

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 v03 – Section 6.0

Test Settings

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

Test Setup

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

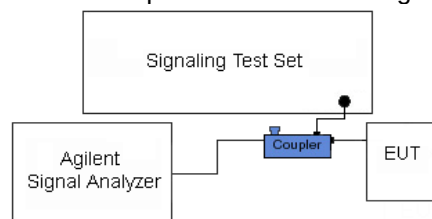


Figure 7-3. Test Instrument & Measurement Setup

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Test Notes

Per 22.917(b) 24.238(a) 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

Per 27.53(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 than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz.

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Band 12



Plot 7-102. Lower Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-103. Upper Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

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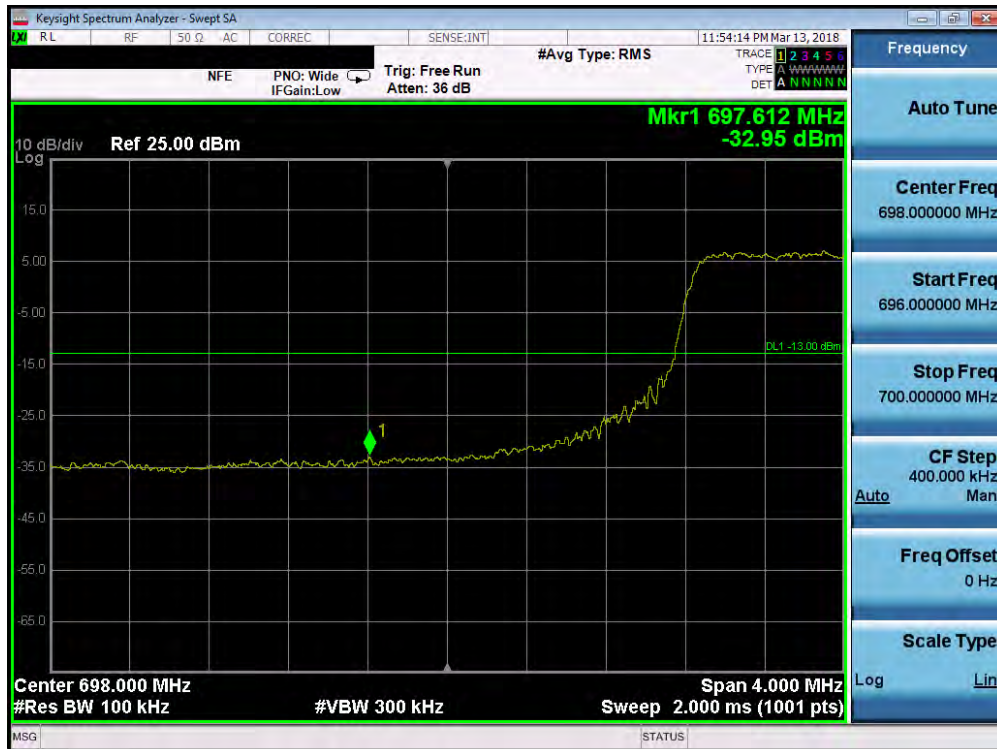


Plot 7-104. Lower Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-105. Upper Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

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Plot 7-106. Lower Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-107. Upper Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)

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Plot 7-108. Lower Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)



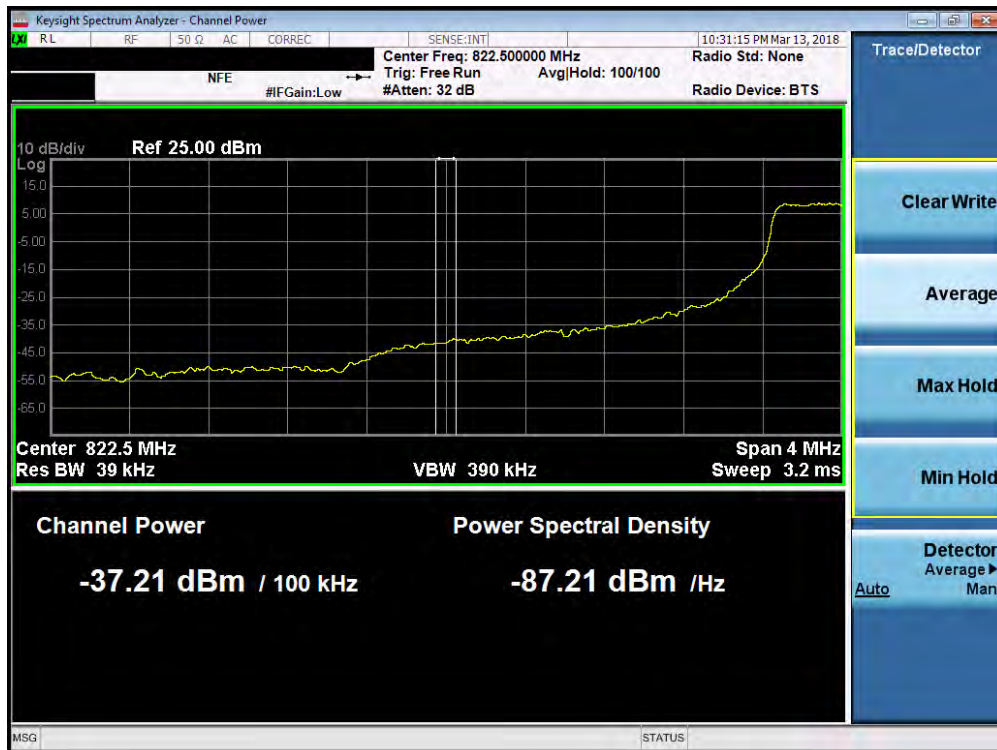
Plot 7-109. Upper Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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Band 5



Plot 7-110. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

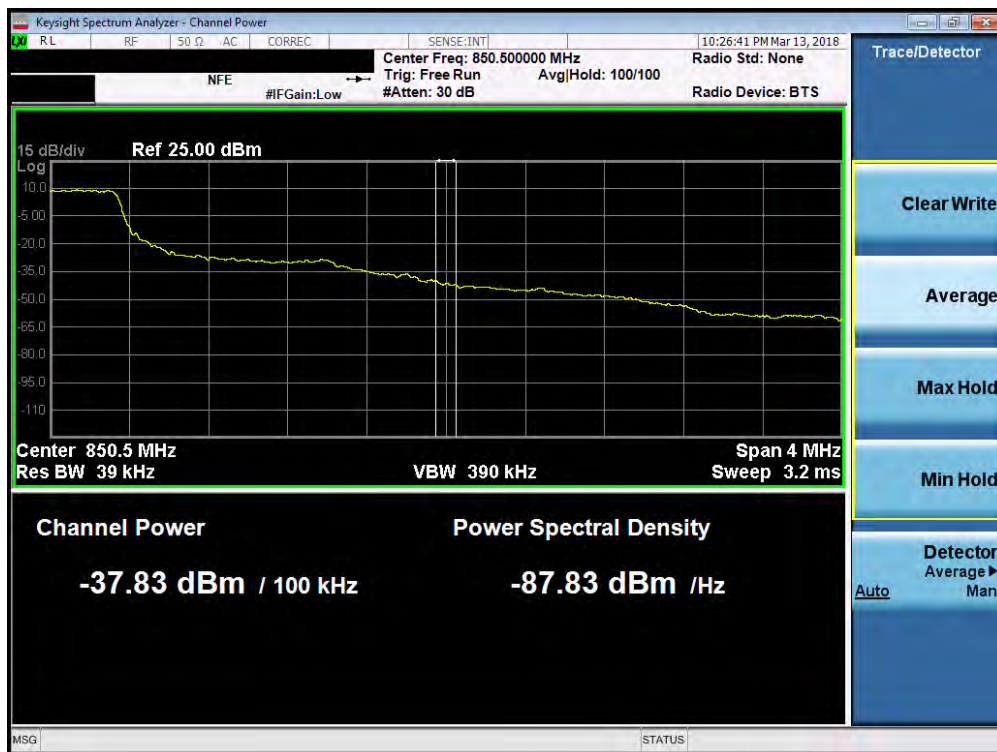


Plot 7-111. Lower Extended Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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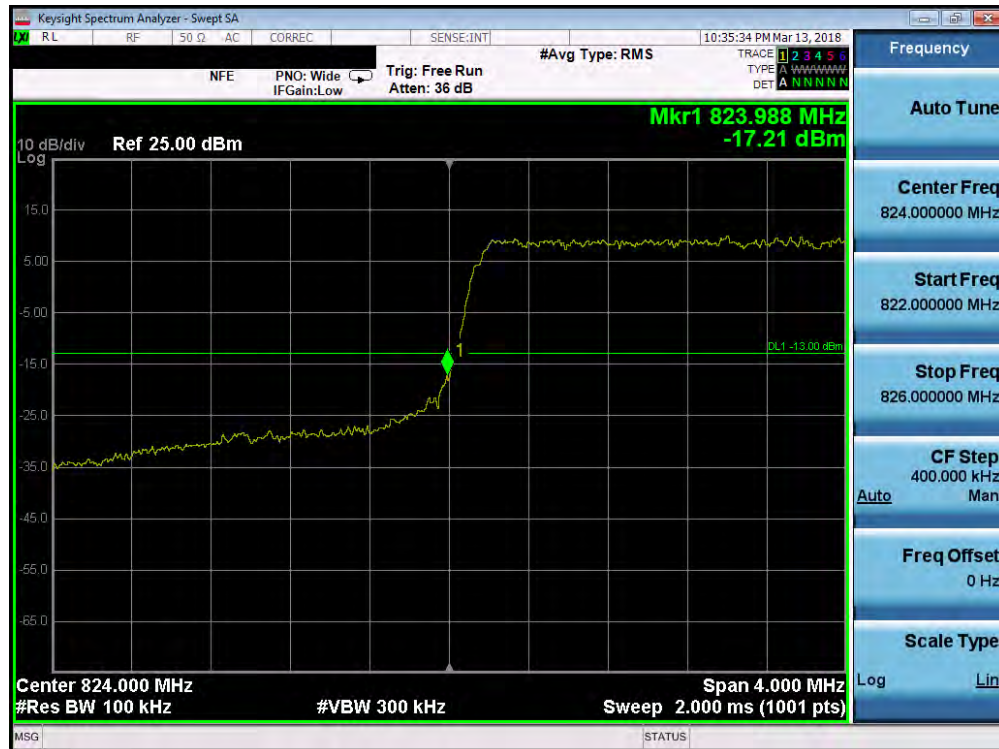


