

## PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21046 USA Tel. 410.290.6652 / Fax 410.290.6654 http://www.pctest.com



# **MEASUREMENT REPORT**

LTE

#### **Applicant Name:**

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea Date of Testing: 08/26/2019 - 09/19/2019 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1908220144-03.A3L

FCC ID:	A3LSMA705U
APPLICANT:	Samsung Electronics Co., Ltd.
Application Type:	Certification
Model:	SM-A705U
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	22, 24, & 27

 Test Procedure(s):
 ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

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.

Råndy Ortanez President



FCC ID: A3LSMA705U	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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# MEASUREMENT REPORT FCC Part 22, 24, & 27



				ERP		RP		
Mode	Mode FCC Rule Part		Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	Emission Designator	Modulation
LTE Band 13	27	779.5 - 784.5	0.062	17.92	0.102	20.07	4M53G7D	QPSK
LTE Band 13	27	779.5 - 784.5	0.051	17.11	0.084	19.26	4M51W7D	16QAM
LTE Band 13	27	779.5 - 784.5	0.040	16.01	0.065	18.16	4M52W7D	64QAM
LTE Band 13	27	782	0.056	17.47	0.092	19.62	8M98G7D	QPSK
LTE Band 13	27	782	0.045	16.54	0.074	18.69	8M96W7D	16QAM
LTE Band 13	27	782	0.037	15.72	0.061	17.87	8M98W7D	64QAM
LTE Band 5	22H	824.7 - 848.3	0.069	18.36	0.112	20.51	1M10G7D	QPSK
LTE Band 5	22H	824.7 - 848.3	0.059	17.69	0.096	19.84	1M09W7D	16QAM
LTE Band 5	22H	824.7 - 848.3	0.046	16.63	0.076	18.78	1M10W7D	64QAM
LTE Band 5	22H	825.5 - 847.5	0.070	18.42	0.114	20.57	2M70G7D	QPSK
LTE Band 5	22H	825.5 - 847.5	0.060	17.76	0.098	19.91	2M70W7D	16QAM
LTE Band 5	22H	825.5 - 847.5	0.047	16.70	0.077	18.85	2M70W7D	64QAM
LTE Band 5	22H	826.5 - 846.5	0.069	18.37	0.113	20.52	4M51G7D	QPSK
LTE Band 5	22H	826.5 - 846.5	0.058	17.66	0.096	19.81	4M51W7D	16QAM
LTE Band 5	22H	826.5 - 846.5	0.047	16.68	0.076	18.83	4M52W7D	64QAM
LTE Band 5	22H	829 - 844	0.070	18.43	0.114	20.58	9M01G7D	QPSK
LTE Band 5	22H	829 - 844	0.056	17.52	0.093	19.67	8M97W7D	16QAM
LTE Band 5	22H	829 - 844	0.047	16.70	0.077	18.85	8M99W7D	64QAM

EUT Overview (<1 GHz)

