

## Test Notes

1. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 D01 v05r02 were not used to evaluate this device for compliance to radiated limits. All radiated spurious emissions levels were measured in a radiated test setup.
2. All emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-5.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The unit was tested with its standard battery.
5. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
6. Average measurements were recorded using a VBW of 3kHz, per Section 4.1.4.2.3 of ANSI C63.10-2013, since 1/T is equal to just under 3kHz. This method was used because the EUT could not be configured to operate with a duty cycle > 98%. Both average and peak measurements were made using a peak detector
7. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
8. No significant radiated band edge emissions were found in the 2310 – 2390MHz restricted band.
9. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

## Sample Calculations

### Determining Spurious Emissions Levels

- Field Strength Level  $_{[dB\mu V/m]} = \text{Analyzer Level }_{[dBm]} + 107 + \text{AFCL }_{[dB/m]}$
- $\text{AFCL }_{[dB/m]} = \text{Antenna Factor }_{[dB/m]} + \text{Cable Loss }_{[dB]}$
- $\text{Margin }_{[dB]} = \text{Field Strength Level }_{[dB\mu V/m]} - \text{Limit }_{[dB\mu V/m]}$

### Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots in Section 7.8 was calculated using the formula:  
Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

FCC ID: A3LSMA127M	 PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1K2103030020-02.A3L	Test Dates: 05/13/2021 – 06/01/2021	EUT Type: Portable Handset		Page 48 of 56

## Radiated Spurious Emission Measurements

§15.205 §15.209 §15.247(d); RSS-Gen [8.9]

Bluetooth Mode: LE  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2402MHz  
 Channel: 0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	H	131	46	-75.86	2.55	33.69	53.98	-20.29
4804.00	Peak	H	131	46	-65.31	2.55	44.24	73.98	-29.74
12010.00	Avg	H	-	-	-83.19	15.23	39.04	53.98	-14.94
12010.00	Peak	H	-	-	-72.39	15.23	49.84	73.98	-24.14

**Table 7-7. Radiated Measurements @ 3 meters**

Bluetooth Mode: LE  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2440MHz  
 Channel: 19

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4880.00	Avg	H	100	52	-73.11	2.65	36.54	53.98	-17.44
4880.00	Peak	H	100	52	-63.28	2.65	46.37	73.98	-27.61
7320.00	Avg	H	104	54	-76.30	8.51	39.21	53.98	-14.77
7320.00	Peak	H	104	54	-66.68	8.51	48.83	73.98	-25.15
12200.00	Avg	H	-	-	-83.36	15.69	39.33	53.98	-14.65
12200.00	Peak	H	-	-	-71.59	15.69	51.10	73.98	-22.88

**Table 7-8. Radiated Measurements @ 3 meters**

FCC ID: A3LSMA127M	 PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1K2103030020-02.A3L	Test Dates: 05/13/2021 – 06/01/2021	EUT Type: Portable Handset		Page 49 of 56

## Radiated Spurious Emission Measurements

§15.205 §15.209 §15.247(d); RSS-Gen [8.9]

Bluetooth Mode: LE  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2480MHz  
 Channel: 39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4960.00	Avg	H	102	51	-73.08	2.64	36.56	53.98	-17.42
4960.00	Peak	H	102	51	-62.76	2.64	46.88	73.98	-27.10
7440.00	Avg	H	102	49	-75.16	8.99	40.83	53.98	-13.15
7440.00	Peak	H	102	49	-65.98	8.99	50.01	73.98	-23.97
12400.00	Avg	H	-	-	-83.29	15.68	39.39	53.98	-14.59
12400.00	Peak	H	-	-	-72.43	15.68	50.25	73.98	-23.73

**Table 7-9. Radiated Measurements @ 3 meters**

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Test Report S/N: 1K2103030020-02.A3L	Test Dates: 05/13/2021 – 06/01/2021	EUT Type: Portable Handset		Page 50 of 56

