

7.4 Peak Power and Maximum Average Emissions §15.519(e), §15.519(c)

Test Overview and Limit

15.519 (3)(e) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fM. That limit is 0 dBm EIRP.

15.519 (3)(c) The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
3100 - 10600	-41.3

Table 7-4. Average EIRP Limit

Test Procedures Used

ANSI C63.10-2013

Test Settings

Peak:

- 1. Analyzer frequency set to the frequency of the radiated spurious emission of interest
- 2. RBW = 50MHz, VBW = 80MHz
- 3. Detector = Peak
- 4. Sweep time = auto coupled
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

Average:

- 1. Analyzer frequency set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz, VBW = 3MHz
- 3. Detector = Average (RMS)
- 4. Sweep time = No more than a 1 ms integration period over each measurement bin
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

FCC ID : A3LSMS908E	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 46 of 96
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 46 of 86
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Test Note

All combinations of HPRF/BPRF, power mode, and preamble are investigated for average and peak EIRP measurements. Only the worst case combinations are reported for each channel and each antenna.

RESULTS – BPRF

ANT	сн	MODE	Preamble	Meas.	FM[GHz]	Peak Power	Peak Limit	Margin
				Ant.		(dBm/50MHz)	(dBm/50MHz)	[dB]
1	5	SPO	9	Н	6.4906	-2.32	0	-2.32
I	9	SPO	9	V	7.9867	-2.58	0	-2.58
2	5	SPO	11	V	6.6075	-3.70	0	-3.7
2	9	SPO	9	Н	7.9877	-1.93	0	-1.93

Table 7-5. BPRF Highest Peak Power Results

ANT	СН	MODE	Preamble	Meas. Ant.	FM[GHz]	Average Power (dBm)	Average Limit (dBm)	Margin [dB]
1	5	SP3	10	Н	6.714488	-42.87	-41.3	-1.57
1	9	SP1	9	V	8.125631	-42.87	-41.3	-1.57
2	5	SP1	12	V	6.622534	-42.92	-41.3	-1.62
2	9	SP3	12	Н	8.031678	-42.85	-41.3	-1.55

Table 7-6. BPRF Highest Average Power Results

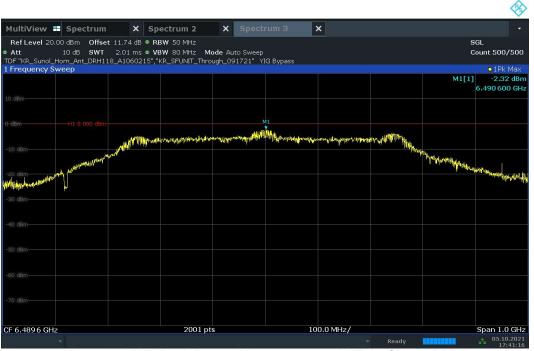
Sample Calculation:

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the EIRP level is calculated by applying the additional factors shown below for a test distance of 3 meter.

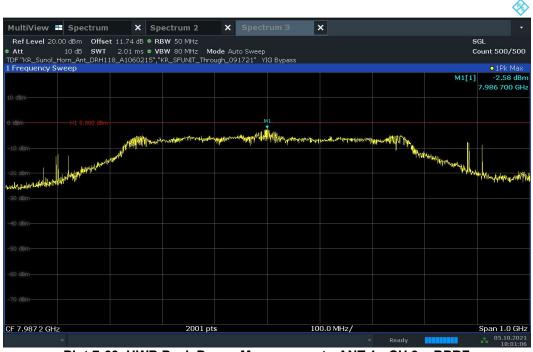
RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) - 104.8

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Test Report S/N:	Test Dates:	EUT Type:		Dage 47 of 96
1M2109220110-17.A3L	9/27 – 10/10/2021	Portable Handset		Page 47 of 86
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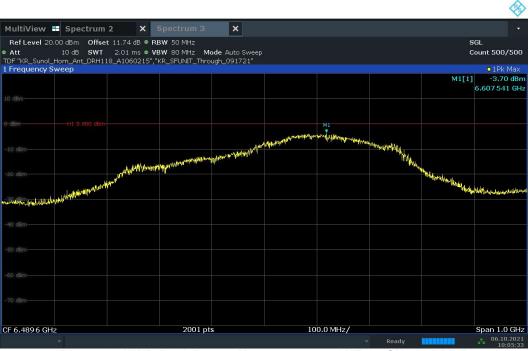
Plot 7-62. UWB Peak Power Measurement - ANT 1 - CH.5 - BPRF