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LTE Band 66/4         27         1710.7 - 1779.3         0.174         22.40         1M10G7D         QPSK           LTE Band 66/4         27         1710.7 - 1779.3         0.116         20.65         1M10W7D         640AM           LTE Band 66/4         27         1711.5 - 1778.5         0.177         22.49         2M70G7D         QPSK           LTE Band 66/4         27         1711.5 - 1778.5         0.177         22.49         2M70G7D         QPSK           LTE Band 66/4         27         1711.5 - 1778.5         0.119         20.76         2M70W7D         640AM           LTE Band 66/4         27         1712.5 - 1777.5         0.177         22.48         4M51G7D         QPSK           LTE Band 66/4         27         1712.5 - 1777.5         0.120         20.77         4M52W7D         640AM           LTE Band 66/4         27         1715 - 1775         0.178         22.50         9M02G7D         QPSK           LTE Band 66/4         27         1715 - 1772.5         0.178         22.50         9M02G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.80         13M507D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5	Mode	FCC Rule Part	Tx Frequency (MHz)	El Max. Power (W)	RP Max. Power (dBm)	Emission Designator	Modulation
LTE Band 66/4         27         1710.7 - 1779.3         0.150         21.76         1M10W7D         16QAM           LTE Band 66/4         27         1711.5 - 1778.5         0.116         20.65         1M10W7D         64QAM           LTE Band 66/4         27         1711.5 - 1778.5         0.153         21.85         2M70G7D         QPSK           LTE Band 66/4         27         1711.5 - 1778.5         0.119         20.76         2W70W7D         64QAM           LTE Band 66/4         27         1712.5 - 1777.5         0.177         22.48         4M51G7D         QPSK           LTE Band 66/4         27         1712.5 - 1777.5         0.177         22.48         4M51W7D         16QAM           LTE Band 66/4         27         1712.5 - 1777.5         0.178         22.50         9M02G7D         QPSK           LTE Band 66/4         27         1715 - 1775         0.178         22.50         9M00W7D         64QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5W7D         64QAM           LTE Band 66/4         27         1717.5 - 1				. ,	、 <i>、</i> /	Ŭ	
LTE Band 66/4         27         1710.7 - 1779.3         0.116         20.65         1M10W7D         64QAM           LTE Band 66/4         27         1711.5 - 1778.5         0.177         22.49         2M70G7D         QPSK           LTE Band 66/4         27         1711.5 - 1778.5         0.119         20.76         2M70W7D         16QAM           LTE Band 66/4         27         1711.5 - 1777.5         0.177         22.48         4M51G7D         QPSK           LTE Band 66/4         27         1712.5 - 1777.5         0.120         20.77         4M51W7D         16QAM           LTE Band 66/4         27         1712.5 - 1777.5         0.120         20.77         4M52W7D         64QAM           LTE Band 66/4         27         1715 - 1775         0.161         21.80         8M98W7D         16QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         9M00V7D         64QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5G7D         0PSK           LTE Band 66/4         27         1717.5 - 1772.5         0.118         20.766         13M5W7D         64QAM           LTE Band 66/4         27         1720 - 1							
LTE Band 66/4         27         1711.5 - 1778.5         0.177         22.49         2M70G7D         QPSK           LTE Band 66/4         27         1711.5 - 1778.5         0.153         21.85         2M70W7D         16QAM           LTE Band 66/4         27         1711.5 - 1778.5         0.119         20.76         2M70W7D         64QAM           LTE Band 66/4         27         1712.5 - 1777.5         0.1177         22.48         4M51G7D         QPSK           LTE Band 66/4         27         1712.5 - 1777.5         0.120         20.76         4M52W7D         64QAM           LTE Band 66/4         27         1715.5         1775         0.120         20.80         9M002G7D         QPSK           LTE Band 66/4         27         1717.5 - 1775         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.43         18M007D         16QAM           LTE Band 66/4         27							
LTE Band 66/4         27         1711.5 - 1778.5         0.153         21.85         2M70W7D         16QAM           LTE Band 66/4         27         1711.5 - 1777.5         0.119         20.76         2M70W7D         64QAM           LTE Band 66/4         27         1712.5 - 1777.5         0.177         22.48         4M51G7D         QPSK           LTE Band 66/4         27         1712.5 - 1777.5         0.154         21.86         4M51W7D         16QAM           LTE Band 66/4         27         1715.5         1777.5         0.120         20.77         4M52W7D         64QAM           LTE Band 66/4         27         1715.5         1777.5         0.120         20.80         9M000W7D         64QAM           LTE Band 66/4         27         1715.5         1772.5         0.178         22.50         13M5G7D         0PSK           LTE Band 66/4         27         1717.5 - 1772.5         0.154         21.89         13M5W7D         16QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.154         21.89         13M5W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.175         22.43         18M0G7D         QPSK           LTE Band 66/4<							
LTE Band 66/4         27         1711.5 - 1778.5         0.119         20.76         2M70W7D         64QAM           LTE Band 66/4         27         1712.5 - 1777.5         0.177         22.48         4M51G7D         QPSK           LTE Band 66/4         27         1712.5 - 1777.5         0.154         21.86         4M51W7D         16QAM           LTE Band 66/4         27         1712.5 - 1777.5         0.120         20.77         4M52W7D         64QAM           LTE Band 66/4         27         1715 - 1775         0.151         21.80         8M98W7D         16QAM           LTE Band 66/4         27         1715 - 1775         0.120         20.80         9M00W7D         64QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5W7D         64QAM           LTE Band 66/4         27         1770 - 1770         0.175         22.43         18M0G7D         QPSK           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         16QAM           LTE Band 66/4         27         1720 - 1770							
LTE Band 66/4         27         1712.5 - 1777.5         0.177         22.48         4M51G7D         QPSK           LTE Band 66/4         27         1712.5 - 1777.5         0.154         21.86         4M51W7D         16QAM           LTE Band 66/4         27         1712.5 - 1777.5         0.120         20.77         4M52W7D         64QAM           LTE Band 66/4         27         1715 - 1775         0.178         22.50         9M02G7D         QPSK           LTE Band 66/4         27         1715 - 1775         0.151         21.80         8M98W7D         16QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.154         21.89         13M507D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.43         18M0W7D         16QAM           LTE Band 66/4         27         1717.0         0.175         22.43         18M0W7D         16QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         16QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         16QAM           LTE Band 2         24E         1850.7 - 1909.3 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>							
LTE Band 66/4         27         1712.5 - 1777.5         0.154         21.86         4M51W7D         16QAM           LTE Band 66/4         27         1712.5 - 1777.5         0.120         20.77         4M52W7D         64QAM           LTE Band 66/4         27         1715 - 1775         0.178         22.50         9M02G7D         QPSK           LTE Band 66/4         27         1715 - 1775         0.151         21.80         8M98W7D         16QAM           LTE Band 66/4         27         1715 - 1772.5         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.148         21.89         13M5W7D         16QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.175         22.43         18M0G7D         QPSK           LTE Band 66/4         27         1720 - 1770         0.175         22.43         18M0W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.142         21.53         18M0W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3							
LTE Band 66/4         27         1712.5 - 1777.5         0.120         20.77         4M52W7D         64QAM           LTE Band 66/4         27         1715 - 1775         0.178         22.50         9M02G7D         QPSK           LTE Band 66/4         27         1715 - 1775         0.151         21.80         8M98W7D         16QAM           LTE Band 66/4         27         1715 - 1775         0.120         20.80         9M00W7D         64QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.154         21.89         13M5W7D         16QAM           LTE Band 66/4         27         1717.0         0.175         22.43         18M0W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         16QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         16QAM           LTE Band 2         24E         1850.7 - 1909.3         0.127         2.95         1M10W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.153							
LTE Band 66/4         27         1715 - 1775         0.178         22.50         9M02G7D         QPSK           LTE Band 66/4         27         1715 - 1775         0.151         21.80         8M98W7D         16QAM           LTE Band 66/4         27         1715 - 1775         0.120         20.80         9M00W7D         64QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.119         20.76         13M5W7D         64QAM           LTE Band 66/4         27         1717.0         0.175         22.43         18M007D         QPSK           LTE Band 66/4         27         1720 - 1770         0.142         21.53         18M0W7D         16QAM           LTE Band 66/4         27         1720 - 1770         0.142         21.53         18M0W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.229         23.59         1M10W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.153 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
LTE Band 66/4         27         1715 - 1775         0.151         21.80         8M98W7D         16QAM           LTE Band 66/4         27         1715 - 1775         0.120         20.80         9M00W7D         64QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.154         21.89         13M5W7D         16QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.119         20.76         13M5W7D         64QAM           LTE Band 66/4         27         1710.         0.175         22.43         18M0G7D         QPSK           LTE Band 66/4         27         1720 - 1770         0.142         21.53         18M0W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.162         20.65         18M0W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.197         22.95         1M10W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.153         21.85         1M10W7D         64QAM           LTE Band 2         24E         1851.5 - 1908.5         0.2							
LTE Band 66/4         27         1715 - 1775         0.120         20.80         9M00W7D         64QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.154         21.89         13M5W7D         16QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.119         20.76         13M5W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.175         22.43         18M0W7D         16QAM           LTE Band 66/4         27         1720 - 1770         0.142         21.53         18M0W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.142         21.53         18M0W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.229         23.59         1M10W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.197         22.95         1M10W7D         64QAM           LTE Band 2         24E         1851.5 - 1903.5         0.234         23.68         2M7107D         QPSK           LTE Band 2         24E         1851.5 - 1907.5							
LTE Band 66/4         27         1717.5 - 1772.5         0.178         22.50         13M5G7D         QPSK           LTE Band 66/4         27         1717.5 - 1772.5         0.154         21.89         13M5W7D         16QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.119         20.76         13M5W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.175         22.43         18M0G7D         QPSK           LTE Band 66/4         27         1720 - 1770         0.142         21.53         18M0W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.197         22.95         1M10W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.197         23.02         2M70W7D         16QAM           LTE Band 2         24E         1851.5 - 1908.5         0.234         23.68         2M71G7D         QPSK           LTE Band 2         24E         1851.5 - 1907.5	LTE Band 66/4					8M98W7D	
LTE Band 66/4         27         1717.5 - 1772.5         0.154         21.89         13M5W7D         16QAM           LTE Band 66/4         27         1717.5 - 1772.5         0.119         20.76         13M5W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.175         22.43         18M0G7D         QPSK           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.229         23.59         1M09G7D         QPSK           LTE Band 2         24E         1850.7 - 1909.3         0.197         22.95         1M10W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.153         21.85         1M10W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.153         21.85         1M10W7D         64QAM           LTE Band 2         24E         1851.5 - 1908.5         0.201         23.02         2M70W7D         16QAM           LTE Band 2         24E         1852.5 - 1907.5	LTE Band 66/4		1715 - 1775	0.120		9M00W7D	64QAM
LTE Band 66/4         27         1717.5 - 1772.5         0.119         20.76         13M5W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.175         22.43         18M0G7D         QPSK           LTE Band 66/4         27         1720 - 1770         0.142         21.53         18M0W7D         16QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.229         23.59         1M09G7D         QPSK           LTE Band 2         24E         1850.7 - 1909.3         0.197         22.95         1M10W7D         16QAM           LTE Band 2         24E         1851.5 - 1908.5         0.234         23.68         2M71G7D         QPSK           LTE Band 2         24E         1851.5 - 1908.5         0.157         21.95         2M70W7D         16QAM           LTE Band 2         24E         1852.5 - 1907.5         0.202         23.02         2M70W7D         16QAM           LTE Band 2         24E         1852.5 - 1907.5	LTE Band 66/4		1717.5 - 1772.5	0.178		13M5G7D	
LTE Band 66/4         27         1720 - 1770         0.175         22.43         18M0G7D         QPSK           LTE Band 66/4         27         1720 - 1770         0.142         21.53         18M0W7D         16QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.229         23.59         1M09G7D         QPSK           LTE Band 2         24E         1850.7 - 1909.3         0.197         22.95         1M10W7D         16QAM           LTE Band 2         24E         1850.7 - 1909.3         0.197         22.95         1M10W7D         16QAM           LTE Band 2         24E         1850.7 - 1909.3         0.153         21.85         1M10W7D         64QAM           LTE Band 2         24E         1851.5 - 1908.5         0.201         23.02         2M71W7D         64QAM           LTE Band 2         24E         1851.5 - 1908.5         0.157         21.95         2M71W7D         64QAM           LTE Band 2         24E         1852.5 - 1907.5         0.202         23.05         4M51W7D         16QAM           LTE Band 2         24E         1855.5 - 1907.5 <td< td=""><td>LTE Band 66/4</td><td>27</td><td>1717.5 - 1772.5</td><td>0.154</td><td>21.89</td><td>13M5W7D</td><td></td></td<>	LTE Band 66/4	27	1717.5 - 1772.5	0.154	21.89	13M5W7D	
LTE Band 66/4         27         1720 - 1770         0.142         21.53         18M0W7D         16QAM           LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.229         23.59         1M09G7D         QPSK           LTE Band 2         24E         1850.7 - 1909.3         0.197         22.95         1M10W7D         16QAM           LTE Band 2         24E         1850.7 - 1909.3         0.153         21.85         1M10W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.153         21.85         1M10W7D         64QAM           LTE Band 2         24E         1851.5 - 1908.5         0.201         23.02         2M70W7D         16QAM           LTE Band 2         24E         1851.5 - 1908.5         0.217         21.95         2M71W7D         64QAM           LTE Band 2         24E         1852.5 - 1907.5         0.236         23.72         4M51G7D         QPSK           LTE Band 2         24E         1852.5 - 1907.5         0.202         23.05         4M51W7D         16QAM           LTE Band 2         24E         1855 1907.5 <t< td=""><td>LTE Band 66/4</td><td>27</td><td>1717.5 - 1772.5</td><td>0.119</td><td>20.76</td><td>13M5W7D</td><td>64QAM</td></t<>	LTE Band 66/4	27	1717.5 - 1772.5	0.119	20.76	13M5W7D	64QAM
LTE Band 66/4         27         1720 - 1770         0.116         20.65         18M0W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.229         23.59         1M09G7D         QPSK           LTE Band 2         24E         1850.7 - 1909.3         0.197         22.95         1M10W7D         16QAM           LTE Band 2         24E         1850.7 - 1909.3         0.153         21.85         1M10W7D         64QAM           LTE Band 2         24E         1850.7 - 1909.3         0.153         21.85         1M10W7D         64QAM           LTE Band 2         24E         1851.5 - 1908.5         0.234         23.68         2M71G7D         QPSK           LTE Band 2         24E         1851.5 - 1908.5         0.201         23.02         2M70W7D         16QAM           LTE Band 2         24E         1852.5 - 1907.5         0.236         23.72         4M51G7D         QPSK           LTE Band 2         24E         1852.5 - 1907.5         0.202         23.05         4M51W7D         16QAM           LTE Band 2         24E         1852.5 - 1907.5         0.202         23.05         4M51W7D         64QAM           LTE Band 2         24E         1857.5 - 1907.5	LTE Band 66/4	27	1720 - 1770	0.175	22.43	18M0G7D	QPSK
LTE Band 224E1850.7 - 1909.30.22923.591M09G7DQPSKLTE Band 224E1850.7 - 1909.30.19722.951M10W7D16QAMLTE Band 224E1850.7 - 1909.30.15321.851M10W7D64QAMLTE Band 224E1851.5 - 1908.50.23423.682M71G7DQPSKLTE Band 224E1851.5 - 1908.50.20123.022M70W7D16QAMLTE Band 224E1851.5 - 1908.50.15721.952M71W7D64QAMLTE Band 224E1852.5 - 1907.50.23623.724M51G7DQPSKLTE Band 224E1852.5 - 1907.50.20223.054M51W7D16QAMLTE Band 224E1852.5 - 1907.50.20223.054M51W7D16QAMLTE Band 224E1855.5 - 1907.50.20223.054M51W7D64QAMLTE Band 224E1855.5 - 19050.24723.939M00G7DQPSKLTE Band 224E1855.5 - 19050.21323.279M00W7D16QAMLTE Band 224E1857.5 - 1902.50.24223.8413M5G7DQPSKLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1860 - 19000.24923.9618M0G7D<	LTE Band 66/4	27	1720 - 1770	0.142	21.53	18M0W7D	16QAM
LTE Band 224E1850.7 - 1909.30.19722.951M10W7D16QAMLTE Band 224E1850.7 - 1909.30.15321.851M10W7D64QAMLTE Band 224E1851.5 - 1908.50.23423.682M71G7DQPSKLTE Band 224E1851.5 - 1908.50.20123.022M70W7D16QAMLTE Band 224E1851.5 - 1908.50.20123.022M70W7D16QAMLTE Band 224E1851.5 - 1908.50.15721.952M71W7D64QAMLTE Band 224E1852.5 - 1907.50.23623.724M51G7DQPSKLTE Band 224E1852.5 - 1907.50.20223.054M51W7D16QAMLTE Band 224E1852.5 - 1907.50.15922.024M51W7D64QAMLTE Band 224E1855 - 19050.24723.939M00G7DQPSKLTE Band 224E1855 - 19050.21323.279M00W7D16QAMLTE Band 224E1855 - 19050.16722.239M00W7D64QAMLTE Band 224E1857.5 - 1902.50.24223.8413M5G7DQPSKLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1860 - 19000.24923.9618M0G7D <td< td=""><td>LTE Band 66/4</td><td>27</td><td>1720 - 1770</td><td>0.116</td><td>20.65</td><td>18M0W7D</td><td>64QAM</td></td<>	LTE Band 66/4	27	1720 - 1770	0.116	20.65	18M0W7D	64QAM
LTE Band 224E1850.7 - 1909.30.15321.851M10W7D64QAMLTE Band 224E1851.5 - 1908.50.23423.682M71G7DQPSKLTE Band 224E1851.5 - 1908.50.20123.022M70W7D16QAMLTE Band 224E1851.5 - 1908.50.15721.952M71W7D64QAMLTE Band 224E1852.5 - 1907.50.23623.724M51G7DQPSKLTE Band 224E1852.5 - 1907.50.20223.054M51W7D16QAMLTE Band 224E1852.5 - 1907.50.20223.054M51W7D64QAMLTE Band 224E1852.5 - 1907.50.20223.054M51W7D64QAMLTE Band 224E1852.5 - 1907.50.20223.054M51W7D64QAMLTE Band 224E1855.5 - 1905.50.24723.939M00G7DQPSKLTE Band 224E1855 - 19050.21323.279M00W7D16QAMLTE Band 224E1857.5 - 1902.50.24223.8413M5G7DQPSKLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1860 - 19000.24923.9618M0G7DQPSKLTE Band 224E1860 - 19000.20123.0318M0W7D	LTE Band 2	24E	1850.7 - 1909.3	0.229	23.59	1M09G7D	QPSK
LTE Band 224E1851.5 - 1908.50.23423.682M71G7DQPSKLTE Band 224E1851.5 - 1908.50.20123.022M70W7D16QAMLTE Band 224E1851.5 - 1908.50.15721.952M71W7D64QAMLTE Band 224E1852.5 - 1907.50.23623.724M51G7DQPSKLTE Band 224E1852.5 - 1907.50.20223.054M51W7D16QAMLTE Band 224E1852.5 - 1907.50.20223.054M51W7D16QAMLTE Band 224E1852.5 - 1907.50.15922.024M51W7D64QAMLTE Band 224E1855 - 19050.24723.939M00G7DQPSKLTE Band 224E1855 - 19050.21323.279M00W7D16QAMLTE Band 224E1855 - 19050.16722.239M00W7D64QAMLTE Band 224E1857.5 - 1902.50.24223.8413M5G7DQPSKLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D64QAMLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.21023.0318M0G7DQPSKLTE Band 224E1860 - 19000.24923.9618M0G7D	LTE Band 2	24E	1850.7 - 1909.3	0.197	22.95	1M10W7D	16QAM
LTE Band 224E1851.5 - 1908.50.20123.022M70W7D16QAMLTE Band 224E1851.5 - 1908.50.15721.952M71W7D64QAMLTE Band 224E1852.5 - 1907.50.23623.724M51G7DQPSKLTE Band 224E1852.5 - 1907.50.20223.054M51W7D16QAMLTE Band 224E1852.5 - 1907.50.20223.054M51W7D64QAMLTE Band 224E1852.5 - 1907.50.15922.024M51W7D64QAMLTE Band 224E1855.5 - 19050.24723.939M00G7DQPSKLTE Band 224E1855 - 19050.21323.279M00W7D16QAMLTE Band 224E1855 - 19050.16722.239M00W7D64QAMLTE Band 224E1857.5 - 1902.50.24223.8413M5G7DQPSKLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D64QAMLTE Band 224E1857.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1867.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1860 - 19000.24923.9618M0G7DQPSKLTE Band 224E1860 - 19000.20123.0318M0W7D16QAM	LTE Band 2	24E	1850.7 - 1909.3	0.153	21.85	1M10W7D	64QAM
LTE Band 224E1851.5 - 1908.50.15721.952M71W7D64QAMLTE Band 224E1852.5 - 1907.50.23623.724M51G7DQPSKLTE Band 224E1852.5 - 1907.50.20223.054M51W7D16QAMLTE Band 224E1852.5 - 1907.50.15922.024M51W7D64QAMLTE Band 224E1852.5 - 1907.50.15922.024M51W7D64QAMLTE Band 224E1855 - 19050.24723.939M00G7DQPSKLTE Band 224E1855 - 19050.21323.279M00W7D16QAMLTE Band 224E1857.5 - 19050.16722.239M00W7D64QAMLTE Band 224E1857.5 - 1902.50.24223.8413M5G7DQPSKLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1867.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1860 - 19000.24923.9618M0G7DQPSKLTE Band 224E1860 - 19000.20123.0318M0W7D16QAM	LTE Band 2	24E	1851.5 - 1908.5	0.234	23.68	2M71G7D	QPSK
LTE Band 224E1852.5 - 1907.50.23623.724M51G7DQPSKLTE Band 224E1852.5 - 1907.50.20223.054M51W7D16QAMLTE Band 224E1852.5 - 1907.50.15922.024M51W7D64QAMLTE Band 224E1855 - 19050.24723.939M00G7DQPSKLTE Band 224E1855 - 19050.21323.279M00W7D16QAMLTE Band 224E1855 - 19050.16722.239M00W7D64QAMLTE Band 224E1857.5 - 1902.50.24223.8413M5G7DQPSKLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D64QAMLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D64QAMLTE Band 224E1857.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1860 - 19000.24923.9618M0G7DQPSKLTE Band 224E1860 - 19000.20123.0318M0W7D16QAM	LTE Band 2	24E	1851.5 - 1908.5	0.201	23.02	2M70W7D	16QAM
LTE Band 224E1852.5 - 1907.50.20223.054M51W7D16QAMLTE Band 224E1852.5 - 1907.50.15922.024M51W7D64QAMLTE Band 224E1855 - 19050.24723.939M00G7DQPSKLTE Band 224E1855 - 19050.21323.279M00W7D16QAMLTE Band 224E1855 - 19050.16722.239M00W7D64QAMLTE Band 224E1857.5 - 19050.16722.239M00W7D64QAMLTE Band 224E1857.5 - 1902.50.24223.8413M5G7DQPSKLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1857.5 - 1902.50.24923.9618M0G7DQPSKLTE Band 224E1860 - 19000.20123.0318M0W7D16QAM	LTE Band 2	24E	1851.5 - 1908.5	0.157	21.95	2M71W7D	64QAM
LTE Band 224E1852.5 - 1907.50.15922.024M51W7D64QAMLTE Band 224E1855 - 19050.24723.939M00G7DQPSKLTE Band 224E1855 - 19050.21323.279M00W7D16QAMLTE Band 224E1855 - 19050.16722.239M00W7D64QAMLTE Band 224E1857.5 - 1902.50.24223.8413M5G7DQPSKLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1867.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1860 - 19000.24923.9618M0G7DQPSKLTE Band 224E1860 - 19000.20123.0318M0W7D16QAM	LTE Band 2	24E	1852.5 - 1907.5	0.236	23.72	4M51G7D	QPSK
LTE Band 224E1852.5 - 1907.50.15922.024M51W7D64QAMLTE Band 224E1855 - 19050.24723.939M00G7DQPSKLTE Band 224E1855 - 19050.21323.279M00W7D16QAMLTE Band 224E1855 - 19050.16722.239M00W7D64QAMLTE Band 224E1857.5 - 1902.50.24223.8413M5G7DQPSKLTE Band 224E1857.5 - 1902.50.21023.2213M5W7D16QAMLTE Band 224E1857.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1867.5 - 1902.50.16222.1013M5W7D64QAMLTE Band 224E1860 - 19000.24923.9618M0G7DQPSKLTE Band 224E1860 - 19000.20123.0318M0W7D16QAM	LTE Band 2	24E	1852.5 - 1907.5	0.202	23.05	4M51W7D	16QAM
LTE Band 2         24E         1855 - 1905         0.213         23.27         9M00W7D         16QAM           LTE Band 2         24E         1855 - 1905         0.167         22.23         9M00W7D         64QAM           LTE Band 2         24E         1857.5 - 1902.5         0.242         23.84         13M5G7D         QPSK           LTE Band 2         24E         1857.5 - 1902.5         0.210         23.22         13M5W7D         16QAM           LTE Band 2         24E         1857.5 - 1902.5         0.210         23.22         13M5W7D         16QAM           LTE Band 2         24E         1857.5 - 1902.5         0.162         22.10         13M5W7D         64QAM           LTE Band 2         24E         1867.5 - 1902.5         0.162         22.10         13M5W7D         64QAM           LTE Band 2         24E         1860 - 1900         0.249         23.96         18M0G7D         QPSK           LTE Band 2         24E         1860 - 1900         0.201         23.03         18M0W7D         16QAM	LTE Band 2	24E	1852.5 - 1907.5	0.159		4M51W7D	64QAM
LTE Band 2         24E         1855 - 1905         0.167         22.23         9M00W7D         64QAM           LTE Band 2         24E         1857.5 - 1902.5         0.242         23.84         13M5G7D         QPSK           LTE Band 2         24E         1857.5 - 1902.5         0.210         23.22         13M5W7D         16QAM           LTE Band 2         24E         1857.5 - 1902.5         0.162         22.10         13M5W7D         16QAM           LTE Band 2         24E         1857.5 - 1902.5         0.162         22.10         13M5W7D         64QAM           LTE Band 2         24E         1860 - 1900         0.249         23.96         18M0G7D         QPSK           LTE Band 2         24E         1860 - 1900         0.201         23.03         18M0W7D         16QAM	LTE Band 2	24E	1855 - 1905	0.247	23.93	9M00G7D	QPSK
LTE Band 2         24E         1857.5 - 1902.5         0.242         23.84         13M5G7D         QPSK           LTE Band 2         24E         1857.5 - 1902.5         0.210         23.22         13M5W7D         16QAM           LTE Band 2         24E         1857.5 - 1902.5         0.162         22.10         13M5W7D         64QAM           LTE Band 2         24E         1860 - 1900         0.249         23.96         18M0G7D         QPSK           LTE Band 2         24E         1860 - 1900         0.201         23.03         18M0W7D         16QAM	LTE Band 2	24E	1855 - 1905	0.213	23.27	9M00W7D	16QAM
LTE Band 2         24E         1857.5 - 1902.5         0.242         23.84         13M5G7D         QPSK           LTE Band 2         24E         1857.5 - 1902.5         0.210         23.22         13M5W7D         16QAM           LTE Band 2         24E         1857.5 - 1902.5         0.162         22.10         13M5W7D         64QAM           LTE Band 2         24E         1860 - 1900         0.249         23.96         18M0G7D         QPSK           LTE Band 2         24E         1860 - 1900         0.201         23.03         18M0W7D         16QAM	LTE Band 2	24E	1855 - 1905	0.167	22.23	9M00W7D	64QAM
LTE Band 2         24E         1857.5 - 1902.5         0.210         23.22         13M5W7D         16QAM           LTE Band 2         24E         1857.5 - 1902.5         0.162         22.10         13M5W7D         64QAM           LTE Band 2         24E         1860 - 1900         0.249         23.96         18M0G7D         QPSK           LTE Band 2         24E         1860 - 1900         0.201         23.03         18M0W7D         16QAM		24E		0.242	23.84	13M5G7D	
LTE Band 2         24E         1857.5 - 1902.5         0.162         22.10         13M5W7D         64QAM           LTE Band 2         24E         1860 - 1900         0.249         23.96         18M0G7D         QPSK           LTE Band 2         24E         1860 - 1900         0.201         23.03         18M0W7D         16QAM		24E					
LTE Band 2         24E         1860 - 1900         0.249         23.96         18M0G7D         QPSK           LTE Band 2         24E         1860 - 1900         0.201         23.03         18M0W7D         16QAM		24E					
LTE Band 2 24E 1860 - 1900 0.201 23.03 18M0W7D 16QAM							
LTE Band 2 24E 1860 - 1900 0.166 22.19 18M0W7D 64QAM	LTE Band 2	24E	1860 - 1900	0.166	22.19	18M0W7D	64QAM

