

ELEMENT WASHINGTON DC LLC

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PART 22 & 90 MEASUREMENT REPORT

Applicant Name:

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea

Date of Testing:

9/5/2022 – 12/14/2022 **Test Report Issue Date:** 02/24/2023 **Test Site/Location:** Element lab., Columbia, MD, USA **Test Report Serial No.:** 1M2212080136-18-R1.A3L

FCC ID:

A3LSMS911JPN

Applicant Name:

Samsung Electronics Co., Ltd.

Application Type: Model(s): EUT Type: FCC Classification: FCC Rule Part: Test Procedure(s):

Certification SC-51D, SCG19 Portable Handset PCS Licensed Transmitter Held to Ear (PCE) §22(H), §90(S) ANSI C63.26-2015, KDB 648474 D03 v01r04

Note: This revised Test Report (S/N: 1M2212080136-18-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez Executive Vice President



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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Measurement	Max. Power [W]	Max. Power [dBm]	Emission Designator
	15 MHz	QPSK	821.5	ERP	0.126	20.99	13M6G7D
		16QAM	821.5	ERP	0.104	20.19	13M6W7D
		QPSK	821.5	Conducted	0.289	24.61	13M6G7D
	15 MHz	16QAM	821.5	Conducted	0.233	23.68	13M6W7D
	10 MHz	QPSK	819.0	Conducted	0.303	24.81	9M04G7D
LTE Band 26		16QAM	819.0	Conducted	0.249	23.96	9M05W7D
LIE Danu 20	5 MHz	QPSK	816.5 - 821.5	Conducted	0.300	24.77	4M56G7D
		16QAM	816.5 - 821.5	Conducted	0.233	23.68	4M56W7D
	3 MHz	QPSK	815.5 - 822.5	Conducted	0.287	24.57	2M73G7D
		16QAM	815.5 - 822.5	Conducted	0.245	23.89	2M74W7D
		QPSK	814.7 - 823.3	Conducted	0.291	24.64	1M11G7D
	1.4 MHz	16QAM	814.7 - 823.3	Conducted	0.235	23.72	1M12W7D

EUT Overview

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 Element Test Location

These measurement tests were conducted at the Element laboratory located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at Element lab located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreement.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS911JPN**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 90 and 22H.

Test Device Serial No.: 1050M, 1066M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 Software and Firmware

Testing was performed on device(s) using software/firmware version S911USQU0AVJM installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the "American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services" (ANSI C63.26-2015) were used in the measurement of the EUT.

Deviation from Measurement Procedure......None

3.2 Radiated Power and Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

For radiated power measurements, substitution method is used per the guidance of ANSI C63.26-2015. For emissions below 1GHz, a half-wave dipole is substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

 $P_{d [dBm]} = P_{g [dBm]} - cable loss [dB] + antenna gain [dBd/dBi];$

where P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_{g \, [dBm]}$ – cable loss [dB].

For radiated spurious emissions measurements, the field strength conversion method is used per the formulas in Section 5.2.7 of ANSI C63.26-2015. Field Strength (EIRP) is calculated using the following formulas:

 $E_{[dB\mu V/m]} =$ Measured amplitude level_[dBm] + 107 + Cable Loss_[dB] + Antenna Factor_[dB/m] And EIRP_[dBm] = $E_{[dB\mu V/m]}$ + 20logD - 104.8; where D is the measurement distance in meters.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI C63.26-2015.