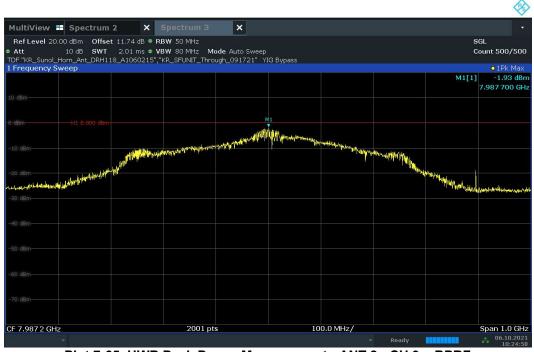
Plot 7-63. UWB Peak Power Measurement - ANT 1 - CH.9 - BPRF

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1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 48 of 86
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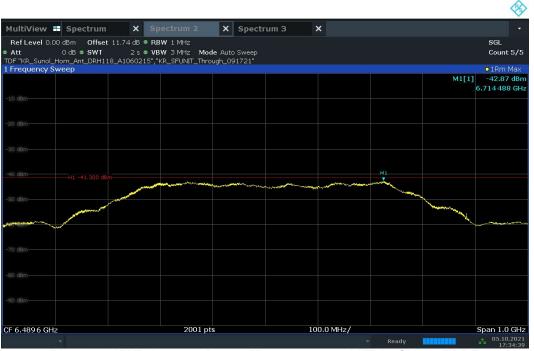
Plot 7-64. UWB Peak Power Measurement - ANT 2 - CH.5 - BPRF



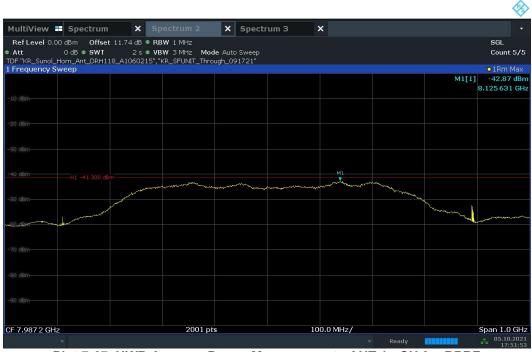
Plot 7-65. UWB Peak Power Measurement - ANT 2 - CH.9 - BPRF

FCC ID : A3LSMS908E	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 96
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 49 of 86
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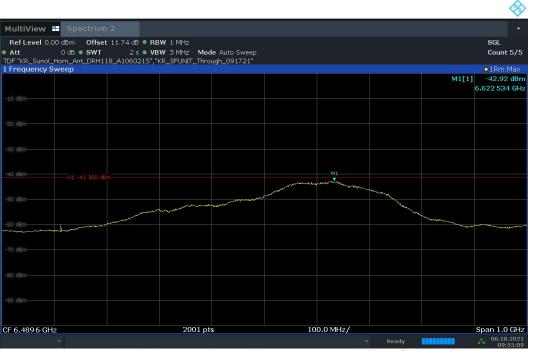
Plot 7-66. UWB Average Power Measurement - ANT 1 - CH.5 – BPRF



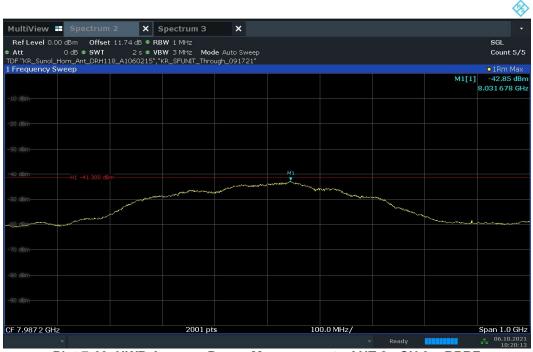
Plot 7-67. UWB Average Power Measurement - ANT 1 - CH.9 - BPRF

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Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 86
1M2109220110-17.A3L	9/27 – 10/10/2021	Portable Handset		Page 50 of 86
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Plot 7-68. UWB Average Power Measurement - ANT 2 - CH.5 - BPRF





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Test Report S/N:	Test Dates:	EUT Type:		Dage E1 of 96
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 51 of 86
© 2021 PCTEST	·			V 9.0 02/01/2019



RESULTS – HPRF

ANT	СН	MODE	Preamble	Meas. Ant.	FM[GHz]	Peak Power (dBm/50MHz)	Peak Limit (dBm/50MHz)	Margin [dB]
1	5	SPO	27	Н	6.6105	-7.62	0	-7.62
1	9	SPO	27	V	8.1146	-6.64	0	-6.64
2	5	SPO	27	V	6.6135	-6.17	0	-6.17
2	9	SPO	27	Н	7.9857	-7.17	0	-7.17

Table 7-7. HPRF Highest Peak Power Results

ANT	СН	MODE	Preamble	Meas. Ant.	FM[GHz]	Average Power (dBm)	Average Limit (dBm)	Margin [dB]
1	5	SP3	27	Н	6.7120	-43.38	-41.3	-2.08
I	9	SP3	27	V	8.1821	-43.71	-41.3	-2.41
2	5	SP3	27	V	6.6145	-43.27	-41.3	-1.97
2	9	SP3	27	Н	8.0287	-43.25	-41.3	-1.95

Table 7-8. HPRF Highest Average Power Results

Sample Calculation

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the EIRP level is calculated by applying the additional factors shown below for a test distance of 3 meter.

