



FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART F, H, and M
FCC CFR47 PART 90 SUBPART S

CERTIFICATION TEST REPORT

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

FCC ID: PY7-21831Z

REPORT NUMBER: 11589096A-E1V3

ISSUE DATE: 2/24/2017

Prepared for

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2017-02-20	Initial Issue	J. Moser
V2	2017-02-24	Deleted model reference on cover page. Revised equipment class in Section 1.4 to PCE.	J. Moser
V3	2017-02-24	Deleted old PY7-29752M and added PY7-21831Z data.	J. Moser

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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 fundamental. Test results were consistent with FCC ID: PY7-29752M.

Technology	Test Items	Configurations	PY7-29752M	PY7-21831Z
			Worst Case Result	Spot Check Result
GSM850 (GPRS)	Fundamental	848.8 MHz	24.89 dBm	25.94 dBm
GSM1900 (GPRS)	Fundamental	1850.2 MHz	27.69 dBm	27.88 dBm
LTE 4 QPSK, 10 MHz	Fundamental	1715 MHz	19.75 dBm	21.50 dBm
LTE 13 QPSK, 5MHz	Fundamental	779.5 MHz	16.06 dBm	16.49 dBm
LTE 17 QPSK 10MHZ	Fundamental	711 MHz	14.35 dBm	13.53 dBm
LTE 41 QPSK, 5MHz	Fundamental	2593 MHz	26.67 dBm (PK)	28.01 dBm (PK) 24.53 dBm (AV)

1.4. REFERENCE DETAIL

Equipment Class	Reference FCC ID	Report Title/Section
PCE	PY7-29752M	16J23633A-E1V2 FCC Report WWAN

2. ATTESTATION OF TEST RESULTS

COMPANY NAME: SONY MOBILE COMMUNICATIONS, INC.
EUT DESCRIPTION: GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC
SERIAL NUMBER: 00440245-675939-2
DATE TESTED: 2017-02-16 to 2017-02-17

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H, 24E, 27H, 27F, 90S	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.

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3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-D, FCC CFR 47 Part 22,24, FCC CFR 47 Part 27, and FCC CFR 47 Part 90.

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:

EIRP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna) + Substitution Antenna Factor (dBi)

ERP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna)

(Path loss = Signal generator output – PSA reading with substitution antenna)

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Total RF power, conducted	±0.45 dB
RF power density, conducted	±1.5 dB
Spurious emissions, conducted	±2.94 dB
All emissions, radiated up to 40 GHz	±5.36 dB
Temperature	±0.07°C
Humidity	±2.26% RH
DC and low frequency voltages	±1.27%
Conducted Emissions (0.150-30MHz)	±2.37dB

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 + BLUETOOTH, DTS/UNII a/b/g/n/ac & NFC.

6.2. MAXIMUM OUTPUT POWER (GSM/EGPRS)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows.
 This data is from PY7-29752M:

FCC Part 22/24						
Band	Frequency Range(MHz)	Modulation	Conducted		Radiated	
			AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
GSM850	824~849	GMSK	31.5	1412.54		
	824~849	GPRS	31.6	1445.44	24.89	308.32
	824~849	EGPRS	26.8	478.63	19.70	93.33
GSM1900	1850~1910	GMSK	28.6	724.44		
	1850~1910	GPRS	27.0	501.19	27.21	526.02
	1850~1910	EGPRS	25.6	363.08	24.62	289.73

6.3. MAXIMUM OUTPUT POWER (WCDMA)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows.
 This data is from PY7-29752M:

FCC Part 22/24/27						
Band	Frequency Range(MHz)	Modulation	Conducted		Radiated	
			AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
Band 2	1850~1910	REL99	21.3	135.21	19.48	88.72
	1850~1910	HSDPA	19.9	98.17	18.04	63.68
	1850~1910	HSUPA	20.0	100.00		
Band 4	1710~1755	REL99	19.9	97.27	19.68	92.90
	1710~1755	HSDPA	18.5	70.96	18.06	63.97
	1710~1755	HSUPA	18.6	72.95		
Band 5	824~849	REL99	24.0	252.93	17.72	59.16
	824~849	HSDPA	23.1	202.77	16.49	44.57
	824~849	HSUPA	23.1	206.06		

