

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: 6/25 – 7/26, 8/17 - 8/28/2018 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1808210161.A3L

FCC ID:

A3LSMA600T

APPLICANT:

Samsung Electronics Co., Ltd.

Application Type: Model: EUT Type: FCC Classification: FCC Rule Part(s): Test Procedure(s): Certification SM-A600T Portable Handset PCS Licensed Transmitter Held to Ear (PCE) 22, 24, & 27 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.

Randy Ortanez President



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MEASUREMENT REPORT FCC Part 22, 24, & 27

| | | | Ef | RP | EI | RP | | |
|-------------|------------------|--------------------|--------------------|----------------------|--------------------|----------------------|------------------------|------------|
| Mode | FCC Rule Part | Tx Frequency (MHz) | Max. Pow er (W) | Max. Pow er (dBm) | Max. Pow er (W) | Max. Pow er (dBm) | Emission Designator | Modulation |
| LTE Band 71 | 27 | 665.5 - 695.5 | 0.046 | 16.64 | | | 4M57G7D | QPSK |
| LTE Band 71 | 27 | 665.5 - 695.5 | 0.034 | 15.30 | | | 4M54W7D | 16QAM |
| LTE Band 71 | 27 | 668 - 693 | 0.047 | 16.75 | | | 9M05G7D | QPSK |
| LTE Band 71 | 27 | 668 - 693 | 0.037 | 15.68 | | | 9M02W7D | 16QAM |
| LTE Band 71 | 27 | 670.5 - 690.5 | 0.051 | 17.10 | | | 13M5G7D | QPSK |
| LTE Band 71 | 27 | 670.5 - 690.5 | 0.041 | 16.10 | | | 13M6W7D | 16QAM |
| LTE Band 71 | 27 | 673 - 688 | 0.050 | 16.96 | | | 18M0G7D | QPSK |
| LTE Band 71 | 27 | 673 - 688 | 0.037 | 15.64 | | | 18M0W7D | 16QAM |
| LTE Band 12 | 27 | 699.7 - 715.3 | 0.074 | 18.70 | 0.122 | 20.85 | 1M10G7D | QPSK |
| LTE Band 12 | 27 | 699.7 - 715.3 | 0.057 | 17.53 | 0.093 | 19.68 | 1M11W7D | 16QAM |
| LTE Band 12 | 27 | 700.5 - 714.5 | 0.079 | 18.97 | 0.129 | 21.12 | 2M74G7D | QPSK |
| LTE Band 12 | 27 | 700.5 - 714.5 | 0.063 | 17.97 | 0.103 | 20.12 | 2M73W7D | 16QAM |
| LTE Band 12 | 27 | 701.5 - 713.5 | 0.079 | 18.98 | 0.130 | 21.13 | 4M58G7D | QPSK |
| LTE Band 12 | 27 | 701.5 - 713.5 | 0.064 | 18.05 | 0.105 | 20.20 | 4M57W7D | 16QAM |
| LTE Band 12 | 27 | 704 - 711 | 0.079 | 18.96 | 0.129 | 21.11 | 9M07G7D | QPSK |
| LTE Band 12 | 27 | 704 - 711 | 0.058 | 17.61 | 0.095 | 19.76 | 9M09W7D | 16QAM |
| LTE Band 5 | 22H | 824.7 - 848.3 | 0.103 | 20.14 | 0.169 | 22.29 | 1M11G7D | QPSK |
| LTE Band 5 | 22H | 824.7 - 848.3 | 0.080 | 19.01 | 0.131 | 21.16 | 1M10W7D | 16QAM |
| LTE Band 5 | 22H | 825.5 - 847.5 | 0.104 | 20.16 | 0.170 | 22.31 | 2M73G7D | QPSK |
| LTE Band 5 | 22H | 825.5 - 847.5 | 0.080 | 19.05 | 0.132 | 21.20 | 2M73W7D | 16QAM |
| LTE Band 5 | 22H | 826.5 - 846.5 | 0.102 | 20.10 | 0.168 | 22.25 | 4M57G7D | QPSK |
| LTE Band 5 | 22H | 826.5 - 846.5 | 0.082 | 19.13 | 0.134 | 21.28 | 4M55W7D | 16QAM |
| LTE Band 5 | 22H | 829 - 844 | 0.106 | 20.24 | 0.173 | 22.39 | 8M99G7D | QPSK |
| LTE Band 5 | 22H | 829 - 844 | 0.081 | 19.09 | 0.133 | 21.24 | 8M96W7D | 16QAM |

EUT Overview (<1GHz)

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| | | | EIRP | | | |
|---------------|------------------|--------------------|--------------------|----------------------|------------------------|------------|
| Mode | FCC Rule Part | Tx Frequency (MHz) | Max. Pow er (W) | Max. Pow er (dBm) | Emission Designator | Modulation |
| LTE Band 66/4 | 27 | 1710.7 - 1779.3 | 0.204 | 23.10 | 1M10G7D | QPSK |
| LTE Band 66/4 | 27 | 1710.7 - 1779.3 | 0.159 | 22.00 | 1M11W7D | 16QAM |
| LTE Band 66/4 | 27 | 1711.5 - 1778.5 | 0.212 | 23.26 | 2M72G7D | QPSK |
| LTE Band 66/4 | 27 | 1711.5 - 1778.5 | 0.150 | 21.75 | 2M72W7D | 16QAM |
| LTE Band 66/4 | 27 | 1712.5 - 1777.5 | 0.210 | 23.21 | 4M56G7D | QPSK |
| LTE Band 66/4 | 27 | 1712.5 - 1777.5 | 0.154 | 21.88 | 4M55W7D | 16QAM |
| LTE Band 66/4 | 27 | 1715 - 1775 | 0.213 | 23.28 | 9M06G7D | QPSK |
| LTE Band 66/4 | 27 | 1715 - 1775 | 0.152 | 21.83 | 9M05W7D | 16QAM |
| LTE Band 66/4 | 27 | 1717.5 - 1772.5 | 0.222 | 23.47 | 13M5G7D | QPSK |
| LTE Band 66/4 | 27 | 1717.5 - 1772.5 | 0.159 | 22.02 | 13M6W7D | 16QAM |
| LTE Band 66/4 | 27 | 1720 - 1770 | 0.208 | 23.18 | 18M0G7D | QPSK |
| LTE Band 66/4 | 27 | 1720 - 1770 | 0.149 | 21.74 | 18M0W7D | 16QAM |
| LTE Band 2 | 24E | 1850.7 - 1909.3 | 0.167 | 22.23 | 1M12G7D | QPSK |
| LTE Band 2 | 24E | 1850.7 - 1909.3 | 0.122 | 20.85 | 1M12W7D | 16QAM |
| LTE Band 2 | 24E | 1851.5 - 1908.5 | 0.174 | 22.40 | 2M73G7D | QPSK |
| LTE Band 2 | 24E | 1851.5 - 1908.5 | 0.124 | 20.94 | 2M72W7D | 16QAM |
| LTE Band 2 | 24E | 1852.5 - 1907.5 | 0.167 | 22.22 | 4M60G7D | QPSK |
| LTE Band 2 | 24E | 1852.5 - 1907.5 | 0.125 | 20.98 | 4M55W7D | 16QAM |
| LTE Band 2 | 24E | 1855 - 1905 | 0.179 | 22.54 | 9M04G7D | QPSK |
| LTE Band 2 | 24E | 1855 - 1905 | 0.129 | 21.09 | 9M05W7D | 16QAM |
| LTE Band 2 | 24E | 1857.5 - 1902.5 | 0.189 | 22.76 | 13M6G7D | QPSK |
| LTE Band 2 | 24E | 1857.5 - 1902.5 | 0.137 | 21.37 | 13M6W7D | 16QAM |
| LTE Band 2 | 24E | 1860 - 1900 | 0.166 | 22.21 | 18M0G7D | QPSK |
| LTE Band 2 | 24E | 1860 - 1900 | 0.128 | 21.07 | 18M0W7D | 16QAM |
| LTE Band 7 | 27 | 2502.5 - 2567.5 | 0.104 | 20.16 | 4M58G7D | QPSK |
| LTE Band 7 | 27 | 2502.5 - 2567.5 | 0.078 | 18.93 | 4M55W7D | 16QAM |
| LTE Band 7 | 27 | 2505 - 2565 | 0.115 | 20.61 | 9M06G7D | QPSK |
| LTE Band 7 | 27 | 2505 - 2565 | 0.091 | 19.57 | 9M06W7D | 16QAM |
| LTE Band 7 | 27 | 2507.5 - 2562.5 | 0.105 | 20.20 | 13M6G7D | QPSK |
| LTE Band 7 | 27 | 2507.5 - 2562.5 | 0.076 | 18.80 | 13M6W7D | 16QAM |
| LTE Band 7 | 27 | 2510 - 2560 | 0.105 | 20.20 | 18M1G7D | QPSK |
| LTE Band 7 | 27 | 2510 - 2560 | 0.074 | 18.69 | 18M0W7D | 16QAM |
| | | FUT Overvie | W (>10U-) | | | |

EUT Overview (>1GHz)

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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: A3LSMA600T**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 30684, 30957, 31062, 30905, 30684

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 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

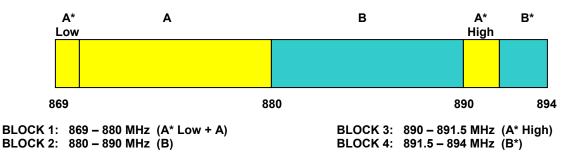
The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission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

3.2 Block A Frequency Range

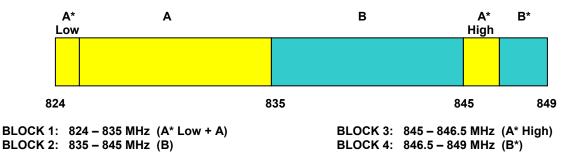
<u>698-746 MHz band</u>. The following frequencies are available for licensing pursuant to this part in the 698-746 MHz band: (1) Three paired channel blocks of 12 megahertz each are available for assignment as follows:

Block A: 698-704 MHz and 728-734 MHz; Block B: 704-710 MHz and 734-740 MHz; and Block C: 710-716 MHz and 740-746 MHz.

3.3 Cellular - Base Frequency Blocks



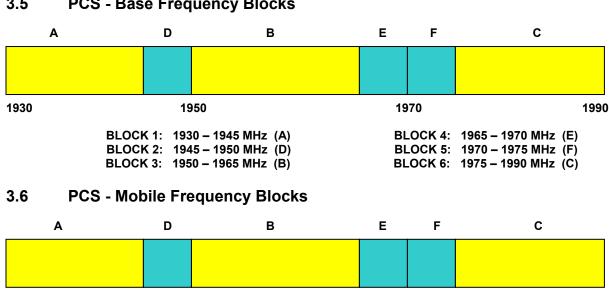
3.4 Cellular - Mobile Frequency Blocks



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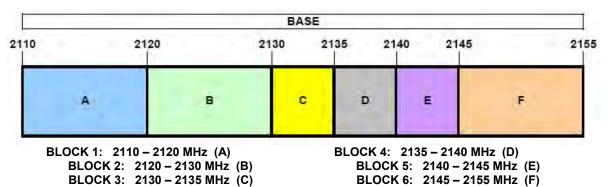


| BLOCK 1: | 1850 – 1865 MHz (A) |
|----------|---------------------|
| BLOCK 2: | 1865 – 1870 MHz (D) |
| BLOCK 3: | 1870 – 1885 MHz (B) |

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3.7 **AWS - Base Frequency Blocks**



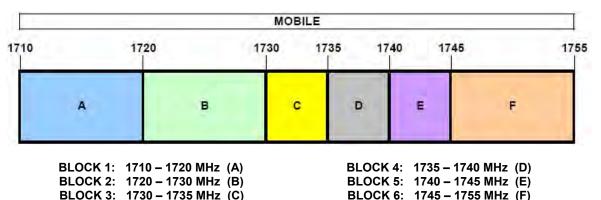
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3.5 **PCS - Base Frequency Blocks**



3.8 AWS - Mobile Frequency Blocks



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:

Pd [dBm] = Pg [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 + 10log₁₀(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 + 10log₁₀(Power [Watts]).

