



FCC 47 CFR PART 15 SUBPART E

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

FCC ID: PY7-21831Z

REPORT NUMBER: 11589096A-E5V3

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**Prepared for
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NVLAP LAB CODE 200246-0

Revision History

<u>Ver.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
1	2017-02-20	Initial Issue	Richard Jankovics
2	2017-02-24	Removed BLE Reference from EUT description and revised Equipment Class in Section 1.4.	Jeff Moser
3	2017-02-24	Deleted old PY7-29752M and added PY7-21831Z data.	Jeff Moser

TABLE OF CONTENTS

1. REUSE OF TEST DATA	4
1.1. INTRODUCTION.....	4
1.2. DEVICES DIFFERENCES	4
1.3. SPOT CHECK VERIFICATION.....	4
1.4. REFERENCE DETAIL.....	4
2. ATTESTATION OF TEST RESULTS.....	5
3. TEST METHODOLOGY	6
4. FACILITIES AND ACCREDITATION.....	6
5. CALIBRATION AND UNCERTAINTY	6
5.1. MEASURING INSTRUMENT CALIBRATION.....	6
5.2. SAMPLE CALCULATION.....	6
5.3. MEASUREMENT UNCERTAINTY.....	7
6. EQUIPMENT UNDER TEST	7
6.1. DESCRIPTION OF EUT.....	7
6.2. MAXIMUM OUTPUT POWER.....	8
6.3. DESCRIPTION OF AVAILABLE ANTENNAS.....	8
6.4. SOFTWARE AND FIRMWARE.....	8
6.5. WORST-CASE CONFIGURATION AND MODE.....	9
6.6. DESCRIPTION OF TEST SETUP.....	10
7. TEST AND MEASUREMENT EQUIPMENT	12
8. RADIATED TEST RESULTS	13
8.1. LIMITS AND PROCEDURE	13
8.2. TRANSMITTER ABOVE 1 GHz	14
9. SETUP PHOTOS.....	15

1. REUSE OF TEST DATA

1.1. INTRODUCTION

According to manufacturer, FCC ID: PY7-29752M and FCC ID: PY7-21831Z licensed and unlicensed radios (WWAN/WLAN/BT/BLE) are electrically identical, except the NFC which has a new chipset. With the exception of the NFC, FCC ID: PY7-29752M and FCC ID: PY7-21831Z share the same chipsets, same power and same antenna performance including antenna gain. The FCC ID: PY7-29752M test data shall remain representative of FCC ID: PY7-21831Z, and therefore FCC ID: PY7-21831Z leverages test data from FCC ID: PY7-29752M.

The applicant takes full responsibility that the test data as referenced in this section represent compliance for this FCC ID.

1.2. DEVICES DIFFERENCES

Difference between PY7-29752M and PY7-21831Z:

Identical except the NFC chipset is new in PY7-21831Z. Refer to Report 11589096A-E7 for PY7-21831Z NFC data.

1.3. SPOT CHECK VERIFICATION

Spot check verification has been done on device FCC ID: PY7-21831Z for the WLAN Radiated Spurious Emissions. Note, 802.11a was chosen as it is considered to have the worst-case Power Spectral Density. Test results were consistent with FCC ID: PY7-29752M.

Technology	Test Items	Configurations	PY7-29752M	PY7-21831Z
			Worst Case Result	Spot Check Result
WLAN UNII	Radiated Spurious	802.11a, 5180 MHz	> 10 dB Margin*	-10.68 dB Margin*

*This emissions were considered Noise Floor

1.4. REFERENCE DETAIL

Equipment Class	Reference FCC ID	Report Title/Section
UNII	PY7-29752M	16J23633A-E5V3 FCC Report UNII

2. ATTESTATION OF TEST RESULTS

COMPANY NAME: SONY MOBILE COMMUNICATIONS, INC.
4-12-3 HIGASHI-SHINAGAWA,
SHINAGAWA -KU, TOKYO, 140-0002, JAPAN

EUT DESCRIPTION: GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

SERIAL NUMBER: Radiated: QV7000ZG0E

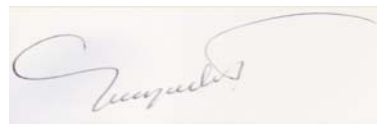
DATE TESTED: 2017-02-20

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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 NVLAP, NIST, or any agency of the U.S. Government.