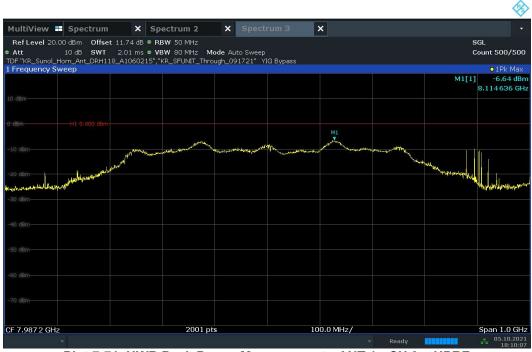
RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) - 104.8

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Test Report S/N:	Test Dates:	EUT Type:		Dago 52 of 96
1M2109220110-17.A3L	9/27 – 10/10/2021	Portable Handset		Page 52 of 86
© 2021 PCTEST				V 9 0 02/01/2019





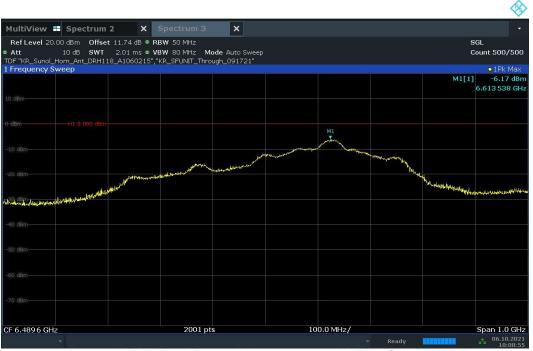
Plot 7-70. UWB Peak Power Measurement - ANT 1 - CH.5 – HPRF



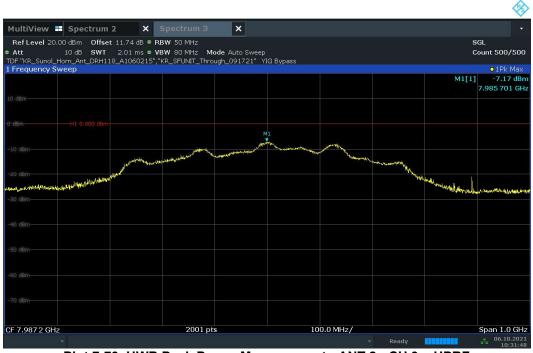
Plot 7-71. UWB Peak Power Measurement - ANT 1 - CH.9 - HPRF

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Test Report S/N:	Test Dates:	EUT Type:		Dage 52 of 96	
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 53 of 86	
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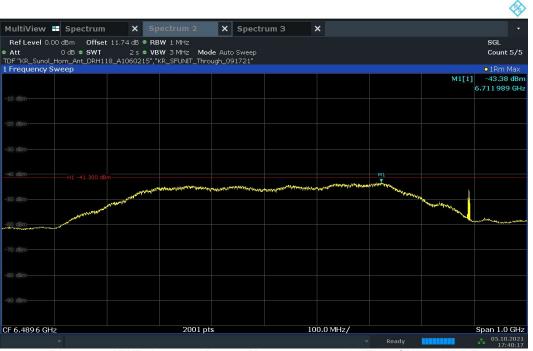
Plot 7-72. UWB Peak Power Measurement - ANT 2 - CH.5 – HPRF



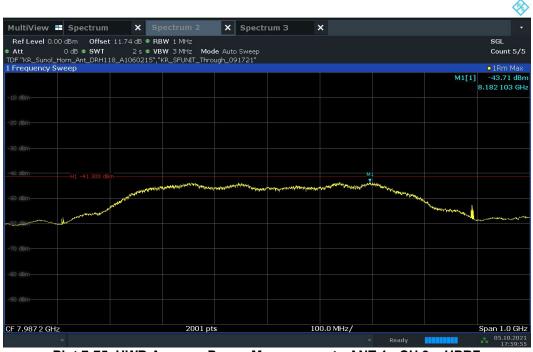
Plot 7-73. UWB Peak Power Measurement - ANT 2 - CH.9 - HPRF