6.4. MAXIMUM OUTPUT POWER (LTE)

The transmitter has a maximum peak conducted and radiated ERP/EIRP output powers as follows. This data is from PY7-29752M:

LTE Band 2

FCC Part 24							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE2	1850~1910	1.4MHz	QPSK	21.4	137.72	17.17	52.12
			16QAM	20.5	111.94	16.36	43.25
		3MHz	QPSK	21.5	141.91	17.17	52.12
			16QAM	20.7	117.22	16.41	43.75
		5MHz	QPSK	21.5	142.56	17.52	56.49
			16QAM	20.8	119.12	16.70	46.77
		10MHz	QPSK	21.6	144.21	16.71	46.88
			16QAM	20.8	119.67	16.02	39.99
		15MHz	QPSK	21.4	136.46	17.18	52.24
			16QAM	20.8	121.06	16.37	43.35
		20MHz	QPSK	21.7	146.22	17.47	55.85
			16QAM	21.2	131.52	16.54	45.08

LTE Band 4

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE4	1710~1755	1.4MHz	QPSK	20.6	113.76	18.84	76.56
			16QAM	19.8	95.50	18.19	65.92
		3MHz	QPSK	20.6	115.61	19.22	83.56
			16QAM	19.6	90.99	18.52	71.12
		5MHz	QPSK	20.7	116.68	19.13	81.85
			16QAM	19.8	95.72	18.48	70.47
		10MHz	QPSK	20.9	121.62	19.75	94.41
			16QAM	19.9	97.95	18.93	78.16
		15MHz	QPSK	20.6	114.55	19.37	86.50
			16QAM	19.9	96.61	18.50	70.79
		20MHz	QPSK	20.7	118.03	19.52	89.54
			16QAM	20.1	102.09	18.77	75.34

LTE Band 5

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE5	824~849	1.4MHz	QPSK	23.5	223.36	17.08	51.05
			16QAM	22.7	185.78	16.28	42.46
		3MHz	QPSK	23.6	230.14	17.01	50.23
			16QAM	23.0	198.15	16.17	41.40
		5MHz	QPSK	23.7	233.88	17.23	52.84
			16QAM	23.0	198.15	16.39	43.55
		10MHz	QPSK	23.8	237.68	17.11	51.40
			16QAM	23.1	203.70	16.30	42.66

LTE Band 7

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	PEAK(dBm)	PEAK(mW)
LTE7	2500~2570	5MHz	QPSK	19.9	96.61	26.30	426.58
			16QAM	18.9	77.27	26.22	418.79
		10MHz	QPSK	19.7	93.54	25.54	358.10
			16QAM	18.7	74.47	25.58	361.41
		15MHz	QPSK	19.6	91.20	25.18	329.61
			16QAM	18.9	77.80	25.21	331.89
		20MHz	QPSK	19.9	96.61	25.91	389.94
			16QAM	19.0	79.07	25.98	396.28

LTE Band 12

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE12	699~716	1.4MHz	QPSK	23.9	244.91	14.01	25.18
			16QAM	23.1	204.64	13.06	20.23
		3MHz	QPSK	23.9	245.47	13.89	24.49
			16QAM	23.3	213.30	13.06	20.23
		5MHz	QPSK	24.1	256.45	14.61	28.91
			16QAM	23.5	221.31	13.27	21.23
		10MHz	QPSK	24.1	254.68	14.28	26.79
			16QAM	23.2	210.38	13.35	21.63

LTE Band 13

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE13	777~787	5MHz	QPSK	23.2	209.89	16.06	40.36
			16QAM	22.1	161.44	15.10	32.36
		10MHz	QPSK	23.1	204.64	15.35	34.28
			16QAM	22.3	169.04	14.50	28.18

LTE Band 17

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE17	704~716	5MHz	QPSK	24.0	251.77	14.33	27.10
			16QAM	23.1	203.24	13.39	21.83
		10MHz	QPSK	23.2	209.41	14.35	27.23
			16QAM	22.3	171.40	13.42	21.98

LTE Band 26 PART 90

FCC Part 90							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE26	814~824	1.4MHz	QPSK	23.8	237.14	16.24	42.07
			16QAM	22.8	192.31	15.32	34.04
		3MHz	QPSK	23.9	245.47	16.14	41.11
			16QAM	23.0	200.91	15.09	32.28
		5MHz	QPSK	23.9	242.66	16.40	43.65
			16QAM	23.0	200.45	15.72	37.33
		10MHz	QPSK	23.8	238.78	16.37	43.35
			16QAM	23.2	207.01	15.30	33.88

