

# TEST REPORT

# **Report Number :** 14040866-E13V1

- Applicant : APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA. 95014, U.S.A.
  - Model : A2651 (Parent Model) A2893, A2894, A2895, A2896 (Variant Models)
  - FCC ID : BCG-E8141A (Parent Model) BCG-E8154A, BCG-E8155A, BCG-E8156A (Variant Models)
- **EUT Description** : SMARTPHONE
- Test Standard(s) : FCC PART 96.47

Date Of Issue: July 18, 2022

Prepared by: UL LLC 47173 Benicia Street Fremont, CA 94538, U.S.A. TEL: (510) 771-1000 FAX: (510) 661-0888



**Revision History** 

Rev.	Issue Date	Revised By	
V1	7/18/2022	Initial Issue	Steven Tran

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# **1. ATTESTATION OF TEST RESULTS**

Applicant Name and Address	APPLE INC. 1 APPLE PARK WAY CUPERTINO CA 95104, U.S.A.
Model	A2651 (Parent Model) A2893, A2894, A2895, A2896 (Variant Models)
Model Of Testing	A2893
Brand	APPLE
FCC ID	BCG-E8141A (Parent Model) BCG-E8154A, BCG-E8155A, BCG-E8156A (Variant Models)
EUT Description	SMART PHONE
Serial Number	RLJ946DQ7X
Sample Receipt Date	05/17/2022
Date Tested	05/26/2022
Applicable Standards	FCC CFR47 PART 96.47
Test Results	COMPLIES

UL LLC 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 LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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:	Tested By:
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Thu Chan	Mengistu Mekuria	Steven Tran
Staff Engineer	Staff Lab Engineer	Project Engineer
UL LLC	UL LLC	UL LLC

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#### 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC Part 96.47, KDB 940660 D01 Part 96 CBRS Eqpt v03 and WINNF-TS-0122-v1.0.2.

# 3. FACILITIES AND ACCREDITATION

UL LLC 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	US0104	2324A	550739
$\boxtimes$	Building 2: 47266 Benicia Street, Fremont, CA 94538	US0104	22541	550739
	Building 4: 47658 Kato Rd, Fremont, CA 94538	US0104	2324B	550739

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#### 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 <sub>Lab</sub>
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
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

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

# 4.4. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

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#### 5. EQUIPMENT UNDER TEST

# 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, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and MSS. All models support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM) in some models. The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is not user accessible. However, the test data in this report refers only to LTE Band 48 that operates in the CBRS band.

Testing was performed on the variant 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. Due to physical restriction from parent model (e-SIM only), variant model was tested in place since it supports the physical SIM slot required to connect to LTE AP equipment.

The Model and FCC ID covered by this report includes:

Parent Model: A2651, FCC ID: BCG-E8141A

Variant Models: A2893, FCC ID: BCG-E8154A A2894; FCC ID: BCG-E8155A A2895 & A2896, FCC ID: BCG-E8156A

#### 5.2. SOFTWARE AND FIRMWARE

The test utility software used during testing was 0.15.02.

#### 5.3. DESCRIPTION OF TEST SETUP

#### SUPPORT EQUIPMENT

Support Equipment List						
Description	Manufacturer	Model	Serial Number	FCC ID		
Router/AC/DC adapter	ASUS	AC1900	GCIAGO000300	MSQ-RTAC6Uv2		
Laptop AC/DC adapter	Lenovo	4236B92	PBFBKHK	ODS-BRCM1046		

#### I/O CABLES

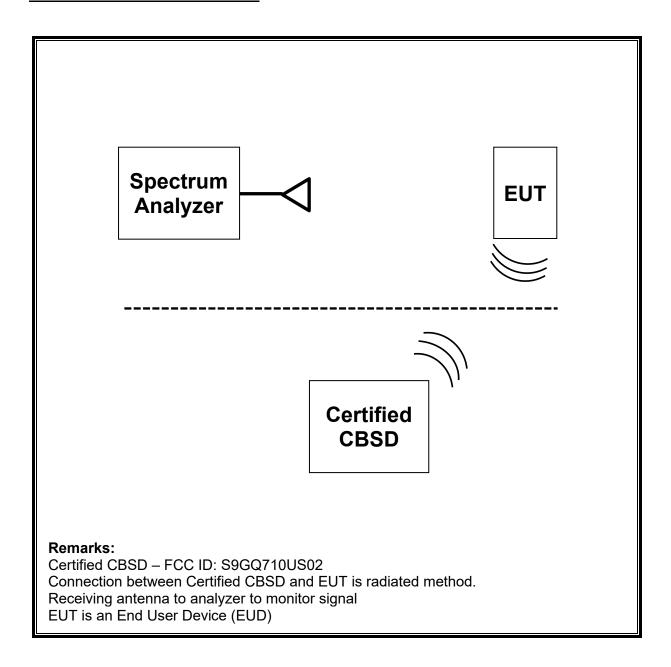
	I/O Cable List							
Cable Port # of identical Connector Cable Type Cable Remarks				Remarks				
No		ports	Туре		Length (m)			
1	AC	1	AC	Un-Shielded	1	N/A		
3	RJ45	3	Ethernet	Un-Shielded	1	N/A		
2	<b>RF Port</b>	2	SMA	Shielded	0.5	N/A		