FCC ID : A3LSMS908E	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 54 of 96	
1M2109220110-17.A3L	9/27 - 10/10/2021	0/10/2021 Portable Handset		Page 54 of 86	
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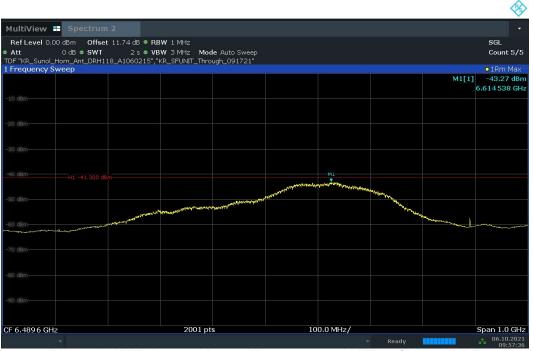
Plot 7-74. UWB Average Power Measurement - ANT 1 - CH.5 – HPRF



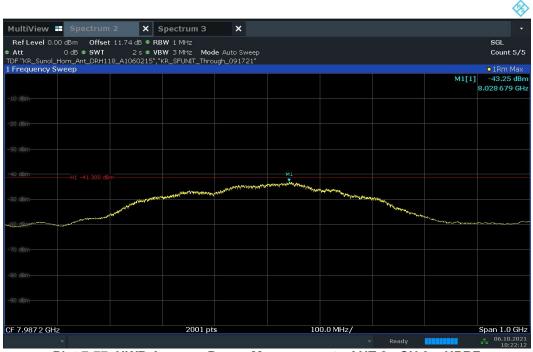
Plot 7-75. UWB Average Power Measurement - ANT 1 - CH.9 – HPRF

FCC ID : A3LSMS908E	PCTEST Proud to be part of @ element		SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere EE of 96
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 55 of 86
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Plot 7-76. UWB Average Power Measurement - ANT 2 - CH.5 – HPRF





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Test Report S/N:	Test Dates:	EUT Type:		Dege EC of 96	
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 56 of 86	
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7.5 Radiated Measurement Data above 960MHz §15.519 (c), §15.519(d), §15.209(a)

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at maximum power and at the appropriate frequencies. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

§15.519(c)

Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-1990	-63.3
1990-3100	-61.3
3100-10600	-41.3
Above 10600	-61.3
Table 7-9. Above 960MHz	Average Limits

§15.519(d)

Frequency in MHz	EIRP in dBm					
1164-1240	-85.3					
1559-1610	-85.3					
Table 7.10 Above 060MHz Average Limite						

Table 7-10. Above 960MHz Average Limits

Test Procedures Used

ANSI C63.10-2013

Test Settings

Average EIRP Measurements

- 1. Analyzer frequency set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz (30kHz for emissions in the GPS bands)
- 3. VBW = 3MHz (100kHz for the emissions in the GPS bands)
- 4. Detector = RMS
- 5. Sweep time = No more than a 1ms integration period over each measurement bin
- 6. Trace mode = Max hold
- 7. Trace was allowed to stabilize

FCC ID : A3LSMS908E	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dege 57 of 96	
1M2109220110-17.A3L	9/27 – 10/10/2021	Portable Handset		Page 57 of 86	
© 2021 PCTEST				V 9.0 02/01/2019	



Test Setup

The EUT and measurement equipment were set up as shown test setup photos provided.

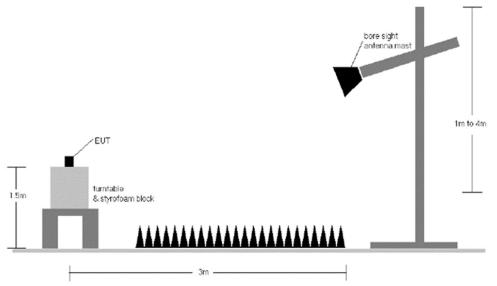


Figure 7-3. Radiated Test Setup > 1GHz

Test Notes

- 1. All modes of operation and settings (Preamble, Packet Type, etc) were investigated and the worst-case emissions are reported.
- 2. The RBW for measurements in the GPS Bands were reduced to 30kHz in order to prove compliance.
- 3. 1000 ~ 18000 MHz and above 18000 MHz pre-scan plots were conducted at 0.7 and 0.6 meter respectively. The plots are only for the purpose of spurious emission identification.
- 4. All final measurements were made at 0.7 meters.
- 5. All readings are calibrated by a signal generator with accuracy traceable to the National Institute of Standards and Technology (NIST).
- 6. AFCL (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)

Sample Calculation

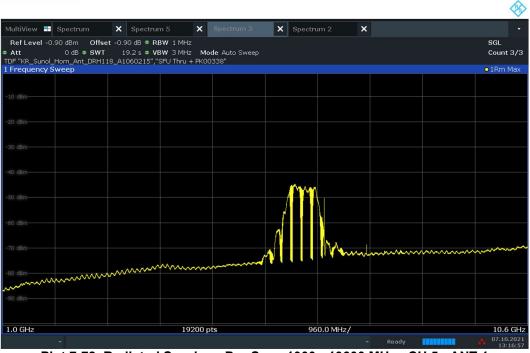
The raw radiated spurious level is converted to field strength in dBuV/m. Then, the EIRP RSE level is calculated by applying the additional factors shown below for a test distance of 3 meter