LTE Band 26 PART 22

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE26	824~849	1.4MHz	QPSK	23.8	239.33	17.10	51.29
			16QAM	23.2	206.54	16.30	42.66
		3MHz	QPSK	23.8	241.55	17.03	50.47
			16QAM	23.1	205.12	16.19	41.59
		5MHz	QPSK	23.8	238.23	17.25	53.09
			16QAM	23.3	214.78	16.41	43.75
		10MHz	QPSK	23.8	241.55	17.13	51.64
			16QAM	22.8	190.99	16.32	42.85
		15MHz	QPSK	23.6	226.99	17.51	56.36
			16QAM	22.9	193.20	16.66	46.34

LTE Band 41

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	PEAK(dBm)	PEAK(mW)
LTE41	2496~2690	5MHz	QPSK	22.2	165.20	26.67	464.52
			16QAM	21.4	137.72	26.65	462.38
		10MHz	QPSK	22.1	160.69	26.44	440.55
			16QAM	21.0	126.47	26.44	440.55
		15MHz	QPSK	22.1	161.44	26.63	460.26
			16QAM	21.3	133.35	26.58	454.99
		20MHz	QPSK	22.5	179.47	26.55	451.86
			16QAM	21.5	141.58	26.53	449.78

6.5. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna for the [List the bands supported] with a maximum peak gain as follow:

Frequency (MHz)	Peak Gain (dBi)
GSM850, 824~849MHz	-5.1
GSM1900, 1850~1910MHz	-2.5
WCDMA Band 2, 1850~1910	-2.5
WCDMA Band 4, 1710~1755	0
WCDMA Band 5, 824~849	-5.1
LTE Band 2, 1850~1910MHz	-2.5
LTE Band 4, 1710~1755MHz	0
LTE Band 5, 824~849MHz	-5.1
LTE Band 7, 2500~2570MHz	-1.8
LTE Band 12, 699~716MHz	-10.1
LTE Band 13, 777~787MHz	-6.9
LTE Band 17, 704~716MHz	-10.1
LTE Band 26, 824~849MHz	-5.1
LTE Band 41, 2496~2690MHz	-1.4

6.6. DESCRIPTION OF TEST SETUP
SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	SONY	1300-7146.1B	5816W02400051	N/A
Earphone	SONY	12271A100010396	12271A100010396	N/A

I/O CABLES (CONDUCTED SETUP)

I/O Cable List						
Cable No	Port	# of Identical ports	Connector Type	Serial Type	Cable Length (m)	Remarks
1	RF Out	1	Spectrum Analyzer	Shielded	None	NA
2	Antenna Port	1	EUT	Shielded	0.1m	NA
3	RF In/Out	1	Communication Test Set	Shielded	1m	NA