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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 |
|-----------------|--------------|----------------------------------|------------------|--------------|------------|---------------|
| - | LTx2 | LIcensed Transmitter Cable Set | 1/23/2018 | Annual | 7/23/2018 | LTx2 |
| Agilent | N9020A | MXA Signal Analyzer | 1/24/2018 | Annual | 1/24/2019 | US46470561 |
| Agilent | N9038A | MXE EMI Receiver | 6/11/2018 | Annual | 6/11/2019 | MY51210133 |
| Agilent | N9030A | PXA Signal Analyzer (26.5GHz) | 8/28/2017 | Annual | 8/28/2018 | MY49432391 |
| Com-Power | AL-130 | 9kHz - 30MHz Loop Antenna | 10/10/2017 | Biennial | 10/10/2019 | 121034 |
| Emco | 3115 | Horn Antenna (1-18GHz) | 3/28/2018 | Biennial | 3/28/2020 | 9704-5182 |
| EMCO | 3160-09 | Small Horn (18 - 26.5GHz) | 8/23/2016 | Biennial | 8/23/2018 | 135427 |
| Espec | ESX-2CA | Environmental Chamber | 3/28/2018 | Annual | 3/28/2019 | 17620 |
| ETS Lindgren | 3164-08 | Quad Ridge Horn Antenna | 3/28/2018 | Biennial | 3/28/2020 | 128337 |
| Mini Circuits | TVA-11-422 | RF Power Amp | RF Power Amp N/A | | QA1317001 | |
| Mini Circuits | PWR-SEN-4GHS | USB Power Sensor | 3/30/2018 | Annual | 3/30/2019 | 11401010036 |
| Mini-Circuits | SSG-4000HP | Synthesized Signal Generator N/A | | 11208010032 | | |
| Mini-Circuits | PWR-SEN-4RMS | USB Power Sensor | 3/30/2018 | Annual | 3/30/2019 | 11210140001 |
| Mini-Circuits | TVA-11-422 | RF Power Amp | | N/A | - | QA1303002 |
| Mini-Circuits | SSG-4000HP | Synthesized Signal Generator | | N/A | | 11403100002 |
| Rohde & Schwarz | CMW500 | Radio Communication Tester | | N/A | | 100976 |
| Rohde & Schwarz | TS-PR26 | 18-26.5 GHz Pre-Amplifier | 1/24/2018 | Annual | 7/24/2018 | 100040 |
| Rohde & Schwarz | ESU40 | EMI Test Receiver (40GHz) | 7/31/2017 | Annual | 7/31/2018 | 100348 |
| Rohde & Schwarz | FSW67 | Signal / Spectrum Analyzer | 8/11/2017 | Annual | 8/11/2018 | 103200 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 7/2/2018 | Annual | 7/2/2019 | 102131 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 6/18/2018 | Annual | 6/18/2019 | 102134 |
| Schwarzbeck | UHA 9105 | Dipole Antenna (400 - 1GHz) Tx | 4/30/2018 | Biennial | 4/30/2020 | 9105-2403 |
| Sunol | DRH-118 | Horn Antenna (1-18GHz) | 8/11/2017 | Biennial | 8/11/2019 | A050307 |
| Sunol | JB5 | Bi-Log Antenna (30M - 5GHz) | 4/19/2018 | Biennial | 4/19/2020 | A051107 |

Table 5-1. Test Equipment (Test Date Range 6/25 – 7/26/2018)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
|-------------------------------|--|---------------------------------------|---------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dega 12 of 166 | |
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| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|-----------------|---------------|--------------------------------|------------|--------------|------------|---------------|
| - | LTx3 | Licensed Transmitter Cable Set | 8/10/2017 | Annual | 8/10/2018 | LTx3 |
| Agilent | N9030A | PXA Signal Analyzer (44GHz) | 5/25/2018 | Annual | 5/25/2019 | MY52350166 |
| Anritsu | MT8820C | Radio Communication Analyzer | 1/30/2018 | Annual | 1/30/2019 | 6201300731 |
| Com-Power | AL-130 | 9kHz - 30MHz Loop Antenna | 10/10/2017 | Biennial | 10/10/2019 | 121034 |
| EMCO | 3160-09 | Small Horn (18 - 26.5GHz) | 8/23/2016 | Biennial | 8/23/2018 | 135427 |
| Espec | ESX-2CA | Environmental Chamber | 3/28/2018 | Annual | 3/28/2019 | 17620 |
| ETS Lindgren | 3164-08 | Quad Ridge Horn Antenna | 3/28/2018 | Biennial | 3/28/2020 | 128337 |
| ETS Lindgren | 3117 | 1-18 GHz DRG Horn (Medium) | 12/1/2016 | Biennial | 12/1/2018 | 125518 |
| Huber + Suhner | Sucoflex 102A | 40GHz Radiated Cable Set | 1/23/2018 | Annual | 1/23/2019 | 251425001 |
| Mini Circuits | TVA-11-422 | RF Power Amp | | N/A | | QA1317001 |
| Mini Circuits | PWR-SEN-4GHS | USB Power Sensor | 3/30/2018 | Annual | 3/30/2019 | 11401010036 |
| Mini-Circuits | SSG-4000HP | Synthesized Signal Generator | | N/A | | 11208010032 |
| Rohde & Schwarz | TS-PR26 | 18-26.5 GHz Pre-Amplifier | 1/24/2018 | Annual | 1/24/2019 | 100040 |
| Rohde & Schwarz | ESU40 | EMI Test Receiver (40GHz) | 7/31/2017 | Annual | 7/31/2018 | 100348 |
| Rohde & Schwarz | CMW500 | Radio Communication Tester | 11/3/2017 | Annual | 11/3/2018 | 100976 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 6/18/2018 | Annual | 6/18/2019 | 102134 |
| Sunol | DRH-118 | Horn Antenna (1-18GHz) | 8/11/2017 | Biennial | 8/11/2019 | A050307 |
| Sunol | JB6 | Bi-Log Antenna (30M - 6GHz) | 9/27/2016 | Biennial | 9/27/2018 | A082816 |

Table 5-2. Test Equipment (Test Date Range 8/17 - 8/28/2018)

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.

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

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

Spurious Radiated Emission – LTE Band

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

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

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|-------------------------------|--|---------------------------------------|---------|---------------------------------|--|
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7.0 TEST RESULTS

7.1 Summary

| Company Name: | Samsung Electronics Co., Ltd. |
|---------------------|--|
| FCC ID: | A3LSMA600T |
| FCC Classification: | PCS Licensed Transmitter Held to Ear (PCE) |
| Mode(s): | <u>LTE</u> |

FCC Part Test Test **Test Description Test Limit** Reference Section(s) Condition Result 2.1049 PASS Occupied Bandwidth N/A Section 7.2 2.1051 > 43 + 10log₁₀ (P[Watts]) at 2.917(a) Section 7.3, 24.238(a) Out of Band Emissions Band Edge and for all out-of-PASS 7.4 27.53(g) band emissions 27.53(h) Undesirable emissions must PASS Section 7.3, 27.53(m) Out of Band Emissions meet the limits detailed in 7.4 27.53(m) CONDUCTED 24.232(d) Peak-Average Ratio < 13 dB PASS Section 7.5 See RF See RF **Transmitter Conducted** 2.1046 N/A Exposure Exposure **Output Power** Report Report 2.1055 < 2.5 ppm (Part 22) and 22.355 fundamental emissions stay Frequency Stability PASS Section 7.8 24.235 within authorized frequency 27.54 block (Part 227)

Table 7-1. Summary of Conducted Test Results

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
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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 | | PASS | Section 7.6 |
| 27.50(c)(10) | Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 71, 12) | < 3 Watts max. ERP | | PASS | Section 7.6 |
| 24.232(c) 27.50(h)(2) | Equivalent Isotropic Radiated Power (Band 2, 71) | < 2 Watts max. EIRP | RADIATED | PASS | Section 7.6 |
| 27.50(d)(4) | Equivalent Isotropic Radiated Power (Band 66/4) | < 1 Watts max. EIRP | | PASS | Section 7.6 |
| 2.1053 22.917(a) 24.238(a) 27.53(g) 27.53(h) | Undesirable Emissions | > 43 + 10log ₁₀ (P[Watts]) for all out-of-band emissions | | PASS | Section 7.7 |
| 27.53(m) | Undesirable Emissions | Undesirable emissions must meet the limits detailed in 27.53(m) | | PASS | 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 4.8.
- 5) For operation <1GHz, the EIRP limits in the table above are referenced to the specifications written in the relevant Radio Standards Specifications for Innovation, Science, and Economic Development Canada.

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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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 \geq 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within
 - 1-5% of the 99% occupied bandwidth observed in Step 7

Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | MSUNG | Approved by: Quality Manager |
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Plot 7-1. Occupied Bandwidth Plot (Band 71 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-2. Occupied Bandwidth Plot (Band 71 - 5.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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Plot 7-3. Occupied Bandwidth Plot (Band 71 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-4. Occupied Bandwidth Plot (Band 71 - 10.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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| Keysight Spectrum Analyzer - Occupied | BW | | | | | - | |
|---------------------------------------|-------------|--|------------------------------|--|-------------------|---------|-------------------|
| IXI RL RF 50 Ω DC | CORREC | SENSE:INT Center Freq: 680.5000 Trig: Free Run | 000 MHz Avg Hold: 100/100 | 05:26:27 PM / Radio Std: N | | Trace/I | Detector |
| | #IFGain:Low | #Atten: 36 dB | | Radio Devic | e: BTS | | |
| 10 dB/div Ref 40.00 dE | 3m | | | | | | |
| 20.0 | Marcolust | | h (Lifferfacture | | | СІ | ear Write |
| 10.0 | | | | | | | |
| -10.0 | anarat . | | - Marine - | | | | Average |
| -30.0 | | | | and a state of the | - marguran | | |
| -40.0 | | | | | | ' | Max Hold |
| Center 680.5 MHz Res BW 360 kHz | | #VBW 1.1 M | Hz | | 7.5 MHz p 1 ms | | Min Hold |
| Occupied Bandwid | | Total Po | ower 31.9 | 9 dBm | | | |
| | 13.539 MH | | | | | | Detector Peak▶ |
| Transmit Freq Error | -3.903 k | Hz % of OE | SW Power 99 | 9.00 % | | Auto | Man |
| x dB Bandwidth | 15.38 M | Hz x dB | -26 | .00 dB | | | |
| MSG | | | STATU | s | | | |

Plot 7-5. Occupied Bandwidth Plot (Band 71 - 15.0MHz QPSK - Full RB Configuration)



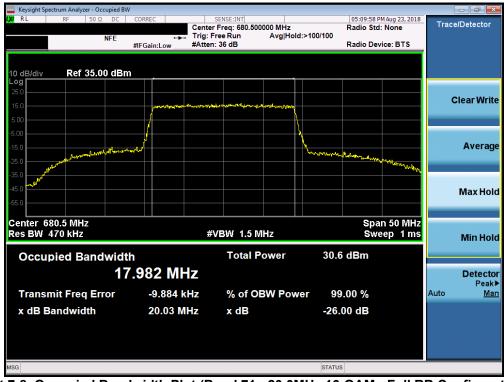
Plot 7-6. Occupied Bandwidth Plot (Band 71 - 15.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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Plot 7-7. Occupied Bandwidth Plot (Band 71 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-8. Occupied Bandwidth Plot (Band 71 - 20.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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| Test Report S/N: | Test Dates: | EUT Type: | | Dage 21 of 166 |
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Band 12



Plot 7-9. Occupied Bandwidth Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-10. Occupied Bandwidth Plot (Band 12 - 1.4MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
|--|-------------------------------|---------------------------------------|------------------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Daga 22 of 166 | |
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Plot 7-11. Occupied Bandwidth Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-12. Occupied Bandwidth Plot (Band 12 - 3.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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| Test Report S/N: | Test Dates: | EUT Type: | | Dage 22 of 166 |
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Plot 7-13. Occupied Bandwidth Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-14. Occupied Bandwidth Plot (Band 12 - 5.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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Plot 7-15. Occupied Bandwidth Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