Plot 7-112. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-113. Upper Extended Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A			MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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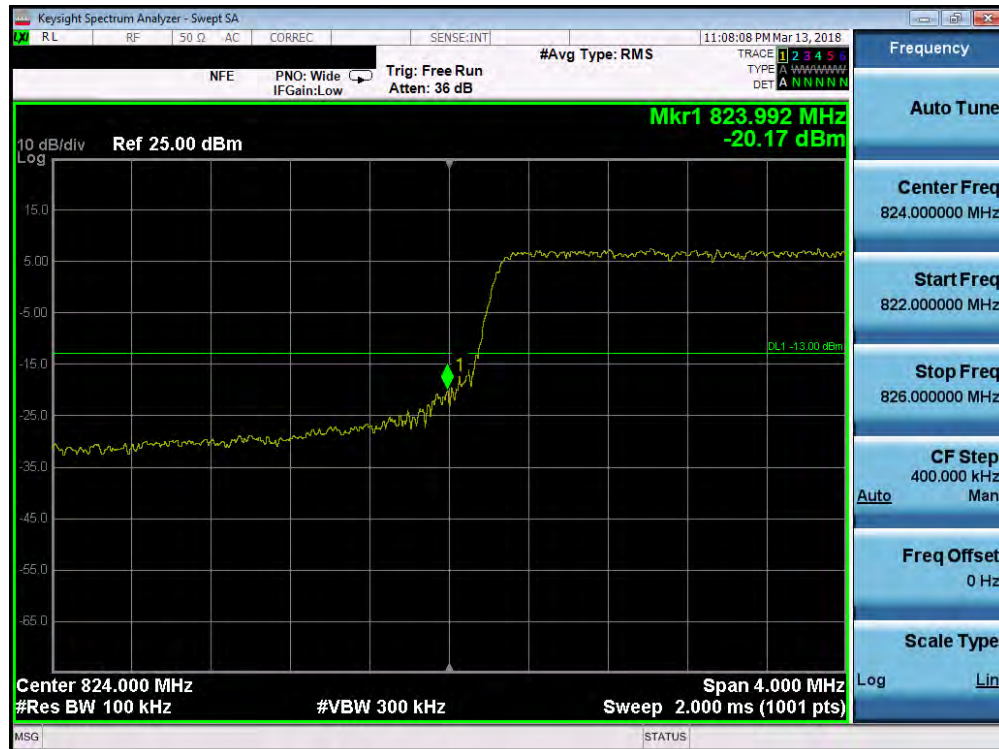


Plot 7-114. Lower Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-115. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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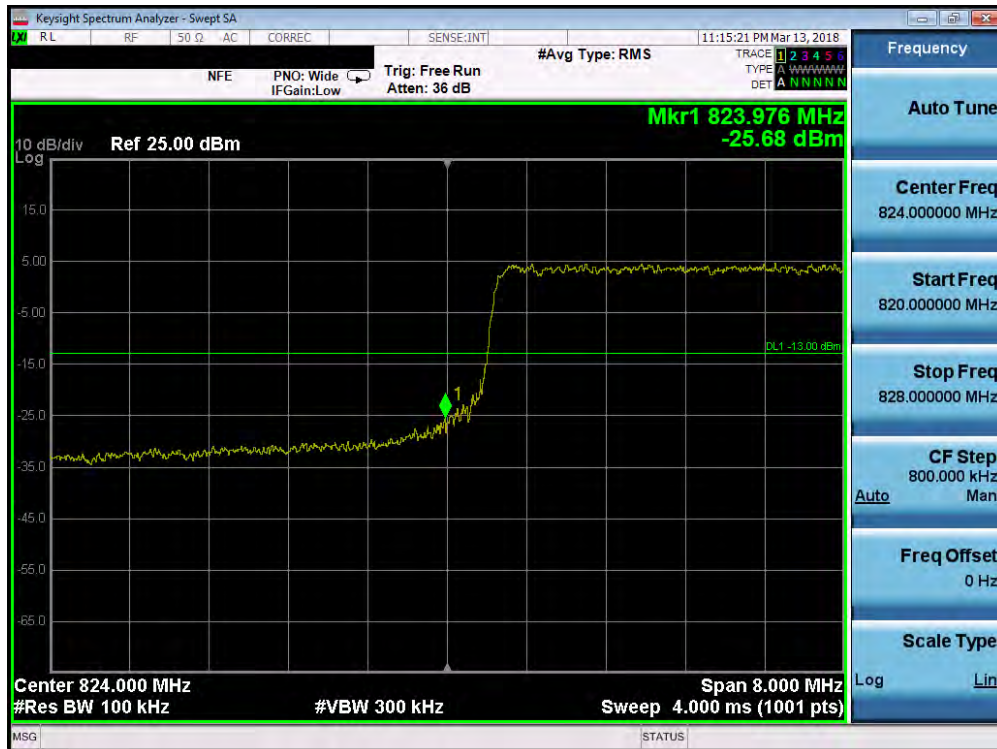


Plot 7-116. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-117. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Plot 7-118. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



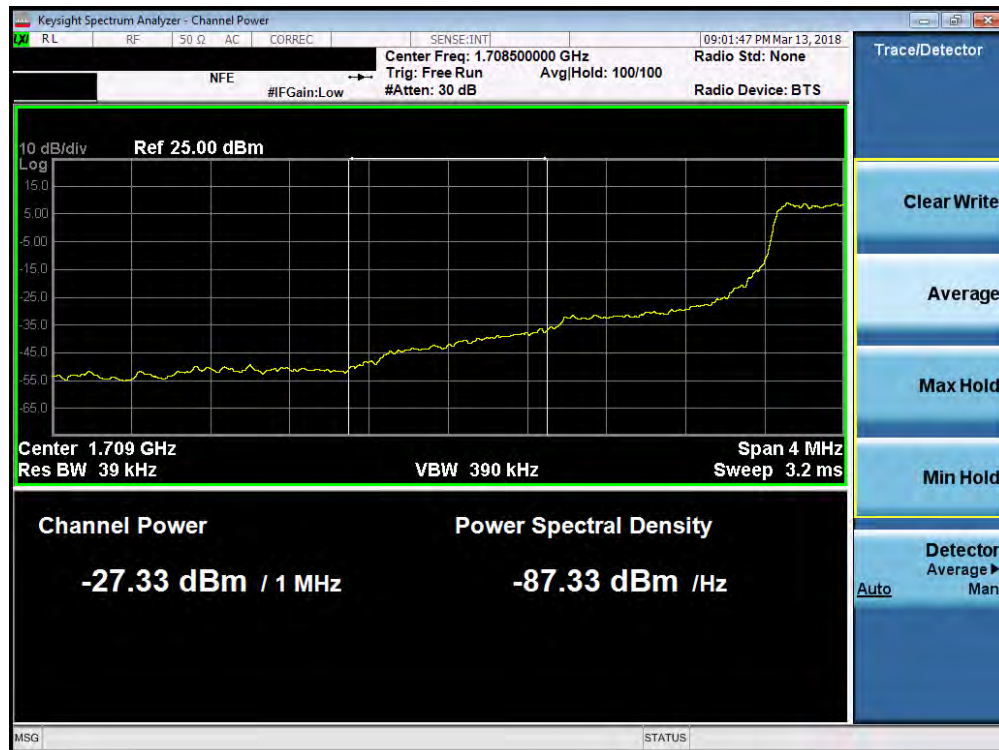
Plot 7-119. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 4



