

TEST REPORT

Report Number : 14040867-E13V2

- Applicant : APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA. 95014, U.S.A.
 - Model : A2649 (Parent Model) A2881, A2882, A2883, A2884 (Variant Models)
 - FCC ID : BCG-E8138A (Parent Model) BCG-E8142A, BCG-E8143A, BCG-E8144A (Variant Models)
- EUT Description : SMARTPHONE
- Test Standard(s) : FCC PART 96.47

Date Of Issue: July 15, 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.	lssue Date	Revisions	Revised By
V1	6/21/2022	Initial Issue	Steven Tran
V2	7/15/2022	Added support equipment info	Steven Tran

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Page 2 of 16

FORM NO: CCSUP4701I FAX: (510) 661-0888

TABLE OF CONTENTS

1. /	ATTESTATION OF TEST RESULTS4
2.	TEST METHODOLOGY
3. I	FACILITIES AND ACCREDITATION5
4. I	DECISION RULES AND MEASUREMENT UNCERTAINTY
4.1	1. METROLOGICAL TRACEABILITY
4.2	2. DECISION RULES
4.3	B. MEASUREMENT UNCERTAINTY
4.4	4. MEASURING INSTRUMENT CALIBRATION7
5. I	EQUIPMENT UNDER TEST7
5.1	DESCRIPTION OF EUT7
5.2	2. SOFTWARE AND FIRMWARE7
5.3	B. DESCRIPTION OF TEST SETUP
6. ⁻	TEST AND MEASUREMENT EQUIPMENT10
7. I	END USER DEVICE ADDITIONAL REQUIREMENT11
7.1	1. TEST REQUIREMENT
8.	TEST PROCEDURE AND EUT CONFIGURATION11
8.1	1. END USER DEVICE CONFIGURATION 112
8.2	2. END USER DEVICE CONFIGURATION 214
9. 3	SETUP PHOTOS16

Page 3 of 16

1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE INC. 1 APPLE PARK WAY CUPERTINO CA 95104, U.S.A.
Model	A2649 (Parent Model) A2881, A2882, A2883, A2884 (Variant Models)
Model Of Testing	A2884
Brand	APPLE
FCC ID	BCG-E8138A (Parent Model) BCG-E8142A, BCG-E8143A, BCG-E8144A (Variant Models)
EUT Description	SMART PHONE
Serial Number	R54KXLK2G1
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.

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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

Page 4 of 16

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

Page 5 of 16

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 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%.

Page 6 of 16

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.

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: A2649, FCC ID: BCG-E8138A

Variant Models: A2881, FCC ID: BCG-E8142A A2882; FCC ID: BCG-E8143A A2883 & A2884, FCC ID: BCG-E8144A

5.2. SOFTWARE AND FIRMWARE

The test utility software used during testing was 0.15.02.

Page 7 of 16

5.3. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

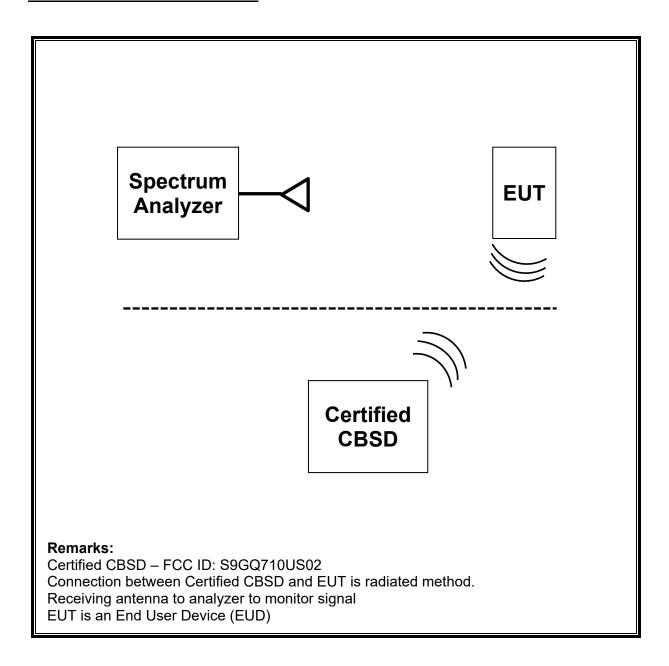
I/O CABLES

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

Page 8 of 16



Page 9 of 16

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 Due							
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 Number					
Laptop (Local SAS – WINNForum Test Harness)	Lenovo	PBFBKHK	2.0		

Page 10 of 16

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.