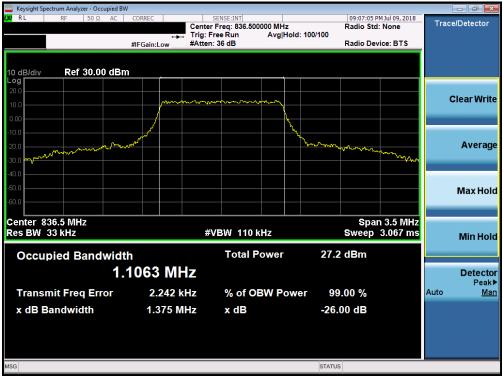


Plot 7-16. Occupied Bandwidth Plot (Band 12 - 10.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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Band 5



Plot 7-17. Occupied Bandwidth Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-18. Occupied Bandwidth Plot (Band 5 - 1.4MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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Plot 7-19. Occupied Bandwidth Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



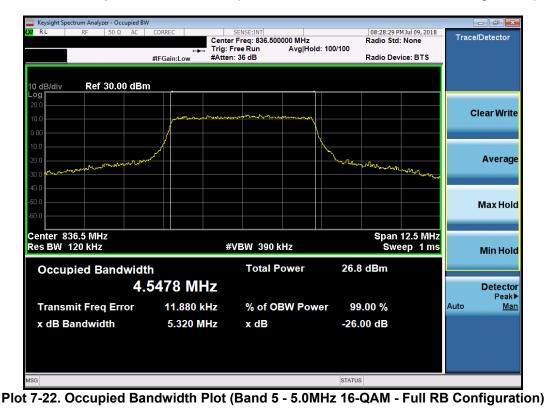
Plot 7-20. Occupied Bandwidth Plot (Band 5 - 3.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | 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 5 - 5.0MHz QPSK - Full RB Configuration)



Approved by: PCTEST MEASUREMENT REPORT SAMSUNG FCC ID: A3LSMA600T (CERTIFICATION) Quality Manager

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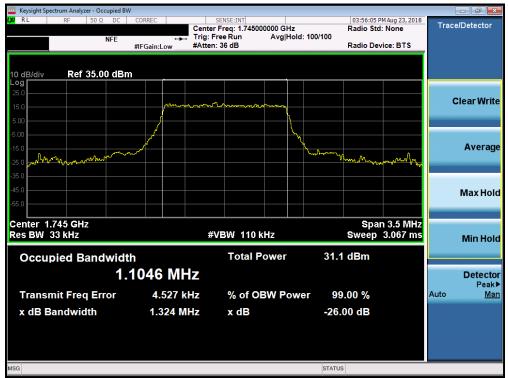
Plot 7-23. Occupied Bandwidth Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-24. Occupied Bandwidth Plot (Band 5 - 10.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
|---|-------------------------------|---------------------------------------|---------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dega 20 of 166 | |
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Plot 7-25. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-26. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|--|-------------------------------|---------------------------------------|------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 20 of 166 |
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Plot 7-27. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-28. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
|--|-------------------------------|---------------------------------------|------------------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 21 of 166 | |
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Plot 7-29. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



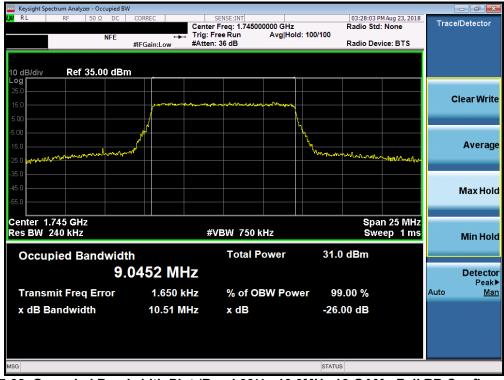
Plot 7-30. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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Plot 7-31. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



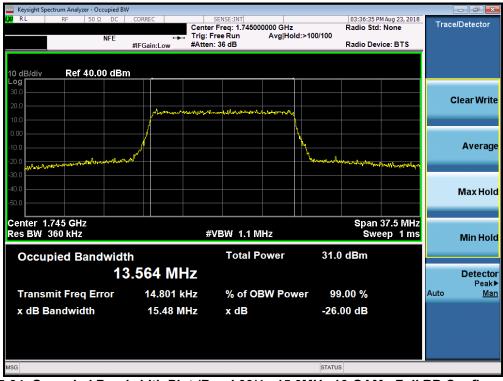
Plot 7-32. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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| 🔤 Keysight Spectrum Analyzer - Occupied B | W | | | |
|---|------------------------------|---|--|--------------------------|
| LXIRL RF 50Ω DC | | SENSE:INT r Freq: 1.745000000 GHz Free Run Avg Hold: 10 | 03:36:20 PM Aug 23, 2018 Radio Std: None | Trace/Detector |
| NFE | | n: 36 dB | Radio Device: BTS | |
| | | | | Í |
| 10 dB/div Ref 40.00 dB | m | | | |
| Log 30.0 | | | | |
| 20.0 | | | | Clear Write |
| 10.0 | and a second a second second | warder ward a stream the | | |
| 0.00 | | | | |
| -10.0 | 1 | | | Average |
| | Short | <u>٦</u> | and the second sec | Arrenuge |
| -20.0 milyer hard with a start of the start | | | and the second the second seco | |
| | | | | |
| -40.0 | | | | Max Hold |
| -50.0 | | | | |
| Center 1.745 GHz | | | Span 37.5 MHz | |
| Res BW 360 kHz | # | VBW 1.1 MHz | Sweep 1 ms | |
| | | Total Power | 31.7 dBm | |
| Occupied Bandwid | | Total Power | 31./ UBIII | |
| 1 | 3.525 MHz | | | Detector |
| Transmit Freq Error | -1.453 kHz | % of OBW Power | 99.00 % | Peak▶ Auto <u>Man</u> |
| x dB Bandwidth | 15.37 MHz | x dB | -26.00 dB | |
| | | | | |
| | | | | |
| | | | | |
| MSG | | | STATUS | |
| | | | | |

Plot 7-33. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-34. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|--|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Deee 24 of 400 |
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| Keysight Spectrum Analyzer - Occupied BV | V | | | | | | X |
|--|---------------------------|--|---------------------------|---|---|-------------|---------------------|
| IX RL RF 50Ω DC | 1 | SENSE:INT Center Freq: 1.74500000 Frig: Free Run A #Atten: 36 dB | 0 GHz vg Hold: 100/100 | 03:41:49 PMA Radio Std: N Radio Devic | lone | Trace/Detec | ctor |
| 10 dB/div Ref 40.00 dBn | n | | | | | | |
| 30.0 20.0 | | Land Contract States and the second states and the second states and the second states and the second states and | uniting | | | Clear | Write |
| 10.0 | | | | | | Δνο | erage |
| -20.0 | | | - Innore | hall from the second | ing and the second s | AVC | rage |
| -40.0 | | | | | | Мах | Hold |
| Center 1.745 GHz Res BW 470 kHz | | #VBW 1.5 MHz | | | 50 MHz p 1 ms | Min | Hold |
| Occupied Bandwidt | ^h 3.049 MHz | Total Pow | ver 32.9 | dBm | | Det | ector |
| Transmit Freq Error | 1.630 kH | | Power 99 | 9.00 % | | | Peak► <u>Man</u> |
| x dB Bandwidth | 20.31 MH | z xdB | -26. | 00 dB | | | |
| MSG | | | STATU | S | | | |

Plot 7-35. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-36. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|--|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 25 of 166 |
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Band 2



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: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|--|-------------------------------|---------------------------------------|------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dago 26 of 166 |
| 1M1808210161.A3L | 6/25 - 7/26, 8/17 - 8/28/2018 | Portable Handset | | Page 36 of 166 |
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Plot 7-39. Occupied Bandwidth Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



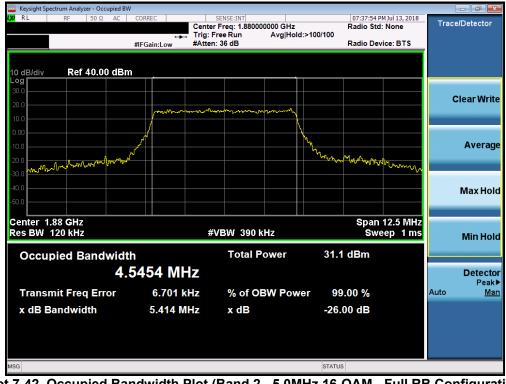
Plot 7-40. Occupied Bandwidth Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|--|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Deep 07 of 400 |
| 1M1808210161.A3L | 6/25 – 7/26, 8/17 - 8/28/2018 | Portable Handset | | Page 37 of 166 |
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Plot 7-41. Occupied Bandwidth Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-42. Occupied Bandwidth Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 29 of 166 |
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Plot 7-43. Occupied Bandwidth Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-44. Occupied Bandwidth Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
|---|-------------------------------|---------------------------------------|---------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dega 20 of 166 | |
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Plot 7-45. Occupied Bandwidth Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-46. Occupied Bandwidth Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | AMSUNG | Approved by: Quality Manager | |
|---|-------------------------------|---------------------------------------|--------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dega 40 of 166 | |
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| Keysight Spectrum Analyzer - Occupied BW | 1 | | | | | |
|--|---|--------------|-------------------------|-------------------|---------|-----------|
| IXI RL RF 50 Ω AC | Center Trig: F | | Radio Sto d:>100/100 | | Trace/I | Detector |
| | #IFGain:Low #Atten | :: 36 dB | Radio De | vice: BTS | | |
| 10 dB/div Ref 40.00 dBn | 1 | | | | | |
| Log 30.0 | | | | | | |
| 20.0 | | | | | CI | ear Write |
| 10.0 | potraction | moundurant | | | | |
| 0.00 | / · · · · · · · · · · · · · · · · · · · | l l | | | | |
| -10.0 | (| | | | | Average |
| | Mart | | Man Marian Marian | | | Average |
| -20.0 population that the for the for the formation of th | | | | www.alicavia.illo | | |
| | | | | | | |
| -40.0 | | | | | | Max Hold |
| -50.0 | | | | | | |
| Center 1.88 GHz | | | | ın 50 MHz | | |
| Res BW 470 kHz | # | VBW 1.5 MHz | Sw | eep 1 ms | | Min Hold |
| Occupied Bandwidt | h | Total Power | 32.6 dBm | | | |
| 18 | .022 MHz | | | | | Detector |
| | | | 00.00.00 | | A | Peak► |
| Transmit Freq Error | 21.152 kHz | % of OBW Pow | er 99.00 % | | Auto | Man |
| x dB Bandwidth | 20.13 MHz | x dB | -26.00 dB | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| MSG | | | STATUS | | | |

Plot 7-47. Occupied Bandwidth Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-48. Occupied Bandwidth Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

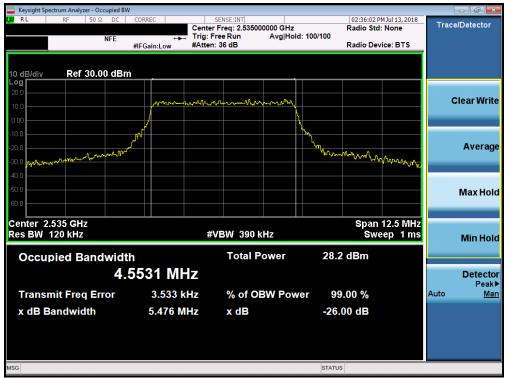
| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 44 of 400 | |
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Band 7

| Keysight Spectrum Analyzer - Occupied BW RL RF 50 Ω DC | | SENSE:INT r Freq: 2.535000000 GHz | Radio Std | MJul 13, 2018 : None | Trace/Detector |
|---|-----------|---|--|-------------------------|----------------|
| NFE | | Free Run Avg Hold n: 36 dB | : 100/100 Radio Dev | rice: BTS | |
| 10 dB/div Ref 30.00 dBm _∘og 20 0 | | | | | |
| 10.0 | | han market and the second s | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | | Clear Writ |
| 20.0 30.0 | | | "hh | Manhan | Averag |
| 50.0 | | | | | Max Hol |
| enter 2.535 GHz es BW 120 kHz Occupied Bandwidth | | VBW 390 kHz Total Power | | 12.5 MHz eep 1 ms | Min Ho |
| | 798 MHz | | LUIU GEIM | | Detect Peal |
| Transmit Freq Error | 3.125 kHz | % of OBW Pow | er 99.00 % | A | uto <u>Ma</u> |
| x dB Bandwidth | 5.656 MHz | x dB | -26.00 dB | | |
| G | | | STATUS | | |