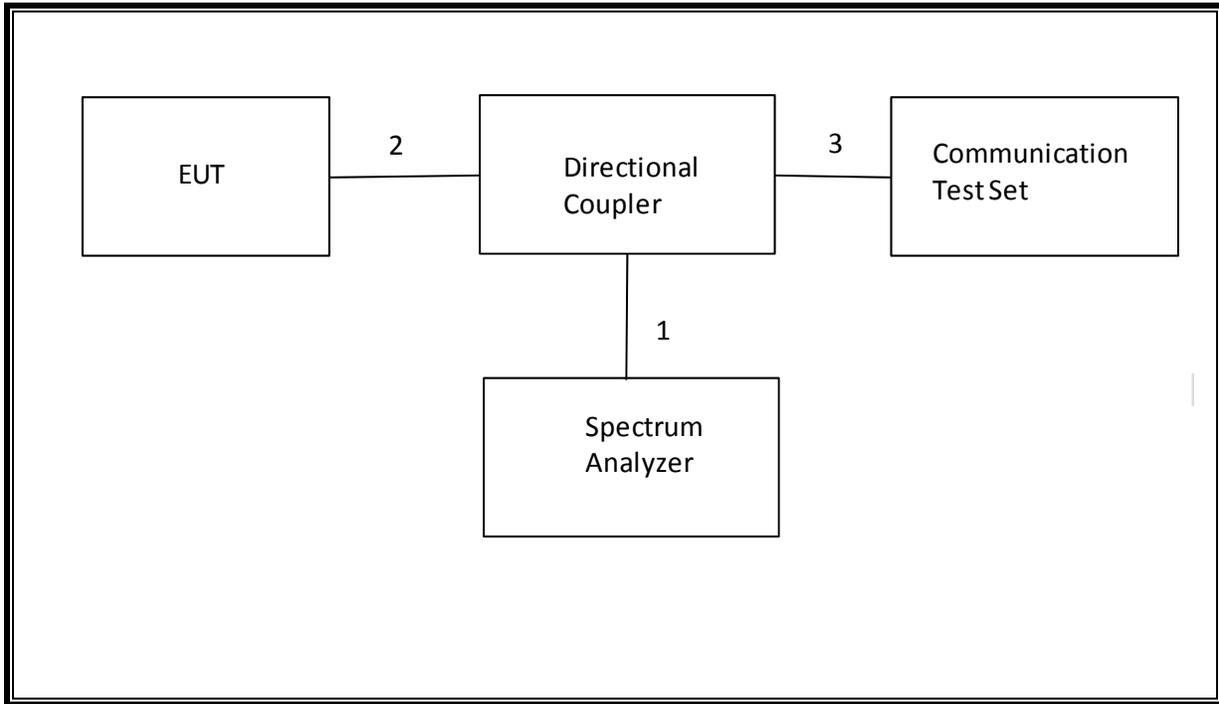
I/O CABLES (RADIATED SETUP)

I/O Cable List						
Cable No	Port	# of Identical ports	Connector Type	Serial Type	Cable Length (m)	Remarks
1	USB	1	AC Adapter	Un-shielded	1.2m	No
2	Audio	1	3.5mm	Shielded	>1m	Headset
3	RF In/out	1	Communication Test Set	Un-shielded	2m	Yes