#### TEST SETUP

The standalone EUT connected to a certified CBSD and Spectrum Analyzer via air and an RF cable respectively.

	•	
UL LLC		FORM NO: CCSUP4701I
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# 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 ID Num Cal I						
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	125179	02/01/2023		
Mount Antenna	Wilson Amplifiers	301126	-	-		

Test Software				
Description Manufacturer Model Version Numbe				
Laptop (Local SAS – WINNForum Test Harness)	Lenovo	PBFBKHK	2.0	

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# 7. END USER DEVICE ADDITIONAL REQUIREMENT

# 7.1. TEST REQUIREMENT

#### FCC Part 96.47

- (a) End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation.
- (1) An End User Device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD.

# 8. TEST PROCEDURE AND EUT CONFIGURATION

KDB 940660 D01 Part 96 CBRS v03, WINNF-TS-0122 V1.0.2

Additional requirements are required to End-User Device LTE Band 48 device base on CBSD protocol. During the test, the EUT and its companion certified CBSD (FCC ID: S9GQ710US02) device communicate with each other via air.

Configuration	Frequency (MHz)	Power (dBm/MHz)	Bandwidth (MHz)
1	3615 - 3635	13	20
2	3665 - 3675	8	10

#### **Configuration 1**

- a) Setup WINNF.PT.C.HBT.1 with 3615MHz-3635MHz and power level 13 dBm/MHz
- b) Enable AP service from Ruckus Cloud Management
- c) Check EUT Transmitter Frequency and power
- d) Disable AP service from Ruckus Cloud management and check EUT stop transmission within 10s.

#### Configuration 2

- a) Setup WINNF.PT.C.HBT.1 with 3665MHz-3675MHz and power level 8 dBm/MHz
- b) Enable AP service from Ruckus Cloud Management
- c) Check EUT Transmitter Frequency and power
- d) Disable AP service from Ruckus Cloud Management and check EUT stop transmission within 10s.

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#### TEST RESULTS

#### 8.1. END USER DEVICE CONFIGURATION 1 (3615MHz - 3635MHz; MaxEIRP: 13 dBm/MHz)

Keysight Spectrum Analyzer - Sv					
RF 50 S		SENSE:INT	ALIGN AUTO Avg Type: RMS	01:46:58 PM May 26, 2022 TRACE 1 2 3 4 5 6	Frequency
art Freq 3.550000	PNO: Fast	Trig: Free Run	Avg Hold: 100/100	TYPE M WWWWW	
	IFGain:Low	#Atten: 10 dB		DET A NNNNN	
			Mkr	2 3.635 00 GHz	Auto Tu
dB/div Ref 0.00 d	IBm			-73.014 dBm	
0.0					Center Fr
).0					3.625000000 G
).0					
).0					Start Fr
).0		Manda Manager			3.550000000 G
0.0			2		
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	alade al Alia alfa Balan Anna an Interna			Provide and the second se	Stop Fr
).0					3.700000000 G
art 3.55000 GHz				Stop 3.70000 GHz	CF Ste
Res BW 1.0 MHz	#VE	SW 3.0 MHz*	Sweep 1	.000 ms (1001 pts)	15.000000 M
R MODE TRC SCL	х	Y EI	INCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> M
1 N 1 f	3.615 00 GHz	-69.601 dBm			
2 N 1 f 3	3.635 00 GHz	-73.014 dBm			Freq Offs
4					0
5				Ξ	
7					
8					Scale Ty
9					Log <u>L</u>
1				-	
		III	1	•	
à			STATUS		
		Oneretie	on Mode		