Approved & Released
For UL LLC By:



Vien Tran
Senior Engineer
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Prepared By:



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WiSE Engineer
UL – Consumer Technology Division

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Suite B, Perimeter Park Drive, Morrisville, NC 27560.

12 Laboratory Dr., RTP, NC 27709
<input type="checkbox"/> Chamber A
<input type="checkbox"/> Chamber C

2800 Suite B Perimeter Park Dr., Morrisville, NC 27560
<input checked="" type="checkbox"/> Chamber NORTH
<input type="checkbox"/> Chamber SOUTH

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at <http://www.nist.gov/nvlap/>

5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

This EUT is a GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Total Output Power (dBm)	Total Output Power (mW)
5180 - 5240	802.11a	12.77	18.92
5260 - 5320	802.11a	12.01	15.89
5500 - 5720	802.11a	11.48	14.06
5745 - 5825	802.11a	11.94	15.63
5180 - 5240	802.11n HT20	12.57	18.07
5260 - 5320	802.11n HT20	12.00	15.85
5500 - 5720	802.11n HT20	11.44	13.93
5745 - 5825	802.11n HT20	11.96	15.70
5190 - 5230	802.11n HT40	13.01	20.00
5270 - 5310	802.11n HT40	12.49	17.74
5510 - 5710	802.11n HT40	11.85	15.31
5755 - 5795	802.11n HT40	12.24	16.75
5210	802.11ac VHT80	13.08	20.32
5290	802.11ac VHT80	12.45	17.58
5530 - 5690	802.11ac VHT80	11.94	15.63
5775	802.11ac VHT80	12.20	16.60

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integrated antenna, with a maximum gain as follows:

Frequency (MHz)	Peak Antenna Gain (dBi)	
	Core0(Main)	Core1 (Sub)
5180 - 5320	-3.9	-5.1
5500 - 5700	-2.1	-2.2
5725 - 5850	-2.8	-2.3

6.4. SOFTWARE AND FIRMWARE

The firmware/SW installed in the EUT during testing was SONY, s_atp_1_600_7_9.

The hardware version was A.

The test utility software used during testing was Tera Term, rev 4.8.9(SVN#6182).

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X-Axis orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X-Axis orientation.

Worst-case data rates as provided by the client were:

Based on the baseline scan, the worst-case data rates were:

802.11a mode MMO: 6 Mbps

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	T450	PC-0A2UQU	N/A
Laptop AC/DC adapter	Lenovo	ADLX65NLC2A	11S45N0263Z1ZS995256HR	N/A
Earphones	SONY	MH410C	N/A	N/A
AC Adapter	SONY	UCH 20 1295-70821	N/A	N/A