Plot 7-120. Lower Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

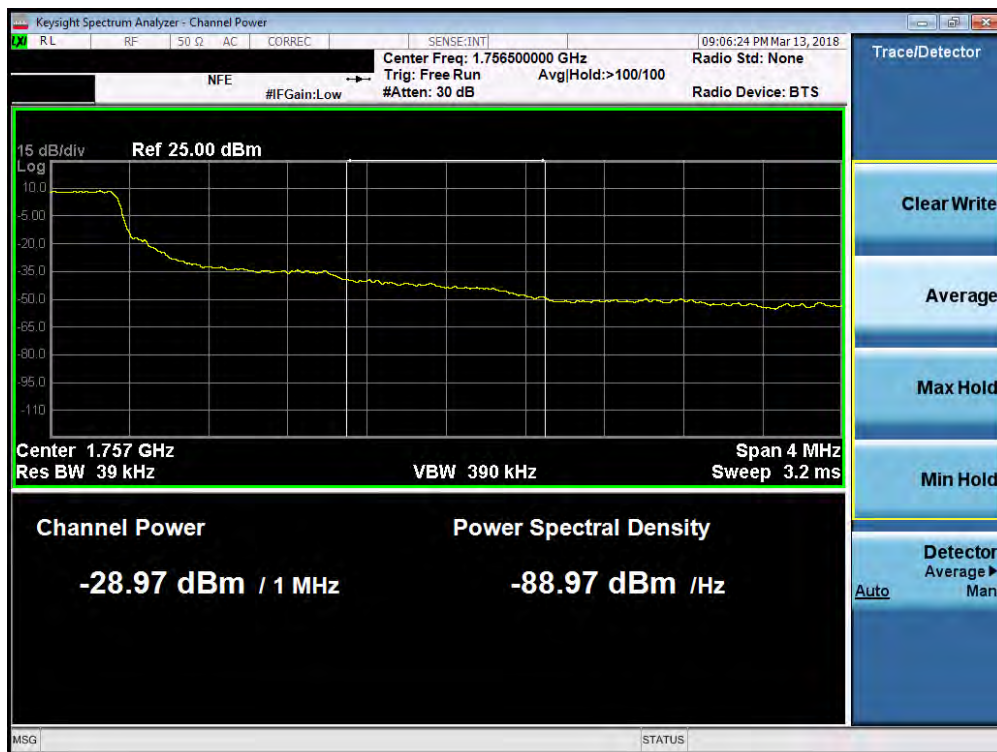


Plot 7-121. Lower Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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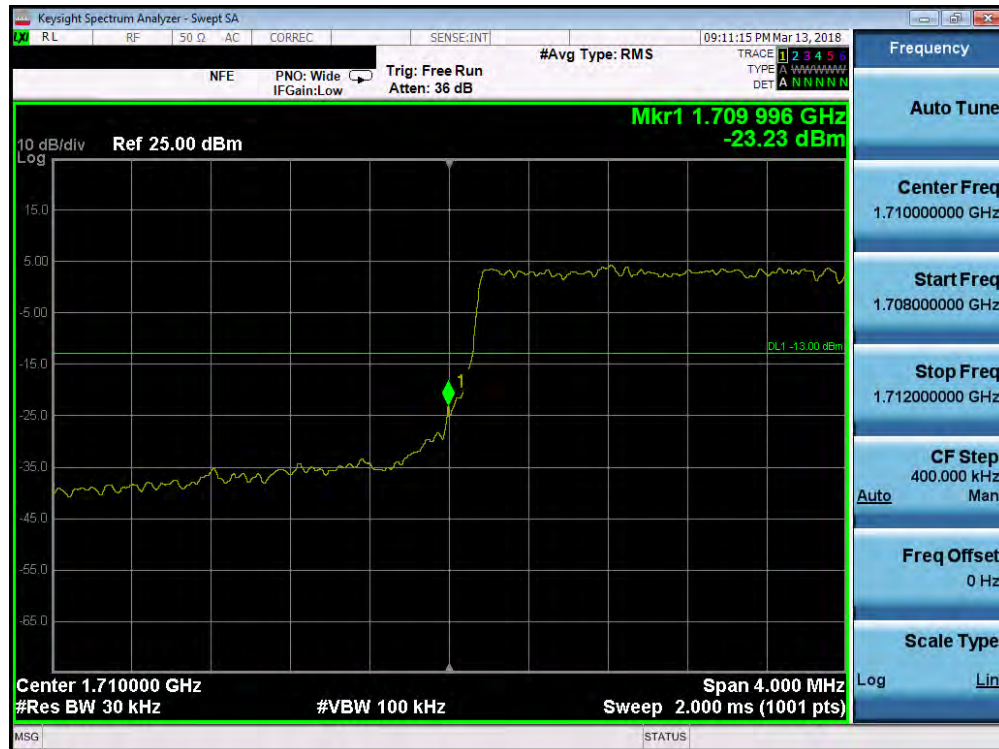


Plot 7-122. Upper Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

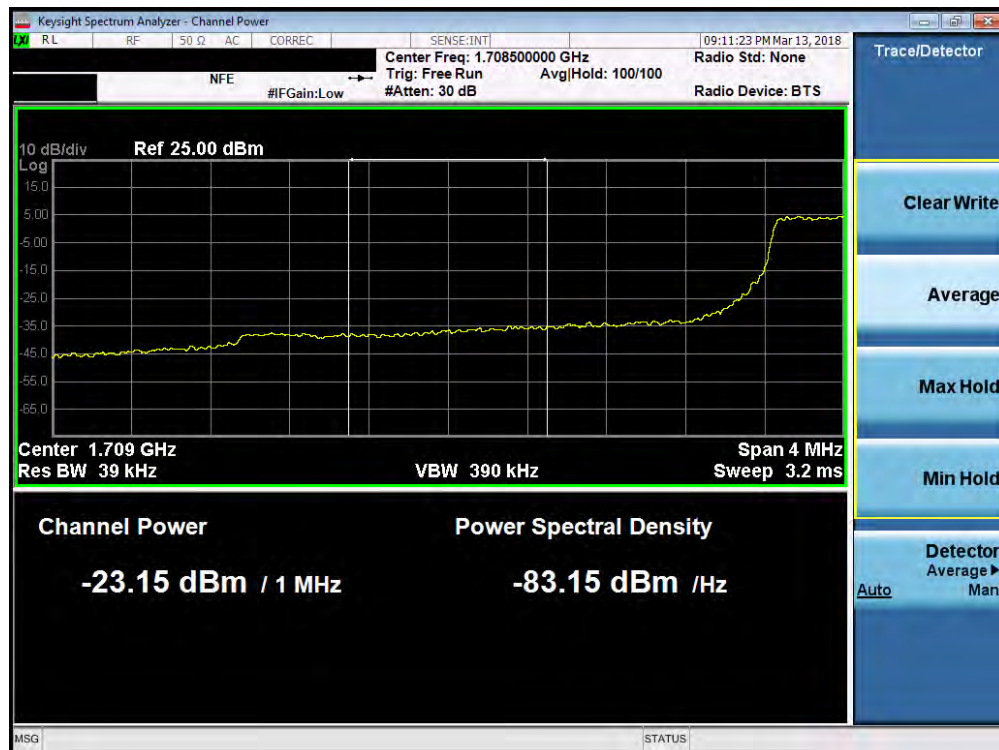


Plot 7-123. Upper Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Plot 7-124. Lower Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

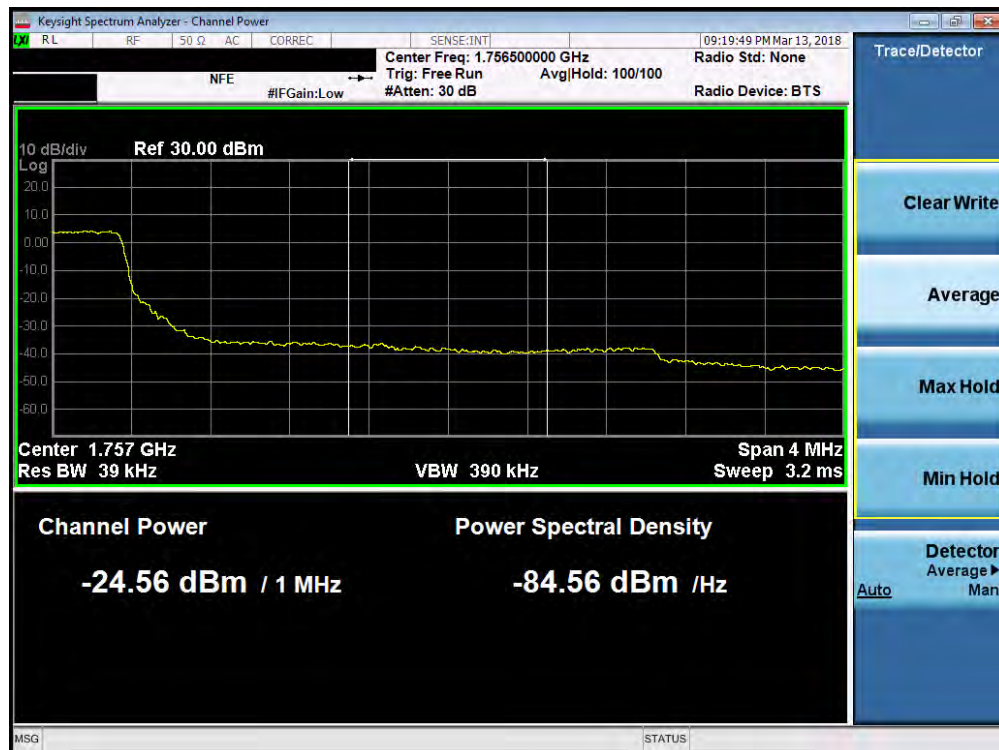


Plot 7-125. Lower Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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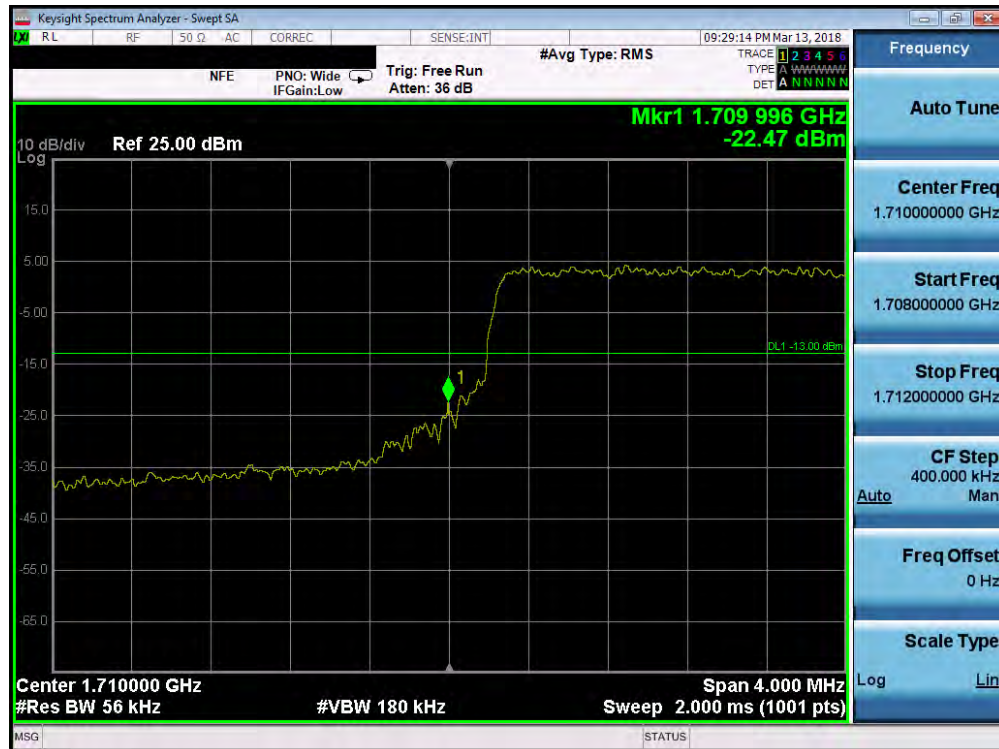