EUT Overview (Mid Bands)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	UNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 4 of 166
1M1908220144-03.A3L	08/26/2019 - 09/19/2019	Portable Handset		Fage 4 01 100
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Mode	FCC Rule Part	Tx Frequency (MHz)	EI Max. Power (W)	RP Max. Power (dBm)	Emission Designator	Modulation
LTE Band 7	27	2502.5 - 2567.5	0.104	20.17	4M51G7D	QPSK
LTE Band 7	27	2502.5 - 2567.5	0.089	19.50	4M51W7D	16QAM
LTE Band 7	27	2502.5 - 2567.5	0.069	18.40	4M51W7D	64QAM
LTE Band 7	27	2505 - 2565	0.106	20.27	9M02G7D	QPSK
LTE Band 7	27	2505 - 2565	0.090	19.53	8M99W7D	16QAM
LTE Band 7	27	2505 - 2565	0.072	18.58	9M01W7D	64QAM
LTE Band 7	27	2507.5 - 2562.5	0.107	20.31	13M5G7D	QPSK
LTE Band 7	27	2507.5 - 2562.5	0.091	19.60	13M5W7D	16QAM
LTE Band 7	27	2507.5 - 2562.5	0.072	18.58	13M5W7D	64QAM
LTE Band 7	27	2510 - 2560	0.109	20.38	18M0G7D	QPSK
LTE Band 7	27	2510 - 2560	0.093	19.69	18M0W7D	16QAM
LTE Band 7	27	2510 - 2560	0.074	18.70	18M0W7D	64QAM

EUT Overview (High Bands)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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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 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility 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 PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 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.
- PCTEST 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).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMA705U**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 10518, 10799, 09049, 08108, 09163

## 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC, ANT+

LTE Band 66 (1710 - 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 - 1755 MHz). Therefore, test data provided in this report covers Band 4 as well as Band 66.

## 2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

## 2.4 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

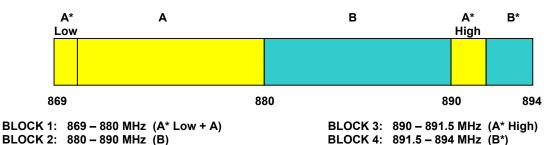
## 3.1 Measurement Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

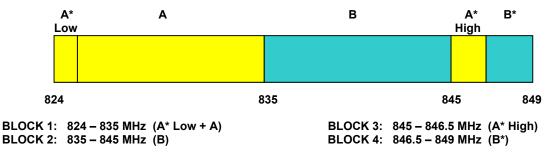
## 3.2 Block C Frequency Range

Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results do not satisfy the applicable reserve price, the spectrum in the 746-757 MHz and 776-787 MHz bands will instead be made available for assignment at a subsequent auction as follows: (i) Two paired channels of 6 megahertz each available for assignment in Block C1 in the 746-752 MHz and 776-782 MHz bands. (ii) Two paired channels of 5 megahertz each available for assignment in Block C2 in the 752-757 MHz and 782-787 MHz bands.