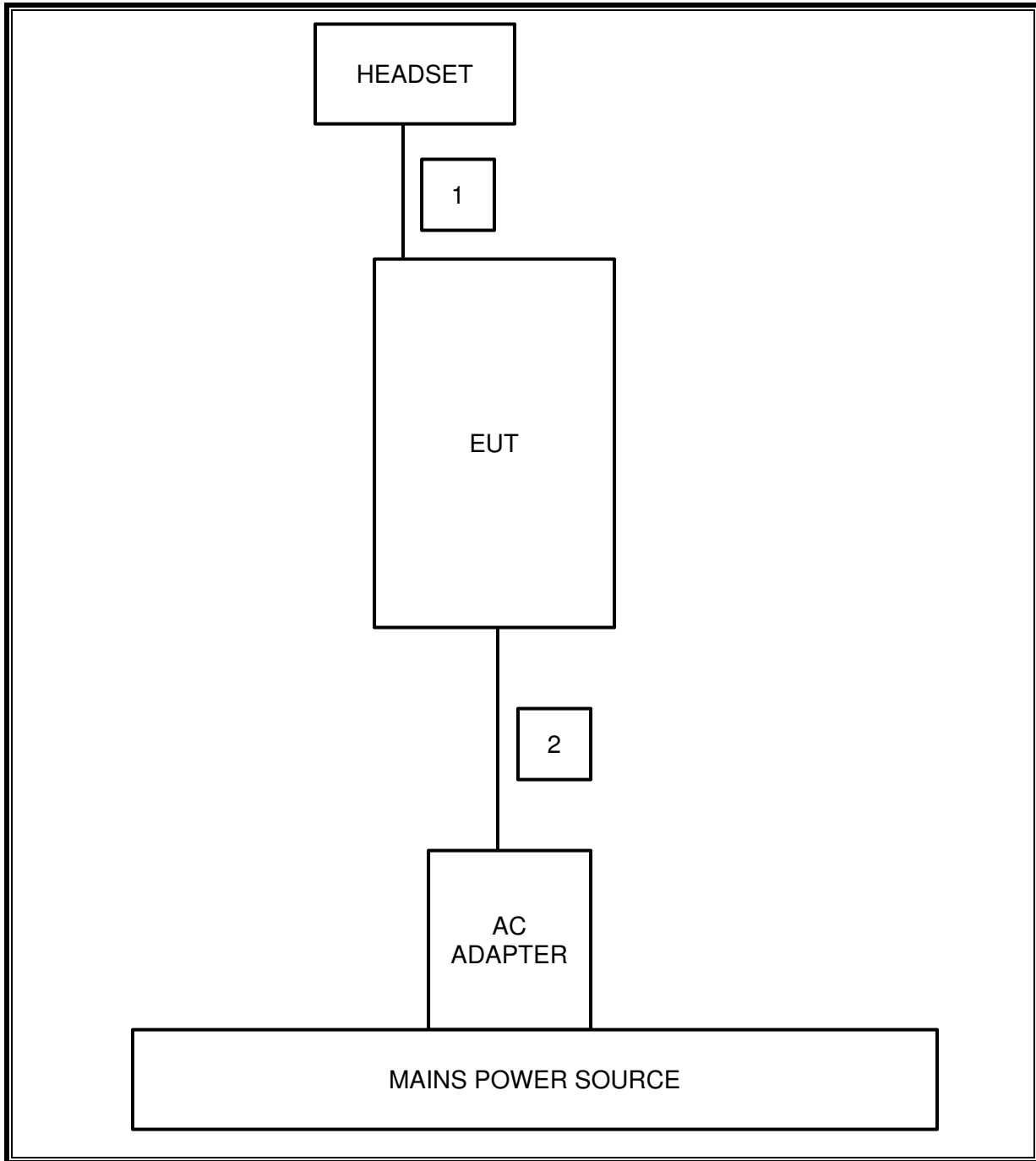
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	USB-C	Shielded	1m	N/A
2	Audio	1	Mini-Jack	Un-shielded	1.5m	N/A

TEST SETUP

The EUT is a stand-alone unit during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



7. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2016-03-07	2017-03-31
	Gain-Loss Chains				
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2016-08-28	2017-08-28
	Receiver & Software				
SA0026	Spectrum Analyzer	Agilent	N9030A	2017-02-17	2018-02-17
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA

8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements and 1.5 m above the ground plane for above 1GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements. For this evaluation, RMS Power Averaging was used and the resolution/video bandwidth settings were 1MHz/3MHz.

