TEST REPORT

Report Number: 14282059-E3V2

Applicant	:	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A
Model	:	A2889, A2890, A2891, A2892
Brand	:	APPLE
FCC ID	:	BCG-E8150A, BCG-E8151A, BCG-E8152A
IC	:	579C-E8150A, 579C-E8151A, 579C-E8152A
EUT Description	:	SMARTPHONE
Test Standard(s)	:	FCC CFR47 PART 22H, 24E, AND 27L ISED RSS-GEN ISSUE 5, RSS-132 ISSUE 3, RSS-133 ISSUE 6, AND RSS-139 ISSUE 3

Date Of Issue:
AUGUST 18, 2022

Prepared by:
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ACCREDITED
CERT #0751.05

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	6/23/2022	Initial Review	
V2	8/18/2022	Section 5.3 Updated Model change column, fixed model typo, and added A2892 to the description paragraph. Section 5.7 removed TNE from BCG-E8152A.	Matthew Wu

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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A
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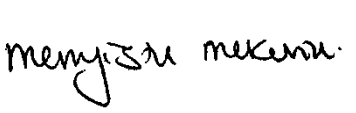
Brand	APPLE
FCC ID	BCG-E8150A, BCG-E8151A, BCG-E8152A
IC	579C-E8150A, 579C-E8151A, 579C-E8152A
EUT Description	SMARTPHONE
Serial Number	D7F61R0HQL, XD20VM92ML, TWVJ4DZKX6, FJFTX061GF, PC22Q43TLY
Sample Receipt Date	APRIL 29, 2022
Date Tested	MAY 24, 2022 to JUNE 01, 2022
Applicable Standards	FCC CFR 47 Part 2, Part 22, Part 24, and Part 27 ISED RSS-GEN Issue 5, RSS-132 Issue 3, RSS-133 Issue 6, RSS-139 Issue 3.
Test Results	COMPLIES

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released By:	Reviewed By:	Prepared By:
		
Mengistu Mekuria Staff Engineer UL LLC.	Tewodros Woldemichael Laboratory Engineer UL LLC.	Binod Sitaula Laboratory Engineer UL LLC.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following:

- ANSI C63.26:2015
- FCC CFR 47 Part 2, Part 22, Part 24, and Part 27
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01. Determining ERP and EIRP
- ISED RSS-GEN Issue 5, RSS-132 Issue 3, RSS-133 Issue 6, RSS-139 Issue 3.

3. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, certification #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☒	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA	US0104	22541	550739
☐	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA	US0104	2324B	550739

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

4.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U_{Lab}
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB
Occupied Channel Bandwidth	±1.22 %
Temperature	±2.26%
Supply voltages	±0.57 %
Time	±3.39 %

Uncertainty figures are valid to a confidence level of 95%.

4.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

5. INTRODUCTION OF TEST DATA REUSE

5.1. DESCRIPTION OF EUT

The Apple iPhone is a smartphone with multimedia functions (music, application support, and video),cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G FR1, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and MSS. All models except refetence model support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is not user accessible.

Testing was performed on the parent model and is used to support the application for the parent and variants identified in this report based on the test plan submitted and approved via KDB inquiry by the FCC and by ISED-Canada.

5.2. INTRODUCTION

This application for certification is leveraging the data reuse procedures from KDB 484596 D01 based on reference FCC ID: BCG-E8140A / IC: 579C-E8140A to cover variant model FCC ID: BCG-E8150A / IC: 579C-E8150A, FCC ID: BCG-E8151A / IC: 579C-E8151A, and FCC ID: BCG-E8152A / IC: 579C-E8152A. The major difference between the parent/reference model and the variant model is the depopulation in the variant model of the mmWave transmitter, and some LTE and 5G NR Bands. All other circuitry and features are identical. The data reuse test plan was approved via manufacturer KDB inquiry.

5.3. MODEL DIFFERENCES

The manufacturer hereby declares the following for models A2650, A2889, A2890, A2891, A2892.

A2650, A2889, A2890, A2891, and A2892 are highly similar, with the only differences being listed on the table below:

Model	FCC ID	IC	Model Changes
A2650	BCG-E8140A	579C-E8140A	Reference Model
A2889	BCG-E8150A	579C-E8150A	Variant model Removed FR2 from the reference model
A2890	BCG-E8151A	579C-E8151A	Variant model Removed FR2, LTE B11/14/29/71, and 5G NR n14/n71 from the reference model
A2891/A2892	BCG-E8152A	579C-E8152A	Variant model Removed FR2, LTE B11/14/29/71, and 5G NR n14/n71 from the reference model

*Note:

They have the same PCB layout, design, common components, antennas, antenna locations and housing cases.