Plot 7-126. Upper Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

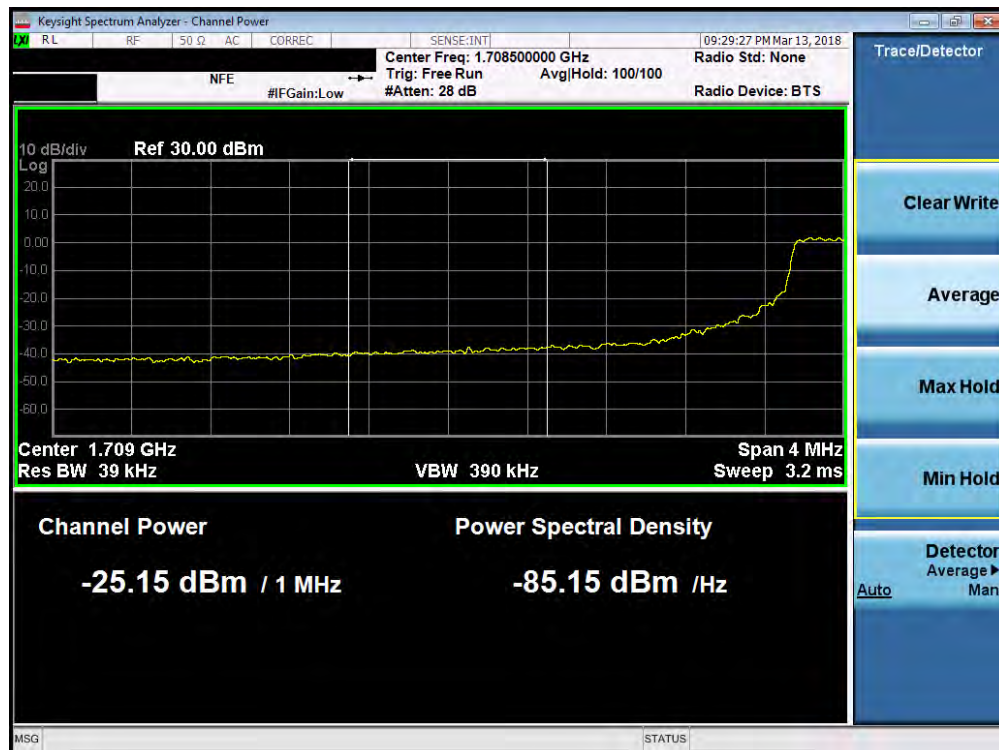


Plot 7-127. Upper Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-128. Lower Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

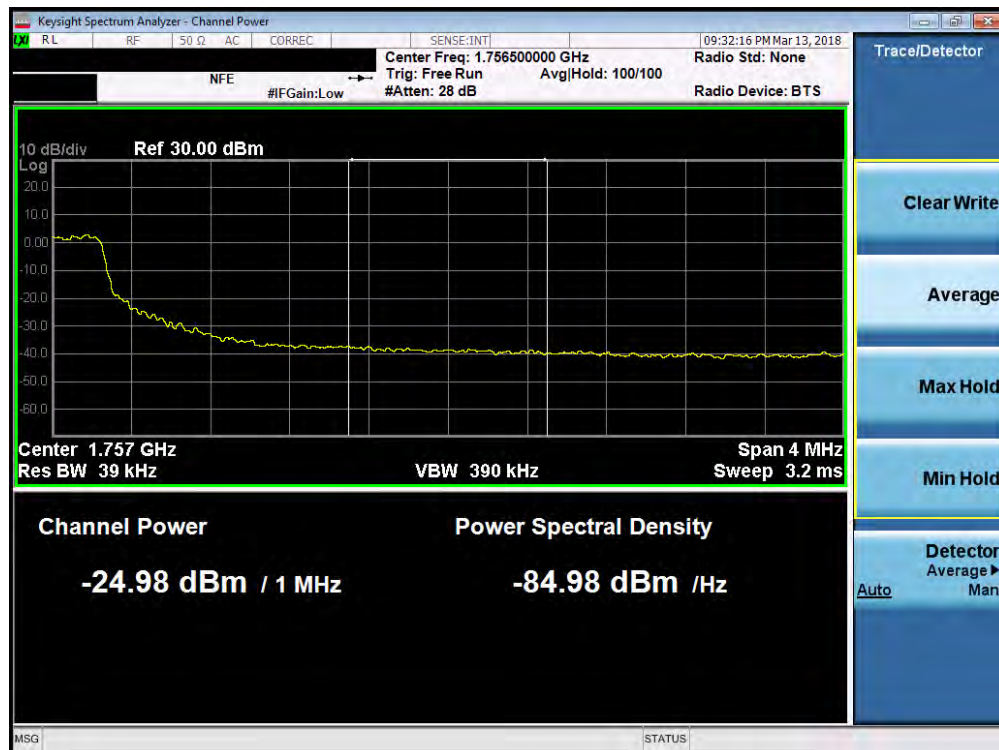


Plot 7-129. Lower Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-130. Upper Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

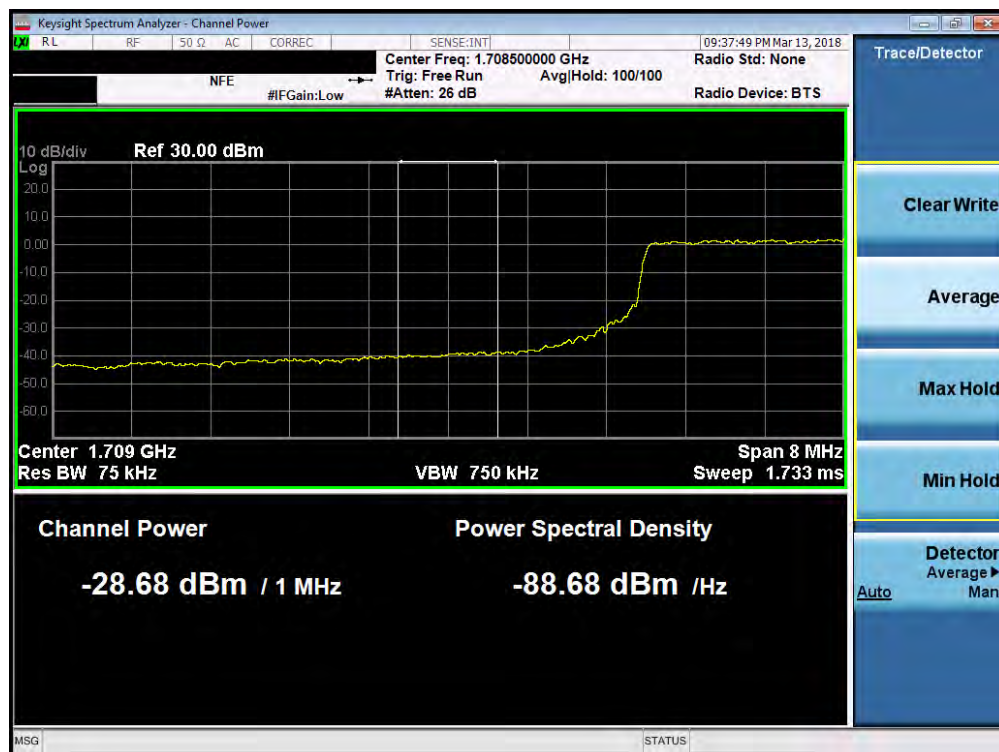


Plot 7-131. Upper Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Plot 7-132. Lower Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

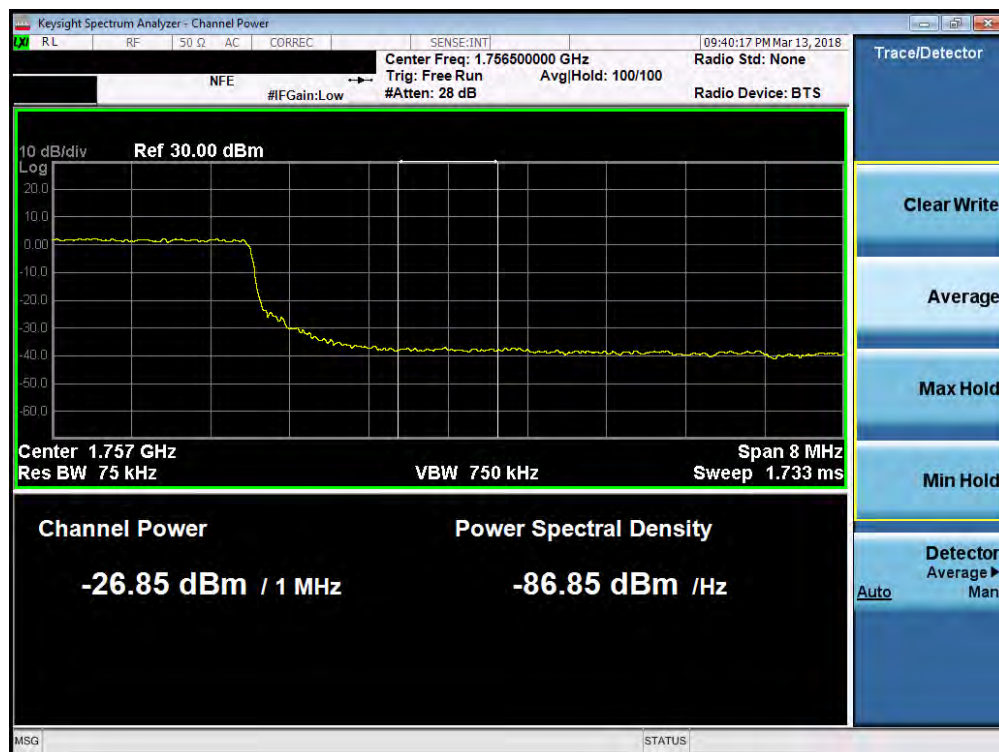


Plot 7-133. Lower Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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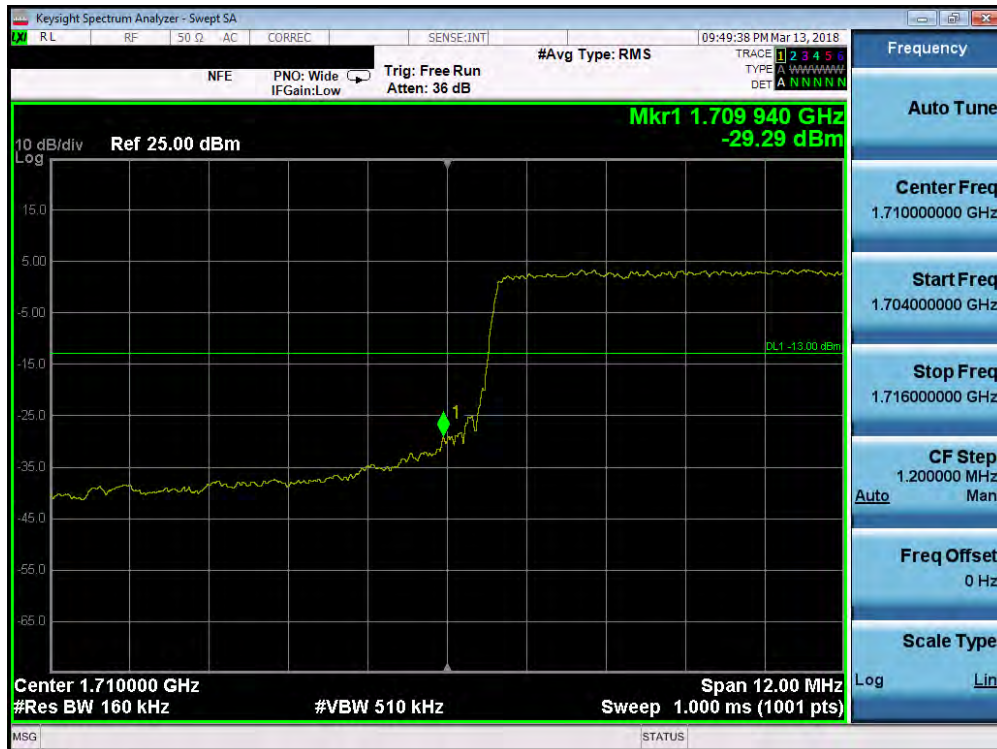