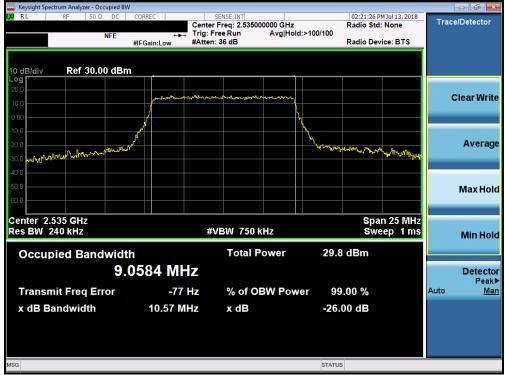
Plot 7-49. Occupied Bandwidth Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-50. Occupied Bandwidth Plot (Band 7 - 5.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|--|-------------------------------|---------------------------------------|---------|---------------------------------|
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Plot 7-51. Occupied Bandwidth Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)



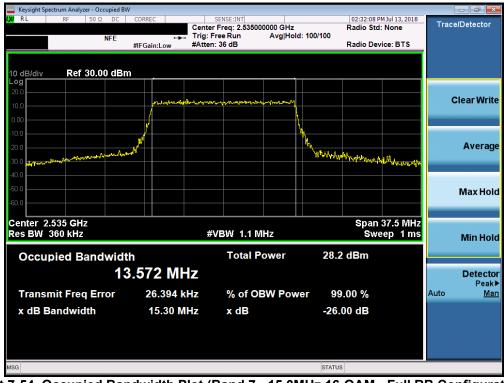
Plot 7-52. Occupied Bandwidth Plot (Band 7 - 10.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|--|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dega 42 of 166 |
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Plot 7-53. Occupied Bandwidth Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-54. Occupied Bandwidth Plot (Band 7 - 15.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dana 44 of 400 | |
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| Keysight Spectrum Analyzer - Occupied | BW | | | | |
|---|----------------------------|--|------------------------------|---|--------------------------|
| KX RL RF 50Ω DC | CORREC #IFGain:Low | SENSE:INT Center Freq: 2.535000000 G Trig: Free Run Avg #Atten: 36 dB | Hz Radio St Hold: 100/100 | PMJul 13, 2018 d: None evice: BTS | Trace/Detector |
| 10 dB/div Ref 30.00 dE | 3m | | | | |
| 20.0 | wheenwh | magnage and a grant and an and a grant of parts | ~~ | | Clear Write |
| -10.0 | / | | | | Average |
| -30.0 สุมประวทยามุรับประวทยามุรับประวทยามุรับประวทยามุรับประวทยามุรับประวทยามุรับประวทยามุรับประวทยาม ุรับประวทยาม | | | Le Month manifest Man | ****** | |
| -50.0 | | | | | Max Hold |
| Center 2.535 GHz Res BW 470 kHz | | #VBW 1.5 MHz | | an 50 MHz ⁄eep 1 ms | Min Hold |
| Occupied Bandwid | ^{ith} 8.051 MH | Total Power | 29.9 dBm | | Detector |
| Transmit Freq Error | 6.840 kł | Iz % of OBW P | | | Peak▶ Auto <u>Man</u> |
| x dB Bandwidth | 20.08 MI | Hz x dB | -26.00 dB | | |
| | | | | | |
| MSG | | | STATUS | | |

Plot 7-55. Occupied Bandwidth Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-56. Occupied Bandwidth Plot (Band 7 - 20.0MHz 16-QAM - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
|---|-------------------------------|---------------------------------------|---------|---------------------------------|--|
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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 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at 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 $43 + \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

For Band 7, the minimum permissible attenuation level of any spurious emission is $55 + \log_{10}(P_{[Watts]})$.

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.

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
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| Keysight Spectrum A | | | | | | | |
|---------------------|-----------|--|--|--|----------|--|--|
| C RL RF | 50 Ω DC | PNO: Fast | SENSE:INT Trig: Free Run #Atten: 46 dB | #Avg Type | : RMS | 05:14:50 PM Aug 23, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N | Frequency |
| 10 dB/div Ref | 20.00 dBm | II Guilleow | | | Mk | r1 661.65 MHz -44.35 dBm | Auto Tur |
| 10.0 | | | | | | | Center Fre 346.000000 MH |
| 10.0 | | | | | | DL1 -13.00 dBm | Start Fre 30.000000 Mi |
| 20.0 | | | | | | | Stop Fre 662.000000 Mi |
| 40.0 50.0 | | . We as block a start for an all searching and | | Ange dagt of An July and p Development | | 1 | CF Ste 63.200000 MI <u>Auto</u> Mi |
| 60.0 | | | | | | | Freq Offs 0 |
| 70.0 | | | | | | Stop 662.0 MHz | Scale Typ |
| Res BW 100 | | #VBW | 300 kHz | Sv | weep 30. | 34 ms (12641 pts) | |
| ISG | | | | | STATUS | | |

Plot 7-57. Conducted Spurious Plot (Band 71 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-58. Conducted Spurious Plot (Band 71 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | | |
|-------------------------------|--|---------------------------------------|---------|---------------------------------|--|--|
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| 🔤 Keysight Spectrum Analy | | | | | | |
|-----------------------------------|---------|---------------------------|---------------------------------|----------------|---|----------------------------|
| LXV RL RF | 50 Ω DC | CORREC | SENSE:INT | #Avg Type: RMS | 05:15:31 PM Aug 23, 2018 TRACE 1 2 3 4 5 6 | Frequency |
| | NFE | PNO: Fast 🖵 IFGain:Low | Trig: Free Run #Atten: 34 dB | | | Auto Tune |
| 10 dB/div Ref 0. | 00 dBm | | | N | 1kr1 9.755 0 GHz -37.14 dBm | Auto Tune |
| | | | Ĭ | | | Center Freq |
| -10.0 | | | | | DL1 -13.00 dBm | 5.500000000 GHz |
| -20.0 | | | | | | Start Freq |
| -30.0 | | | | | 1 | 1.000000000 GHz |
| -40.0 | | ~~~ | | | | Stop Freq |
| -50.0 | | | | | | 10.000000000 GHz |
| | | | | | | CF Ster |
| -60.0 | | | | | | 900.000000 MHz Auto Mar |
| -70.0 | | | | | | |
| -80.0 | | | | | | Freq Offset 0 Hz |
| -90.0 | | | | | | |
| | | | | | | Scale Type |
| Start 1.000 GHz #Res BW 1.0 MH | z | #VBW | 3.0 MHz | Sweep / | Stop 10.000 GHz 15.60 ms (18001 pts) | Log <u>Lin</u> |
| MSG | | | | STAT | | |

Plot 7-59. Conducted Spurious Plot (Band 71 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-60. Conducted Spurious Plot (Band 71 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
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| | pectrum Analyze | | | | | | | | | | |
|-------------------------|---------------------------|--|--|-------------------------|------------------------|--|---|---|-----------------------|-------------------|-------------------------------------|
| LX/IRL | RF | 50 Ω DC | CORREC | SEN | ISE:INT | #Avg Typ | e: RMS | | MAug 23, 2018 | Fr | equency |
| | | NFE | PNO: Fast IFGain:Low | Trig: Free #Atten: 5 | | | | TYF DE | 20 MHz 58 dBm | | Auto Tune |
| 10 dB/div Log | Ref 20. | 00 dBm | | | | | | -34. | 98 aBM | | |
| 10.0 | | | | | | | | | | | enter Freq .000000 MHz |
| -10.0 | | | | | | | | | DL1 -13.00 dBm | 698 | Start Freq .000000 MHz |
| -20.0 | | | | | | | | | | 1.000 | Stop Freq |
| -30.0 -1 -40.0 -40.0 | nit (edistrita projecture | alalystering and allowed a | yanyalayina ta'ini katana ta'ini yanya ta'u yana | eydericyyn elyderryd | an dan Herender Mehren | an a | an a marina da ang ang ang ang ang ang ang ang ang an | andre ann an | l agent dig van dae d | 30 <u>Auto</u> | CF Step 200000 MHz Man |
| -50.0 | | | | | | | | | | H | F req Offset 0 Hz |
| -70.0 | | | | | | | | | | | Scale Type |
| Start 0.6 #Res BW | 980 GHz / 100 kHz | | #VBW | 300 kHz | | | Sweep 1 | Stop 1.0 4.50 ms (|)000 GHz 6041 pts) | Log | <u>Lin</u> |
| MSG | | | | | | | STATUS | | | | |

Plot 7-61. Conducted Spurious Plot (Band 71 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



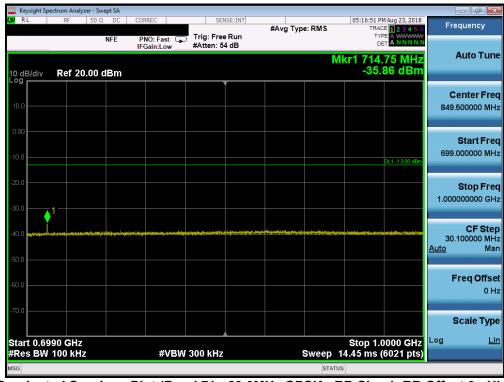
Plot 7-62. Conducted Spurious Plot (Band 71 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
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| | pectrum Analyze | | | | | | | |
|----------------------|------------------|-------------------------|--|----------------------------|---------|---|---|---|
| LX/ RL | RF | 50 Ω DC | CORREC | SENS | #Avg Ty | pe: RMS | 05:16:42 PM Aug 23, 2018 TRACE 1 2 3 4 5 6 | Frequency |
| | | NFE | PNO: Fast 🕞 IFGain:Low | Trig: Free F #Atten: 54 | | М | Kr1 661.25 MHz | Auto Tune |
| 10 dB/div Log | Ref 20. | 00 dBm | | | | | -38.24 dBm | |
| 10.0 | | | | | | | | Center Freq 346.500000 MHz |
| -10.0 | | | | | | | DL1 -13.00 dBm | Start Freq 30.000000 MHz |
| -20.0 | | | | | | | | Stop Freq 663.000000 MHz |
| -40.0 | | Bernine Petrika (Selay) | Negelen gi plantisk synositetisk for | | | a tala sa | rhoutena hapistach storenne service | CF Step 63.300000 MHz <u>Auto</u> Man |
| -50.0 | | | | | | | | Freq Offset 0 Hz |
| -70.0 | | | | | | | | Scale Type |
| Start 30. #Res BW | 0 MHz 100 kHz | | #VBW | / 300 kHz | | Sweep 30 | Stop 663.0 MHz).38 ms (12661 pts) | Log <u>Lin</u> |
| MSG | | | <i>"</i> , , , , , , , , , , , , , , , , , , , | | | STATUS | | |

Plot 7-63. Conducted Spurious Plot (Band 71 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-64. Conducted Spurious Plot (Band 71 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | | | |
|---|-------------------------------|---------------------------------------|---------|---------------------------------|--|--|--|
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| | ectrum Analyz | | | | | | | | | |
|-----------------------|---------------|---------|---------------------------|-------------------------|--------|----------|--------|-------------------------------|------------------------------|--|
| L <mark>XI</mark> RL | RF | 50 Ω DC | CORREC | | SE:INT | #Avg Typ | e: RMS | TRAC | MAug 23, 2018 | Frequency |
| | | NFE | PNO: Fast 🖵 IFGain:Low | Trig: Free #Atten: 3 | | | | TY D | PE A WWWWW ET A N N N N N | |
| 10 dB/div Log | Ref 0.0 | 00 dBm | | | | | M | (r1 9.79 -39. | 6 0 GHz 30 dBm | Auto Tune |
| -10.0 | | | | | | | | | DL1 -13.00 dBm | Center Free 5.500000000 GH: |
| -20.0 | | | | | | | | | | Start Fred 1.000000000 GH: |
| -40.0 | | | _~~~ | ~~~ | ~~~ | | ~~~ | | | Stop Free 10.000000000 GH: |
| -60.0 | | | | | | | | | | CF Step 900.000000 MH: <u>Auto</u> Mar |
| -80.0 | | | | | | | | | | Freq Offse 0 H: |
| -90.0 | | | | | | | | | | Scale Type |
| Start 1.00 #Res BW | | | #VBW | 3.0 MHz | | s | weep 1 | Stop 10 5.60 ms <u> (1</u> | .000 GHz 8001 pts) | |
| MSG | | | | | | | STATU | · | | |