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) - 104.8

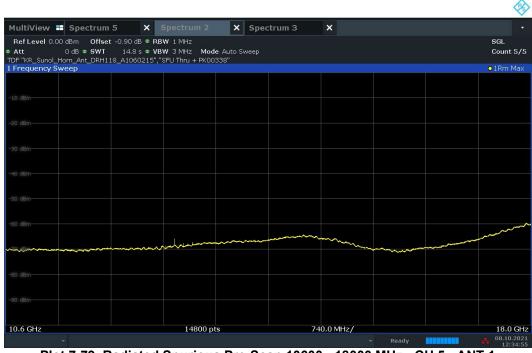
FCC ID : A3LSMS908E	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dege 50 of 96	
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 58 of 86	
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Channel 5 ANTENNA 1:



Plot 7-78. Radiated Spurious Pre-Scan 1000 - 10600 MHz - CH.5 - ANT 1



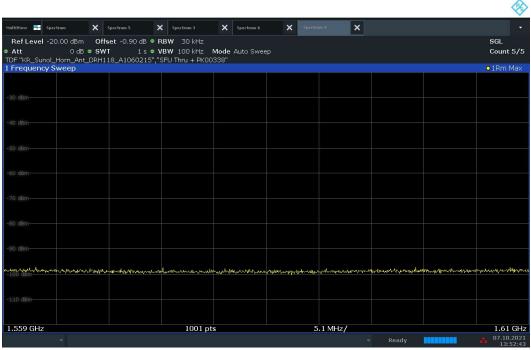
Plot 7-79. Radiated Spurious Pre-Scan 10600 - 18000 MHz - CH.5 - ANT 1

FCC ID : A3LSMS908E	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 96	
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 59 of 86	
© 2021 PCTEST	•	•		V 9.0 02/01/2019	



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Plot 7-80. Radiated Spurious Pre-Scan 1164 - 1240 MHz - CH.5 - ANT 1 - GPS band



Plot 7-81. Radiated Spurious Pre-Scan 1559 - 1610 MHz - CH.5 - ANT 1 – GPS band

FCC ID : A3LSMS908E	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 60 of 96	
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 60 of 86	
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-30 dBm								
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Plot 7-82. Radiated Spurious Pre-Scan 18 – 40 GHz - CH.5 - ANT 1

Channel:	5
Frequency (MHz):	6489.6
Preamble ID	10
Config	SP3
1	50 U

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Dist. Corr. Factor [dB]	Spurious Emission Level[dBm]	Limit [dBm]	Margin [dB]
1428	RMS	Н	-	-	-72.74	-9.71	-12.64	-83.35	-75.30	-8.05
3099	RMS	Н	-	-	-73.00	-5.02	-12.64	-78.92	-61.30	-17.62
7608	RMS	Н	150	10	-76.17	3.61	-12.64	-73.45	-41.30	-32.15
10989	RMS	V	-	-	-75.77	7.13	-12.64	-69.54	-61.30	-8.24
12979	RMS	V	150	341	-73.68	8.65	-12.64	-65.93	-61.30	-4.63
14794	RMS	V	-	-	-75.69	12.35	-12.64	-64.24	-61.30	-2.94

 Table 7-11. Radiated Spurious Emissions CH. 5 – ANT1

Channel:	5
Frequency (MHz):	6489.6
Preamble ID	10
Config	SP3

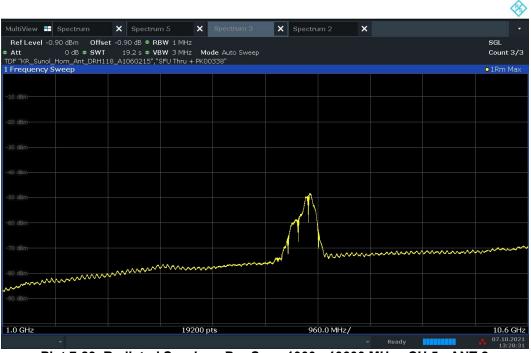
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Dist. Corr. Factor [dB]	Spurious Emission Level[dBm]	Limit [dBm]	Margin [dB]
1200	RMS	Н	-	-	-86.76	-11.59	-12.64	-99.25	-85.30	-13.95
1218	RMS	Н	-	-	-86.80	-11.49	-12.64	-99.20	-85.30	-13.90
1234	RMS	Н	-	-	-86.65	-11.41	-12.64	-98.97	-85.30	-13.67
1562	RMS	Н	-	-	-87.15	-9.28	-12.64	-97.32	-85.30	-12.02
1598	RMS	Н	-	-	-87.01	-9.42	-12.64	-97.33	-85.30	-12.03
1608	RMS	Н	-	-	-86.95	-9.48	-12.64	-97.33	-85.30	-12.03