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4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
	AP2	EMC Cable and Switch System	8/11/2022	Annual	8/11/2023	AP2
-	AP1	EMC Cable and Switch System	8/15/2022	Annual	8/15/2023	AP1
	ETS	EMC Cable and Switch System	8/11/2022	Annual	8/11/2023	ETS
2	LTx1	Licensed Transmitter Cable Set	7/29/2022	Annual	7/29/2023	LTX1
	LTx2	Licensed Transmitter Cable Set	8/15/2022	Annual	B/15/2023	LTx2
÷	LTX3	Licensed Transmitter Cable Set	8/15/2022	Annual	8/15/2023	LTx3
	LTx4	Licensed Transmitter Cable Set	7/29/2022	Annual	7/29/2023	LTx4
-	LTX5	Licensed Transmitter Cable Set	7/29/2022	Annual	7/29/2023	LTXS
Agilent	E5515C	Wireless Communications Test Set		N/A		G845360985
Agilent	E5515C	Wireless Communications Test Set		N/A		G846310798
Anritsu	MT8820C	Radio Communication Analyzer		N/A		6201300731
Anritsu	MT8821C	Radio Communication Analyzer		N/A		6201351794
Anritsu	MT8821C	Radio Communication Analyzer		N/A		6200901190
Anritsu	MTB821C	Radio Communication Analyzer		N/A		6201525694
Com-Power	AL-130R	Active Loop Antenna	1/19/2022	Biennial	1/19/2024	121085
Emco	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
Espec	ESK-2CA	Environmental Chamber	5/25/2022	Siennial	\$/25/2024	17620
ETS Lindgren	3117	1-15 GHz DRG Horn (Medium)	4/20/2021	Siennial	4/20/2023	00125518
ETS Lindgren	3164-10	Quad Ridge Horn 400MHz - 10000MHz	5/10/2021	Biennial	5/10/2023	00166283
ETS Lindgren	3516/2NM	LISN	8/11/2022	Biennial	8/11/2024	00114451
Keysight Technologies	N9020A	NDIA Signal Analyzer	3/15/2022	Annual	3/15/2023	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer (44G Hz)	8/18/2022	Annual	8/18/2023	MY49430494
Keysight Technologies	N9030A	PXA Signal Analyzer (44G Hz)	2/14/2022	Annual	2/14/2023	MY52350166
Mini-Circuits	SSG-4000 HP	Synthesized Signal Generator		N/A		11208010032
Mini-Circuits	55G-4000 HP	Synthesized Signal Generator		N/A		11403100002
Rohde & Schwarz	C MU 200	Base Station Simulator		N/A		836371/0079
Rohde & Schwarz	C MU 200	Base Station Simulator		N/A		833855/0010
Rohde & Schwarz	C MU 200	Base Station Simulator		N/A		107826
Rohde & Schwarz	C MU 200	Base Station Simulator		N/A		109892
Rohde & Schwarz	C MU 200	Base Station Simulator		N/A		836536/0005
Rohde & Schwarz	C MW 500	Radio Communication Tester		N/A		100976
Rohde & Schwarz	C MW 500	Radio Communication Tester		N/A		112347
Rohde & Schwarz	ESU 26	EMI Test Receiver (26.5GHz)	8/29/2022	Annual	8/29/2023	100342
Rohde & Schwarz	ESU 40	EMI Test Receiver (40GHz)	8/25/2022	Annual	8/25/2023	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	3/28/2022	Annual	3/28/2023	101716
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and Spectrum Analyzer	4/14/2022	Annual	4/14/2023	103187

Table 5-1. Test Equipment

Notes:

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

- G = Phase Modulation
- 7 = Quantized/Digital Info
- D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz W = Amplitude/Angle Modulated 7 = Quantized/Digital Info D = Data transmission, telemetry, telecommand

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm - (-24.80) = 50.3 dBc.

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7.0 TEST RESULTS

7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
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FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	LTE

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
	Transmitter Conducted Output Power*	2.1046(a), 90.635(b)	< 100 Watts	PASS	Section 7.2
	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3
CONDUCTED	Conducted Band Edge / Spurious Emissions (LTE Band 26)	2.1051, 90.691(a)	 > 43 + 10 log10(P[Watts]) for all out-of-band emissions except emissions beyond 37.5kHz from the block edge > 50 + 10 log10(P[Watts]) at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge 	PASS	Sections 7.4, 7.5
	Peak-to-Average Ratio	N/A	≤ 13 dB	PASS	Section 7.6
	Frequency Stability	2.1055, 90.213	< 2.5 ppm **Fundamental emissions stay within authorized frequency block	PASS	Section 7.9
ATED	Effective Radiated Power (LTE Band 26)	22.913(a)(2)	< 7 Watts max. ERP	PASS	Section 7.7
RADIATED	Radiated Spurious Emissions (LTE Band 26)	2.1053, 90.691(a)	 > 43 + 10 log10(P[Watts]) for all out-of-band emissions except emissions beyond 37.5kHz from the block edge > 50 + 10 log10(P[Watts]) at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge 	PASS	Section 7.8

* The only transmitter output conducted powers included in this report are those where the Pmax value, per the tune-up document, is higher than any of the DSI power levels. For the remaining conducted power measurements, see the **RF Exposure Report**.