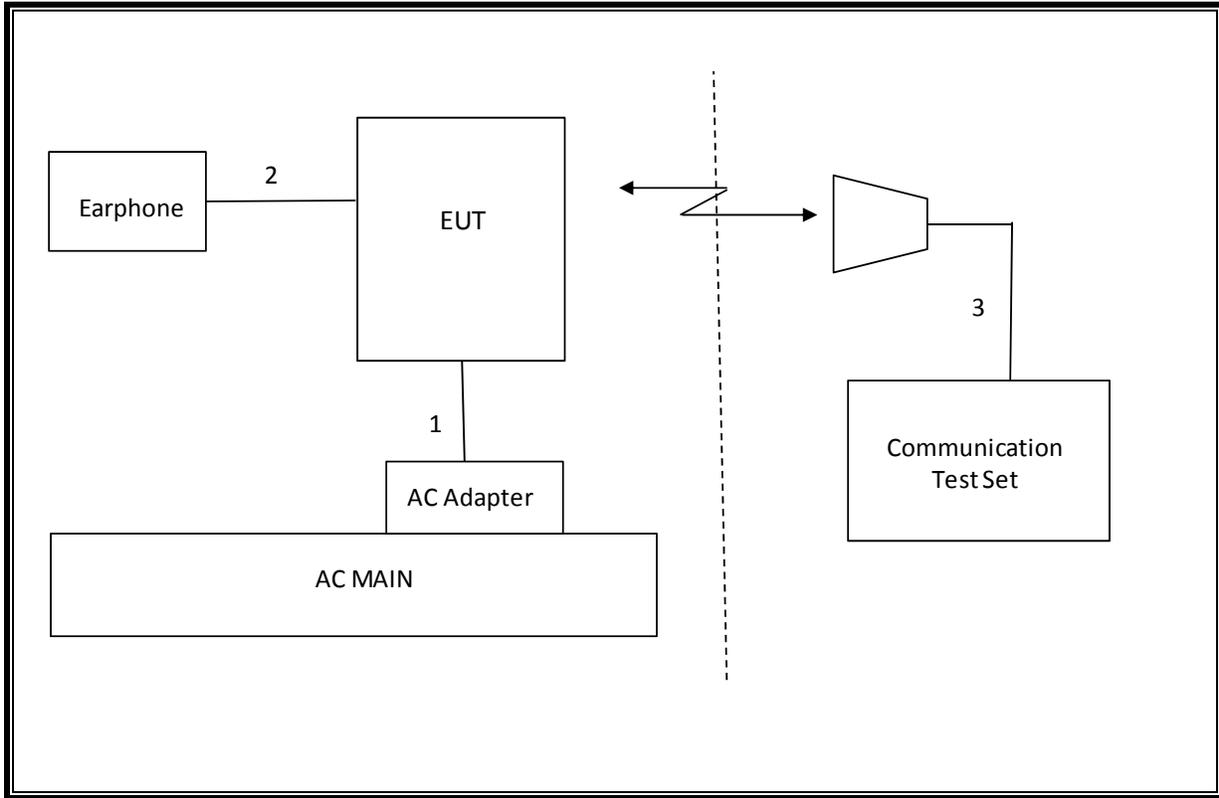
TEST SETUP

The EUT is continuously communicated to the call box during the tests.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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.
	30-1000 MHz				
AT0073	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2016-06-27	2017-06-30
	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-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2016-06-26	2017-06-30
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	2018-02-28
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
T374	Wideband Radio Communications Tester	Rohde and Schwartz	CMW500	2016-11-02	2017-11-02

8. RADIATED TEST RESULTS

8.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2. 1046, §22. 913, §24. 232, §27 and § 90.635.

LIMITS

22.913 (a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232 (c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

27.50 (b) - (10) Portable stations (handheld devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP. (LTE B13)

27.50 (c) - (10) Portable stations (handheld devices) are limited to 3 watts ERP; (LTE B17)

27.50 (d) - (4) Fixed, mobile, and portable (handheld) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.(Band 4)

27.50 (h) - (2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power. (LTE B41 & 7)

90.635 (b) - The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw). (LTE B26)

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17; PSA setting reference to 971168 D01 v02r02

For peak power measurement with a PSA:

a) Set the RBW \geq OBW; b) Set VBW $\geq 3 \times$ RBW; c) Set span $\geq 2 \times$ RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points \geq span/RBW; g) Trace mode = max hold;

For average power measurement with a PSA:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW $\geq 3 \times$ RBW; d) Set number of points in sweep $\geq 2 \times$ span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 98 ; h) Use trigger to capture bursts If burst duty cycle < 98 ; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

8.1.1. ERP/EIRP RESULTS

GSM

Fundamental Substitution Measurement (Fc < 1GHz) UL LLC, Chamber N									
Company: SOMC Project #: 16J23633 Date: 07/18/2016 Test Engineer: Mark Nolting Configuration: Standalone (GSM/UMTS sample #3) Mode: GPRS850 Test Equipment: Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
824.20	30.08	V	5.1	0.7	-1.45	23.52	38.5	-14.9	
824.20	21.71	H	5.1	0.7	-1.45	15.15	38.5	-23.3	
Mid Ch									
836.60	31.21	V	5.2	0.7	-1.45	24.59	38.5	-13.9	
836.60	22.66	H	5.2	0.7	-1.45	16.04	38.5	-22.4	
High Ch									
848.80	31.53	V	5.2	0.7	-1.45	24.89	38.5	-13.6	
848.80	23.83	H	5.2	0.7	-1.45	17.19	38.5	-21.3	
Rev: 11.02.2015 Note: For Band 13/17 ERP limit is 34.77dBm. For Band 26 limit is 50dBm									
Fundamental Substitution Measurement (Fc < 1GHz) UL LLC, Chamber N									
Company: SOMC Project #: 11589096 Date: 02/16/2017 Test Engineer: Mark Nolting Configuration: Standalone (Sample #729221-1) Mode: GPRS850 Test Equipment: Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
High Ch									
848.80	32.58	V	5.2	0.7	-1.45	25.94	38.5	-12.5	
848.80	23.52	H	5.2	0.7	-1.45	16.88	38.5	-21.6	
Rev: 11.02.2015 Note: For Band 13/17 ERP limit is 34.77dBm. For Band 26 limit is 50dBm									
Fundamental Substitution Measurement (Fc > 1GHz) UL LLC, Chamber N									
Company: SOMC Project #: 16J23633 Date: 07/18/2016 Test Engineer: Mark Nolting Configuration: Standalone (GSM/UMTS sample #3) Mode: GPRS1900 Test Equipment: Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch									
1850.20	31.42	V	8.1	4.4	27.69	33.0	-5.3		
1850.20	26.23	H	8.1	4.4	22.49	33.0	-10.5		
Mid Ch									
1880.00	31.07	V	8.2	4.3	27.21	33.0	-5.8		
1880.00	26.74	H	8.2	4.3	22.87	33.0	-10.1		
High Ch									
1909.80	30.72	V	8.2	4.2	26.70	33.0	-6.3		
1909.80	25.45	H	8.2	4.2	21.42	33.0	-11.6		
Rev: 11.02.2015 Note: For Band 4 EIRP limit is 30dBm									
Fundamental Substitution Measurement (Fc > 1GHz) UL LLC, Chamber N									
Company: SOMC Project #: 11589096 Date: 02/16/2017 Test Engineer: Mark Nolting Configuration: Standalone (Sample #729221-1) Mode: GPRS1900 Test Equipment: Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch									
1850.20	31.42	V	8.1	4.6	27.88	33.0	-5.1		
1850.20	25.93	H	8.1	4.6	22.39	33.0	-10.6		
Rev: 11.02.2015 Note: For Band 4 EIRP limit is 30dBm									