Plot 7-65. Conducted Spurious Plot (Band 71 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Page 51 of 166 |
| 1M1808210161.A3L | 6/25 - 7/26, 8/17 - 8/28/2018 | Portable Handset | | Page 51 01 100 |
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Start 30.0 MHz

#Res BW 100 kHz

Keysight Spectrum Analyzer - Swept SA RI 04:03:57 PM Jul 06, 2018 Frequency #Avg Type: RMS TRACE 1 2 3 4 5 PNO: Fast Trig: Free Run Atten: 30 dB Auto Tune Mkr1 697.20 MHz -34.67 dBm Ref 20.00 dBm 10 dB/div **Center Freq** 363.950000 MHz Start Freq 30.000000 MHz Stop Freq 697.900000 MHz CF Step 66.790000 MHz Man Auto **Freq Offset** 0 Hz Scale Type

Plot 7-66. Conducted Spurious Plot (Band 12 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

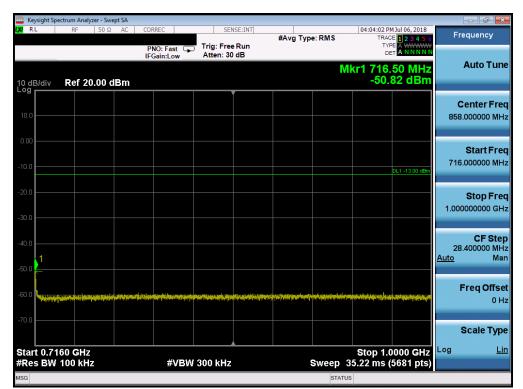
#VBW 300 kHz

Stop 697.9 MHz Sweep 82.82 ms (13359 pts)

STATUS

Log

Lin



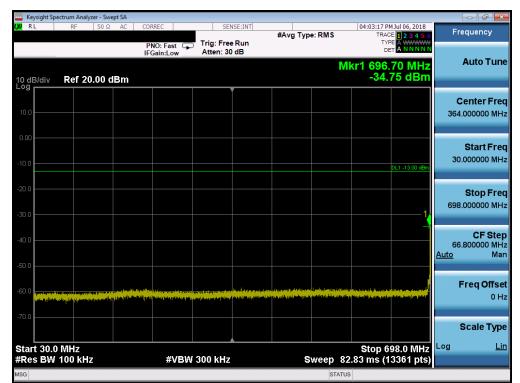
Plot 7-67. Conducted Spurious Plot (Band 12 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dago 52 of 166 |
| 1M1808210161.A3L | 6/25 - 7/26, 8/17 - 8/28/2018 | Portable Handset | | Page 52 of 166 |
| © 2018 PCTEST Engineering La | V 8 4 08/10/2018 | | | |



| | oectrum Analyzer - S | | | | | | | | | | |
|-----------------------|----------------------|-------------------------------------|--------------------------|-------------------------|---|---|---------------|----------------------------|-------------------|-------------|-------------------------------|
| (XI RL | RF 50 | Ω AC O | ORREC | SEN | ISE:INT | #Avg Typ | e: RMS | | MJul 06, 2018 | Fr | equency |
| | | I | PNO: Fast 🕞 FGain:Low | Trig: Free #Atten: 3 | | | | TYF DE | | | |
| 10 dB/div Log | Ref 0.00 c | IBm | | | | | M | kr1 8.64 -40. |) 5 GHz 93 dBm | | Auto Tune |
| -10.0 | | | | | | | | | DL1 -13.00 dBm | | Center Freq |
| -20.0 | | | | | | | | | | | |
| -30.0 | | | | | | | | | | 1.00 | Start Freq |
| -40.0 | | teal | | | , and the second live | | | | | | Stop Freq |
| -50.0 | | titi ashido ^{nika dhekito} | | | and the second secon | in the local part of the line | | | alta merudan | 10.00 | 0000000 GHz |
| -60.0 | | | | | | | | | | 900 Auto | CF Step .000000 MHz Man |
| -70.0 | | | | | | | | | | | |
| -80.0 | | | | | | | | | | | F req Offset 0 Hz |
| -90.0 | | | | | | | | | | | Scale Type |
| Start 1.00 #Res BW | | | #VBW | / 3.0 MHz | | S | weep <u>1</u> | ⊥ Stop 10 5.60 ms (1 | 000 0112 | Log | Lin |
| MSG | | | | | | | STATU | | | | |

Plot 7-68. Conducted Spurious Plot (Band 12 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-69. Conducted Spurious Plot (Band 12 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|----------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | Dage 52 of 166 | |
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| 🧧 Keysight Spectrum Analyzer - Swept SA | | | | | | | | | | | |
|---|-------------|------|---|-------------------------|---------|----------|---------|------------------------|---------------------------------|-------------------|--------------------|
| LX/RL | RF 50 Ω | AC C | ORREC | SEN | ISE:INT | #Avg Typ | e: RMS | | 1 Jul 06, 2018 E 1 2 3 4 5 6 | Fre | equency |
| | | | PNO: Fast 🕞 | Trig: Free Atten: 30 | | | | TYF DE | | | Auto Tune |
| 10 dB/div Log | Ref 20.00 d | Bm | | | | | M | kr1 717. -46. | 50 MHz 30 dBm | | Auto Tune |
| | | | | | | | | | | | enter Freq |
| 10.0 | | | | | | | | | | 858 | .000000 MHz |
| 0.00 | | | | | | | | | | | Start Freq |
| -10.0 | | | | | | | | | DL1 -13.00 dBm | 716 | .000000 MHz |
| -20.0 | | | | | | | | | | | Stop Freq |
| -30.0 | | | | | | | | | | 1.000 | 000000 GHz |
| | | | | | | | | | | | CF Step |
| -40.0 | | | | | | | | | | 28 <u>Auto</u> | 400000 MHz Man |
| -50.0 | | | | | | | | | | | |
| -60.0 | | | in the second | | | | | | | F | req Offset 0 Hz |
| -70.0 | | | | | | | | | | | |
| | | | | | | | | | | | Scale Type |
| Start 0.71 #Res BW | | | #VBW | 300 kHz | | | Sweep 3 | Stop 1.0 35.22 ms (| 1000 GHz 5681 pts) | Log | <u>Lin</u> |
| MSG | | | | | | | STATUS | S | | | |

Plot 7-70. Conducted Spurious Plot (Band 12 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



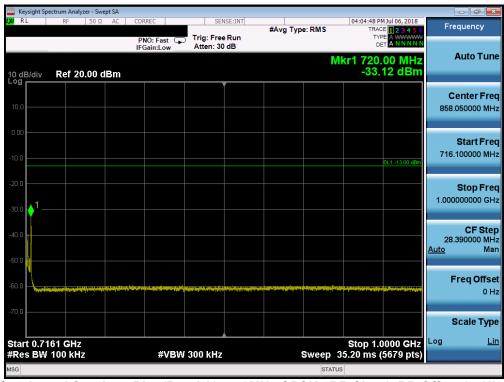
Plot 7-71. Conducted Spurious Plot (Band 12 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
|-------------------------------|-------------------------------|---------------------------------------|----------------|---------------------------------|--|
| Test Report S/N: | Test Dates: | EUT Type: | Dage 54 of 166 | | |
| 1M1808210161.A3L | 6/25 – 7/26, 8/17 - 8/28/2018 | Portable Handset | | Page 54 of 166 | |
| © 2018 PCTEST Engineering Lab | V 8.4 08/10/2018 | | | | |



| | ectrum Analyzer | | | | | | | | | | | |
|---------------|------------------------------------|-------------------|--------------------------|--------------------------|------------------------------------|---|------------------------------------|--|-------------------------------------|--|-------------|-------------|
| LXI RL | RF | 50 Ω AC | CORREC | | SEN | ISE:INT | #Avg Typ | e: RMS | | PM Jul 06, 2018 | Fr | equency |
| | | | PNO: F | ast 🖵 | Trig: Free Atten: 30 | | • 71 | | - | | | |
| | | | ii Gain.i | LOW | , | | | | Mkr1 69 | 4.15 MHz | | Auto Tune |
| 10 dB/div | Ref 20.0 | 00 dBm | | | | | | | -5 | 5.85 dBm | | |
| | | | | | | | | | | | | Senter From |
| 10.0 | | | | | | | | | | | | enter Freq |
| | | | | | | | | | | | 004 | |
| 0.00 | | | | | | | | | | | | |
| | | | | | | | | | | | 20 | Start Freq |
| -10.0 | | | | | | | | | | DL1 -13.00 dBm | 30 | |
| -20.0 | | | | | | | | | | | | |
| -20.0 | | | | | | | | | | | | Stop Freq |
| -30.0 | | | | | | | | | | | 698 | .000000 MHZ |
| | | | | | | | | | | | | CF Step |
| -40.0 | | | | | | | | | | | 66 | .800000 MHz |
| 50.0 | | | | | | | | | | | <u>Auto</u> | Man |
| -50.0 | | | | | | | | | | | | |
| -60.0 | At in without a the distance lines | | | | | a di da ca da di carite ca | united to the second | والمراجع والم | and the first state of the | nay Markinson | | Freq Offset |
| and the state | anipated of these at the | alasal addination | Alexandria (a faitheach | والتراوية والمتحققة والم | a bladi gʻigʻa ya aktiri ya katiri | السل رانت. وهم داما وا _ر به الال | and the second of the later of the | and the second | ويتحد وتواطر بالكام الأوم الترواسات | and a set of the billing in the billing of the set of t | | 0 Hz |
| -70.0 | | | | | | | | | | | | |
| | | | | | | | | | | | | Scale Type |
| Start 30.0 | | | | | | | | | Stop | 698.0 MHz | Log | Lin |
| #Res BW | 100 kHz | | ; | #VBW | 300 kHz | | s | weep | 82.83 ms | (13361 pts) | | |
| MSG | | | | | | | | ST | ATUS | | | |

Plot 7-72. Conducted Spurious Plot (Band 12 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-73. Conducted Spurious Plot (Band 12 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | | | | |
|--|-------------------------------|---------------------------------------|---------|---------------------------------|--|--|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dama 55 of 100 | | | | |
| 1M1808210161.A3L | 6/25 – 7/26, 8/17 - 8/28/2018 | Portable Handset | | Page 55 of 166 | | | | |
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| | | ctrum Anal | | | | | | | | | | | | |
|----------------|----------|------------|--------|----|----------------|-----------------|-------------------------|---------|----------|--------|-------------------|----------------|-------------|------------|
| l,XI RI | | RF | 50 Ω | AC | CORREC | 0 | SEN | ISE:INT | #Avg Typ | e: RMS | | MJul 06, 2018 | Fre | equency |
| | | | | | PNO: IFGain | Fast 😱 n:Low | Trig: Free #Atten: 3 | | 0 ,1 | | TYF DE | | | Auto Tune |
| 10 dE Log | 3/div | Ref 0 | .00 dE | sm | | | | | | | lkr1 8.67 -40. | 85 dBm | | |
| | | | | | | | , | | | | | | | enter Freq |
| -10.0 | | | | | | | | | | | | DL1 -13.00 dBm | 5.500 | 000000 GHz |
| -20.0 | | | | | | | | | | | | | | Start Freq |
| -30.0 | | | | | | | | | | | | | 1.000 | 000000 GHz |
| -40.0 | | | | | | | | | | | 1 | | | |
| | | | | | | | | | | | | | 10.000 | Stop Freq |
| -50.0 | الانتخاص | | | | | | | | | | | | | |
| -60.0 | | | | | | | | | | | | | | CF Step |
| -70.0 | | | | | | | | | | | | | <u>Auto</u> | Man |
| -80.0 | | | | | | | | | | | | | F | req Offset |
| | | | | | | | | | | | | | | 0 Hz |
| -90.0 | | | | | | | | | | | | | : | Scale Type |
| | | 0 GHz | | | | | | | | | Stop 10 | .000 GHz | Log | Lin |
| #Res | s BW | 1.0 MH | z | | | #VBW | 3.0 MHz | | s | weep | 15.60 ms (1 | 8001 pts) | | |
| MSG | | | | | | | | | | STAT | US | | | |