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is EMC Software Tool V1.0.

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7.2 Conducted Output Power Data

Test Overview

All emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 - Section 5.2

Test Settings

- 1. Span = $2 \times OBW$ to $3 \times OBW$
- 2. Detector = RMS
- 3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 4. Sweep time = auto couple
- 5. The trace was allowed to stabilize
- 6. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

- 1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
- 2. This unit was tested with its standard battery.
- 3. Conducted power measurements were evaluated using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.
- 4. All other conducted power measurements are contained in the RF exposure report for this filing.

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Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]	Conducted Power [Watts]	Conducted Power Limit [dBm]	Margin [dB]
15 MHz	QPSK	26765	821.5	1/0	24.61	0.289	50.00	-25.39
	16-QAM	26765	821.5	1/0	23.68	0.233	50.00	-26.32
10 MHz	QPSK	26740	819.0	1 / 0	24.81	0.303	50.00	-25.19
	16-QAM	26740	819.0	1/0	23.96	0.249	50.00	-26.04
	QPSK	26715	816.5	1/0	24.77	0.300	50.00	-25.23
5 MHz	QFOR	26765	821.5	1 / 12	24.63	0.290	50.00	-25.37
JIVITIZ	3 WITZ 16-QAM	26715	816.5	1/0	23.63	0.231	50.00	-26.37
10-0	10-024101	26765	821.5	1 / 12	23.68	0.233	50.00	-26.32
	QPSK	26705	815.5	1 / 14	24.49	0.281	50.00	-25.51
3 MHz	QFOR	26775	822.5	1 / 7	24.57	0.287	50.00	-25.43
	16-QAM	26705	815.5	1 / 14	23.64	0.231	50.00	-26.36
	10-QAIM	26775	822.5	1 / 7	23.89	0.245	50.00	-26.11
QPSK	ODSK	26697	814.7	1/3	24.60	0.288	50.00	-25.40
	QF SN	26783	823.3	1/3	24.64	0.291	50.00	-25.36
	16-QAM	26697	814.7	1/3	23.72	0.235	50.00	-26.28
	IO-QAM	26783	823.3	1/3	23.64	0.231	50.00	-26.36

Table 7-2. Conducted Power Output Data (LTE Band 26)

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7.3 Occupied Bandwidth

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 - Section 5.4.4

Test Settings

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5% of the expected OBW
- 3. VBW \geq 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within

1-5% of the 99% occupied bandwidth observed in Step 7

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None

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LTE Band 26



Plot 7-1. Occupied Bandwidth Plot (LTE Band 26 - 15MHz QPSK - Full RB)



Plot 7-2. Occupied Bandwidth Plot (LTE Band 26 - 15MHz 16-QAM - Full RB)

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Plot 7-3. Occupied Bandwidth Plot (LTE Band 26 - 10MHz QPSK - Full RB)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 26 - 10MHz 16-QAM - Full RB)

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Plot 7-5. Occupied Bandwidth Plot (LTE Band 26 - 5MHz QPSK - Full RB)



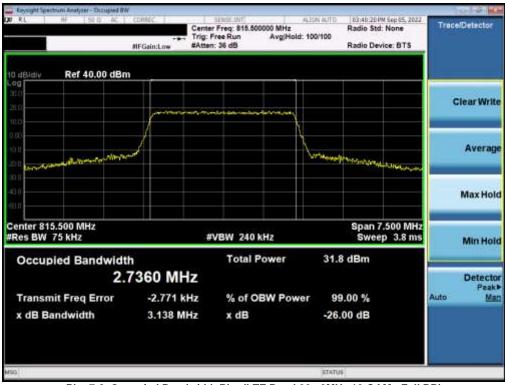
Plot 7-6. Occupied Bandwidth Plot (LTE Band 26 - 5MHz 16-QAM - Full RB)