Plot 7-134. Upper Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

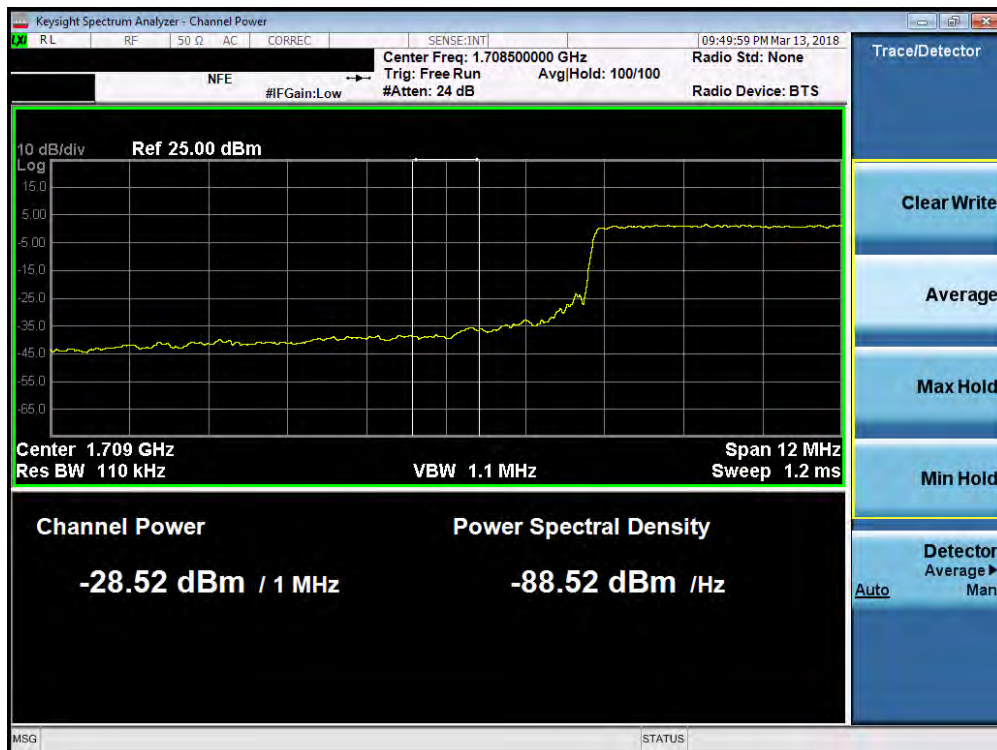


Plot 7-135. Upper Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Plot 7-136. Lower Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

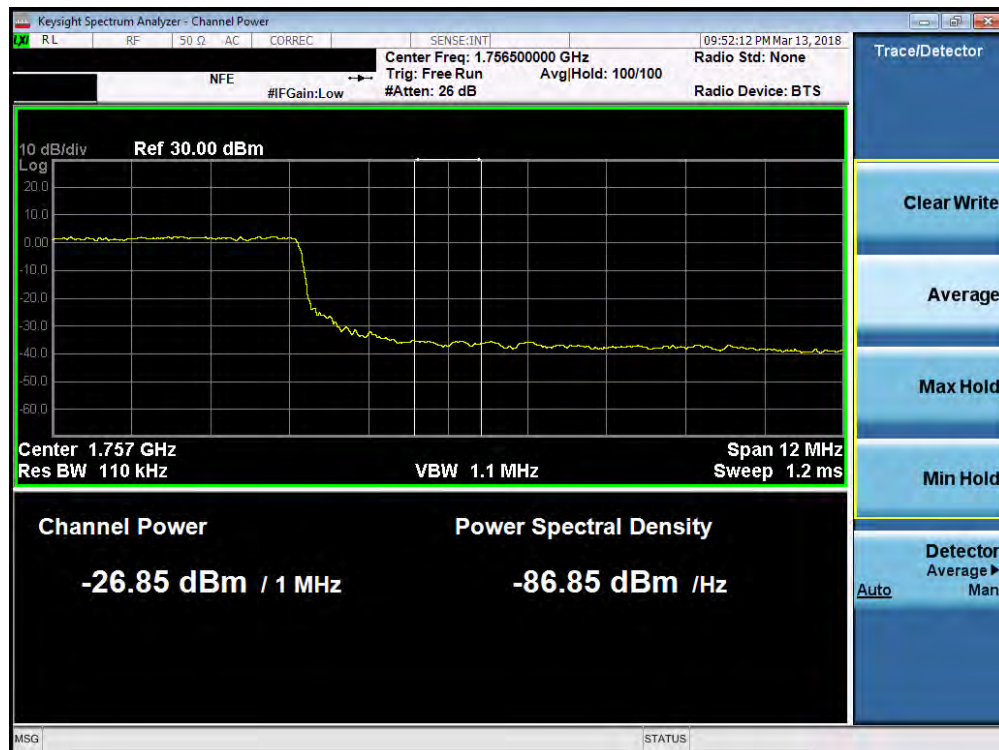


Plot 7-137. Lower Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Plot 7-138. Upper Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

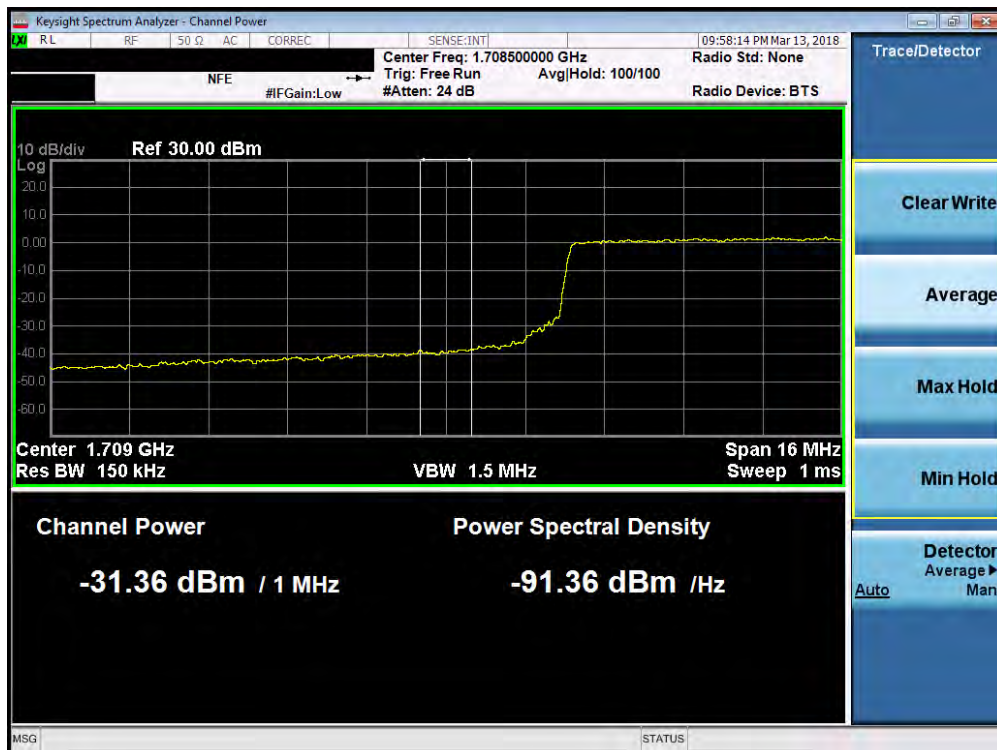


Plot 7-139. Upper Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-140. Lower Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