Plot 7-74. Conducted Spurious Plot (Band 12 - 5.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

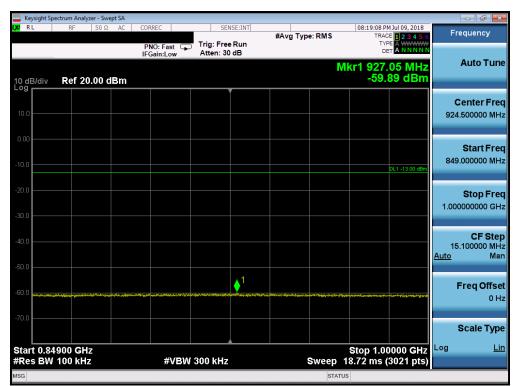
| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Page 56 of 166 |
| 1M1808210161.A3L | 6/25 - 7/26, 8/17 - 8/28/2018 | Portable Handset | | Page 50 01 100 |
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Band 5

| | ectrum Analyzer - Sv | | | | | | | | | | |
|-----------------------|----------------------|------|------------|-----------|-----|-----------|--------------------------------|-------------------------------|--|-------------------|-------------------------------|
| LX/IRL | RF 50 S | Ω AC | PNO: Fast | | Run | #Avg Type | RMS | TRAC | 1 Jul 09, 2018 E <mark>1 2 3 4 5 6</mark> E A WWWW | Fr | equency |
| 10 dB/div | Ref 20.00 | dBm | IFGain:Low | Atten: 30 | | | M | kr1 820. | 20 MHz 06 dBm | | Auto Tune |
| 10.0 | | | | | | | | | | | Center Fred 5.500000 MHz |
| -10.0 | | | | | | | | | DL1 -13.00 dBm | 30 | Start Fred |
| -20.0 | | | | | | | | | | 823 | Stop Fred 3.000000 MH: |
| -40.0 | | | | | | | | | 1 | 79 <u>Auto</u> | CF Step 0.300000 MH Mar |
| -60.0 | | | | | | | ter ter det i Mary a det patie | an terretion let a son be the | | ļ | Freq Offse 0 H |
| -70.0 | | | | | | | | | | | Scale Type |
| Start 30.0 #Res BW | | | #VBV | V 300 kHz | | SI | weep 98 | Stop 8: 33 ms (1 | 20.011112 | Log | Lir |
| MSG | | | | | | | STATUS | ; | | | |

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



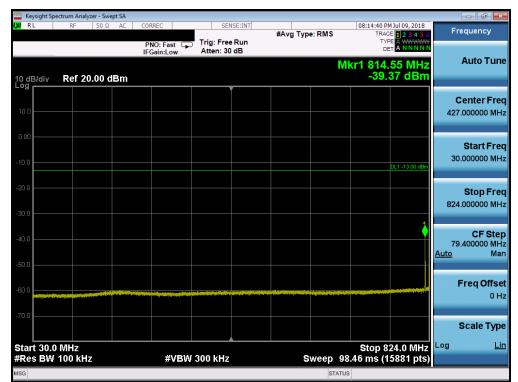
Plot 7-76. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 57 of 166 |
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| | pectrum Analyz | | | | | | | | | | | | |
|----------------------|---------------------|------|----|---------------------|--------------|-------------------------|---------|----------|--------|------------------|-----------------------------------|----------------------|------------------------------------|
| L <mark>XI</mark> RL | RF | 50 Ω | AC | CORREC | | SEI | ISE:INT | #Avg Typ | e: RMS | | PM Jul 09, 2018 CE 1 2 3 4 5 6 | Fred | uency |
| | Ref 0.0 | | | PNO: Fa IFGain:L | ast 😱 .ow | Trig: Free #Atten: 3 | | | N | /kr1 8.67 | | A | uto Tune |
| 10 dB/div Log | | | | | | | | | | | DL1 -13.00 dBm | | nter Freq 00000 GHz |
| -20.0 | | | | | | | | | | | | | Start Freq 00000 GHz |
| -40.0 | | | | | | | | | | | | | Stop Freq 00000 GHz |
| -60.0 | | | | | | | | | | | | 900.0 <u>Auto</u> | CF Step 00000 MHz Man |
| -80.0 | | | | | | | | | | | | Fr | e q Offset 0 Hz |
| -90.0 | | | | | | | | | | Otom 4/ | | So Log | ale Type |
| Start 1.0 #Res BV | UU GHZ V 1.0 MHz | | | # | ≠vвw | 3.0 MHz | | s | weep | 500 1 15.60 ms (| 0.000 GHz 18001 pts) | 209 | |
| MSG | | | | | | | | | STAT | TUS | | | |

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



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

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 59 of 166 |
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| | ectrum Analyzer - Swep | | | | | | | |
|-----------------------|---|--------------------------|--|-------------------------------|--|----------|--|--|
| (XI RL | RF 50 Ω | AC CC | ORREC | SENSE: | Avg Typ | e: RMS | 08:15:13 PM Jul 09, 2018 TRACE 1 2 3 4 5 6 | Frequency |
| | | F | PNO: Fast 🖵 Gain:Low | Trig: Free Ru Atten: 30 dB | | Mk | TYPE A WWWW DET A NNNNN | Auto Tune |
| 10 dB/div Log | Ref 20.00 di | Bm | | | | | -31.77 dBm | |
| 10.0 | | | | | | | | Center Freq 924.500000 MHz |
| -10.0 | | | | | | | DL1 -13.00 dBm | Start Freq 849.000000 MHz |
| -20.0 | | | | | | | | Stop Freq 1.000000000 GHz |
| -40.0 | | | | | | | | CF Step 15.100000 MHz <u>Auto</u> Mar |
| -50.0 | reaction of the state of the grade of the grad | September: grad de maise | uniter and a state of the state | 99 1 11111111 | an a | | water the second s | Freq Offset 0 Hz |
| -70.0 | | | | | | | | Scale Type |
| Start 0.84 #Res BW | | | #VBW | 300 kHz | | Sweep 18 | top 1.00000 GHz .72 ms (3021 pts) | Log <u>Lin</u> |
| мsg 🗼 Poin | ts changed; all tra | aces clea | red | | | STATUS | | |

Plot 7-79. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



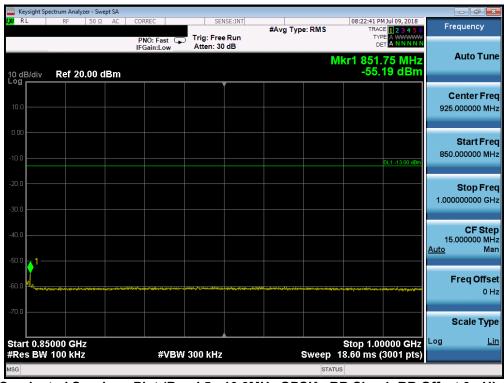
Plot 7-80. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | | |
|---|-------------------------------|---------------------------------------|---------|---------------------------------|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Daga 50 of 166 | | |
| 1M1808210161.A3L | 6/25 – 7/26, 8/17 - 8/28/2018 | Portable Handset | | Page 59 of 166 | | |
| 2018 PCTEST Engineering Laboratory, Inc. V 8.4 08/10/2018 | | | | | | |



| | ectrum Analyzer - | | | | | | | | | | |
|------------------|-------------------|----------------------------|-------------------------|---------------------------|---------------------------------|----------|----------------------------------|----------------------|---------------------------------|--------------------|--------------------------|
| LX/RL | RF 50 | Ω AC | CORREC | SEN | ISE:INT | #Avg Typ | e: RMS | | 1 Jul 09, 2018 E 1 2 3 4 5 6 | Fre | equency |
| | | | PNO: Fast IFGain:Low | Trig: Free Atten: 30 | | 0 ,1 | | TYF DE | | | Auto Tune |
| 10 dB/div Log | Ref 20.00 | dBm | | | | | M | kr1 822. -40. | 00 MHz 67 dBm | | Autorune |
| | | | | | | | | | | С | enter Freq |
| 10.0 | | | | | | | | | | 427 | .000000 MHz |
| 0.00 | | | | | | | | | | | |
| 10.0 | | | | | | | | | | 30. | Start Freq 000000 MHz |
| -10.0 | | | | | | | | | DL1 -13.00 dBm | | |
| -20.0 | | | | | | | | | | | Stop Freq |
| -30.0 | | | | | | | | | | 824. | .000000 MHz |
| | | | | | | | | | 1 | | CF Step |
| -40.0 | | | | | | | | | ` | 79. <u>Auto</u> | 400000 MHz Man |
| -50.0 | | | | | | | | | | Auto | ind i |
| -60.0 | | | | | | | | | | F | req Offset |
| | | a see a set block of an in | | and a second standard and | (Level a dis (Inc.) and with th | | line for an an state of a second | | | | 0 Hz |
| -70.0 | | | | | | | | | | : | Scale Type |
| Start 30.0 | | | | | | | | Stop 9 | 24.0 MHz | Log | Lin |
| #Res BW | | | #VBW | 300 kHz | | s | weep 98 | 5.0p 8 8.46 ms (1 | 5881 pts) | | 200 |
| MSG | | | | | | | STATU | s | | | |

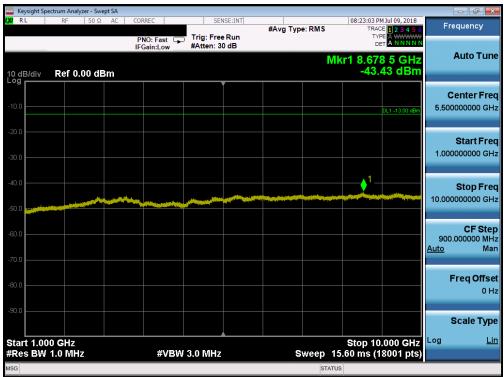
Plot 7-81. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-82. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | NG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|----|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dege 60 of 166 |
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Plot 7-83. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Page 61 of 166 |
| 1M1808210161.A3L | 6/25 - 7/26, 8/17 - 8/28/2018 | Portable Handset | | Page 61 01 100 |
| © 2018 PCTEST Engineering Lab | V 8.4 08/10/2018 | | | |



| C RL RF 5 | 0 Ω DC CORREC | SENSE:INT | | 03:32:51 PM Aug 23, 2018 | |
|-----------------------------------|--|---------------------------------|----------------|---|--|
| | NFE PNO: Fast G | Trig: Free Run #Atten: 46 dB | #Avg Type: RMS | TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN | Frequency |
| 0 dB/div Ref 20.0 | | | М | kr1 1.701 5 GHz -31.53 dBm | Auto Tur |
| 10.0 | | | | | Center Fre 869.000000 MH |
| 10.0 | | | | DL1 -13.00 dBm | Start Fre 30.000000 Mi |
| 20.0 | | | | , <u>,</u> | Stop Fro 1.708000000 GI |
| 10.0 | nagaden of general spectra of the second spectrum of the | | | , | CF Ste 167.800000 MI <u>Auto</u> M |
| 50.0 | | | | | Freq Offs 0 |
| | | | | | Scale Typ |
| tart 0.0300 GHz Res BW 1.0 MHz | #VBV | V 3.0 MHz | Sweep | Stop 1.7080 GHz 2.239 ms (3359 pts) | |