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Plot 7-7. Occupied Bandwidth Plot (LTE Band 26 - 3MHz QPSK - Full RB)



Plot 7-8. Occupied Bandwidth Plot (LTE Band 26 - 3MHz 16-QAM - Full RB)

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Plot 7-9. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz QPSK - Full RB)



Plot 7-10. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz 16-QAM - Full RB)

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7.4 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + 10 \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.4

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (separated into at least two plots per channel)
- 2. RBW ≥ 100kHz
- 3. VBW \geq 3 x RBW
- 4. Detector = RMS
- 5. Trace mode = max hold
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-3. Test Instrument & Measurement Setup

Test Notes

1. Per Part 22H and 90, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

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LTE Band 26

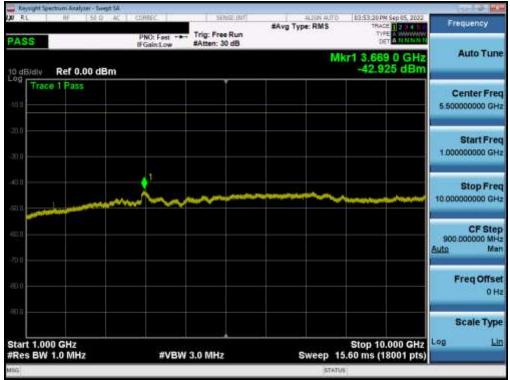
Keyvojiti Spectrum Analyzer - Swept			10 VA000455		321-3
AU RL HF SHO	PNC: Fast +++	Trig: Free Run	#Avg Type: RMS	103143 HP PM Sep 05, 2022 TRACE 12 2 4 4 9 TYPE A RESIDENT	Frequency
10 dBJdlv Ref 20.00 dB	IFGainLow	Atten: 30 dB	Mkr1	814,000 0 MHz -30,57 dBm	Auto Tun
Trace 1 Pass					Center Fre 422.000000 MH
0.00 %1.0					Start Fre 30.000000 MH
2011				-1	Stop Fre 814.000000 MH
4111					CF Ste 78.400000 Mi Auto Mi
60 0			-	and not defined and the state of the state o	Freq Offs 0 H
Start 30.0 MHz #Res BW 100 kHz	#1914	300 kHz	Swaan 2	Stop 814.0 MHz 7.33 ms (20001 pts)	Scale Typ
Inc.	#VBW	300 KH2	Sweep J		

Plot 7-11. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)



		· · · ·	
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Plot 7-13. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)

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7.5 Band Edge Emissions at Antenna Terminal

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

For LTE B26, under Part 90.691, the minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by greater than 37.5 kHz is $43 + 10\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts. The minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by up to and including 37.5 kHz is $50 + 10\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

ANSI C63.26-2015 - Section 5.7.3

Test Settings

- 1. Span was set large enough so as to capture all out of band emissions near the band edge
- 2. RBW = 100 kHz
- 3. VBW = 300 kHz
- 4. Detector = RMS
- 5. Trace mode = trace average
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-4. Test Instrument & Measurement Setup

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Test Notes

- 1. For channel edge emission, the signal analyzer's "ACP" measurement capability is used.
- 2. Per 22.917(b) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

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LTE Band 26



Plot 7-14. Channel Edge Plot (LTE Band 26 - 15MHz QPSK - Mid Channel)



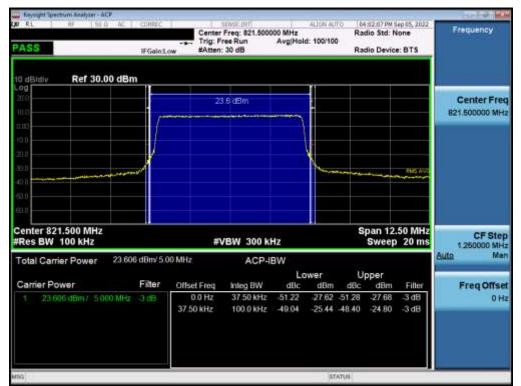
Plot 7-15. Channel Edge Plot (LTE Band 26 - 10MHz QPSK - Mid Channel)