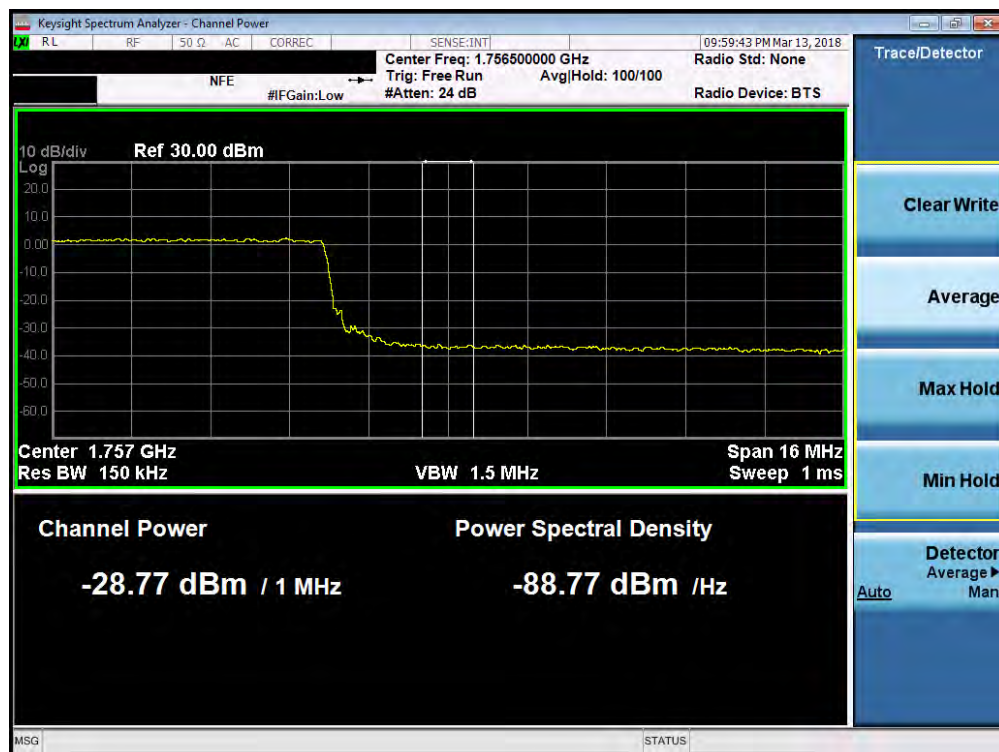


Plot 7-141. Lower Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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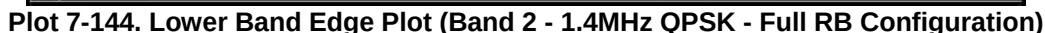


Plot 7-142. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-143. Upper Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

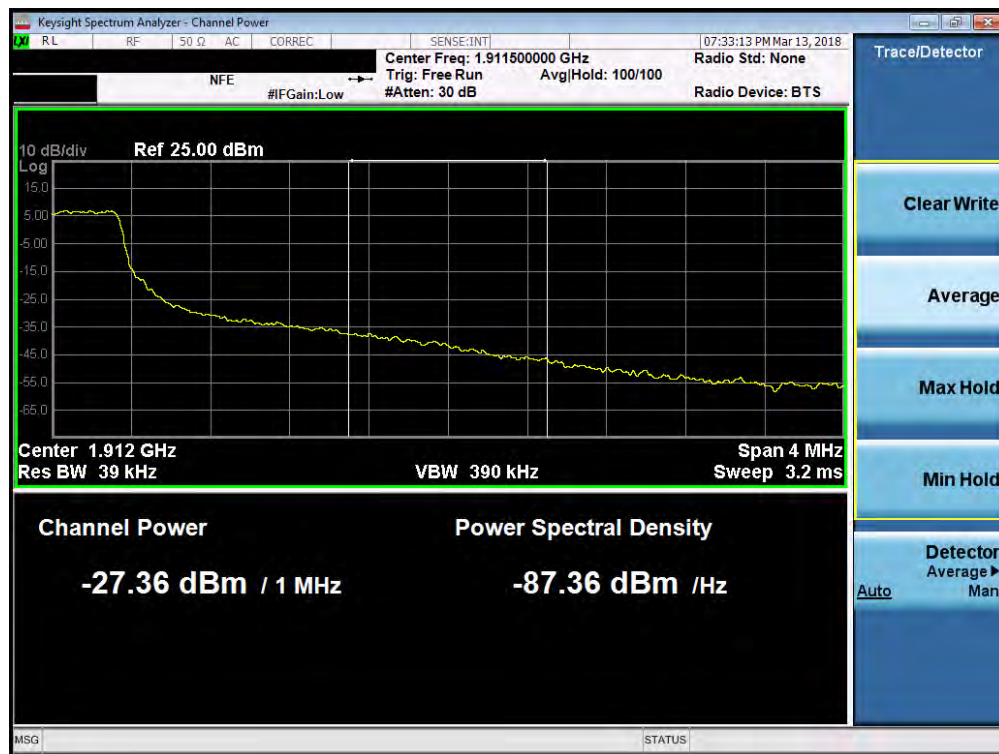
FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Plot 7-146. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



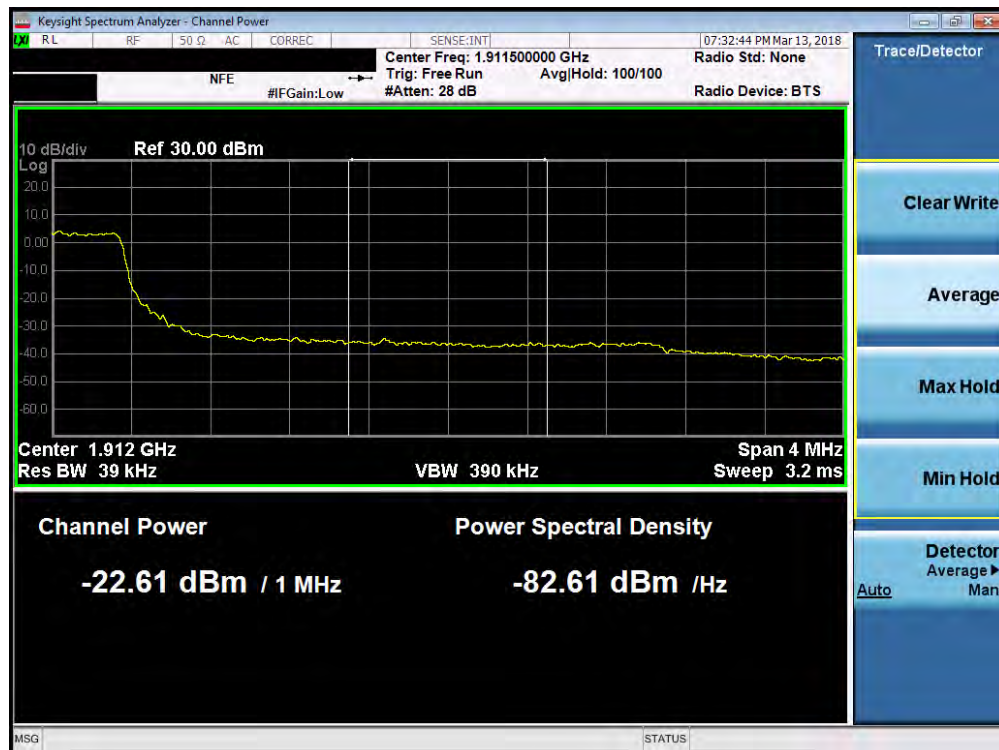
Plot 7-147. Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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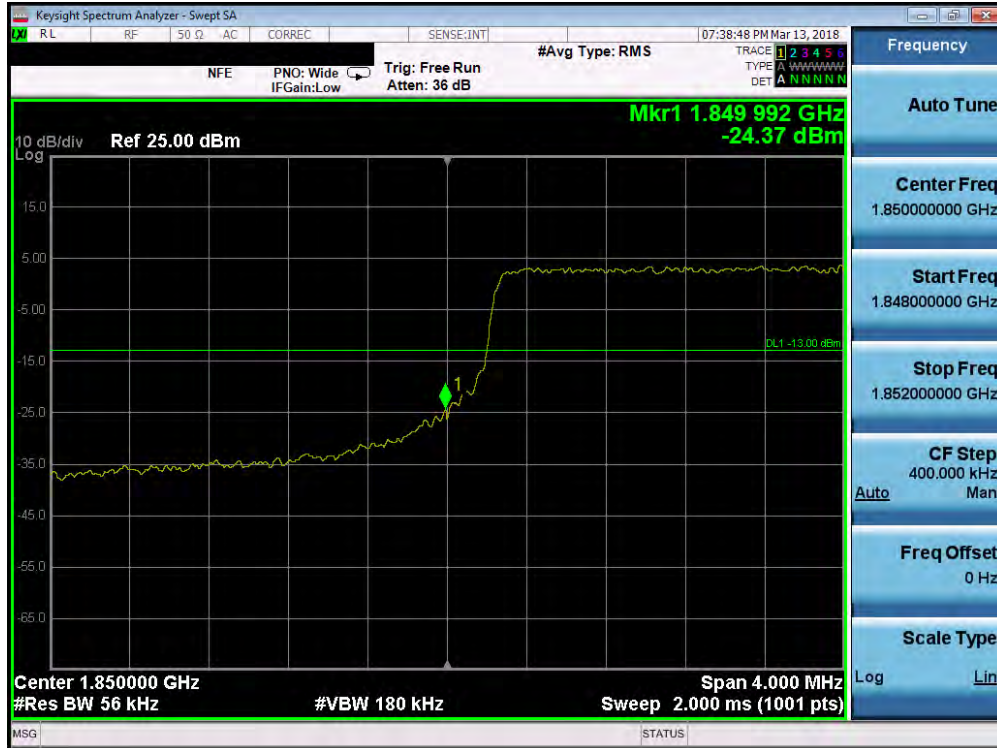