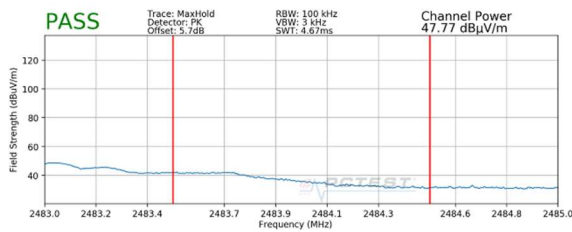
## 7.8 Radiated Restricted Band Edge Measurements §15.205 §15.209; RSS-Gen [8.9]

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

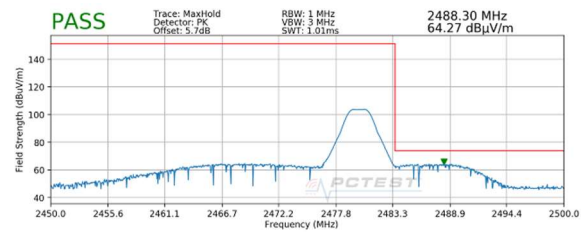
The amplitude offset shown in the following plots for average measurements was calculated using the formula:

$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss} + \text{Attenuator}) - \text{Preamplifier Gain}$$

Bluetooth Mode:	LE
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	39



**Plot 7-51. Radiated Restricted Upper Band Edge Measurement (Average)**



**Plot 7-52. Radiated Restricted Upper Band Edge Measurement (Peak)**

### Note:

A channel integration method was used to determine compliance with the out of band average radiated spurious emissions limit in the 2483.5 – 2500MHz band. Per KDB 558074 D01 v05r02 Section 8.7.3 and ANSI C63.10-2013 Section 11.13.3.5, a measurement was performed using a RBW of 100kHz at the 2483.5MHz band edge. The results were integrated up to the 1MHz reference bandwidth to show compliance with the 15.209 radiated limit for emissions greater than 1GHz

FCC ID: A3LSMA127M		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1K2103030020-02.A3L	Test Dates: 05/13/2021 – 06/01/2021	EUT Type: Portable Handset		Page 51 of 56

## 7.9 Line-Conducted Test Data

### §15.207; RSS-Gen [8.8]

#### Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

**All conducted emissions must not exceed the limits shown in the table below, per Section 15.207 and RSS-Gen (8.8).**

Frequency of emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

**Table 7-10. Conducted Limits**

\*Decreases with the logarithm of the frequency.