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Reysight Spectrum Analyzer - ACP	A. 3476 (1997)		an tanana			13.00
N RLT NF 540 40	EDHREC IFGala3.cw	Center Freq: 816.500 Trig: Free Run #Atten: 30 dB	ALTON AL 000 MHz Avg(Hold: 100/10	Radio Std:	None	Frequency
to abidiy Ref 30.00 dBm	- 19.		5.1.1			
200		23.6 dBm				Center Fre 816.500000 MH
0.00						
	<i>.</i>		1	-angel and the state of the sta	RMS AVS	
Center 816.500 MHz				Span 12	.50 MHz	CF Ste
#Res BW 100 kHz		#VBW 300 k	Hz	Swee	o 20 ms	1.250000 MH
Total Carrier Power 23.636	dBm/ 5.00 MHz	ACP-I	BW Lower	Upper		Auto Ma
						and the second sec
Carrier Power 1 23/636 dBm / 5/000 MHz	Filter Offsel	0 Hz 37 50 kHz		dBc dBm -52.39 -28.75 -48.76 -25.13	Filler -3 dB -3 dB	Freq Offs 0+

Plot 7-16. Channel Edge Plot (LTE Band 26 - 5MHz QPSK - Low Channel)



Plot 7-17. Channel Edge Plot (LTE Band 26 - 5MHz QPSK - High Channel)

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PASS FGale	Center Free Trig: Free			ALISN AU	Rad	8313PM S lio Std: N lio Device	230	F	requency
t0 dBidiy Ref 30.00 dBm	23.6	dEm							Center Fred
							Mes Avg	811	5.500000 MH
Center 815.500 MHz #Res BW 100 kHz	#VB	W 300 kH	z				00 MHz 20 ms		CF Ster 750.000 kH
Total Carrier Power 23 586 dBm/3	3.00 MHz	ACP-IB			×.			Auto	Mar
Carrier Power Filter	0.0 Hz	integ BW 37.50 kHz	dBc -47.94 -46.11		dBc -48.10 -46.65	dBm -24.51 -23.07	Filter -3 dB -3 dB		Freq Offse 0 H:
1 23.596 dBm / 3.000 MHz -3 dB	37.50 kHz	100.0 kHz	-+0.11	-22.33		20.01			

Plot 7-18. Channel Edge Plot (LTE Band 26 - 3MHz QPSK - Low Channel)



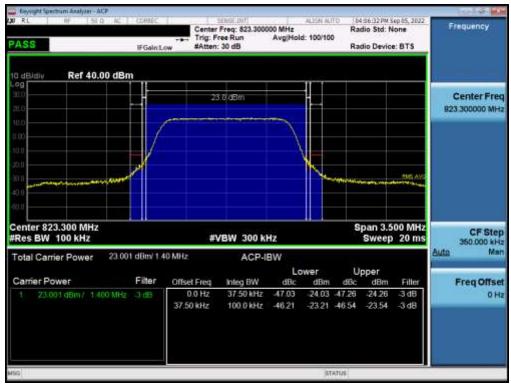
Plot 7-19. Channel Edge Plot (LTE Band 26 - 3MHz QPSK - High Channel)

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Plot 7-20. Channel Edge Plot (LTE Band 26 - 1.4MHz QPSK - Low Channel)



Plot 7-21. Channel Edge Plot (LTE Band 26 - 1.4MHz QPSK - High Channel)

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7.6 Radiated Power (ERP)

Test Overview

Effective Radiated Power (ERP) measurements are performed using the substitution method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 - Section 5.2.4.4

Test Settings

- 1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
- 2. RBW = 1 5% of the expected OBW
- 3. VBW \geq 3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points $\geq 2 \times \text{span} / \text{RBW}$
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize.

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The EUT and measurement equipment were set up as shown in the diagram below.