Plot 7-150. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



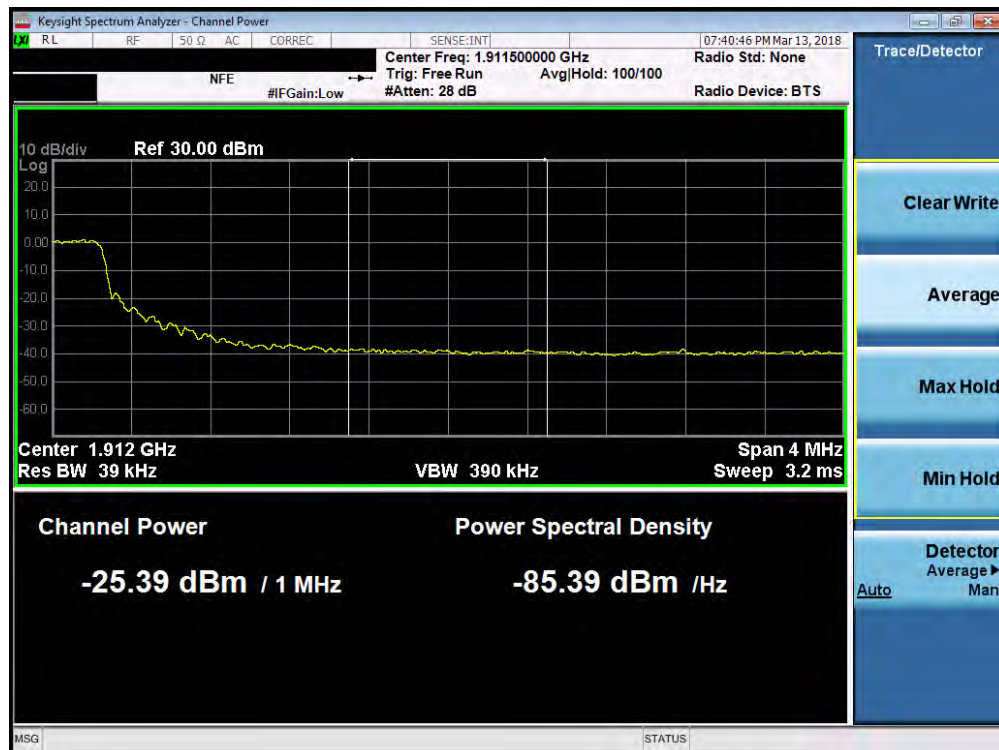
Plot 7-151. Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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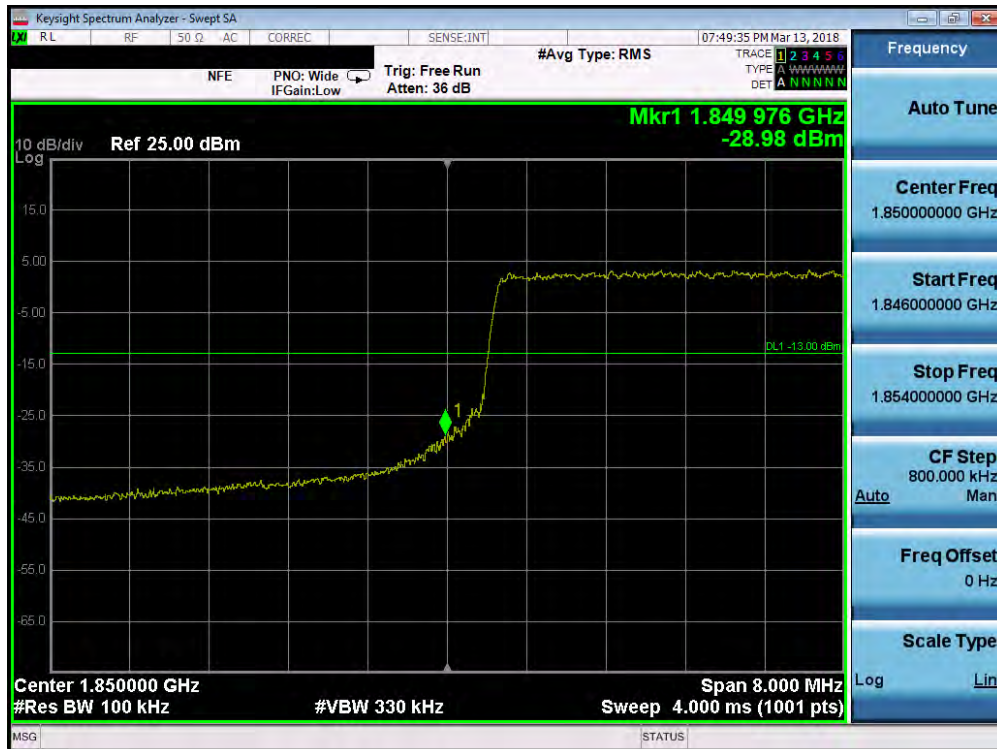


Plot 7-154. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

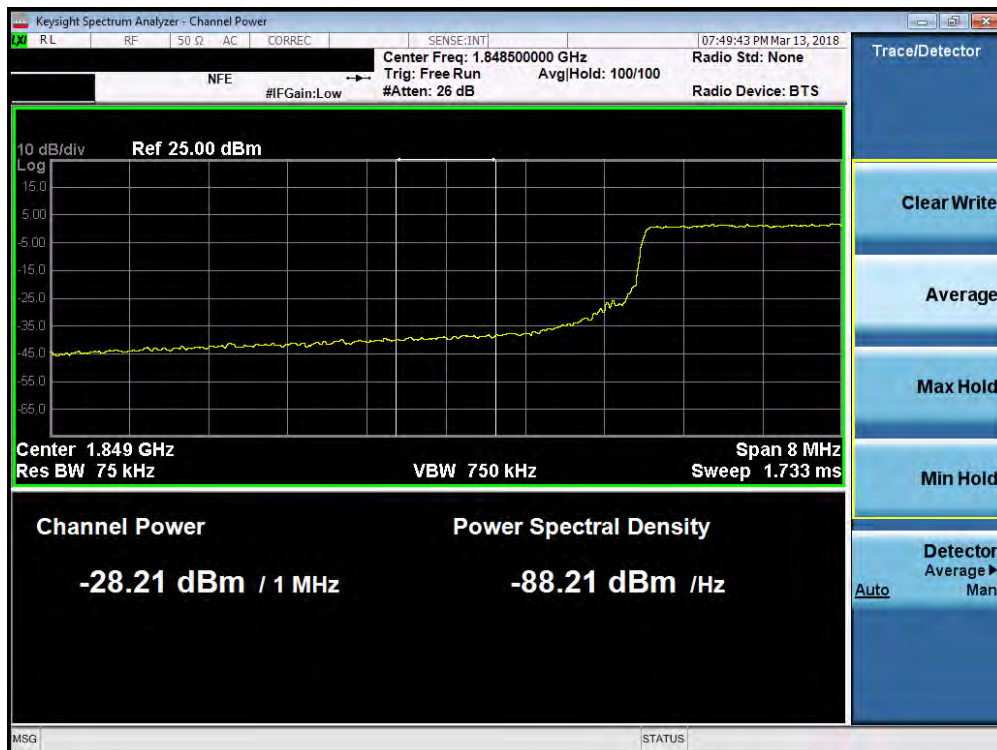


Plot 7-155. Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-156. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

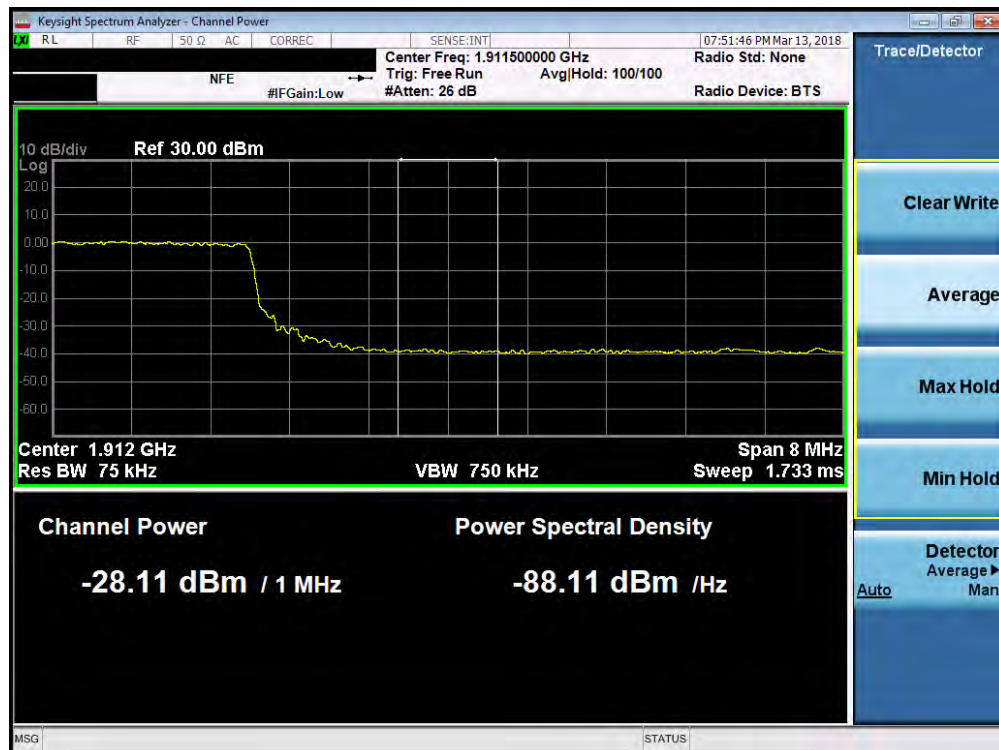


Plot 7-157. Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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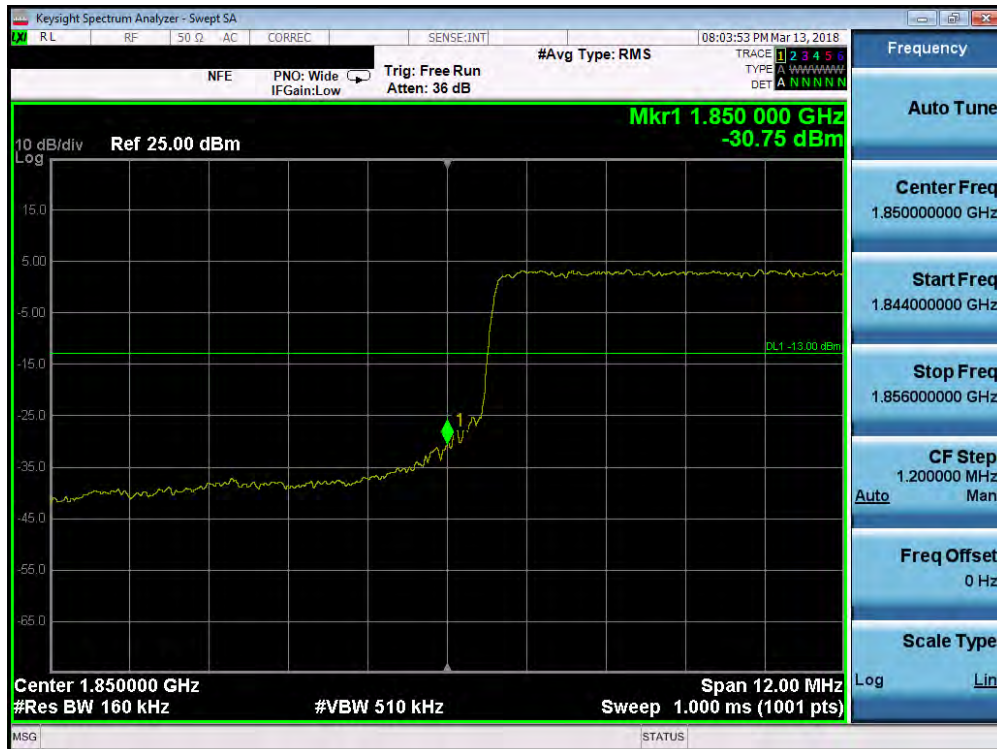