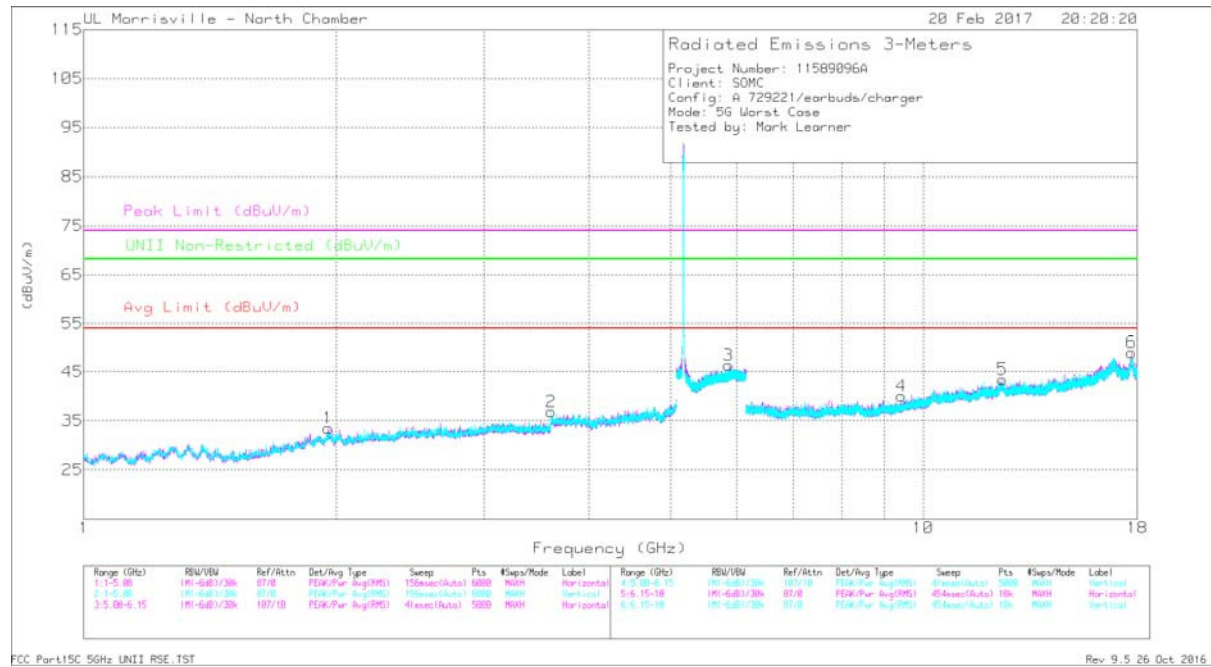
The spectrum from 9 kHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

8.2. TRANSMITTER ABOVE 1 GHz

HARMONICS AND SPURIOUS EMISSIONS

5GHz 802.11a



Trace Markers

Marker	Freq. (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Pol
2	* 3.604	41.45	PK-U	32.9	-32.3	0	42.05	-	-	74	-31.95	-	-	360	156	V
	* 3.603	29.21	ADR	32.9	-32.3	0	29.81	54	-24.19	-	-	-	-	360	156	V
5	* 12.437	35.66	PK-U	39	-25.6	0	49.06	-	-	74	-24.94	-	-	84	104	H
	* 12.44	24.73	ADR	39	-25.6	0	38.13	54	-15.87	-	-	-	-	84	104	H
6	* 17.715	34.63	PK-U	41.4	-21.7	0	54.33	-	-	74	-19.67	-	-	149	208	H
	* 17.714	23.62	ADR	41.4	-21.7	0	43.32	54	-10.68	-	-	-	-	149	208	H
4	* 9.416	37.77	PK-U	36.3	-28.9	0	45.17	-	-	74	-28.83	-	-	110	383	V
	* 9.416	25.79	ADR	36.3	-28.9	0	33.19	54	-20.81	-	-	-	-	110	383	V
1	1.956	42.71	PK-U	31.6	-34.8	0	39.51	-	-	-	-	68.2	-28.69	153	177	H
3	5.866	39.44	PK-U	34.8	-22.6	0	51.64	-	-	-	-	68.2	-16.56	259	218	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

FCC Part15C 5GHz UNII RSE.TST

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