Plot 7-84. Conducted Spurious Plot (Band 66/4 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-85. Conducted Spurious Plot (Band 66/4 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Daga 62 of 166 |
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| | ectrum Analyze | | | | | | | |
|------------------|----------------|---------|-------------------------|---------------------------------|----------|--------|---|------------------------------|
| LXI RL | RF | 50 Ω DC | CORREC | SENSE:INT | #Avg Typ | e: RMS | 03:34:24 PM Aug 23, 2018 TRACE 1 2 3 4 5 6 | Frequency |
| | | NFE | PNO: Fast IFGain:Low | Trig: Free Run #Atten: 26 dB | | | DET A WWWW | Auto Tune |
| 10 dB/div Log | Ref 0.0 | 0 dBm | | | | Mk | r1 19.196 0 GHz -40.87 dBm | Auto Tune |
| Ū | | | | Ĭ | | | | Center Freq |
| -10.0 | | | | | | | DL1 -13.00 dBm | 15.00000000 GHz |
| -20.0 | | | | | | | | |
| 2010 | | | | | | | | Start Freq |
| -30.0 | | | | | | | | 10.00000000 GHz |
| -40.0 | | | | | | | | |
| -40.0 | | | | | | | | Stop Freq 20.00000000 GHz |
| -50.0 | | | | | | | | 20.000000000 GHZ |
| | | | | | | | | CF Step |
| -60.0 | | | | | | | | 1.000000000 GHz Auto Man |
| -70.0 | | | | | | | | |
| | | | | | | | | Freq Offset |
| -80.0 | | | | | | | | 0 Hz |
| -90.0 | | | | | | | | |
| | | | | | | | | Scale Type |
| Start 10.0 | | | | | | | Stop 20.000 GHz | Log <u>Lin</u> |
| #Res BW | 1.0 MHz | | #VBW | 3.0 MHz | S | weep 1 | 7.33 ms (20001 pts) | |
| MSG | | | | | | STATU | S | |

Plot 7-86. Conducted Spurious Plot (Band 66/4 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



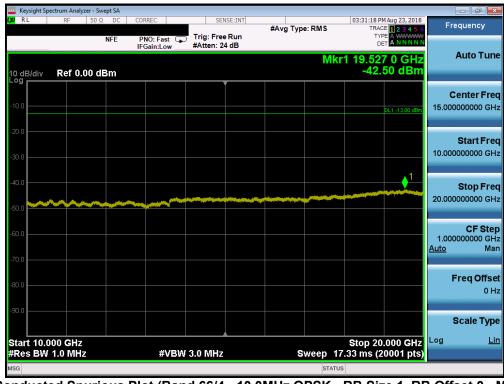
Plot 7-87. Conducted Spurious Plot (Band 66/4 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Dogo 62 of 166 |
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Plot 7-88. Conducted Spurious Plot (Band 66/4 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-89. Conducted Spurious Plot (Band 66/4 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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| Test Report S/N: | Test Dates: | EUT Type: | | Dage 64 of 166 |
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Band 2

| | ectrum Analyzer - Sv | | | | | | |
|-----------------------|----------------------------|------|------------|--------------------------------|---------------|--|---|
| LXU RL | RF 50 Ω | 2 AC | PNO: Fast | Trig: Free Run Atten: 30 dB | #Avg Type: RM | 07:21:31 PM Jul 13, 2018 IS TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N | Frequency |
| 10 dB/div Log | Ref 20.00 | dBm | IFGain:Low | Atten: 00 dB | | Mkr1 1.842 0 GHz -40.90 dBm | Auto Tune |
| 10.0 | | | | | | | Center Freq 939.000000 MHz |
| -10.0 | | | | | | DL1 -13.00 dBm | Start Freq 30.000000 MHz |
| -20.0 | | | | | | | Stop Freq 1.848000000 GHz |
| -40.0 | | | | | | 1 | CF Step 181.800000 MHz <u>Auto</u> Man |
| -60.0 | galiter a second parameter | | | | | | Freq Offset 0 Hz |
| -70.0 | | | | | | | Scale Type |
| Start 0.03 #Res BW | | | #VBW | 3.0 MHz | Swe | Stop 1.8480 GHz ep 2.425 ms (3639 pts) | Log <u>Lin</u> |
| MSG | | | | | | STATUS | |

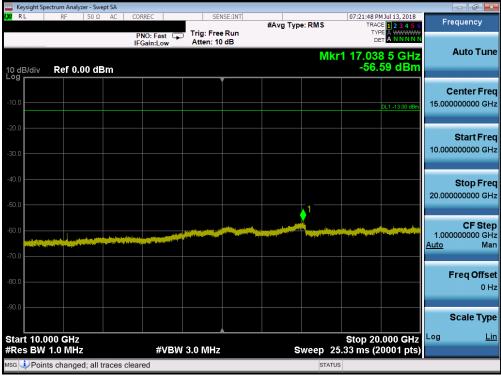
Plot 7-90. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-91. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | | |
|-------------------------------|--|---------------------------------------|---------|---------------------------------|--|--|
| Test Report S/N: | Test Dates: | EUT Type: | | Dage 65 of 166 | | |
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Plot 7-92. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



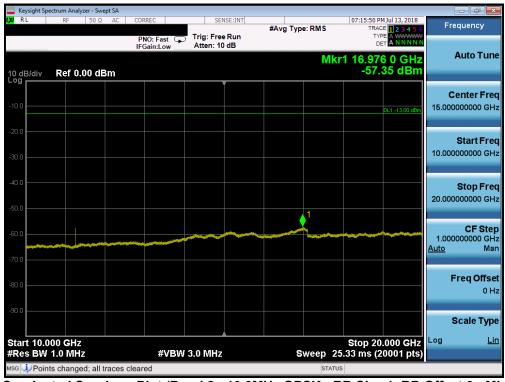
Plot 7-93. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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| Keysight Spectrum Analyzer - S | | | | | | | | | |
|------------------------------------|----------------|-------------------------|-------------------------|--------|---|---------|-----------------------|---------------------------------|--|
| LX/ RL RF 50 | Ω AC CC | RREC | SEN | SE:INT | #Avg Type | e: RMS | | M Jul 13, 2018 E 1 2 3 4 5 6 | Frequency |
| | IF | PNO: Fast 🖵 Gain:Low | Trig: Free Atten: 30 | | | M | rr1 9.52 | 6 0 GHz 74 dBm | Auto Tune |
| 10 dB/div Ref 20.00 | dBm | | Ĭ | | | | -45. | 74 abm | |
| 10.0 | | | | | | | | | Center Freq 5.955000000 GHz |
| -10.0 | | | | | | | | DL1 -13.00 dBm | Start Freq 1.910000000 GHz |
| -20.0 | | | | | | | | | Stop Fred 10.000000000 GHz |
| -40.0 | | | | | e e se | | | 1 | CF Step 809.000000 MHz <u>Auto</u> Mar |
| -60.0 | | | | | | | | | Freq Offse 0 H; |
| -70.0 | | | | | | | | | Scale Type |
| Start 1.910 GHz #Res BW 1.0 MHz | | #VBW | 3.0 MHz | | S | weep 14 | Stop 10 1.02 ms (1 | .000 GHz 6181 pts) | Log <u>Lin</u> |
| мsg 🗼 Points changed; a | Il traces clea | red | | | | STATUS | s | | |

Plot 7-94. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-95. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | MSUNG | Approved by: Quality Manager | | |
|-------------------------------|-------------------------------|---------------------------------------|-------|---------------------------------|--|--|
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| | pectrum Analyzer - Sw | | | | | | | | | _ | |
|-----------------------|-----------------------|------|-------------|-------------------------|--------|----------|----------------------------|-----------------------|---------------------------------------|---------------------|-------------------------------------|
| LXI RL | RF 50 Ω | AC (| ORREC | SEN | SE:INT | #Avg Typ | e: RMS | | MJul 13, 2018 E 1 2 3 4 5 6 | Fre | equency |
| | | | PNO: Fast 🕞 | Trig: Free Atten: 30 | | | Mk | rri 1.84 | 3 5 GHz | | Auto Tune |
| 10 dB/div Log | Ref 20.00 (| dBm | | | | | | -47. | 90 dBm | | |
| 10.0 | | | | | | | | | | | enter Freq 000000 MHz |
| -10.0 | | | | | | | | | DL1 -13.00 dBm | 30. | Start Freq 000000 MHz |
| -20.0 | | | | | | | | | | 1.850 | Stop Freq 000000 GHz |
| -40.0 | | | | | | | المالين لومر وحجوا اليومون | - | 1 | 182. <u>Auto</u> | CF Step 000000 MHz Man |
| -60.0 | | | | | | | | | | F | F req Offset 0 Hz |
| -70.0 | | | | | | | | | | | Scale Type |
| Start 0.03 #Res BW | | | #VBW | 3.0 MHz | | | Sweep 2 | Stop 1.3 .427 ms (| 3500 GHz 3641 pts) | Log | Lin |
| MSG | | | | | | | STATUS | | | | |

Plot 7-96. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-97. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager | |
|-------------------------------|-------------------------------|---------------------------------------|----------------|---------------------------------|--|
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Plot 7-98. Conducted Spurious Plot (Band 2 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|----------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | Page 69 of 166 | |
| 1M1808210161.A3L | 6/25 - 7/26, 8/17 - 8/28/2018 | 018 Portable Handset | | |
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Band 7

| Keysight Spectro | um Analyzer - Swept SA | | | | | |
|-------------------|---|---|---|---|--|---|
| LXU RL | RF 50 Ω DC | | SENSE:INT Trig: Free Run Atten: 30 dB | #Avg Type: RMS | 02:25:50 PM Jul 13, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N | Frequency |
| 10 dB/div | Ref 20.00 dBm | IFGain:Low | Atten: 50 db | М | kr1 2.463 0 GHz -52.54 dBm | Auto Tune |
| 10.0 | | | | | | Center Freq 1.252500000 GHz |
| -10.0 | | | | | | Start Freq 30.000000 MHz |
| -20.0 | | | | | DL1 -25.00 dBm | Stop Freq 2.475000000 GHz |
| -40.0 | | | | | <u>1</u> | CF Step 244.500000 MHz <u>Auto</u> Mar |
| -60.0 | perior deservations and the best of the | and the second secon | 1 | *************************************** | | Freq Offset 0 Hz |
| -70.0 Start 0.030 | | | | | 0100 2.470 0112 | Scale Type |
| #Res BW 1. | 0 MHz | #VBW 3 | .0 MHz | Sweep Statu | 3.260 ms (4891 pts) | |

Plot 7-99. Conducted Spurious Plot (Band 7 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-100. Conducted Spurious Plot (Band 7 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Page 70 of 166 |
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| | ectrum Analyzer - Swep | ot SA | | | | | | | | | × |
|-----------------------|------------------------|-------------|--|-------------------------|--|----------|---------|-----------------|-----------------------|---------------------|-------|
| LXI RL | RF 50 Ω | DC COI | RREC | SEN | ISE:INT | #Avg Typ | e: RMS | | MJul 13, 2018 | Frequency | y |
| | N | IFE P IF | NO:Fast 🕞 Gain:Low | Trig: Free Atten: 10 | | 0 ,1 | | TYF DE | | Auto T | Tune |
| 10 dB/div Log | Ref 0.00 dB | m | | | | | Mkr | 1 26.31 -57. | 0 5 GHz 93 dBm | | une |
| | | | | | | | | | | Center F | |
| -10.0 | | | | | | | | | | 21.00000000 | GHz |
| -20.0 | | | | | | | | | DL1 -25.00 dBm | Start F | |
| -30.0 | | | | | | | | | | 15.000000000 | GHz |
| -40.0 | | | | | | | | | | Stop F | |
| -50.0 | | | | | | | | | . 1 | 27.000000000 | GHz |
| -60.0 | | 1 | | | and the second s | | | | | CF S 1.200000000 | |
| -70.0 | | | and the second | | أليسفير وأأفري بالمرع | | | | | | Man |
| -80.0 | | | | | | | | | | Freq Of | ffset |
| | | | | | | | | | | | 0 Hz |
| -90.0 | | | | | | | | | | Scale T | Гуре |
| Start 15.0 #Res BW | 000 GHz | | #\/B\/ | 3.0 MHz | | | ween 20 | Stop 27 | .000 GHz 4001 pts) | Log | Lin |
| MSG | | | #VDVV | 3.0 WHZ | | 3 | status | | 400 r pts) | | |
| | | | | | | | | | | | _ |