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Keysight Sp	ectrum Analyzer - Sw	•					
	RF 50 Ω	PNO: Fast		n Av	ALIGN AUTO	02:06:05 PM May 26, 2 TRACE 1 2 3 4 TYPE WWWW DET A N N	Frequency
dB/div	Ref 0.00 d	IFGain:Lov Bm	y #Atten: 10 di			ΔMkr3 5.025 -13.46 c	Auto Tu
<b>9</b> 1.0 1.0							Center Fr 3.625000000 G
		~~~~	304		1∆2		<b>Start Fr</b> 3.625000000 G
0 0							Stop Fr 3.625000000 G
nter 3. s BW 8			'BW 50 MHz*	FUNCTION	Sweep	Span 0 25.00 s (1001 p	ts) 8.000000 N
Δ2 F Δ4 F	t (Δ) t t (Δ) t	10.00 s 7.000 s 5.025 s 7.000 s	-54.58 dBm				Freq Offs
ì					STATU	JS	
t 7.0 t (Δ) 5.0 t 7.0	7.0 5.0 7.0	000 s 025 s 000 s	-54.58 dBm (Δ) -13.46 dB	Vithin 1			Freq Offs 0 Scale Ty Log L

Marker 2: Time elapsed since signal to stop LTE transmission. EUD has stopped transmission. Marker 3-4 Delta: 10 seconds has elapsed since CBSD has sent a signal to stop LTE transmission to EUT.

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#### 8.2. END USER DEVICE CONFIGURATION 2 (3665MHz - 3675MHz; MaxEIRP: 8 dBm/MHz)

Keysight Spectrum Analyzer - Sv	· · · · · · · · · · · · · · · · · · ·				
RF 50 S	2 AC	SENSE:INT	ALIGN AUTO	02:18:53 PM May 26, 2022 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast	Trig: Free Run	Avg/Hold:>100/100	TYPE M WWWWW	
	IFGain:Low	#Atten: 10 dB		DETANNNN	Auto Tur
			Mkr	2 3.675 00 GHz	Auto Tun
0 dB/div Ref 0.00 d	Bm			-61.324 dBm	
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20.0					3.625000000 GH
30.0					
40.0					Ctort Er
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50.0			- I ()***	ww <sup>2</sup>	3.550000000 GH
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30.0					3.70000000 GI
90.0					5.70000000 GI
tart 3.55000 GHz				Stop 3.70000 GHz	CF Ste
Res BW 1.0 MHz	#VB	W 3.0 MHz*	Sweep 1.	000 ms (1001 pts)	15.000000 Mi Auto Ma
KR MODE TRC SCL	Х		JNCTION FUNCTION WIDTH	FUNCTION VALUE	
1 N 1 f 2 N 1 f	3.665 00 GHz 3.675 00 GHz	-60.903 dBm -61.324 dBm			
3					Freq Offs
4 5					01
6					
7 8					Scale Typ
9					
10  1					Log <u>L</u>
		III			
G			STATUS		Ľ
		0	va Mada		
		<u>Operatio</u>	on wode		

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aaa Key	ysight Sp			- Swept SA								
<u>.x.</u>			RF	50 Ω AC	PNO: Fast		SENSE:INT	Avg Typ	ALIGN AUTO e: RMS	TYPE	1 2 3 4 5 6 W	Frequency
	B/div	R	ef 0.0	0 dBm	IFGain:Low	#Atte	en: 10 dB			ΔMkr3 4	.025 s .72 dB	Auto Tun
-10.0 -20.0 -30.0												Center Fre 3.670000000 GH
-40.0 -50.0 -60.0				<u>3</u> \]			Δ <u>2</u>					<b>Start Fre</b> 3.670000000 GH
-70.0 -80.0 -90.0		2										<b>Stop Fre</b> 3.670000000 GH
Res	ter 3 BW	8 M	Hz	00 GHz ×	#VE	3W 50 M			Sweep	25.00 s (10		<b>CF Ste</b> j 8.000000 MH <u>Auto</u> Ma
1 2 3 4 5	Δ2 F Δ4 F	1 1 1 1 1 1	t (Δ) t t (Δ) t		10.00 s( 825.0 ms 4.025 s( 825.0 ms	-62.4 Δ) -6	6.71 dB 10 dBm 6.72 dB 10 dBm				E	Freq Offse 0 H
6 7 8 9												Scale Typ
10 11 <											-	Log <u>Li</u>
MSG									STATU	3		
	er 1:				sends a sig	inal to st		nsmission.		<b>lode</b> ed transmiss	sion	

Marker 3-4 Delta: 10 seconds has elapsed since CBSD has sent a signal to stop LTE transmission to EUT.

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# 9. SETUP PHOTOS

Please refer to 14040866-EP1V1 for setup photos

# **END OF REPORT**

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