## 3.3 Cellular - Base Frequency Blocks

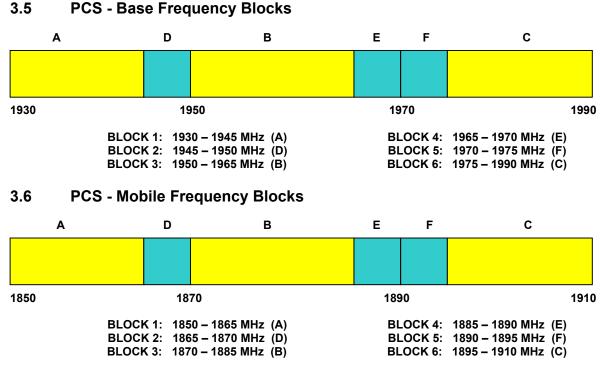


## 3.4 Cellular - Mobile Frequency Blocks

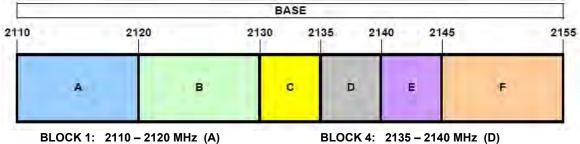


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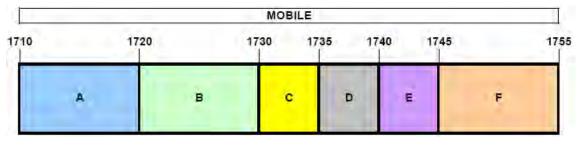


### 3.7 AWS - Base Frequency Blocks



BLOCK 1: 2110 – 2120 MHz (A) BLOCK 2: 2120 – 2130 MHz (B) BLOCK 3: 2130 – 2135 MHz (C) BLOCK 4: 2135 – 2140 MHz (D) BLOCK 5: 2140 – 2145 MHz (E) BLOCK 6: 2145 – 2155 MHz (F)

### 3.8 AWS - Mobile Frequency Blocks



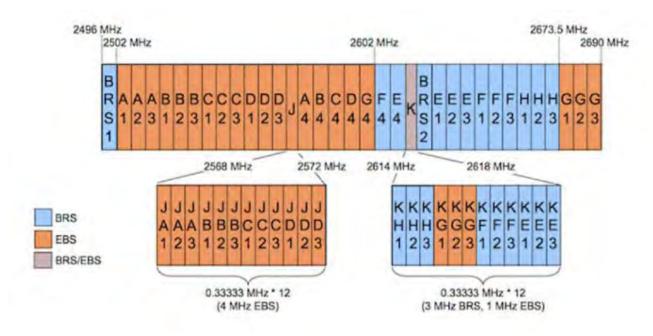
BLOCK 1:	1710 – 1720 MHz	(A)
BLOCK 2:	1720 – 1730 MHz	(B)
BLOCK 3:	1730 – 1735 MHz	(C)

BLOCK 4: 1735 – 1740 MHz (D) BLOCK 5: 1740 – 1745 MHz (E) BLOCK 6: 1745 – 1755 MHz (F)

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## 3.9 BRS/EBS Frequency Block



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## 3.10 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. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then 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].

The calculated  $P_d$  levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10 log<sub>10</sub>(Power [Watts]). For Band 7, the calculated  $P_d$  levels are compared to the absolute spurious emission limit of -25dBm which is equivalent to the required minimum attenuation of 55 + 10 log<sub>10</sub>(Power [Watts]).

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 474788 D01.

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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
-	LTx3	Licensed Transmitter Cable Set	6/3/2019	Annual	6/3/2020	LTx3
-	LTx4	Licensed Transmitter Cable Set	6/4/2019	Annual	6/4/2020	LTx4
Agilent	N9020A	MXA Signal Analyzer	4/20/2019	Annual	4/20/2020	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	6/12/2019	Annual	6/12/2020	MY52350166
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	9/17/2018	Annual	9/17/2019	441119
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	6/7/2018	Triennial	6/7/2021	9203-2178
Espec	ESX-2CA	Environmental Chamber	6/13/2019	Annual	6/13/2020	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	4/19/2019	Annual	4/19/2020	11401010036
Mini Circuits	TVA-11-422	RF Power Amp		N/A		QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator		N/A		11208010032
Rohde & Schwarz	CMW500	Radio Communication Tester	9/25/2018	Annual	9/25/2019	102060
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	6/5/2019	Annual	6/5/2020	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/9/2018	Annual	9/9/2019	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	5/6/2019	Annual	5/6/2020	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/11/2019	Annual	7/11/2020	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/8/2019	Annual	7/8/2020	102133
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/9/2019	Annual	7/9/2020	102138
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	7/16/2018	Biennial	7/16/2020	101073
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	9/19/2018	Annual	9/19/2019	100040
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

Table 5-1. Test Equipment

#### Notes:

- 1. 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.
- 2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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## 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 2<sup>nd</sup> 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).

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# 7.0 TEST RESULTS

## 7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
FCC ID:	<u>A3LSMA705U</u>

<u>LTE</u>

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

Mode(s):

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference			
2.1049	Occupied Bandwidth	N/A						Section 7.2
2.1051 22.917(a) 24.238(a) 27.53(c) 27.53(h)	Out of Band Emissions	> 43 + 10 log <sub>10</sub> (P[Watts]) at Band Edge and for all out-of- band emissions			Section 7.3, 7.4			
27.53(m)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.3, 7.4			
24.232(d) 27.50(d)	Peak-Average Ratio	< 13 dB	CONDUCTED	PASS	Section 7.5			
2.1046	Transmitter Conducted Output Power	N/A			See RF Exposure Report			
2.1055 22.355 24.235 27.54	Frequency Stability	< 2.5 ppm (Part 22) and fundamental emissions stay within authorized frequency block (Part 24, 27)	1		Section 7.8			

Table 7-1. Summary of Conducted Test Results

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FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.913(a)(5)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 5)	< 7 Watts max. ERP			Section 7.6
27.50(b)(10)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 13)	< 3 Watts max. ERP			Section 7.6
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 2, 7)	< 2 Watts max. EIRP			Section 7.6
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 66/4)	< 1 Watts max. EIRP	RADIATED	PASS	Section 7.6
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(h)	Undesirable Emissions (Band 13, 5, 66/4)	> 43 + 10 log <sub>10</sub> (P[Watts]) for all out-of-band emissions			Section 7.7
27.53(f)	Undesirable Emissions (Band 13)	<ul> <li>-70 dBW/MHz (for wideband signals)</li> <li>-80 dBW (for discrete emissions less than 700Hz BW)</li> <li>For all emissions in the band 1559 – 1610 MHz</li> </ul>			Section 7.7
27.53(m)	Undesirable Emissions (Band 7)	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.7

Table 7-2. Summary of Radiated 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 (Sections 7.2, 7.3, 7.4, 7.5) were all 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.
- 4) 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 PCTEST "LTE Automation," Version 5.3.

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## 7.2 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**

KDB 971168 D01 v03r01 - Section 4.2

#### **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  $\ge$  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 7-1. Test Instrument & Measurement Setup

#### Test Notes

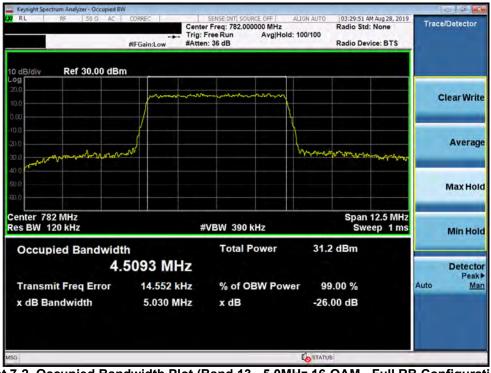
None.

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SENSE:INT SOURCE OFF ALIGN AUTO Center Freq: 782.000000 MHz Trig: Free Run Avg|Hold: 100/100 #Atten: 36 dB RL 03:29:33 AM Aug 28, 2019 Radio Std: None Trace/Detector Radio Device: BTS #IFGain:Low Ref 30.00 dBm 0 dB(di og **Clear Write** Average Max Hold Center 782 MHz Res BW 120 kHz Span 12.5 MHz Sweep 1 ms #VBW 390 kHz Min Hold **Occupied Bandwidth Total Power** 32.3 dBm 4.5265 MHz Detector Peak **Transmit Freq Error** 21.251 kHz % of OBW Power 99.00 % Auto Man x dB Bandwidth 4.966 MHz x dB -26.00 dB STATUS

Plot 7-1. Occupied Bandwidth Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



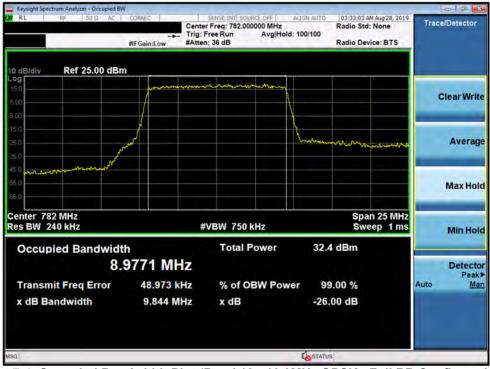
Plot 7-2. Occupied Bandwidth Plot (Band 13 - 5.0MHz 16-QAM - Full RB Configuration)

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Plot 7-3. Occupied Bandwidth Plot (Band 13 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-4. Occupied Bandwidth Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

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Plot 7-5. Occupied Bandwidth Plot (Band 13 - 10.0MHz 16-QAM - Full RB Configuration)



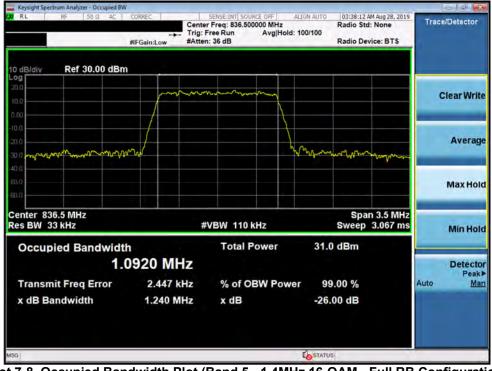
Plot 7-6. Occupied Bandwidth Plot (Band 13 - 10.0MHz 64-QAM - Full RB Configuration)

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lyzer - Occupied BW 03:37:59 AM Aug 28, 2019 Radio Std: None PI Trace/Detector Center Freq: 836.500000 MHz Trig: Free Run Avg|Hold: 100/100 #Atten: 36 dB Radio Device: BTS #FGain:Low 0 dB/div Ref 30.00 dBm og **Clear Write** Average Max Hold Span 3.5 MHz Sweep 3.067 ms Center 836.5 MHz Res BW 33 kHz #VBW 110 kHz Min Hold **Occupied Bandwidth Total Power** 32.0 dBm 1.0950 MHz Detector Peak **Transmit Freg Error** -147 Hz % of OBW Power 99.00 % Auto Man x dB Bandwidth 1.248 MHz -26.00 dB x dB STATUS

Plot 7-7. Occupied Bandwidth Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



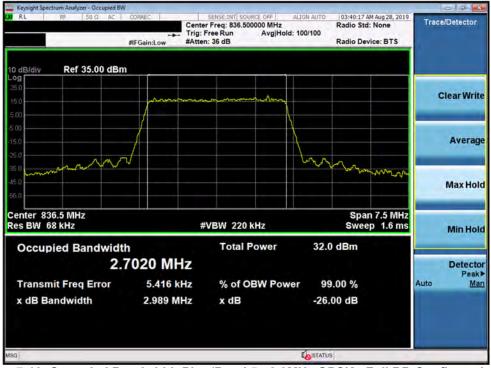
Plot 7-8. Occupied Bandwidth Plot (Band 5 - 1.4MHz 16-QAM - Full RB Configuration)

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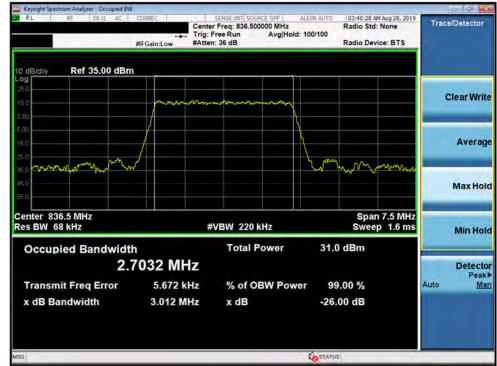
Plot 7-9. Occupied Bandwidth Plot (Band 5 - 1.4MHz 64-QAM - Full RB Configuration)



Plot 7-10. Occupied Bandwidth Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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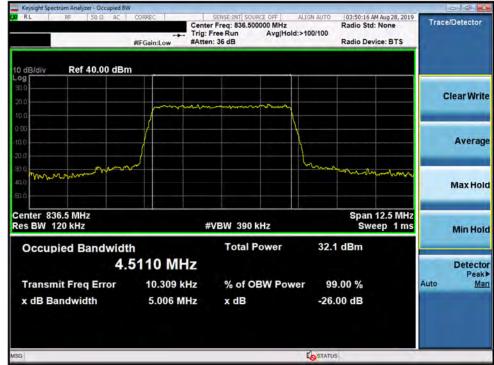
Plot 7-11. Occupied Bandwidth Plot (Band 5 - 3.0MHz 16-QAM - Full RB Configuration)