Plot 7-101. Conducted Spurious Plot (Band 7 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-102. Conducted Spurious Plot (Band 7 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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| | ectrum Analyzer | | | | | | | |
|---------------------|-----------------|-------|---------------------------|-----------------------------|---------------|---------------------------------|---|--|
| LXI RL | RF 5 | 0Ω DC | CORREC | SENS | E:INT #Avg Ty | pe: RMS | 02:23:24 PM Jul 13, 2018 TRACE 1 2 3 4 5 6 | Frequency |
| | | NFE | PNO: Fast 📮 IFGain:Low | Trig: Free F Atten: 30 d | lun | | 14.354 5 GHz | Auto Tune |
| 10 dB/div Log | Ref 20.0 | 0 dBm | | | | | -43.86 dBm | |
| 10.0 | | | | | | | | Center Freq 8.785000000 GHz |
| -10.0 | | | | | | | | Start Freq 2.570000000 GHz |
| -20.0 | | | | | | | DL1 -25.00 dBm | Stop Freq 15.000000000 GHz |
| -40.0 | | | | | | Repairing and the second second | 1_ | CF Step 1.243000000 GHz <u>Auto</u> Man |
| -50.0 | | | | | | | | Freq Offset 0 Hz |
| -70.0 Start 2.57 | 70 GHz | | | | | | Stop 15.000 GHz | Scale Type |
| #Res BW | | | #VBW | 3.0 MHz | ş | Sweep 21. | 55 ms (24861 pts) | |
| MSG | | | | | | STATUS | | |

Plot 7-103. Conducted Spurious Plot (Band 7 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



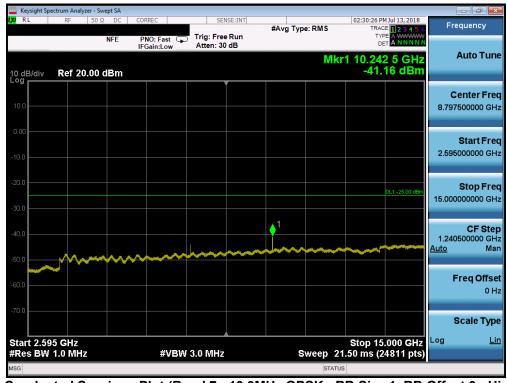
Plot 7-104. Conducted Spurious Plot (Band 7 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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| | ectrum Analyze | | | | | | | | | | x |
|--------------------|----------------|---------|---|--|---------|----------|--------------------|-------------|---------------------------------|----------------------------------|-----------|
| LXU RL | RF | 50 Ω DC | CORREC | SEN | ISE:INT | #Avg Typ | e: RMS | | 1 Jul 13, 2018 E 1 2 3 4 5 6 | Frequency | |
| | | NFE | PNO: Fast G | Trig: Free Atten: 30 | | 0 ,1 | | TYP | | Auto Tu | ne |
| 10 dB/div Log | Ref 20. | 00 dBm | | | | | | -52.4 | 43 dBm | | |
| 10.0 | | | | | | | | | | Center Fr 1.265000000 G | |
| 0.00 | | | | | | | | | | 1.26500000 G | Π2 |
| | | | | | | | | | | Start Fr 30.000000 M | |
| -10.0 | | | | | | | | | | | |
| -20.0 | | | | | | | | | DL1 -25.00 dBm | Stop Fr 2.500000000 G | |
| -30.0 | | | | | | | | | | | |
| -40.0 | | | | | | | | | | CF Sto 247.000000 M Auto M | |
| -50.0 | | | | | | | وخط فروجه مرور و م | | | | |
| -60.0 -60.0 | And the second | | and a product of the state of the | and the second | | | | | | Freq Offs 0 | set Hz |
| -70.0 | | | | | | | | | | Scale Ty | ne |
| Start 0.03 | 0 GHz | | | | | | | Stop 2 | .500 GHz | | _in |
| #Res BW | | | #VBV | V 3.0 MHz | | | Sweep 🗧 | 3.293 ms (4 | 4941 pts) | | |
| MSG | | | | | | | STATU | s | | | |

Plot 7-105. Conducted Spurious Plot (Band 7 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-106. Conducted Spurious Plot (Band 7 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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| | ectrum Analyz | | | | | | | | | | 7 × |
|-----------------------|---------------|--------|-------------|-------------------------|---------|----------|----------------------------|-----------------|--|----------------------------------|------------------------|
| IXI RL | RF | 50Ω DC | CORREC | | ISE:INT | #Avg Typ | e: RMS | TRAC | M Jul 13, 2018 E 1 2 3 4 5 6 | Frequenc | су |
| | | NFE | PNO: Fast G | Trig: Free Atten: 10 | | | | TYI Di | | | |
| 10 dB/div Log | Ref 0.0 | 00 dBm | | | | | Mkr | 1 26.77 -58. | 3 5 GHz 31 dBm | Auto | Tune |
| -10.0 | | | | | | | | | | Center 21.00000000 | |
| -20.0 | | | | | | | | | DL1 -25.00 dBm | Start 15.00000000 | t Freq 0 GHz |
| -40.0 | | | | | | | | | | Stop 27.00000000 | Freq 0 GHz |
| -60.0 | | | | | | | a parti de Propiet Planete | | <u> </u> | CF 1.200000000 <u>Auto</u> | 0 GHz Man |
| -80.0 | | | | | | | | | | Freq C | Offset 0 Hz |
| -90.0 | | | | | | | | | | Scale | |
| Start 15.0 #Res BW | | | #VBW | 3.0 MHz | | s | weep 20 | | .000 GHz 4001 pts) | - | Lin |
| MSG | | | | | | | STATUS | | | | |

Plot 7-107. Conducted Spurious Plot (Band 7 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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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 $43 + \log_{10}(P_{[Watts]})$, 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 > 1% of the emission bandwidth
- 4. VBW ≥ 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

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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<u>Test Notes</u>

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(g) for operations in the 698-746 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.

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.

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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Plot 7-108. Lower Band Edge Plot (Band 71 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-109. Upper Band Edge Plot (Band 71 - 5.0MHz QPSK - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
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| Test Report S/N: | Test Dates: | EUT Type: | | Dega 77 of 166 |
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| RL | ectrum Analyz RF | 50 Ω DC | | EC | SEI | NSE:INT | | | 05:30:19 PI | M Aug 23, 2018 | | |
|---------------------|---------------------|---------------|--|---|--|---------|---------------------|---------|---|--------------------------------------|-------------|-----------------------------------|
| | | NFE | | :Wide 🕞 | | Run | #Avg Typ | e: RMS | TRAC | E 1 2 3 4 5 6 E A WWWW A NNNNN | F | requency |
| 0 dB/div | Ref 25 | .00 dBn | | in:Low | Atten: 36 | a B | | Mk | r1 662.9 | 04 MHz 21 dBm | | Auto Tun |
| 15.0 | | | | | | | | | | | | Center Fre 3.000000 M⊦ |
| 5.00 | | | | | | M | al Array Contractor | | and the second se | DL1 -13.00 dBm | 65 | Start Fre 9.000000 MH |
| 25.0 | | | | | Ales Ales and | | | | | | 66 | Stop Fre 7.000000 MF |
| 35.0 ••••••••• | and the second | elas-lass smp | and a second | gallen an | and a second | | | | | | <u>Auto</u> | CF Ste 800.000 kl Ma |
| 55.0 | | | | | | | | | | | | Freq Offs 0 I |
| 65.0 | | | | | | | | | | | | Scale Typ |
| Center 66 Res BW | | | | #VBW | / 300 kHz | | | Sweep 4 | Span 8 1.000 ms (| .000 MHz 1001 pts) | Log | L |
| SG | | | | | | | | STATU | s | | | |

Plot 7-110. Lower Band Edge Plot (Band 71 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-111. Upper Band Edge Plot (Band 71 - 10.0MHz QPSK - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | SAMSUNG | Approved by: Quality Manager |
|------------------------------|-------------------------------|---------------------------------------|---------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | | Decc. 79 of 166 |
| 1M1808210161.A3L | 6/25 - 7/26, 8/17 - 8/28/2018 | Portable Handset | | Page 78 of 166 |
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| | ectrum Analyzer | | | | | | | | | | |
|-----------|-----------------|--------|-------------------------|-------------------------------|---|-----------|--------|---------------|------------------|------|-----------------------------|
| LXI RL | RF | 50Ω DC | CORREC | SENSE: | | #Avg Type | RMS | TRAC | MAug 23, 2018 | Fr | equency |
| 10 dB/div | Ref 25.0 | NFE | PNO: Wide IFGain:Low | Trig: Free Ru Atten: 36 dB | n | | Mkı | DE 1 662.8 | 92 MHz 25 dBm | | Auto Tune |
| 15.0 | | | | | | | | | | | Center Fred |
| -5.00 | | | | | ſ | | ~~~~~ | | | 657 | Start Fred 000000 MH; |
| -15.0 | | | | 1 | | | | | DL1 -13.00 dBm | 669 | Stop Fred 0.000000 MH2 |
| -35.0 | monter | | | | | | | | | Auto | CF Stej .200000 MH Ma |
| -55.0 | | | | | | | | | | | F req Offse 0 H |
| | 63.000 MH | Iz | | | | | | Span 1 | 2.00 MHz | Log | Scale Type Lir |
| #Res BW | 150 kHz | | #VBW | 470 kHz | | Ś | | .000 ms (| 1001 pts) | | |
| 150 | | | | | | | STATUS | | | | |

Plot 7-112. Lower Band Edge Plot (Band 71 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-113. Upper Band Edge Plot (Band 71 - 15.0MHz QPSK - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | Approved by: Quality Manager |
|-------------------------------|-------------------------------|---------------------------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | Dago 70 of 166 |
| 1M1808210161.A3L | 6/25 – 7/26, 8/17 - 8/28/2018 | Portable Handset | Page 79 of 166 |
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| | pectrum Analy | | | | | | | | | | | |
|---------------------|-----------------------|---|----------------|--------------|-------------------------|--|---------|---------|--|--|------------------|------------------|
| X/RL | RF | 50 Ω DC | | | | NSE:INT | #Avg Ty | pe: RMS | TRA | PM Aug 23, 2018 ACE 1 2 3 4 5 6 | Fr | equency |
| | | NFE | PNO: IFGair | Wide 🕞 | Trig: Free Atten: 36 | | | | | | | |
| 10 dB/div Log | Ref 2 | 5.00 dBn | n | | | | | M | kr1 662. -28 | 968 MHz .33 dBm | | Auto Tun |
| 15.0 | | | | | | | | | | | | Center Free |
| 5.00 | | | | | | | | | | | | |
| -5.00 | | | | | | | | | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | 655 | Start Fre |
| -15.0 | | | | | | | | | | DL1 -13.00 dBm | | |
| | | | | | | 1 | | | | | 671 | Stop Fre |
| -25.0 | | | | - and any my | and the second | and the second s | | | | | | CF Ste |
| 35.0 | | and the second | warman | | | | | | | | 1 <u>Auto</u> | .600000 MH Ma |
| 45.0 | man | Var de la compañía de | | | | | | | | | | Freq Offs |
| 55.0 | | | | | | | | | | | | 0 H |
| 65.0 | | | | | | | | | | | | Scale Typ |
| Center 6 #Res BW | 63.000 N V 200 kH: | /IHz z | | #VBW | 620 kHz | | | Sweep | Span 1.000 ms | 16.00 MHz (1001 pts) | Log | Li |
| ISG | | | | | | | | STAT | | | | |

Plot 7-114. Lower Band Edge Plot (Band 71 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-115. Upper Band Edge Plot (Band 71 - 20.0MHz QPSK - Full RB Configuration)

| FCC ID: A3LSMA600T | | MEASUREMENT REPORT (CERTIFICATION) | Approved by: Quality Manager |
|--|-------------------------------|---------------------------------------|---------------------------------|
| Test Report S/N: | Test Dates: | EUT Type: | Baga 80 of 166 |
| 1M1808210161.A3L | 6/25 – 7/26, 8/17 - 8/28/2018 | Portable Handset | Page 80 of 166 |
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