Table 7-12. Radiated Spurious Emissions CH. 5 – ANT1 – GPS BANDs

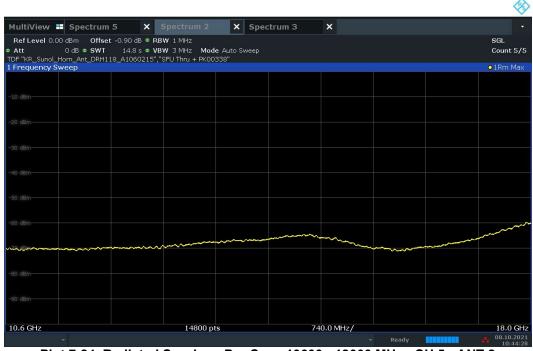
FCC ID : A3LSMS908E	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 61 of 86
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 61 01 86
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Channel 5 ANTENNA 2:



Plot 7-83. Radiated Spurious Pre-Scan 1000 - 10600 MHz - CH.5 - ANT 2



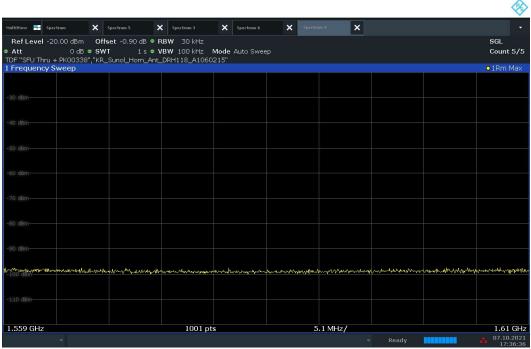
Plot 7-84. Radiated Spurious Pre-Scan 10600 - 18000 MHz - CH.5 - ANT 2

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Test Report S/N:	Test Dates:	EUT Type:		Dage 62 of 96
1M2109220110-17.A3L	9/27 – 10/10/2021	Portable Handset		Page 62 of 86
© 2021 PCTEST				V 9.0 02/01/2019



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50 dBm														
90 dBm														
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Plot 7-85. Radiated Spurious Pre-Scan 1164 - 1240 MHz - CH.5 - ANT 2 - GPS band



Plot 7-86. Radiated Spurious Pre-Scan 1559 - 1610 MHz - CH.5 - ANT 2 - GPS band

FCC ID : A3LSMS908E	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere 62 of 96
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 63 of 86
© 2021 PCTEST	·	·		V 9.0 02/01/2019



Preamble ID

9

MultiView	Spectrum	5 X	Spectrum 2	× Spec	trum 3	×			
Ref Level 0.0 • Att	0 dBm Offset 0 dB • SWT S-PR1840_AMP","I	-2.24 dB • RB 44 s • VB	WI1MHz WI3MHz Mode		- CN TO59701	2"			SGL Count 2/2
1 Frequency S	weep	KK_IIIIIWave_C	BUIC_2TD , NR_N	03_400Hz_110H	1_3N-1036701-	5		i i	o1Rm Max
-10 d8m									
-20 dBm									
-30 dBm									
-60 dBm									
and the second secon	water	and a stand and a stand of the		and the second	man Marana	www.www.www.www.ww	y/~~/~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		maraya a da
-90 dBm									
18.0 GHz			44000 pt	6		2.2 GHz/			40.0 GHz
Rovo Griz				3		2.2 GH2/	Ready		** 08.10.2021 14:21:19

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Plot 7-87. Radiated Spurious Pre-Scan 18 – 40 GHz - CH.5 - ANT 2

Channel:		5										
Frequency (MHz)	6489.6	5									
Preamble ID		9										
Config		SP1										
Frequency [MHz]	Dete	ctor	Ant. I [H/\		Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Dist. Corr. Factor [dB]	Spurious Emission Level[dBm]	Limit [dBm]	Margin [dB]
1554	RM	1S	Н		-	-	-73.32	-9.27	-12.64	-83.49	-75.30	-8.19
1893	RM	1S	Н		-	-	-72.82	-8.13	-12.64	-81.85	-63.30	-18.55
10515	RM	1S	Н		-	-	-75.59	7.32	-12.64	-69.17	-41.30	-27.87
11896	RM	1S	Н		-	-	-76.34	7.72	-12.64	-69.52	-61.30	-8.22
12903	RM	1S	Н		. – .	-	-76.15	8.29	-12.64	-68.76	-61.30	-7.46
14877	RM	1S	Н		-	-	-75.81	12.38	-12.64	-64.33	-61.30	-3.03
				Т	able 7-13	8. Radiate	d Spurio	us Emis	sions CH.	5 – ANT2	-	
Channel:		5]			-					
Frequency (MHz)	6489.6	6]								