#### Test Procedures Used

ANSI C63.10-2013, Section 6.2

#### Test Settings

##### Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

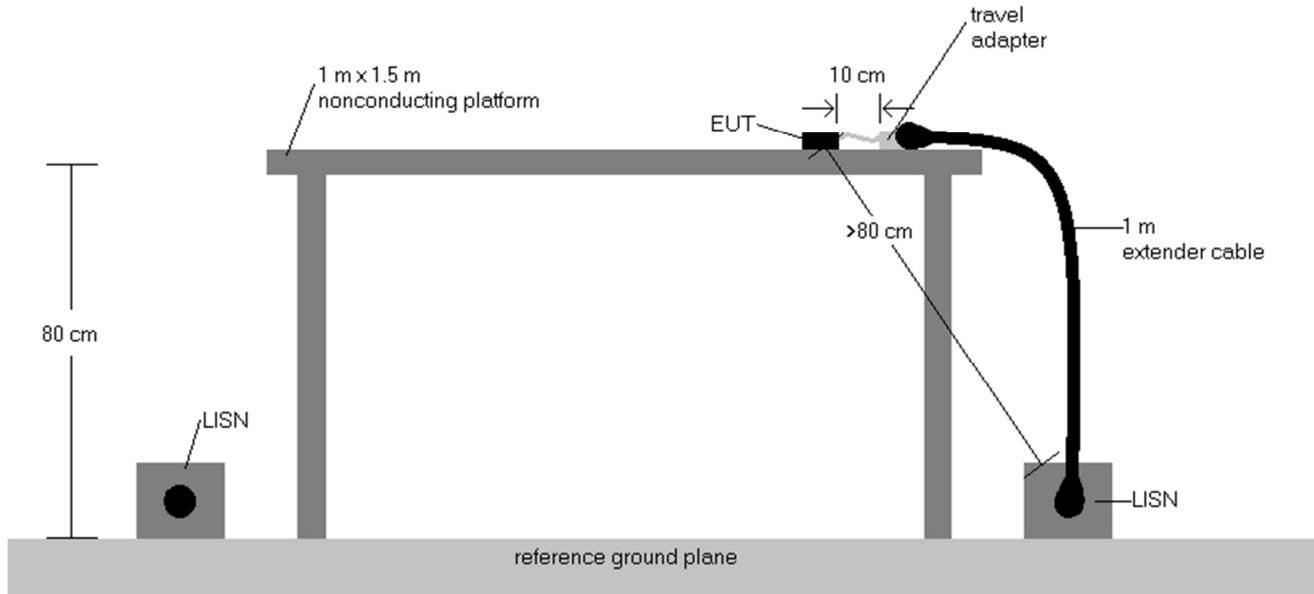
##### Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = RMS
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

FCC ID: A3LSMA127M	 PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1K2103030020-02.A3L	Test Dates: 05/13/2021 – 06/01/2021	EUT Type: Portable Handset		Page 52 of 56