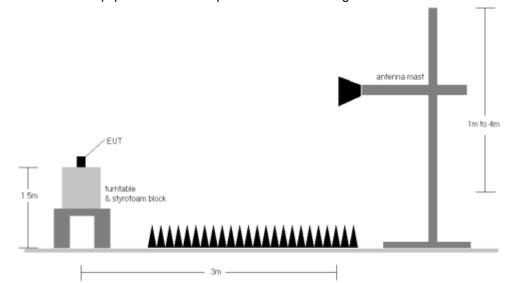


Figure 7-5. Radiated Test Setup <1GHz

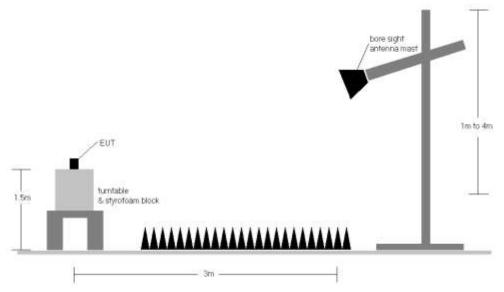


Figure 7-6. Radiated Test Setup > 1GHz

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.

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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
15 MHz	QPSK	821.5	V	159	253	1.24	1 / 37	21.90	20.99	0.126	38.45	-17.46
13 141112	16-QAM	821.5	V	159	253	1.24	1 / 37	21.10	20.19	0.104	38.45	-18.26
15 MHz	QPSK	816.5	Н	389	273	1.24	1 / 37	18.79	17.88	0.061	38.45	-20.57
13 1411 12	QPSK (WCP)	821.5	V	142	343	1.24	1/0	19.32	18.41	0.069	38.45	-20.04

Table 7-3. ERP Data (LTE Band 26)

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7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using hybrid (biconical/log) antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 - Section 5.5.4

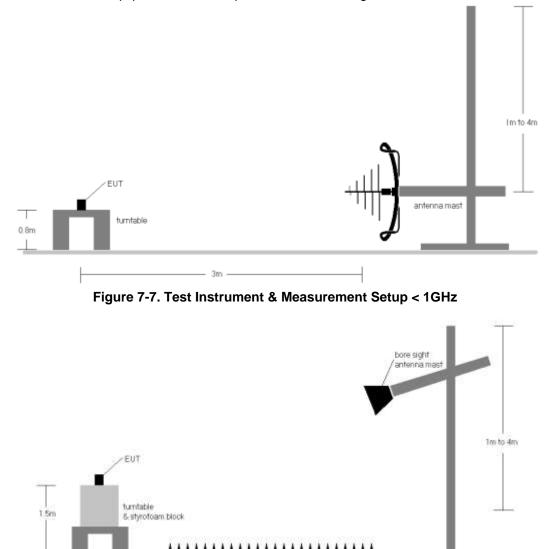
Test Settings

- 1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
- 2. VBW \geq 3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points \geq 2 x span / RBW
- 5. Detector = RMS
- 6. Trace mode = Average (Max Hold for pulsed emissions)
- 7. The trace was allowed to stabilize

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The EUT and measurement equipment were set up as shown in the diagram below.





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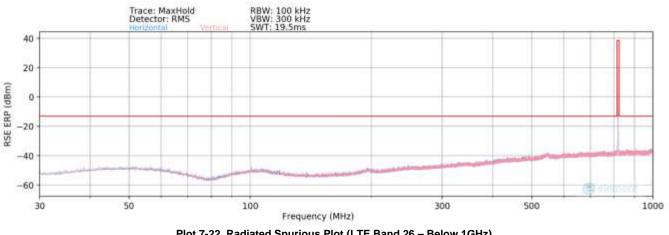
Test Notes

- 1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
 - a) $E(dB\mu V/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m) b) EIRP (dBm) = E(dB\mu V/m) + 20logD 104.8; where D is the measurement distance in meters.$
- 2) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst-case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 3) This unit was tested with its standard battery.
- 4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 5) Emissions below 18GHz were measured at a 3-meter test distance while emissions above 18GHz were measured at a 1-meter test distance with the application of a distance correction factor.
- 6) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