More specifically, their cellular modem, Wi-Fi, BT, NFC, WPT and UWB transmitters are identical, and removal of cellular bands is done by software and depopulation of band-specific components associated with the removed bands.

Spot check verification has been done on models A2889, A2890, A2891, and A2892 in accordance with the test plan approved via KDB inquiry. Comparison of the models, upper deviation is within 3dB range and all tests are under FCC/ISED Technical Limits. The results documented for model A2650 may be applied as representative to models A2889, A2890, A2891, A2892.

5.4. SPOT CHECK VERIFICATION RESULTS SUMMARY FOR A2889.

A2889 SPOT CHECK RESULTS							
Technology	Worst Mode	Test Item	Measured	Original Model: A2650	Sub Model: A2889	Delta (dB)	Remarks
			Frequency MHz	FCC ID: BCG-E8140A IC:579C-E8140A (dBm)	FCC ID: BCG-E8150A IC:579C-E8150A (dBm)		
GSM 850	GPRS 1 Slot	Cond Power	824-849	33.35	33.50	0.15	
GSM 1900	GPRS 1 Slot	Cond Power	1850-1910	31.50	32.00	0.5	
WCDMA B5	REL 99	Cond Power	824-849	25.70	25.70	0.00	
WCDMA B2	REL 99	Cond Power	1852.4	25.70	25.70	0.00	
WCDMA B4	REL 99	Cond Power	1732.6	25.70	25.70	0.00	

5.5. SPOT CHECK VERIFICATION RESULTS SUMMARY FOR A2890

A2890 SPOT CHECK RESULTS							
Technology	Worst Mode	Test Item	Measured	Original Model: A2650	Sub Model: A2890	Delta (dB)	Remarks
			Frequency MHz	FCC ID: BCG-E8140A IC:579C-E8140A (dBm)	FCC ID: BCG-E8151A IC:579C-E8151A (dBm)		
GSM 850	GPRS 1 Slot	Cond Power	824-849	33.35	33.50	0.15	
GSM 1900	GPRS 1 Slot	Cond Power	1850-1910	31.50	31.50	0.00	
WCDMA B5	REL 99	Cond Power	824-849	25.70	25.70	0.00	
WCDMA B2	REL 99	Cond Power	1852.4	25.70	25.70	0.00	
WCDMA B4	REL 99	Cond Power	1732.6	25.70	25.70	0.00	

5.6. SPOT CHECK VERIFICATION RESULTS SUMMARY FOR A2891 AND A2892

A2891 AND A2892 SPOT CHECK RESULTS							
Technology	Worst Mode	Test Item	Measured	Original Model: A2650	Sub Model: A2891/A2892	Delta (dB)	Remarks
			Frequency MHz	FCC ID: BCG-E8140A IC:579C-E8140A (dBm)	FCC ID: BCG-E8152A IC:579C-E8152A (dBm)		
GSM 850	GPRS 1 Slot	Cond Power	824-849	33.35	33.44	0.09	
GSM 1900	GPRS 1 Slot	Cond Power	1850-1910	31.50	31.50	0.00	
WCDMA B5	REL 99	Cond Power	824-849	25.70	25.70	0	
WCDMA B2	REL 99	Cond Power	1852.4	25.70	25.70	0	
WCDMA B4	REL 99	Cond Power	1732.6	25.70	25.70	0	

5.7. REFERENCE DETAIL

Reference application that contains the reused reference data.

Equipment Class	Reference FCC ID/ IC	Reference Application	Variant model FCC ID/IC	Report Title/Section
PCE, TNE	BCG-E8140A/ 579C-E8140A	14040863-E7	BCG-E8150A/ 579C-E8150A	FCC_IC 2G/3G Report / All Sections
PCE, TNE	BCG-E8140A/ 579C-E8140A	14040863-E7	BCG-E8151A/ 579C-E8151A	FCC_IC 2G/3G Report / All Sections
PCE, TNE	BCG-E8140A/ 579C-E8140A	14040863-E7	BCG-E8152A/ 579C-E8152A	FCC_IC 2G/3G Report / All Sections

5.8. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version: 0.15.02.