Plot 7-12. Occupied Bandwidth Plot (Band 5 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMA705U	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	MSUNG	Approved by: Quality Manager
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Plot 7-13. Occupied Bandwidth Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-14. Occupied Bandwidth Plot (Band 5 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-15. Occupied Bandwidth Plot (Band 5 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-16. Occupied Bandwidth Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMA705U	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	ING	Approved by: Quality Manager
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Plot 7-17. Occupied Bandwidth Plot (Band 5 - 10.0MHz 16-QAM - Full RB Configuration)



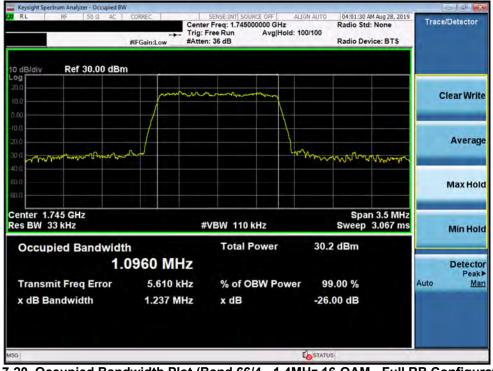
Plot 7-18. Occupied Bandwidth Plot (Band 5 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager		
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Plot 7-19. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-20. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 07 of 166
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Plot 7-21. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz 64-QAM - Full RB Configuration)



Plot 7-22. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMA705U	MEASUREMENT REPORT (CERTIFICATION)		SAMSU		SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 29 of 166		
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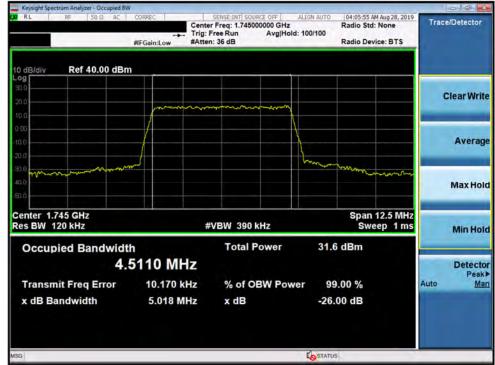
Plot 7-23. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)



Plot 7-24. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager		
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Plot 7-25. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-26. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMA705U	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-27. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-28. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager		
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	IFGain:Low	Center	SENSE:INT SOU Freq: 1.74500 ree Run : 36 dB				Radio Std Radio Dev		Trac	e/Detector
0 dB/div Ref 30.00 dBm .0g 20 0	min	twonwood	-	more						Clear Write
0.02 10.0 20.0 30.0 Upp. ph. ph. ph. ph. ph. ph. ph. ph. ph.					1	mon	- Commenta			Average
ιά C										Max Hold
Center 1.745 GHz Res BW 240 kHz Occupied Bandwidth		#\	/BW 750 I Total P			31.0		n 25 MHz ep 1 ms		Min Hold
	846 MH 27.193 H 9.822 M	Hz	% of O x dB	BW Pov	ver		0.00 % 00 dB		Auto	Detector Peak≯ <u>Man</u>
sg						STATUS	5		-	

Plot 7-29. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)



Plot 7-30. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager		
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Plot 7-31. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-32. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	ASUNG	Approved by: Quality Manager		
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Plot 7-33. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-34. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager		
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Plot 7-35. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)



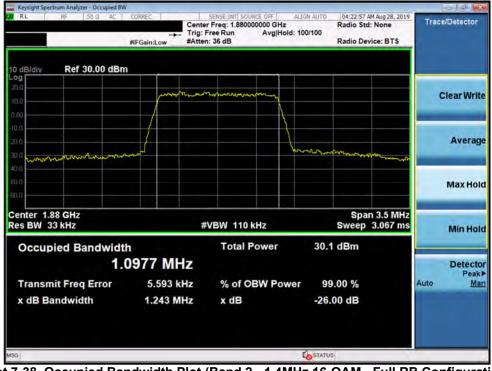
Plot 7-36. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	AMSUNG	Approved by: Quality Manager		
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Plot 7-37. Occupied Bandwidth Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-38. Occupied Bandwidth Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-39. Occupied Bandwidth Plot (Band 2 - 1.4MHz 64-QAM - Full RB Configuration)



Plot 7-40. Occupied Bandwidth Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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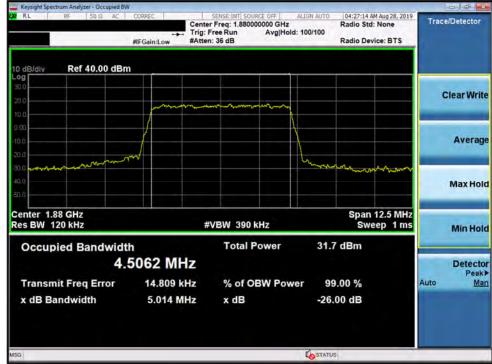
Plot 7-41. Occupied Bandwidth Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)



Plot 7-42. Occupied Bandwidth Plot (Band 2 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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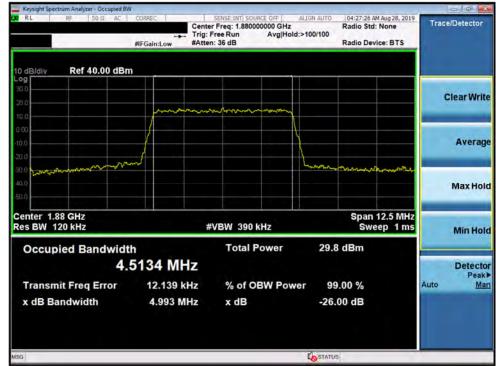
Plot 7-43. Occupied Bandwidth Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-44. Occupied Bandwidth Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SUNG	Approved by: Quality Manager
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Plot 7-45. Occupied Bandwidth Plot (Band 2 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-46. Occupied Bandwidth Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Plot 7-47. Occupied Bandwidth Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)



Plot 7-48. Occupied Bandwidth Plot (Band 2 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	AMSUNG	Approved by: Quality Manager
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Plot 7-49. Occupied Bandwidth Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-50. Occupied Bandwidth Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-51. Occupied Bandwidth Plot (Band 2 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-52. Occupied Bandwidth Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Plot 7-53. Occupied Bandwidth Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-54. Occupied Bandwidth Plot (Band 2 - 20.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMA705U	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	MSUNG	Approved by: Quality Manager
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er - Occup 03:13:47 AM Sep 17, 2019 Radio Std: None 81 ALIGN AUTO Trace/Detector Center Freq: 2.535000000 GHz Trig: Free Run Avg|Hold: 100/100 #Atten: 36 dB NFE #IFGain:Low Radio Device: BTS 10 dB/div Ref 30.00 dBm **Clear Write** Average mon Max Hold Center 2.535 GHz Res BW 120 kHz Span 12.5 MHz Sweep 1 ms #VBW 390 kHz **Min Hold Occupied Bandwidth Total Power** 31.1 dBm 4.5123 MHz Detector Peak Man 16.246 kHz 99.00 % Auto **Transmit Freg Error** % of OBW Power x dB Bandwidth 5.010 MHz -26.00 dB x dB STATUS

Plot 7-55. Occupied Bandwidth Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-56. Occupied Bandwidth Plot (Band 7 - 5.0MHz 16-QAM - Full RB Configuration)

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n Analyzer - Occur Keysight St 03:14:13 AM Sep 17, 2019 Radio Std: None DI ALIGN AUTO Center Freq: 2.535000000 GHz Trig: Free Run Avg|Hold #Atten: 36 dB Trace/Detector Avg|Hold: 100/100 #IFGain:Low Radio Device: BTS Ref 30.00 dBm **Clear Write** Average Max Hold Center 2.535 GHz Res BW 120 kHz Span 12.5 MHz #VBW 390 kHz Sweep 1 ms **Min Hold Total Power** 28.6 dBm **Occupied Bandwidth** Detector Peak► <u>Man</u> 4.5129 MHz 16.195 kHz % of OBW Power 99.00 % Auto **Transmit Freq Error** x dB Bandwidth 4.944 MHz x dB -26.00 dB STATUS

Plot 7-57. Occupied Bandwidth Plot (Band 7 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-58. Occupied Bandwidth Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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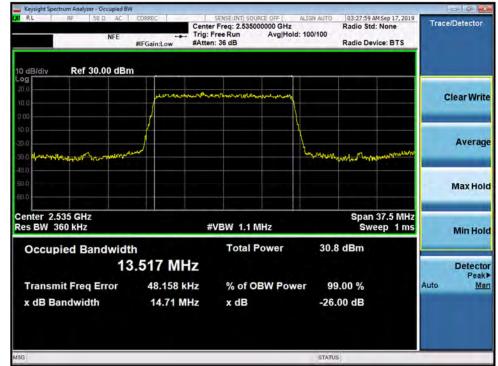
Plot 7-59. Occupied Bandwidth Plot (Band 7 - 10.0MHz 16-QAM - Full RB Configuration)



Plot 7-60. Occupied Bandwidth Plot (Band 7 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-61. Occupied Bandwidth Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-62. Occupied Bandwidth Plot (Band 7 - 15.0MHz 16-QAM - Full RB Configuration)

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NFE	Center Trig: F	SENSE:INT SOURCE ( er Freq: 2.53500000 Free Run A n: 36 dB		ALIGN AUTO	03:28:21 / Radio Std Radio De		Trace	Detector
10 dB/div Ref 30.00 dBm								
20.0	monum	worker and the second second	mm				c	lear Write
0.00			ł					
200 multiportestore				Windhowen	wanter	manning	_	Averag
000 500 500	ک کار آن						-	Max Hol
Center 2.535 GHz tes BW 360 kHz	#	VBW 1.1 MHz	2			37.5 MHz eep 1 ms		Min Ho
Occupied Bandwidth		Total Pow	ver	28.5	dBm			
13. Transmit Freq Error	.468 MHz 35.526 kHz	% of OBW	Powe	r 99	.00 %		Auto	Detecto Peak <u>Ma</u>
x dB Bandwidth	14.83 MHz	x dB			00 dB			
ISG				STATUS				

Plot 7-63. Occupied Bandwidth Plot (Band 7 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-64. Occupied Bandwidth Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)

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Plot 7-65. Occupied Bandwidth Plot (Band 7 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-66. Occupied Bandwidth Plot (Band 7 - 20.0MHz 64-QAM - Full RB Configuration)

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# 7.3 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 10<sup>th</sup> 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 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.

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

For Band 7, the minimum permissible attenuation level of any spurious emission is 55 + 10 log<sub>10</sub>(P<sub>[Watts]</sub>).

#### Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

### Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to at least 10 \* the fundamental frequency (separated into at least two plots per channel)
- 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.