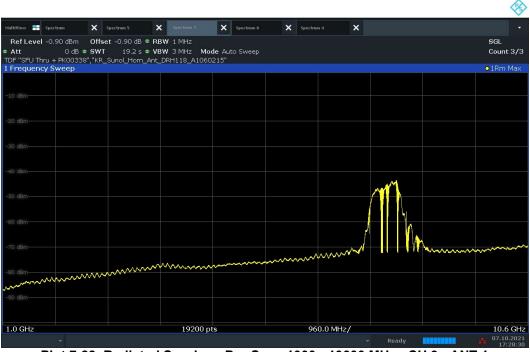
Config	SP1									
Frequency [MHz]	Detector	Ant. F [H/\	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Dist. Corr. Factor [dB]	Spurious Emission Level[dBm]	Limit [dBm]	Margin [dB]
1181	RMS	V	-	-	-86.67	-11.66	-12.64	-99.23	-85.30	-13.93
1227	RMS	V	-	-	-86.84	-11.45	-12.64	-99.18	-85.30	-13.88
1234	RMS	V	-	-	-86.43	-11.41	-12.64	-98.75	-85.30	-13.45
1559	RMS	V	-	-	-87.35	-9.27	-12.64	-97.52	-85.30	-12.22
1601	RMS	V	-	-	-87.15	-9.43	-12.64	-97.48	-85.30	-12.18
1607	RMS	V	-	-	-87.15	-9.48	-12.64	-97.53	-85.30	-12.23

Table 7-14. Radiated Spurious Emissions CH. 5 – ANT2 – GPS BANDs

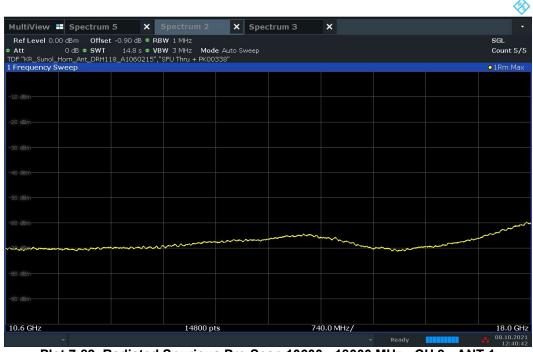
FCC ID : A3LSMS908E	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 64 of 86
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 64 01 66
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Channel 9 ANTENNA 1:



Plot 7-88. Radiated Spurious Pre-Scan 1000 - 10600 MHz - CH.9 - ANT 1



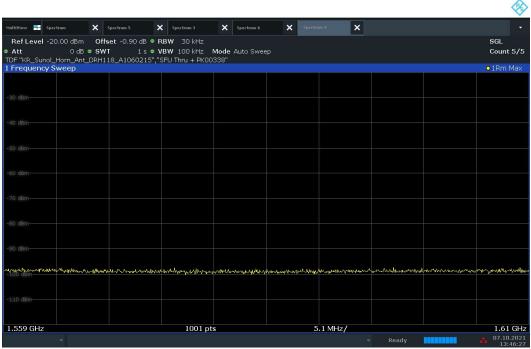
Plot 7-89. Radiated Spurious Pre-Scan 10600 - 18000 MHz - CH.9 - ANT 1

FCC ID : A3LSMS908E	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dege 65 of 96	
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 65 of 86	
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ulti¥iew 📑		× sp	ectrum 5	×	Spectrum 3	×	Spectrum 6	×	Spectrum 4	×				
Att		8 o swt	1 s	e vbv	V 30 kHz V 100 kHz J Thru + PK0		Auto Swee	p						SGL Count 5/5
Frequenc		CONTIN		, or c		5556		7			í.			o1Rm Max
50 dBm														
30 dBm														
ARChall Martin	phonenature	W.m.many)	throughout	whether	water	you when the	Arrow W	natura	vmmun	~~/kratMers/weer	ogether and the second	anter production of the	gent and a second s	mahallana
.10 dBm														
.164 GHz					1001 p	ts			7.61	MHz/				1.24 GH
Griz					1001 p				7101		- Read			07.10.202 13:45:4