GSM850 GPRS (PY7-29752M)

GSM850 GPRS (PY7-21831Z)

GSM1900 GPRS (PY7-29752M)

GSM1900 GPRS (PY7-21831Z)

LTE Band 4

Fundamental Substitution Measurement (Fc > 1GHz) UL LLC, Chamber N									
Company: SOMC Project #: 16J23633 Date: 07/14/2016 Test Engineer: Mark Nolting Configuration: Standalone (LTE sample #1) Mode: LTE 4, 10M, QPSK									
Test Equipment: Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch									
1715.00	22.79	V	7.7	4.7	19.75	30.0	-10.2		
1715.00	17.08	H	7.7	4.7	14.04	30.0	-16.0		
Mid Ch									
1732.50	22.66	V	7.8	4.6	19.54	30.0	-10.5		
1732.50	18.52	H	7.8	4.6	15.40	30.0	-14.6		
High Ch									
1750.00	22.26	V	7.8	4.6	19.05	30.0	-11.0		
1750.00	17.51	H	7.8	4.6	14.30	30.0	-15.7		
Rev: 11.02.2015 Note: For Band 4 EIRP limit is 30dBm									
LTE B4 10MHz QPSK (PY7-29752M)									

Fundamental Substitution Measurement (Fc > 1GHz) UL LLC, Chamber N									
Company: SOMC Project #: 11589096 Date: 02/17/2017 Test Engineer: Mark Nolting Configuration: Standalone (Sample #729221-1) Mode: LTE 4, 10M, QPSK									
Test Equipment: Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch									
1715.00	24.52	V	7.7	4.7	21.50	30.0	8.5		
1715.00	15.02	H	7.7	4.7	12.00	30.0	-18.0		
Rev: 11.02.2015 Note: For Band 4 EIRP limit is 30dBm									
LTE B4 10MHz QPSK (PY7-21831Z)									

LTE Band 13

Fundamental Substitution Measurement (Fc < 1GHz) UL LLC, Chamber N									
Company: SOMC Project #: 16J23633 Date: 07/21/2016 Test Engineer: Brian Kiewra / John Manser Configuration: Standalone (LTE Sample #1) Mode: LTE 13, 5MHz, QPSK									
Test Equipment: Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
779.50	22.21	V	4.5	0.9	-1.20	16.06	38.5	-22.4	Avg
779.50	11.43	H	4.9	0.9	-1.20	5.28	38.5	-33.2	
Mid Ch									
782.00	22.08	V	5.0	0.9	-1.23	15.89	38.5	-22.6	
782.00	11.87	H	5.0	0.9	-1.23	5.68	38.5	-32.8	
High Ch									
784.50	22.06	V	5.0	0.9	-1.26	15.82	38.5	-22.6	
784.50	12.08	H	5.0	0.9	-1.26	5.94	38.5	-32.6	
Rev: 11.02.2015 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									
LTE B13 5MHz QPSK (PY7-29752M)									