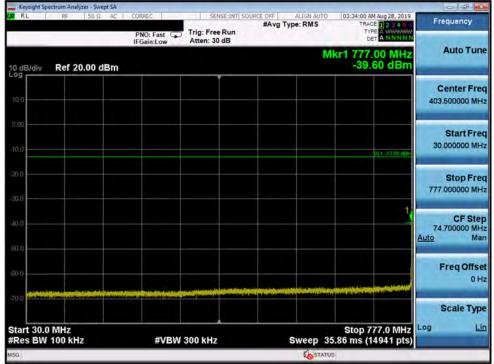
Figure 7-2. Test Instrument & Measurement Setup

### Test Notes

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, 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. 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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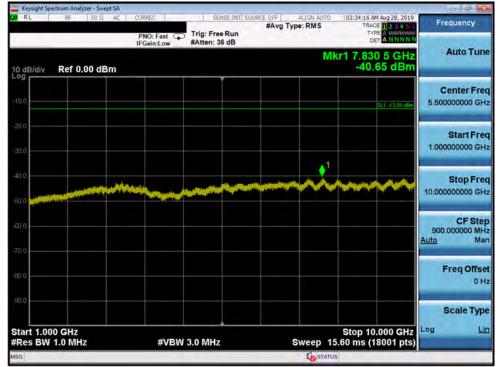
Plot 7-67. Conducted Spurious Plot (Band 13 - 10.0MHz QPSK - RB Size 1, RB Offset 0)

Frequency	03:34:06 AM Aug 28, 2019	ALIGN AUTO		SENSE:INT S	CORREC	2 AC	RF 50	
Frequency	TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	ype: RMS	#Avg	Trig: Free Run Atten: 30 dB	PNO: Fast			
Auto Tun	kr1 787.00 MHz -55.60 dBm	M				dBm	Ref 20.00	10 dB/div
Center Fre 893.500000 MH								10.0
Start Fre 787.000000 MH	DL1 -13-00 dBm							0.00
Stop Fre 1.000000000 GF								20.0 30.0
CF Ste 21.300000 Mi Auto Mi								40.0 50.0 <b>4</b>
Freq Offs 0 F	and the second	under an		ngalas anto information and	- Saran aya 19 da aya ayaa ayaa ayaa		~~~~	60 D
Scale Typ								70.0
Log <u>L</u>	Stop 1.0000 GHz 0.22 ms (4261 pts)	Sweep 1		300 kHz	#VBW 3			start 0.78 Res BW
		STATUS						ISG

Plot 7-68. Conducted Spurious Plot (Band 13 - 10.0MHz QPSK - RB Size 1, RB Offset 0)

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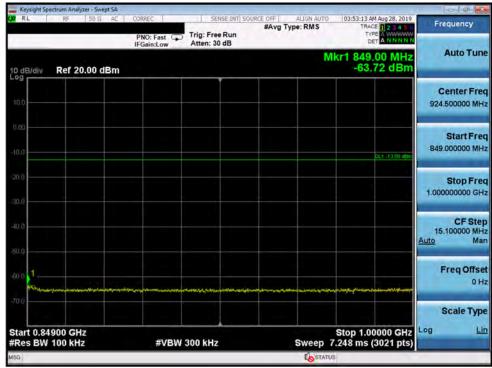
Plot 7-69. Conducted Spurious Plot (Band 13 - 10.0MHz QPSK - RB Size 1, RB Offset 0)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager				
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alyzer - Swept SA Keysight Sp RL 03:53:07 AM Aug 28, 2019 TRACE 1 2 3 4 5 0 TYPE A WWWW DET A N N N N N Frequency #Avg Type: RMS Trig: Free Run Atten: 30 dB PNO: Fast C Auto Tune Mkr1 820 25 MHz -38.02 dBm Ref 20.00 dBm 10 dB/div **Center Freq** 426.500000 MHz Start Freq 30.000000 MHz Stop Freq 823.000000 MHz CF Step 79.300000 MHz Man Auto **Freq Offset** 0 Hz Scale Type Lin Start 30.0 MHz #Res BW 100 kHz Stop 823.0 MHz Sweep 38.06 ms (15861 pts) Log #VBW 300 kHz

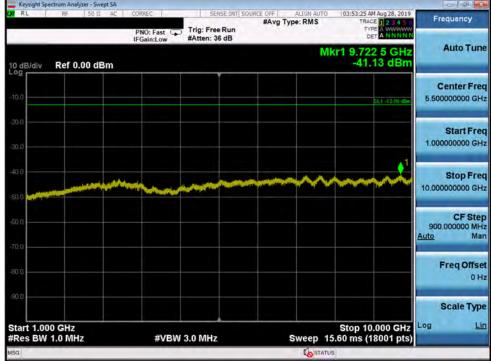
Plot 7-70. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



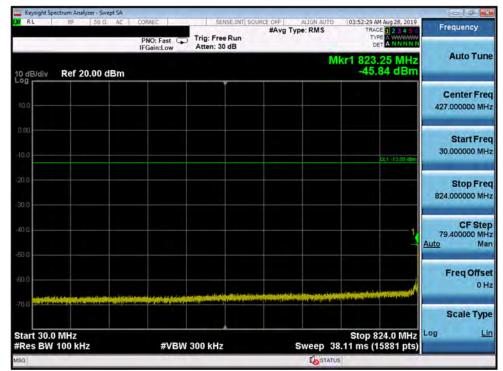
Plot 7-71. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager			
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Plot 7-72. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



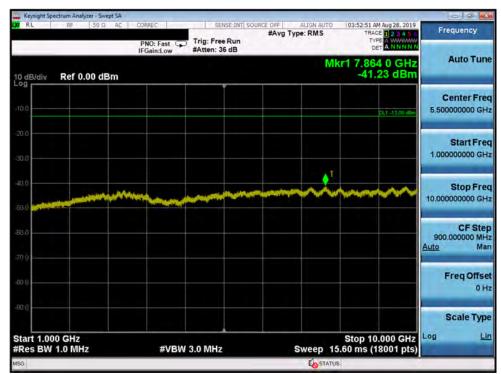
Plot 7-73. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager				
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Atten: 30 dB	#Avg Type: RMS	kr1 849.70 MHz -62.04 dBm	Auto Tun Center Fre 924.500000 MH
	M	kr1 849.70 MHz -62.04 dBm	Center Fre
		DL1 -13 00 dBm	Start Fr 849.000000 M
			Stop Fr 1.000000000 G
			CF St 15.100000 M Auto N
ang mangan gint matagang pang mangang pang mangang pang mangang pang mangang pang pang mangang pang pang pang m	***	-)	Freq Offs 0
			Scale Ty
/BW 300 kHz	Sweep 7	Stop 1.00000 GHz .248 ms (3021 pts)	Log L
		BW 300 kHz Sweep 7	Stop 1.00000 GHz

Plot 7-74. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



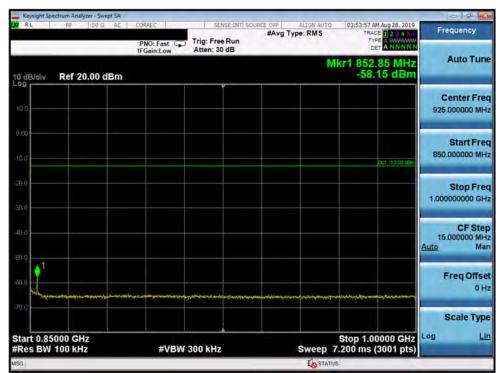
Plot 7-75. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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RL	RF 50 G		CORREC	SENSE:INT SE		ALIGN AUTO		Aug 28, 2019	Frequency
			PNO: Fast 😱 IFGain:Low	Trig: Free Run Atten: 30 dB	#Avg Typ	e: RMS	TRAC TYP DE	E 2 3 4 5 6 E A WWWWW T A N N N N N	Frequency
0 dB/div	Ref 20.00 d	IBm				MI	kr1 823. -62.1	45 MHz 13 dBm	Auto Tur
tō,ō									Center Fro 427.000000 Mi
1.00								DL1 -13.00 dBm	Start Fr 30.000000 M
a a a a									Stop Fr 824.000000 M
00 00									CF SI 79.400000 M <u>Auto</u> M
io io		and a set how						1 Verfingene <sup>th</sup>	Freq Off
10.0			aler a sin in a selected it				Stop 8	24.0 MHz	Scale Ty
Res BW 1			#VBW :	300 kHz	S	weep 38	.11 ms (1	5881 pts)	

Plot 7-76. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-77. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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Keysight Spectrum Analyzer - Swept S RL RF 50 Q A		SENSE:INT SO	URCE OFF ALIGN AUTO	03:54:08 AM Aug 28, 2019	
	PNO: Fast	Trig: Free Run #Atten: 36 dB	#Avg Type: RMS	TRACE 1 2 3 4 5 0 TYPE A WWWW DET A NNNNN	Frequency
0 dB/div Ref 0.00 dBm			MI	r1 7.820 0 GHz -40.94 dBm	Auto Tun
10.0				OL1 -13 00 dBm	Center Fre 5.500000000 GH
20.0 30.0					Start Fre 1.00000000 GH
	the second	-		~~~~	Stop Fre 10.000000000 Gi
70.0					CF Sto 900.000000 M <u>Auto</u> M
30 13					Freq Offs 01
90 1)					Scale Typ
Start 1.000 GHz Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep 1	Stop 10.000 GHz 5.60 ms (18001 pts)	Log
SG			STATU		

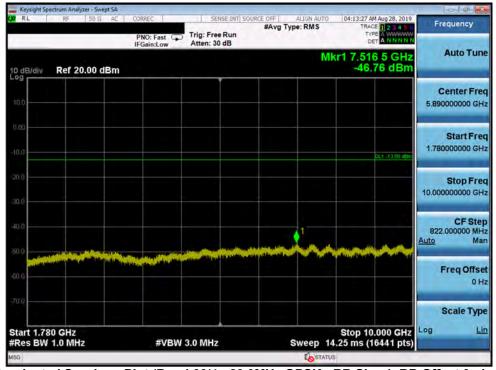
Plot 7-78. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: A3LSMA705U	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SUNG	Approved by: Quality Manager
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<b>Χ RL</b> RF 50Ω AC	PNO: Fast Trig: Free Run IFGain:Low Atten: 30 dB	#Avg Type: RMS	04:13:20 AM Aug 28, 2019 TRACE 1 2 3 4 5 0 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Ref 20.00 dBm		Mk	r1 1.703 0 GHz -34.59 dBm	Auto Tune
10.0				Center Free 869.500000 MH
10.0			DL1 -13.00 dBm	Start Fre 30.000000 MH
20.0 39.8			1	Stop Fre 1.709000000 GH
۵۵				CF Ste 167.900000 MH Auto Ma
60 C	and an all and a state of the	un an		Freq Offse 0 H
770 0 Start 0.0300 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 2	Stop 1.7090 GHz 239 ms (3359 pts)	Scale Typ

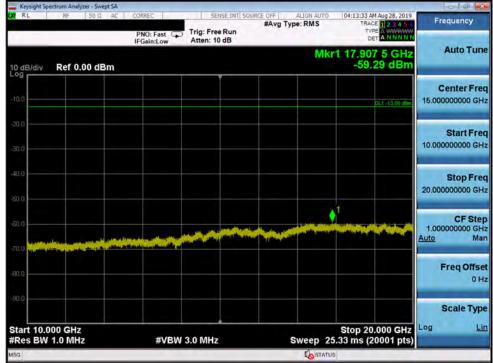
Plot 7-79. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-80. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-81. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



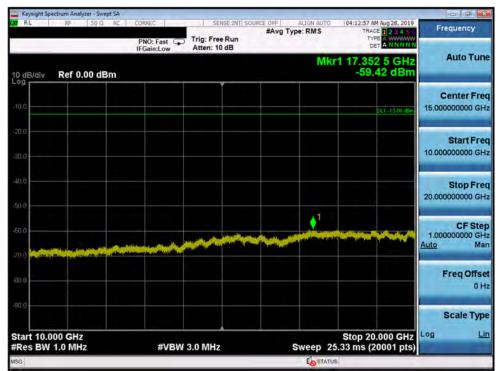
Plot 7-82. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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RL RF 50.9 AC	CORREC	SENSE:INT SO			1 Aug 28, 2019	Frequency
		rig: Free Run Atten: 30 dB	#Avg Type: RM	TYP	E 1 2 3 4 5 6 E A WWWWW A NNNNN	Frequency
0 dB/div Ref 20.00 dBm				Mkr1 1.78 -45.	3 0 GHz 37 dBm	Auto Tun
og 10.0						Center Fre 5.890000000 GH
0.00					DL1 -13.00 dBm	Start Fre 1.780000000 GH
201 ()						<b>Stop Fre</b> 10.000000000 GH
40.0 1		in and address			A	CF Ste 822.000000 MH uto Ma
50 0 50 0 50 0						Freq Offse 0 H
start 1.780 GHz	#UD14 0	0.0411-		Stop 10 p 14.25 ms (1	.000 GHz	Scale Typ
Res BW 1.0 MHz	#VBW 3.			STATUS	644 T pts/	

