure the power densities on channel 1 with spectrum analyzer. Stimulate traffic from DUT by entering Package Error Measurement Mode. Attach the DUT to the CMU with MCC310 MNC 030 to simulate USA. Turn off airplane mode. Re-associate the DUT to channel 1 and measure the power densities on channel 1 with spectrum analyzer. Repeat the whole procedure for channel 11, 36, 52, 100, 149.

6.6.3 Pass criterion:

The DUT will use no more than the below power densities.

FCC	☒ Part 15 Subpart C, §15.407(a)(1)(2)(5)
Limits [dBm/MHz]	FCC: U-NII 1: $\leq 4\text{dBm} + 6\text{dB} - 2.8\text{dB} = 7.2\text{dBm}$ in any 1 MHz band U-NII 2+ext.: $\leq 11\text{dBm} + 6\text{dB} - 2.8\text{dB} = 14.2\text{dBm}$ in any 1 MHz band U-NII 3: $\leq 17\text{dBm} + 6\text{dB} - 2.8\text{dB} = 20.2\text{dBm}$ in any 1 MHz band

6.6.4 Result:

PASS. Power densities are $< 7.2\text{dBm}$ for default mode and USA mode for channels 1, 11, 36, 52, 100, 149.

6.7 Test 7

6.7.1 Function under test:

DUT is used as Wi-Fi station in default mode. It is tested whether the Country code setting of the Wi-Fi network can overrule the specified way of selecting allowed channel via MCC, MNC by changing country code on the CMW to Germany (DE) and checking if channel 12 and 13 will become available.

6.7.2 Procedure

Set Wi-Fi channel on CMW to 12. Set DUT into airplane mode to ensure that it will not retrieve MCC/MNC. Power cycle the DUT to set it into default mode. Activate Wi-Fi client mode through the settings menu and leave DUT in airplane mode. Wait for 2 minutes for DUT to associate to CMW. Set the country code on CMW to “DE”. Wait for 2 minutes for DUT to associate to CMW. Verify test setup by setting CMW to ch11.

6.7.3 Pass criterion:

No association possible until channel is set to 11.

6.7.4 Result:

PASS.

6.8 Test 8

6.8.1 Function under test:

DUT is used as Wi-Fi station in DE (Germany) mode being associated to channel 13. It is tested whether the Wi-Fi connection will be terminated latest after one hour after the simulated German cellular network is switched off.

6.8.2 Procedure

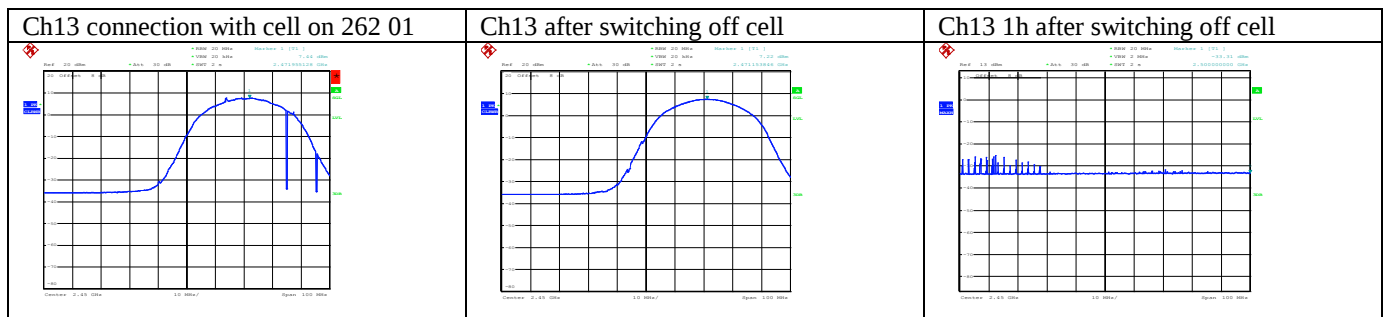
Set Wi-Fi channel on CMW to 13. Set the CMU to GSM cellular on MCC/MNC 262/01 to simulate a location in Germany. Wait for the DUT to perform a location update to the German network. Associate the DUT to channel 13 by activating Wi-Fi client mode through the settings menu. Start a BLER measurement and record resulting Wi-Fi traffic on the spectrum analyzer. Switch off the cell simulating location in Germany. Run another BLER and record result on SA. Wait for one hour and start and record another BLER measurement.

6.8.3 Pass criterion:

No power transmitted from DUT after waiting time of one hour after switching off the cell simulating location in Germany.

6.8.4 Result:

PASS



7 Test Equipment and Ancillaries used for tests

Item Name	Manufacturer	Equipment Type	Model	Serial #	Calibration Cycle	Last Calibration Date
Binconlog Antenna 3141	EMCO	Binconilog Antenna	3141	0005-1186	3 years	4/5/2012
Digital Radio Comm. Tester CMU 200# 4	R&S	Digital Radio Comm. Tester	CMU 200# 4	110229	2 Years	6/15/2013
Digital Radio Comm. Tester CMU 200 #1	R&S	Digital Radio Comm. Tester	CMU 200 #1	101821	2 Years	6/17/2013
Digital Radio Comm. Tester CMU 200 #2	R&S	Digital Radio Comm. Tester	CMU 200 #2	109879	2 Years	6/15/2013
Digital Radio Comm. Tester CMU 200 #3	R&S	Digital Radio Comm. Tester	CMU 200 #3	110759	2 Years	6/15/2013
ESU Receiver	R&S	EMI Receiver	ESU40	100251	2 Years	9/13/2013
Horn Antenna 3115	EMCO	Horn Antenna	3115	35114	3 years	3/6/2012
Horn Antenna 3116	EMCO	Horn Antenna	3116	70497	3 years	3/2/2012
LISN ESH3-Z5	R&S	LISN	ESH3-Z5	836679/003	2 Years	6/18/2013
LISN ESH3-Z6	R&S	LISN	ESH3-Z6	836154/011	2 Years	6/16/2013
LISN FCC-LISN-50-25-2-08	FCC	LISN	FCC-LISN-50-25-2-08	70497	2 Years	7/12/2012
Log Periodic Antenna 3149	ETS Lindgren	Log Periodic Antenna	3149	1186	3 years	8/23/2011
Loop Antenna 6512	ETS Lindgren	Loop Antenna	6512	49838	3 years	8/1/2011
Thermometer Humidity TM320	Dickson	Thermometer Humidity	TM320	5280063	1 Year	4/15/2013
Thermometer Humidity TM325	Dickson	Thermometer Humidity	TM325	5285354	2 Years	4/15/2013
FSU 26	R&S	Spectrum Analyzer	FSU 26	100189	2 Years	6/1/2013
SMP04	R&S	Signal Generator	SMP04	100151	2 Years	6/17/2013

Test Report #: EMC_INTEL-032-13001_CHANNEL_PLAN_COMPLIANCE

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8 Revision History

Date	Report Name	Changes to report	Report prepared by
2014-06-11	EMC_INTEL-039-14001_CHANNEL_PLAN_COMPLIANCE	First Version	F. Engert