**Test Setup**

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

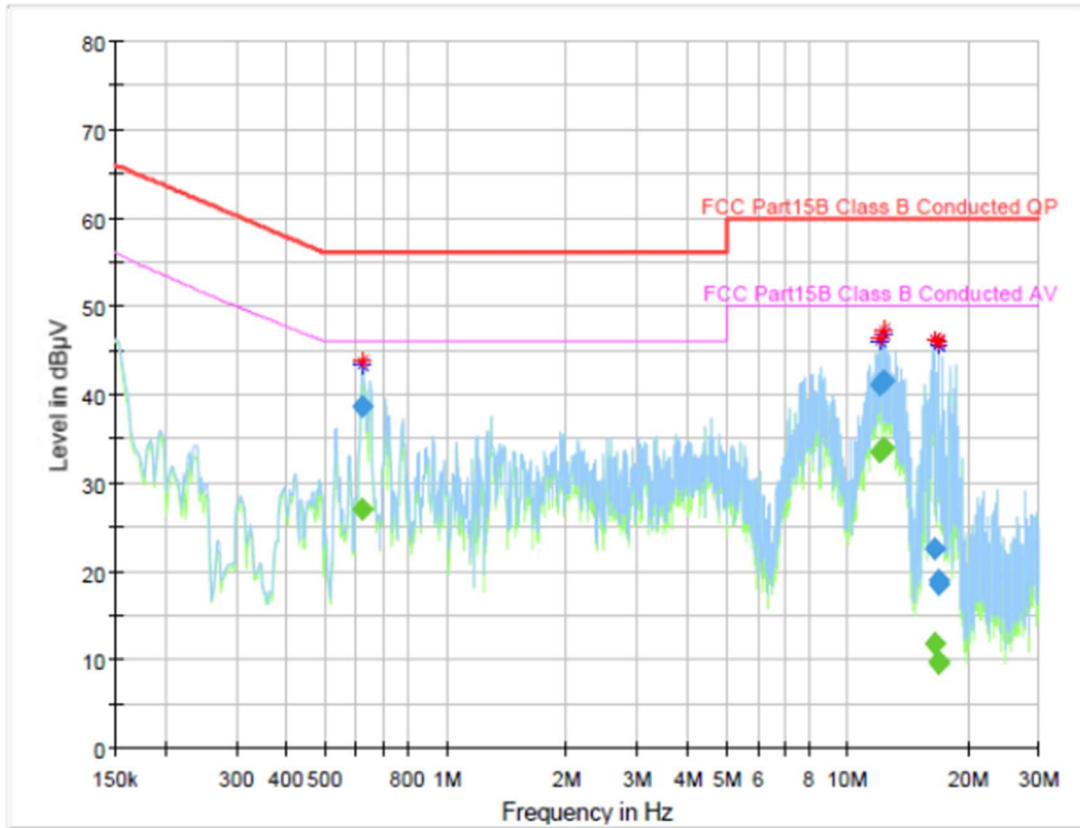


**Figure 7-7. Test Instrument & Measurement Setup**

**Test Notes**

1. All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
2. The limit for an intentional radiator from 150kHz to 30MHz are specified in Part 15.207 and RSS-Gen (8.8).
3.  $Corr. (dB) = Cable\ loss (dB) + LISN\ insertion\ factor (dB)$
4.  $QP/AV\ Level (dB\mu V) = QP/AV\ Analyzer/Receiver\ Level (dB\mu V) + Corr. (dB)$
5.  $Margin (dB) = QP/AV\ Limit (dB\mu V) - QP/AV\ Level (dB\mu V)$
6. Traces shown in plot are made using a peak detector.
7. Deviations to the Specifications: None.

FCC ID: A3LSMA127M	<b>PCTEST</b> Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1K2103030020-02.A3L	Test Dates: 05/13/2021 – 06/01/2021	EUT Type: Portable Handset		Page 53 of 56



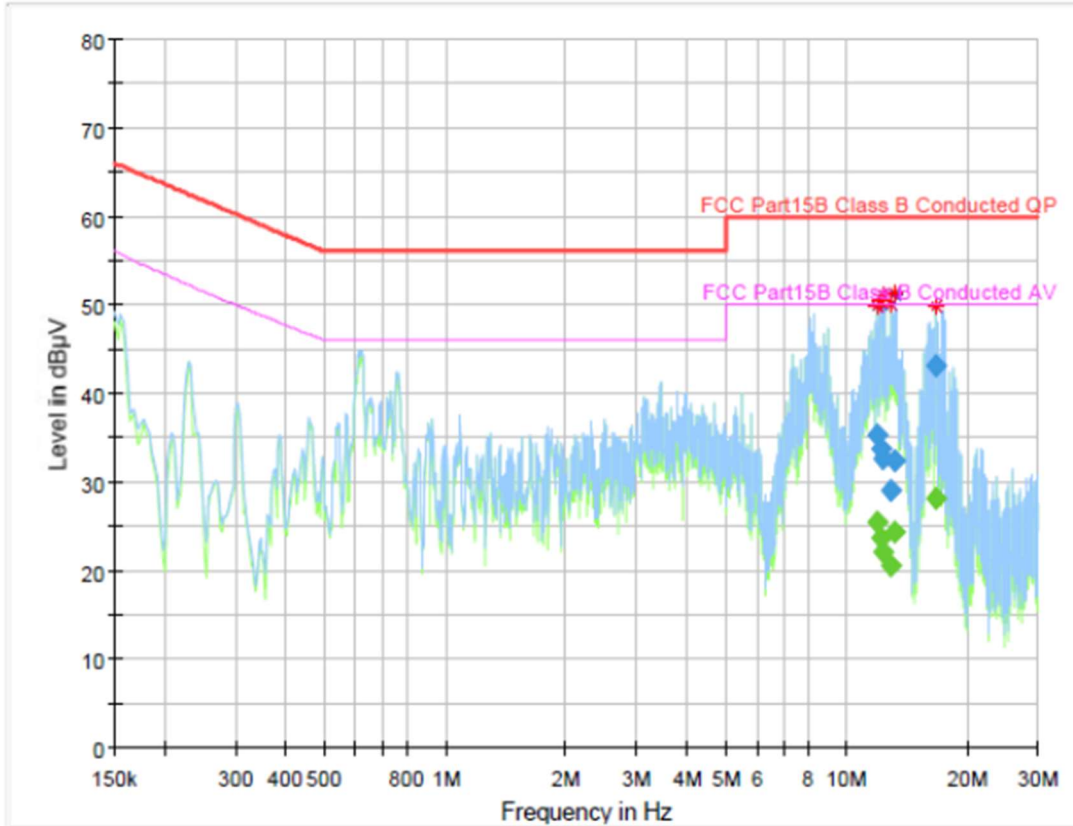
Plot 7-53. Line Conducted Plot with Bluetooth LE (L1)

### Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.618645	---	27.06	46.00	18.94	1000.0	9.000	L1	10.0
0.618645	38.58	---	56.00	17.42	1000.0	9.000	L1	10.0
12.098955	---	33.42	50.00	16.58	1000.0	9.000	L1	10.0
12.098955	41.08	---	60.00	18.92	1000.0	9.000	L1	10.0
12.403425	---	34.00	50.00	16.00	1000.0	9.000	L1	10.0
12.403425	41.45	---	60.00	18.55	1000.0	9.000	L1	10.0
16.489890	---	11.86	50.00	38.14	1000.0	9.000	L1	10.0
16.489890	22.68	---	60.00	37.32	1000.0	9.000	L1	10.0
16.821225	---	9.73	50.00	40.27	1000.0	9.000	L1	10.0
16.821225	18.48	---	60.00	41.52	1000.0	9.000	L1	10.0
16.863015	---	9.63	50.00	40.37	1000.0	9.000	L1	10.0
16.863015	18.92	---	60.00	41.08	1000.0	9.000	L1	10.0

Table 7-11. Line Conducted Data with Bluetooth LE (L1)

FCC ID: A3LSMA127M	<b>PCTEST</b> Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1K2103030020-02.A3L	Test Dates: 05/13/2021 – 06/01/2021	EUT Type: Portable Handset		Page 54 of 56



Plot 7-54. Line Conducted Plot with Bluetooth LE (N)

### Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
11.961645	---	25.39	50.00	24.61	1000.0	9.000	N	10.0
11.961645	35.21	---	60.00	24.79	1000.0	9.000	N	10.0
12.176565	---	23.74	50.00	26.26	1000.0	9.000	N	10.0
12.176565	33.82	---	60.00	26.18	1000.0	9.000	N	10.0
12.340740	---	22.14	50.00	27.86	1000.0	9.000	N	10.0
12.340740	32.52	---	60.00	27.48	1000.0	9.000	N	10.0
12.854160	---	20.46	50.00	29.54	1000.0	9.000	N	10.0
12.854160	29.00	---	60.00	31.00	1000.0	9.000	N	10.0
13.200420	---	24.40	50.00	25.60	1000.0	9.000	N	10.0
13.200420	32.46	---	60.00	27.54	1000.0	9.000	N	10.0
16.663020	---	28.15	50.00	21.85	1000.0	9.000	N	10.1
16.663020	43.06	---	60.00	16.94	1000.0	9.000	N	10.1

Table 7-12. Line Conducted Data with Bluetooth LE (N)

FCC ID: A3LSMA127M	<b>PCTEST</b> Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	<b>SAMSUNG</b>	Approved by: Technical Manager
Test Report S/N: 1K2103030020-02.A3L	Test Dates: 05/13/2021 – 06/01/2021	EUT Type: Portable Handset		Page 55 of 56



## 8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMA127M** is in compliance with Part 15C of the FCC rules.

<b>FCC ID:</b> A3LSMA127M		<b>MEASUREMENT REPORT (CERTIFICATION)</b>	 <b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1K2103030020-02.A3L	<b>Test Dates:</b> 05/13/2021 – 06/01/2021	<b>EUT Type:</b> Portable Handset	Page 56 of 56