Plot 7-83. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



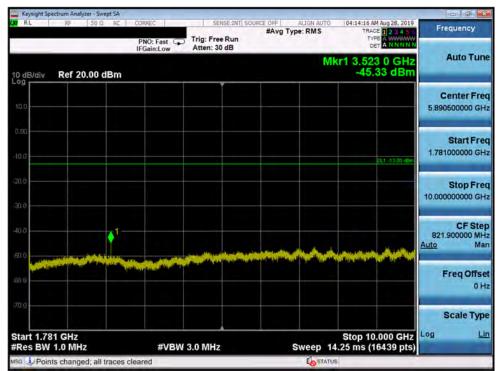
Plot 7-84. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Swep	AC CORREC	SENSE:INT SO		04:14:11 AM Aug 28, 2019	Frequency
	PNO: Fast 😱 IFGain:Low	Trig: Free Run Atten: 30 dB	#Avg Type: RMS	TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Frequency
10 dB/div Ref 20.00 dl	Bm		м	kr1 1.706 0 GHz -50.05 dBm	Auto Tun
10.0					Center Fre 870.000000 MH
10.0				DL1 -13.00 dBm	Start Fre 30.000000 MH
30.0					Stop Fre 1.710000000 GH
40.0 50.0				P.	CF Ste 168.000000 Mi Auto Mi
60.0	an Bree Standy States and a state of the states of the		an farinin an farin a baran baran an baran an baran	ang ang anang ang ang ang ang ang ang an	Freq Offs 01
70.0					Scale Typ
Start 0.0300 GHz #Res BW 1.0 MHz	#VBW 3	3.0 MHz	Sweep	Stop 1.7100 GHz 2.240 ms (3361 pts)	Log
ISG			STATU		

Plot 7-85. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-86. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Auto Tur 5 GHz 5 dBm Center Fre 15.00000000 GH Start Fre 10.000000000 GH	Type: RMS TRACE [] 2:3 4 5 6 TYPE AVMANN N DEF ANNAN N Mkr1 18.293 5 GHz -59.35 dBm
Center Fre 15.00000000 GH Start Fre 10.000000000 GH	-59.35 dBm
15.00000000 GH Start Fre 10.00000000 GH Stop Fre	0L1 -13 00 dbn
10.000000000 GH	
20.00000000 GH	
CF Ste 1.000000000 Gi Auto Mi	
Freq Offs 01	
Scale Typ	Stop 20.000 GHz
0001 pts)	Sweep 25.33 ms (20001 pts)
#VBW 3.0 MHz Sweep 25.33 ms (20	

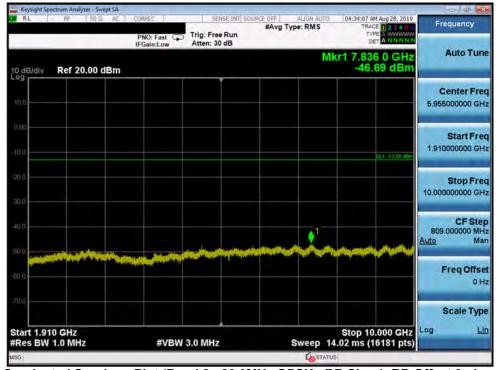
Plot 7-87. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: A3LSMA705U	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	ING	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Swept 5 RL RF 50 Ω A		SOURCE OFF ALIGN AUTO	04:34:01 AM Aug 28, 2019	
AL 10 10032 A	PNO: Fast C Trig: Free Run IFGain:Low Atten: 30 dB	#Avg Type: RMS	TRACE 1 2 3 4 5 0 TYPE A WWWW DET A NNNN N	Frequency
ID dB/div Ref 20.00 dBr	n	Mk	r1 1.843 0 GHz -31.95 dBm	Auto Tur
10.0				Center Fre 939,500000 MH
10.0			DL1 -13.00 dBm	Start Fre 30.000000 MH
zā ā 30.it			t	Stop Fre 1.849000000 Gi
40.0				CF Ste 181.900000 Mi Auto Mi
50 G				Freq Offs 01
70 0 Start 0.0300 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Sween 2	Stop 1.8490 GHz .425 ms (3639 pts)	Scale Typ
SG	#12W 5.5 WI12	Lo STATUS		

Plot 7-88. Conducted Spurious Plot (Band 2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



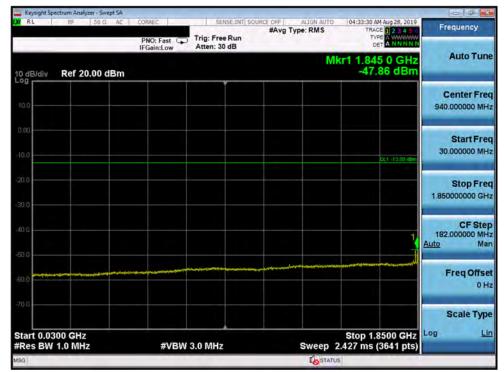
Plot 7-89. Conducted Spurious Plot (Band 2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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RL RF 50 Q AC	CORREC SENSE:INT SI	#Avg Type: RMS TRACE 12.3.4 TYPE	Frequency
	PNO: Fast Frig: Free Run IFGain:Low Atten: 10 dB	DETANNN	
0 dB/div Ref 0.00 dBm		Mkr1 19.841 5 GH -59.02 dB	Auto Tune m
10.0		DL1 -13 08 d	Center Free
30.0			Start Fre 10.000000000 GH
40,0			Stop Fre 20.000000000 GH
50 0 70 0			CF Ste 1.00000000 GF <u>Auto</u> Ma
80.0			Freq Offse
300 GHz		Stop 20.000 GF	Scale Typ
Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 25.33 ms (20001 pt	(5)
SG		STATUS	

Plot 7-90. Conducted Spurious Plot (Band 2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



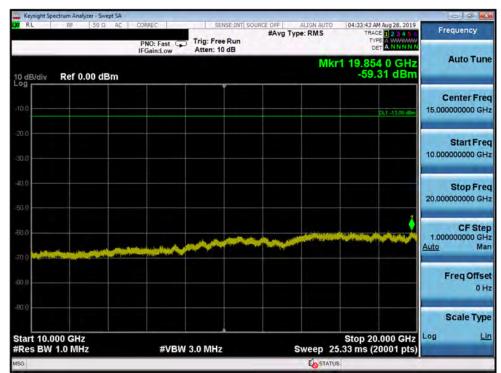
Plot 7-91. Conducted Spurious Plot (Band 2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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CORREC			04:33:37 AM Aug 28, 2019 TRACE 1 2 3 4 5 6 TYPE A WARMAN	Frequency
		_	DETANNNN	
		M	46.96 dBm	Auto Tur
				Center Fre 5.955000000 GH
			DL1 -13:00 x8m	Start Fro 1.910000000 Gi
				<b>Stop Fr</b> 10.000000000 G
			• •	CF St 809.000000 M <u>Auto</u> M
				Freq Offs 0
				Scale Ty
#VBW 3.0 N	ЛНz	Sweep 14	Stop 10.000 GHz .02 ms (16181 pts)	Log L
	IFGain:Low Atte	PNO: Fast 😱 Trig: Free Run	#VBW 3.0 MHz Sweep 14	PNO: Fast Trig: Free Run Atten: 30 dB Mkr1 9.397 0 GHz -46.96 dBm DU 33.00 dbm DU 33.00 dbm

Plot 7-92. Conducted Spurious Plot (Band 2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



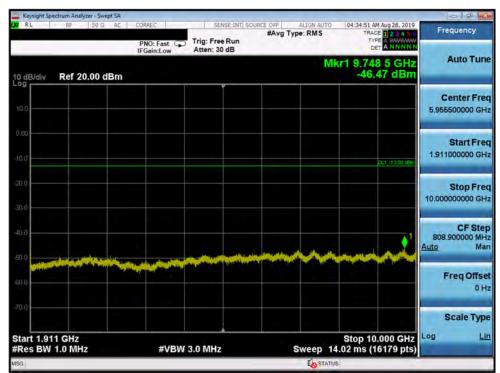
Plot 7-93. Conducted Spurious Plot (Band 2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	MSUNG	Approved by: Quality Manager	
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Frequency	04:34:45 AM Aug 28, 2019 TRACE 1 2 3 4 5 0 TYPE A WWWW DET A N N N N N	g Type: RMS	SENSE:INT  SOU		RF 50.92 AC	RL
Auto Tur	r1 1.846 0 GHz -51.36 dBm	Mk	Atten: 30 dB	IFGain:Low	Ref 20.00 dBm	0 dB/div
Center Fre 940.000000 Mi						og 10.0
Start Fre 30.000000 Mi	DL1 -13.09 dBm					10.0
Stop Fre 1.85000000 Gł						20.0 30.0
CF Ste 182.000000 MH Auto Ma	1					40 Å
Freq Offs 0 F						60 D
Scale Typ	Stop 1.8500 GHz					tart 0.030
	.427 ms (3641 pts)	Sweep 2	U WHZ	#VBW 3	.0 MH2	Res BW 1

Plot 7-94. Conducted Spurious Plot (Band 2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-95. Conducted Spurious Plot (Band 2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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RL         RF         50 G         AC	CORREC	SENSE:INT SO		ALIGN AUTO	04:34:57	AM Aug 28, 2019	Frequency
		Free Run n: 10 dB	#Avg Typ	e: RMS	TRO	ACE 1 2 3 4 5 6 YPE A WWWWW DET A NNNNN	requercy
dB/div Ref 0.00 dBm				Mkr	1 18.00 -59	01 5 GHz .05 dBm	Auto Tun
0.0						OL1 -13.00 dBm	Center Fre 15.000000000 GF
D.0							Start Fre 10.00000000 GF
ā0 							Stop Fre 20.000000000 GH
	-	-			1		CF Ste 1.000000000 GF Auto Mi
00							Freq Offs 01
tart 10.000 GHz					Stop 2	0.000 GHz	Scale Typ
Res BW 1.0 MHz	#VBW 3.0 N	lHz	s	weep 25	.33 ms (	20001 pts)	

Plot 7-96. Conducted Spurious Plot (Band 2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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Keysight Sp R.L lyzer - Swept SA AUTO 03:35:32 AM Sep 17, 2019 S TRACE 123450 Frequency #Avg Type: RMS Trig: Free Run Atten: 30 dB NEF PNO: Fast C ANNNN DET Auto Tune Mkr1 2.413 0 GHz -46.41 dBm Ref 20.00 dBm 10 dB/div **Center Freq** 1 252500000 GHz Start Freq 30.000000 MHz Stop Freq 2.475000000 GHz CF Step 244.500000 MHz Z Man Auto **Freq Offset** 0 Hz Scale Type Start 0.030 GHz #Res BW 1.0 MHz Log Lin Stop 2.475 GHz #VBW 3.0 MHz Sweep 3.260 ms (4891 pts)

Plot 7-97. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

Keysight Spectrum Analyzer - Swept SA ALIGN AUTO 03:35:53 AM Sep 17, 2019 #Avg Type: RMS TRACE SENSE:INT SOURC Frequency Trig: Free Run Atten: 30 dB PNO: Fast TYP Auto Tune Mkr1 14.800 5 GHz -38.37 dBm 10 dB/div Ref 20.00 dBm Center Freq 8.785000000 GHz Start Freq 2.570000000 GHz Stop Freq 15.00000000 GHz CF Step 1.243000000 GHz uto Man Auto Freq Offset 0 Hz Scale Type Start 2.570 GHz #Res BW 1.0 MHz Log Lin Stop 15.000 GHz #VBW 3.0 MHz Sweep 24.86 ms (24861 pts)

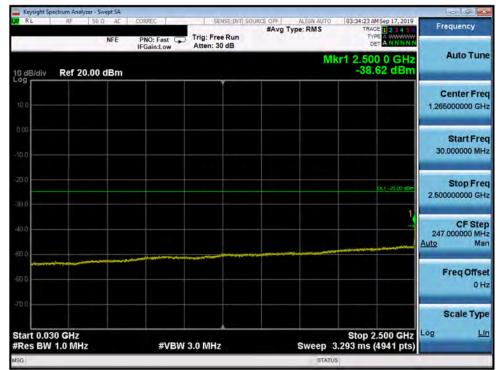
Plot 7-98. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

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Plot 7-99. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-100. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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3G					STATUS		
tart 2.570 GHz Res BW 1.0 MHz		#VBW	3.0 MHz	s	weep 24	Stop 15.000 GHz .86 ms (24861 pts)	Log <u>L</u>
70.0							Scale Typ
500							Freq Offs 0 F
	m		~~~~	~~~~~	~~~		1.243000000 Gi Auto Mi
40 Å							CF Ste
20.0						01, j +25 00 a6m	Stop Fre 15.00000000 Gi
10.0							2.570000000 G
00.							Start Fr
10.0							Center Fr 8.785000000 G
o dB/div Ref 20.00	) dBm		Y	_	Mk	r1 2.574 5 GHz -38.06 dBm	Auto Tu
	NFE F	NO: Fast 😱 Gain:Low	Trig: Free Run Atten: 30 dB	#Avg Typ	and a	TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	
RL RF 50	Ω AC CC	RREC	SENSE:INT		ALIGN AUTO	03:34:41 AM Sep 17, 2019	Frequency

Plot 7-101. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-102. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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PNO: Fast 😱 Trig: Free Run	#Avg Type: RMS TRACE 2345	Frequency
IFGam:Low Atten. 30 dB	Mkr1 2.500 0 GH -44.79 dBn	Auto Tune
		Center Fre 1.265000000 GH
		Start Fre 30.000000 MF
	Du1 -25 00 e8m	Stop Fre 2.50000000 GH
	1	CF Ste 247.000000 Mi Auto Mi
n an		Freq Offs 01
	Stop 2.500 GHz	Scale Typ
		PNO: Fast         Trig: Free Run Atten: 30 dB         #Avg Type: RMS         Trace Type         Participants           Mkr1 2.500 0 GHz

Plot 7-103. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-104. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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Plot 7-105. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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# 7.4 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 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.