Plot 7-90. Radiated Spurious Pre-Scan 1164 - 1240 MHz - CH.9 - ANT 1 - GPS band



Plot 7-91. Radiated Spurious Pre-Scan 1559 - 1610 MHz - CH.9 - ANT 1 – GPS band

FCC ID : A3LSMS908E	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dege 66 of 96	
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset		Page 66 of 86	
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MultiView	Spectrum !	5 X	Spectrum 2	× Spec	trum 3	×		
Ref Level 0.0 • Att	0 dBm Offset 0 dB • SWT 5-PR1840_AMP","k	-2.24 dB • RB 44 s • VB	WIMHz WI3MHz Mode		SN-T059701-1	2"		SGL Count 2/2
1 Frequency S		<r_iiiiiiwave_c< td=""><td>dbic_210, KK_K</td><td></td><td>_314-1050701-3</td><td></td><td></td><td> o1Rm Max</td></r_iiiiiiwave_c<>	dbic_210, KK_K		_314-1050701-3			 o1Rm Max
-10 dBm								
-40 dBm								
	-	المصبية المراجل والمردومة المحيطة المريطين	mannamman	-	and the second	mannon	ymm	
and a subscription of the	****							
18.0 GHz			44000 pt	S		2.2 GHz/		40.0 GHz
							Ready	08.10.2021 15:09:44

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Plot 7-92. Radiated Spurious Pre-Scan 18 – 40 GHz - CH.9 - ANT 1

7987.2
12
SP1

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Dist. Corr. Factor [dB]	Spurious Emission Level[dBm]	Limit [dBm]	Margin [dB]
1427	RMS	V	-	-	-73.05	-9.55	-12.64	-83.50	-75.30	-8.20
1891	RMS	V	-	-	-72.93	-8.13	-12.64	-81.96	-63.30	-18.66
3092	RMS	V	-	-	-72.97	-5.11	-12.64	-78.97	-61.30	-17.67
10995	RMS	V	-	-	-75.78	7.16	-12.64	-69.52	-61.30	-8.22
14798	RMS	V	-	-	-75.79	12.33	-12.64	-64.37	-61.30	-3.07
15898	RMS	V	-	-	-75.49	6.93	-12.64	-69.47	-61.30	-8.17

 Table 7-15. Radiated Spurious Emissions CH. 9 – ANT1

Channel:	9
Frequency (MHz):	7987.2
Preamble ID	12
Config	SP1

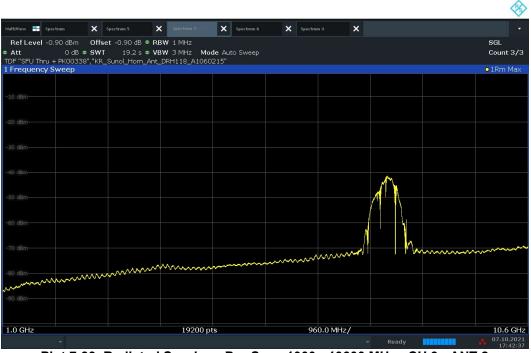
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Dist. Corr. Factor [dB]	Spurious Emission Level[dBm]	Limit [dBm]	Margin [dB]
1203	RMS	Н	-		-86.98	-11.57	-12.64	-99.45	-85.30	-14.15
1235	RMS	Н	-	-	-86.52	-11.41	-12.64	-98.83	-85.30	-13.53
1239	RMS	Н	-	-	-86.82	-11.39	-12.64	-99.11	-85.30	-13.81
1560	RMS	Н	-	-	-87.44	-9.27	-12.64	-97.61	-85.30	-12.31
1575	RMS	Н	-	-	-87.28	-9.30	-12.64	-97.49	-85.30	-12.19
1609	RMS	Н	-	-	-87.03	-9.49	-12.64	-97.42	-85.30	-12.12

Table 7-16. Radiated Spurious Emissions CH. 9 – ANT1 – GPS BANDs

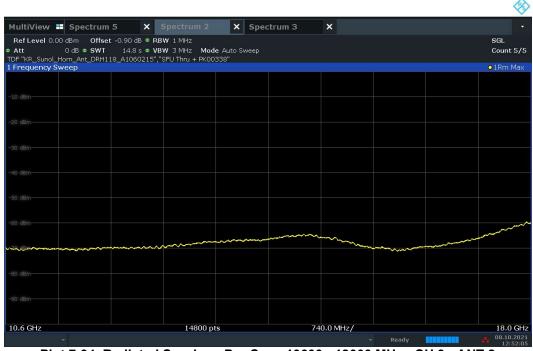
FCC ID : A3LSMS908E	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 67 of 96
1M2109220110-17.A3L	9/27 - 10/10/2021	Portable Handset	Page 67 of 86	
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Channel 9 ANTENNA 2:



Plot 7-93. Radiated Spurious Pre-Scan 1000 - 10600 MHz - CH.9 - ANT 2



Plot 7-94. Radiated Spurious Pre-Scan 10600 - 18000 MHz - CH.9 - ANT 2

FCC ID : A3LSMS908E	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dara 69 of 96	
1M2109220110-17.A3L	9/27 – 10/10/2021	Portable Handset		Page 68 of 86	
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