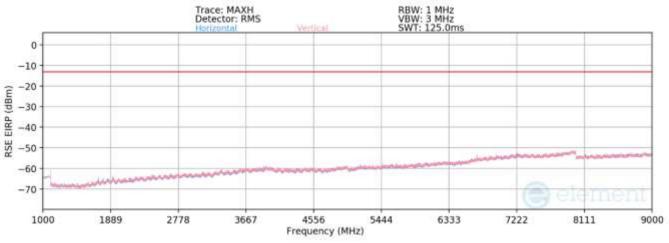
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Bandwidth (MHz):	10
Frequency (MHz):	819
RB Config (Size / Offset):	1/25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
456.57	н			-79.16	17.92	45.76	-49.49	-13.00	-36.49
551.40	н		-:	-78.60	19.75	48.15	-47.11	-13.00	-34.11
864.76	н	-	-	-79.91	24.76	51.85	-43.41	-13.00	-30.41

Table 7-4. Radiated Spurious Data (LTE Band 26 – Mid Channel – Below 1GHz)

Bandwidth (MHz):	10	
Frequency (MHz):	819	
RB Config (Size / Offset):	1/25	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1638.00	н	200	223	-72.10	-7.81	27.09	-68.17	-13.00	-55.17
2457.00	н			-75.60	-4.21	27.19	-68.06	-13.00	-55.06
3276.00	н			-76.81	-1.18	29.01	-66.25	-13.00	-53.25
4095.00	н			-77.27	1.13	30.86	-64.39	-13.00	-51.39
4914.00	н	-	-	-78.46	1.68	30.22	-65.04	-13.00	-52.04
5733.00	н	-	-	-78.49	3.20	31.71	-63.54	-13.00	-50.54

Table 7-5. Radiated Spurious Data (LTE Band 26 – Mid Channel)

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7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

Test Procedure Used

ANSI C63.26-2015 – Section 5.6

Test Settings

- 1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

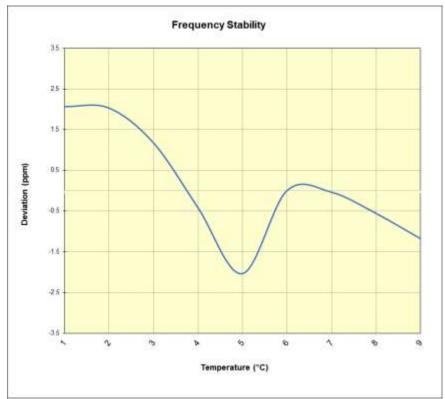
FCC ID: A3LSMS911JPN		MEASUREMENT REPORT (CERTIFICATION)		
Test Report S/N:	Test Dates:	EUT Type:	Dogo 26 of 29	
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Frequency Stability / Temperature Variation

LTE Band 26						
	Operating F	requency (Hz):	819,00			
	Ref.	Voltage (VDC):	4.35			
	Deviation Limit:		± 0.00025% or 2.5 ppm			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)	
100 %		- 30	818,995,877	1,696	0.0002071	
		- 20	818,995,848	1,667	0.0002035	
		- 10	818,995,148	967	0.0001181	
		0	818,993,844	-337	-0.0000411	
	4.35	+ 10	818,992,511	-1,670	-0.0002039	
		+ 20 (Ref)	818,994,181	0	0.0000000	
		+ 30	818,994,151	-30	-0.000037	
		+ 40	818,993,725	-456	-0.0000557	
		+ 50	818,993,216	-965	-0.0001178	
Battery Endpoint	3.69	+ 20	818,994,879	698	0.0000852	

Table 7-6. LTE Band 26 Frequency Stability Data



Plot 7-24. LTE Band 26 Frequency Stability Chart

FCC ID: A3LSMS911JPN		MEASUREMENT REPORT (CERTIFICATION)		
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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMS911JPN** complies with all the requirements of Parts 22(H) and 90 of the FCC rules.

FCC ID: A3LSMS911JPN	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 38 of 38
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