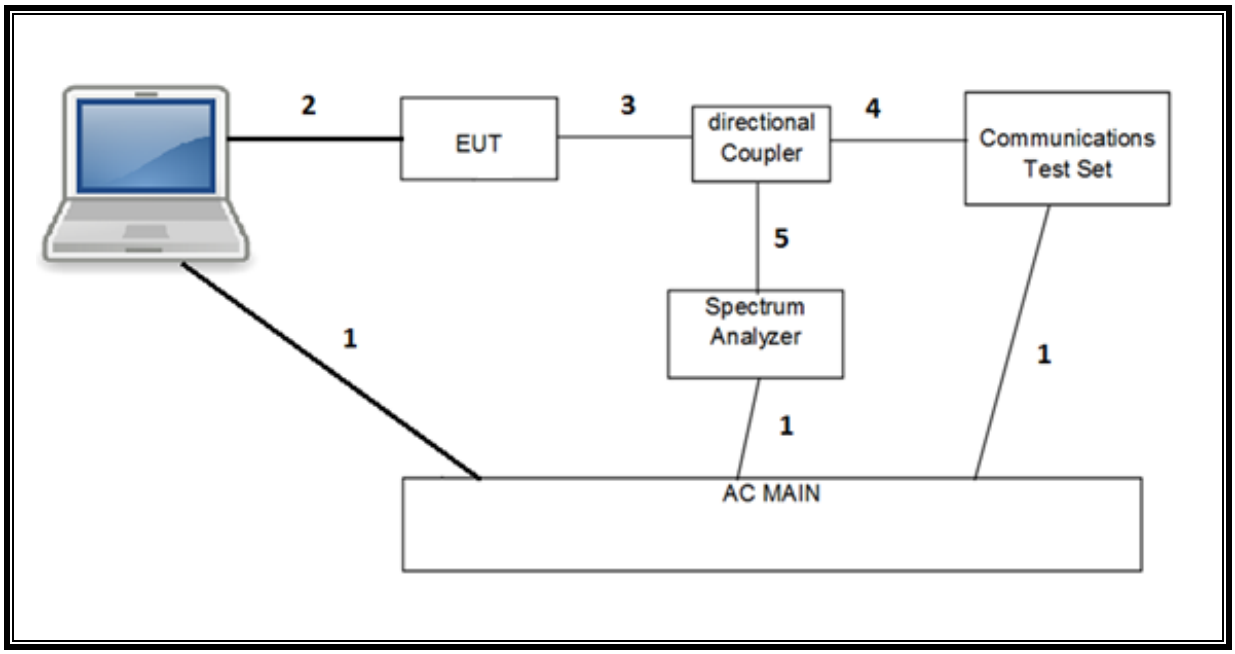
5.9. SPOT CHECK WORST-CASE CONFIGURATION AND MODE

The spot checks were performed on the worst-case configurations based on the parent model of reference report.

5.10. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT						
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID/ DoC**		
Laptop	Apple	MacBook Pro	HRP082673	BCGA1708		
AC/DC adapter	Apple	A1718	C4H64450HH3GN8RA6	--		
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	3	US 115V	Un-shielded	2.0	N/A
2	USB	1	DC	Un-shielded	1.0	N/A
3	RF In/Out	1	EUT	Un-shielded	0.6	N/A
4	RF In/Out	1	Communication Test Set	Un-shielded	1.2	N/A
5	RF In/Out	1	Barrel	N/A	N/A	N/A

CONDUCTED SETUP



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	85212	0/30/2023
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	N9030A	85213	01/19/2023
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	N9030A	125178	01/24/2023
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	85201	02/01/2023
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	85214	02/02/2023
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	80400	02/01/2023
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	80397	02/01/2023
Spectrum Analyzer, PXA, 3Hz to 50GHz w/Ext. Mixer	Keysight	N9030A	T342	02/01/2023
Spectrum Analyzer, PSA 3Hz to 44GHz	Keysight	E4440A	81311	02/02/2023
Directional Coupler	KRYTAR	152610	T1161	09/23/2022
Directional Coupler	KRYTAR	152610	T1536	09/23/2022
Directional Coupler	KRYTAR	152610	T1537	09/23/2022
Power Meter, P-series single channel	Keysight	N1912A	90630	01/24/2023
Power Meter, P-series single channel	Keysight	N1912A	90719	01/24/2023
Power Meter, P-series single channel	Agilent	N1911A	82174	01/24/2023
Power Sensor, P – series, 50MHz to 18GHz, Wideband	Keysight	N1921A	90389	01/25/2023
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	80397	02/01/2023
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	85827	02/21/2023
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	80105	02/21/2023
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	159994	02/23/2023
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	85806	02/22/2023
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	85943	02/20/2023
UL AUTOMATION SOFTWARE				
CLT Software	UL	UL RF	Ver 3.4, May 20, 2022	
Power Measurement Software	UL	UL RF	Ver 3.1.4, April 29, 2022	

NOTES:

1. * Testing is completed before equipment expiration date.

Appendix A – Reference Test Report

Attached is the test report (14040863-E7) containing the reference data from the parent model as detailed in section 5.7.