Fundamental Substitution Measurement (Fc < 1GHz) UL LLC, Chamber N									
Company: SOMC Project #: 11589096 Date: 02/16/2017 Test Engineer: Mark Nolting Configuration: Standalone (Sample #729221-1) Mode: LTE 13, 5MHz, QPSK									
Test Equipment: Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
779.50	22.64	V	4.9	0.9	-1.20	16.49	38.5	-22.0	
779.50	12.19	H	4.9	0.9	-1.20	6.04	38.5	-32.4	
Rev: 11.02.2015 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									
LTE B13 5MHz QPSK (PY7-21831Z)									

LTE Band 17

Fundamental Substitution Measurement (Fc < 1GHz)
 UL LLC, Chamber N

Company: SOMC
 Project #: 16J23633
 Date: 07/21/2016
 Test Engineer: Brian Kiewra / John Manser
 Configuration: Standalone (LTE Sample #1)
 Mode: LTE 17, 10MHz, QPSK

Test Equipment:
 Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
709.00	19.00	V	4.7	1.9	-0.26	14.04	38.5	-24.4	Avg
709.00	6.85	H	4.7	1.9	-0.26	1.69	38.5	-36.8	
Mid Ch									
710.00	18.89	V	4.7	1.9	-0.27	13.92	38.5	-24.5	
710.00	7.11	H	4.7	1.9	-0.27	2.14	38.5	-36.3	
High Ch									
711.00	19.34	V	4.7	1.9	-0.28	14.35	38.5	-24.1	
711.00	6.26	H	4.7	1.9	-0.28	1.27	38.5	-37.2	

Rev: 11.02.2015
 Note: For Band 13/17 ERP limit is 34.77dBm. For Band 26 limit is 50dBm

LTE B17 10MHz QPSK (PY7-29752M)

Fundamental Substitution Measurement (Fc < 1GHz)
 UL LLC, Chamber N

Company: SOMC
 Project #: 11589096
 Date: 02/16/2017
 Test Engineer: Mark Nolting
 Configuration: Standalone (Sample #729221-1)
 Mode: LTE 17, 10MHz, QPSK

Test Equipment:
 Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
High Ch									
711.00	18.52	V	4.7	1.9	-0.28	13.53	38.5	-24.9	
711.00	7.21	H	4.7	1.9	-0.28	2.22	38.5	-36.2	

Rev: 11.02.2015
 Note: For Band 13/17 ERP limit is 34.77dBm. For Band 26 limit is 50dBm

LTE B17 10MHz QPSK (PY7-21831Z)

LTE Band 41

Fundamental Substitution Measurement (Fc > 1GHz)
 UL LLC, Chamber N

Company: SOMC
 Project #: 16J23633
 Date: 07/20/2016
 Test Engineer: Mark Nolting
 Configuration: Standalone (LTE sample #2)
 Mode: LTE 41, 5M, QPSK

Test Equipment:
 Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2498.50	29.37	V	9.6	5.5	25.31	33.0	-7.7	Pk
2498.50	27.48	H	9.6	5.5	23.42	33.0	-9.6	Pk
Mid Ch								
2593.00	30.70	V	9.8	5.8	26.67	33.0	-6.3	Pk
2593.00	28.53	H	9.8	5.8	24.50	33.0	-8.5	Pk
High Ch								
2687.50	27.38	V	10.0	6.0	23.42	33.0	-9.6	Pk
2687.50	24.23	H	10.0	6.0	20.27	33.0	-12.7	Pk

Rev: 11.02.2015
 Note: For Band 4 EIRP limit is 30dBm

LTE B41 5MHz QPSK (PY7-29752M)

Fundamental Substitution Measurement (Fc > 1GHz)
 UL LLC, Chamber N

Company: SOMC
 Project #: 11589096
 Date: 02/16/2017
 Test Engineer: Mark Nolting
 Configuration: Standalone (Sample #729221-1)
 Mode: LTE 41, 5M, QPSK

Test Equipment:
 Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Mid Ch								
2593.00	32.00	V	9.8	5.8	28.01	33.0	-5.0	Pk
2593.00	29.67	H	9.8	5.8	25.68	33.0	-7.3	Pk
2593.00	28.49	V	10.0	6.0	24.53	33.0	-8.5	Avg
2593.00	25.97	H	10.0	6.0	22.01	33.0	-11.0	Avg

Rev: 11.02.2015
 Note: For Band 4 EIRP limit is 30dBm

LTE B41 5MHz QPSK (PY7-21831Z)