Page 11 of 16

TEST RESULTS

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

Page 12 of 16

DATE: 7/15/2022

REPORT NO: 14040867-E13V2

		n Analyzer -	DΩ AC		CEN	SE:INT		ALIGN AUTO	01:57:42 PM Ma	w 26 2022	
			J SZ AC	PNO: Fast • IFGain:Low	Tuin Fran	Run	Аvg Тур		TRACE 1 TYPE V	2 3 4 5 6 WWWWW NNNNN	Frequency
dB/div	Р	ef 0.00	dBm	IFGalli:Low	#Attent A				ΔMkr3 4. -13.	325 s 92 dB	Auto Tu
	K		ubiii								
											Center Fr
0										_	3.625000000 G
o											
o											Start Fr
0 - wz	,										3.625000000 G
. – Ж	1	/	<u> </u>		<u></u>						0.0200000000
			•		$\langle \rangle$						
											Stop Fr
。 											3.625000000 G
		000000) GHz							ın 0 Hz	CF St
s BW	8 MI	lz		#VB	W 50 MHz*			Sweep	25.00 s (10	01 pts)	8.000000 M Auto N
MODE			Х		Y		ICTION FU	NCTION WIDTH	FUNCTION \	ALUE	<u>Auto</u> N
Δ2 F	1 t 1 t			10.00 s (2 950.0 ms	 -13.93 (-55.47 dE 					_	
Δ4 F	1 t			4.325 s (2 950.0 ms	 -13.92 (-55.47 dE 						Freq Offs
	<u> </u>			950.0 ms	-55.47 UE					=	0
											Scale Ty
											Log
											2
								STATUS	2	r	
				Stop (Operatio	<u>n With</u>	<u>ın 10 se</u>	cond M	lode		
TE:											

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

Page 13 of 16

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

Keysight Spectrum Analyzer - Si					
RF 50 9		SENSE:INT	ALIGN AUTO Avg Type: RMS	02:17:09 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 WWWW	
	IFGain:Low	#Atten: 10 dB		DET A NNNN	
			Mkr	2 3.675 00 GHz	Auto Tui
) dB/div Ref 0.00 c	Bm			-57.909 dBm	
0.0					Center Fr
0.0					3.625000000 G
					0.0200000000
0.0					
0.0					Start Fr
0.0				444 2	3.550000000 G
nn			Y	V	
Man Brand and Marked Annaly Brand and	and a second state and the second second	the proper spectrum and the	Window water and water	hind have been and the second	Stop Fr
0.0					3.70000000 G
0.0					
tart 3.55000 GHz Res BW 1.0 MHz	40. (P	NW 0 0 BALL-*	0	Stop 3.70000 GHz	CF Ste 15.000000 M
Res BW 1.0 MINZ	#V0	BW 3.0 MHz*	Sweep 1	.000 ms (1001 pts)	Auto M
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	-56.619 dBm -57.909 dBm			
3	0.070 00 0112	-07.505 0.501			Freq Offs
4 5					0
6				=	
7					Scale Ty
8 9					Scale Ty
0					Log <u>L</u>
1					
G			STATUS		
		• • •	on Mode		

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DATE: 7/15/2022

REPORT NO: 14040867-E13V2

Keysight Sp	pectrum Analyzer - Swe					
	RF 50 Ω	AC PNO: Fast		ALIGN AUTO Avg Type: RMS	02:25:26 PM May 26, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWW DET A N N N N N	Frequency
dB/div	Ref 0.00 dB				ΔMkr3 4.675 s -7.68 dB	Auto Tu
9 .0 .0						Center Fr 3.670000000 G
	,		<u></u> 3∆4			Start Fi 3.670000000 G
0 0						Stop Fr 3.670000000 G
	.670000000 G 8 MHz Reisci		BW 50 MHz*		Span 0 Hz 25.00 s (1001 pts) FUNCTION VALUE	CF St 8.000000 M <u>Auto</u> M
Δ2 F Δ4 F	1 t (Δ) 1 t 1 t (Δ) 1 t	10.00 s 7.225 s 4.675 s 7.225 s	-61.48 dBm		E	Freq Offs 0
						Scale Ty
			III	STATU	*	Log
) DTE:	Authorized CE	<u>Stop</u>	Operation Wit	statu: hin 10 second M	-	

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.

Page 15 of 16

9. SETUP PHOTOS

Please refer to 14040867-EP1V1 for setup photos

END OF REPORT

Page 16 of 16

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