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

# The minimum permissible attenuation level for Band 7 is as noted in the Test Notes on the following page.

## **Test Procedure Used**

KDB 971168 D01 v03r01 - Section 6.0

### Test Settings

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW  $\geq$  1% of the emission bandwidth
- 4. VBW <u>></u> 3 x RBW
- 5. Detector = RMS
- 6. Number of sweep points  $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 8. Sweep time = auto couple
- 9. 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

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#### Test Notes

Per 22.917(b) 24.238(a) 27.53(h) 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.

Per 27.53(c)(5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c)(4) is 65 + 10  $\log_{10}(P)$  = -35dBm in a 6.25kHz bandwidth.

Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than  $40 + 10 \log (P) dB$  on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P) dB$  on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that  $43 + 10 \log (P) dB$  on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

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Plot 7-106. Lower Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

Trig: Free Run Atten: 36 dB	#Avg Type: RMS	TRACE 1 2 3 4 5 6	Frequency
		DET A NNNNN	
	Mk	r1 775.000 MHz -63.13 dBm	Auto Tune
			Center Free 769.000000 MH:
			Start Free 763.000000 MH
			Stop Fre 775.000000 MH
		0L1 -35 00 aBm	CF Ste 1.200000 MH Auto Ma
		1	Freq Offse 0 H
مور معان المعار والي التاريخ التاريخ من الم	- Andrean 1995 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200	and and a second and a second and a second	Scale Type
W 30 kHz	#Sweep	Stop 775.000 MHz 1.000 s (1001 pts)	Log <u>Li</u>
	N 30 kHz	N 30 kHz #Sweep	-63.13 dBm

Plot 7-107. Lower Emission Mask Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

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Plot 7-108. Upper Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



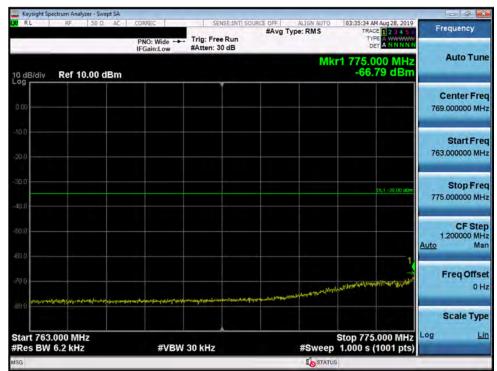
Plot 7-109. Upper Emission Mask Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

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Keysight Spectrum Analyzer - Swept SA	CORREC	SENSE:INT SC	URCE OFF ALIGN AUT	0 03:35:04 AM Aug 28, 2019	- 0 -
	PNO: Wide G	Trig: Free Run Atten: 36 dB	#Avg Type: RMS	TRACE 2 2 4 5 6 TYPE A WWWWW DET A NNNN	Frequency
10 dBidiv Ref 25.00 dBm			N	lkr1 777.000 MHz -29.90 dBm	Auto Tun
15.0					Center Fre 777.000000 MH
5.00		(		- hanna h	Start Fre 773.000000 MF
-15.0 		11		0L1 -13.00 dBn	Stop Fre 781.000000 MH
-35.ù 	للمسمر				CF Ste 800,000 kl Auto Mi
65 0	~				Freq Offs 0 F
50 Center 777.000 MHz				Spap 8 000 MHz	Scale Typ
#Res BW 100 kHz	#VBW :	300 kHz	Sweep	Span 8.000 MHz 1.000 ms (1001 pts)	
MSG.			LO STA	TUS	





Plot 7-111. Lower Emission Mask Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

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Frequency	03:36:15 AM Aug 28, 2019		SENSE:INT SO	CORREC	RF 50 Q AC	RL
	TRACE 23456 TYPE A WWWWWW DET A NNNNN	#Avg Type: RMS	Trig: Free Run Atten: 36 dB	PNO: Wide 🖵		
Auto Tur	r1 787.000 MHz -28.26 dBm	Mk			Ref 25.00 dBm	0 dB/div
Center Fre 787.000000 MH						15.0
Start Fre 783.000000 MH					www.	5.00
Stop Fre 791.000000 Mi	0L1 -13.00 dBm		1_			15.0 25.11
CF Ste 800.000 kł Auto Ma	minn	······································	L			35.Ú
Freq Offs 01						55 0
Scale Typ	Span 8.000 MHz .000 ms (1001 pts)	Swaard		#VBW 3	7.000 MHz	Center 78
		Sweep	00 KH2	#VDVV 5	100 KH2	SG.

Plot 7-112. Upper Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

Keysight Spectrum Analyzer - Swept SA RL RF 50 Ω AC	CORREC	SENSE:INT SO	URCE OFF ALIGN AUTO	03:36:32 AM Aug 28, 2019	
	PNO: Wide	Trig: Free Run #Atten: 36 dB	#Avg Type: RMS	TRACE 2 3 4 5 6 TYPE A WWWWWW DET A N N N N	Frequency
10 dB/div Ref 10.00 dBm			Mk	r1 793.546 MHz -51.04 dBm	Auto Tun
¢ óo					Center Fre 799.500000 MH
-10.0					Start Fre 793.000000 MH
-40 Å				0, 1 -35.00 dBm	Stop Fre 806.000000 MH
20.0 1 1000 1000 1000 1000 1000 1000 1000					CF Ste 1.300000 MH Auto Ma
/0.0	B-Marrison and a second second second	หรูสาราช (10) เหมือนสาวาราช (10)	dan malan san di ang	adayayan in meridak dari baga sana na hi	Freq Offse 0 H
Start 793.000 MHz				Stop 806.000 MHz	Scale Typ
#Res BW 6.2 kHz	#VBW	30 kHz		1.000 s (1001 pts)	
ISG			STATU	S	

Plot 7-113. Upper Emission Mask Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

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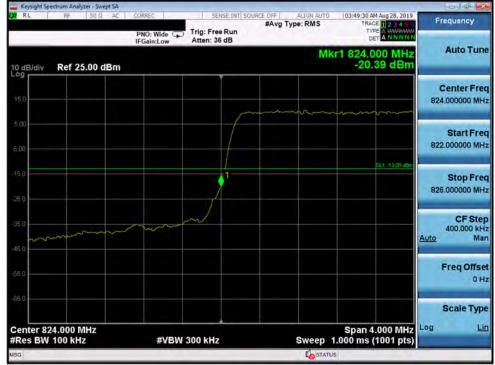
Keysight Sp RL n Analyzer - Swept SA 03:39:27 AM Aug 28, 2019 TRACE 2 3 4 5 0 TYPE A WWWW DET A N N N N N Frequency #Avg Type: RMS Trig: Free Run Atten: 36 dB PNO: Wide C Auto Tune Mkr1 824.000 MHz -25.01 dBm Ref 25.00 dBm 10 dB/div **Center Freq** 824.000000 MHz Start Freq 822.000000 MHz Stop Freq 826.000000 MHz CF Step 400.000 kHz Man Auto Freq Offset 0 Hz Scale Type Center 824.000 MHz #Res BW 100 kHz Span 4.000 MHz Sweep 1.000 ms (1001 pts) Log Lin #VBW 300 kHz 1h

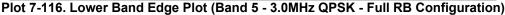
Plot 7-114. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



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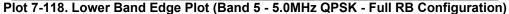


Plot 7-117. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMA705U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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RL RF 50.9 AC	CORREC	SENSE:INT SO	#Avg Type: RMS	03:51:08 AM Aug 28, 2019 TRACE 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
	IFGain:Low	Atten: 36 dB			Auto Tun
O dB/div Ref 25.00 dBm			Mk	r1 824.000 MHz -25.03 dBm	Auto Tun
15,0					Center Fre 824.000000 MH
5.00				man	Start Fre 822.000000 MH
15 0 25 d		<b>↓</b> <sup>1</sup>		DL1 -13.00 dBm	Stop Fre 826.000000 Mi
15 0	~~~~~	~			CF Ste 400.000 k Auto M
56 1)					Freq Offs 01
65 Ú					Scale Typ
Center 824.000 MHz #Res BW 100 kHz	#VBW :	300 kHz	Sweep	Span 4.000 MHz 1.000 ms (1001 pts)	Log L





Plot 7-119. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

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Keysight Spectrum Analyzer - Swept SA RL RF 50.92 AC	CORREC	SENSE:INT SO	URCE OFF ALIGN AUTO #Avg Type: RMS	03:53:34 AM Aug 28, 2019 TRACE 1 2 3 4 5 0	Frequency
	PNO: Wide	Trig: Free Run Atten: 36 dB	wavg type, kms	TYPE A WWWWW	
O dB/div Ref 25.00 dBm			Mk	r1 824.000 MHz -29.80 dBm	Auto Tun
15,0					Center Fre 824.000000 MF
5.00				harmon	Start Fre 820.000000 Mi
15.0		1		GL1 -13.00 dBm	Stop Fro 828.000000 Mi
35 D	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\sim$			CF Ste 800.000 ki Auto M
55 0					Freq Offs 0
Center 824.000 MHz				Span 8.000 MHz	Scale Typ
Res BW 100 kHz	#VBW	300 kHz	Sweep	1.000 ms (1001 pts)	

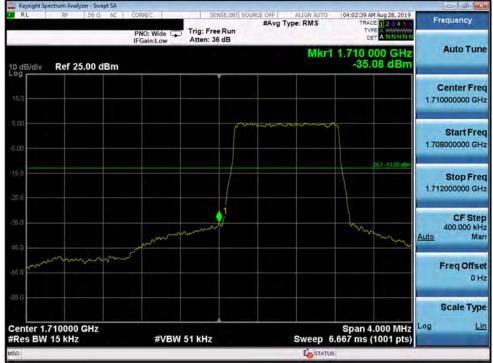
Plot 7-120. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



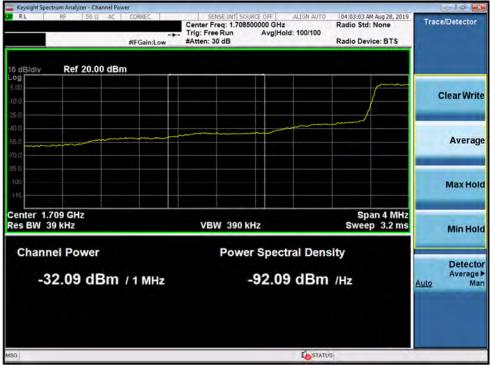
Plot 7-121. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

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Plot 7-122. Lower Band Edge Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



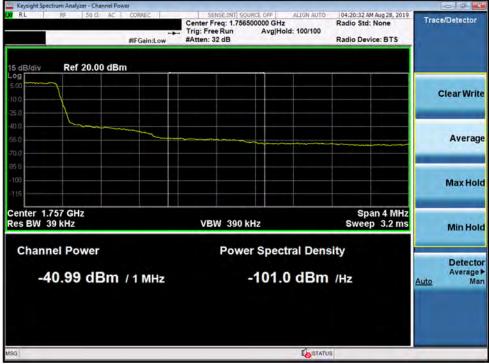
Plot 7-123. Lower Extended Band Edge Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)

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Plot 7-124. Upper Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-125. Upper Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

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