Plot 7-158. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

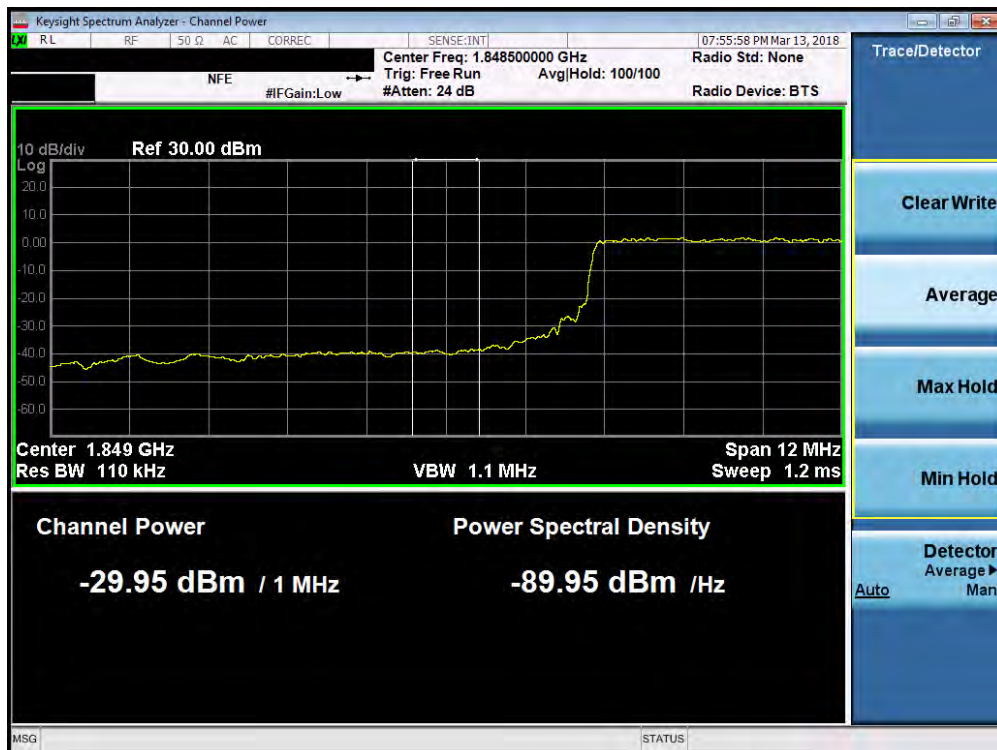


Plot 7-159. Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-160. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

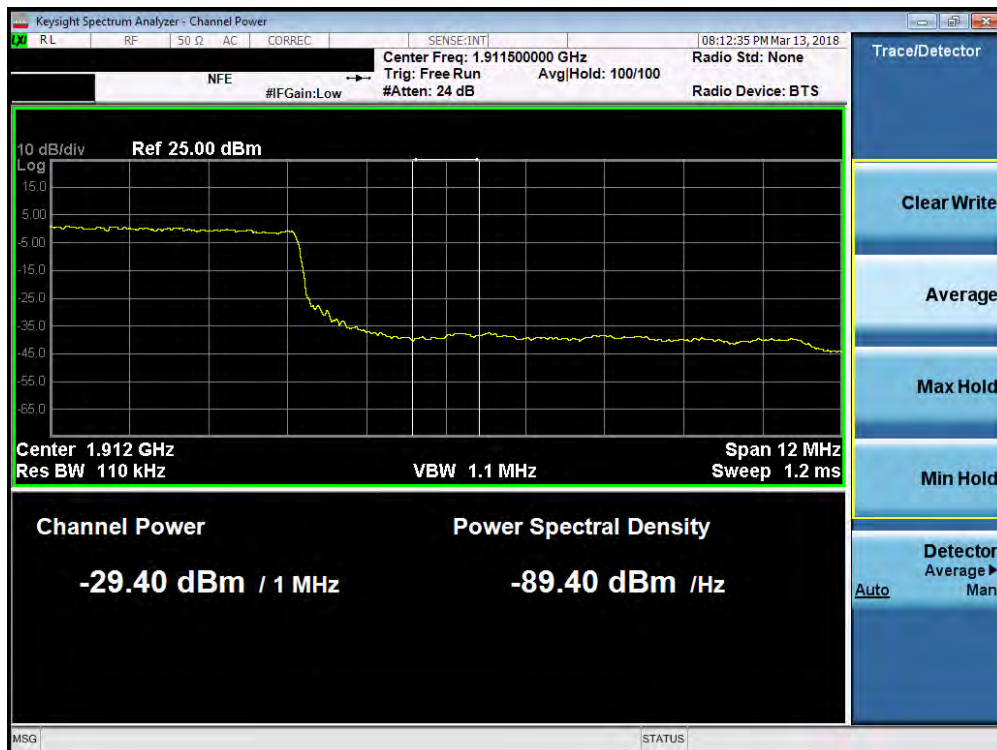


Plot 7-161. Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-162. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

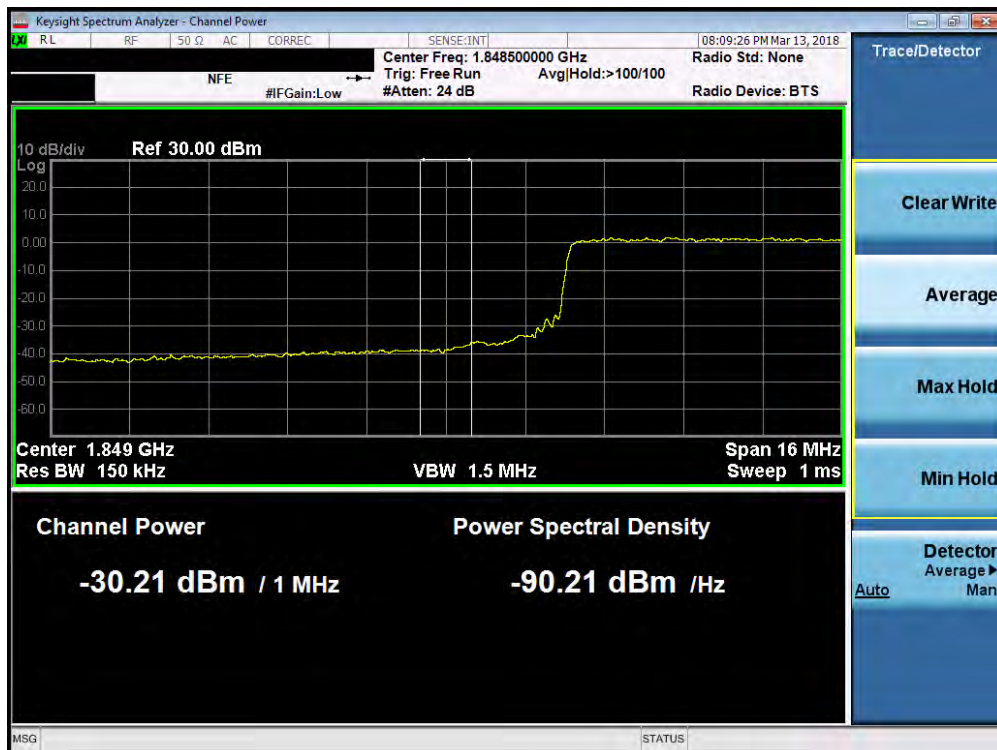


Plot 7-163. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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Plot 7-164. Lower Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

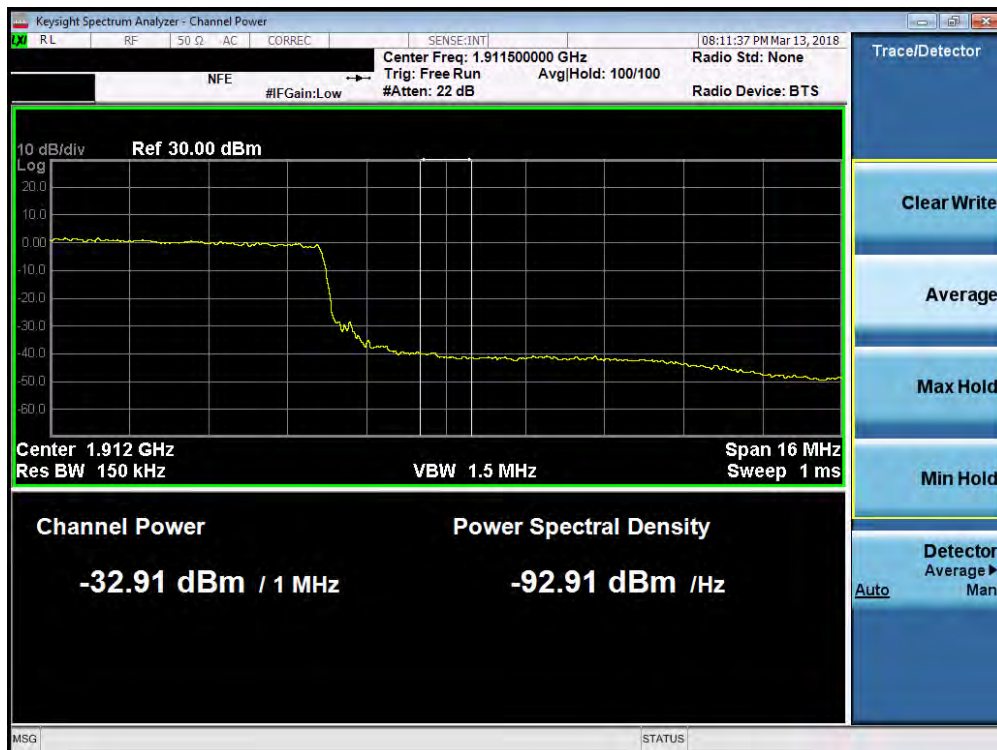


Plot 7-165. Lower Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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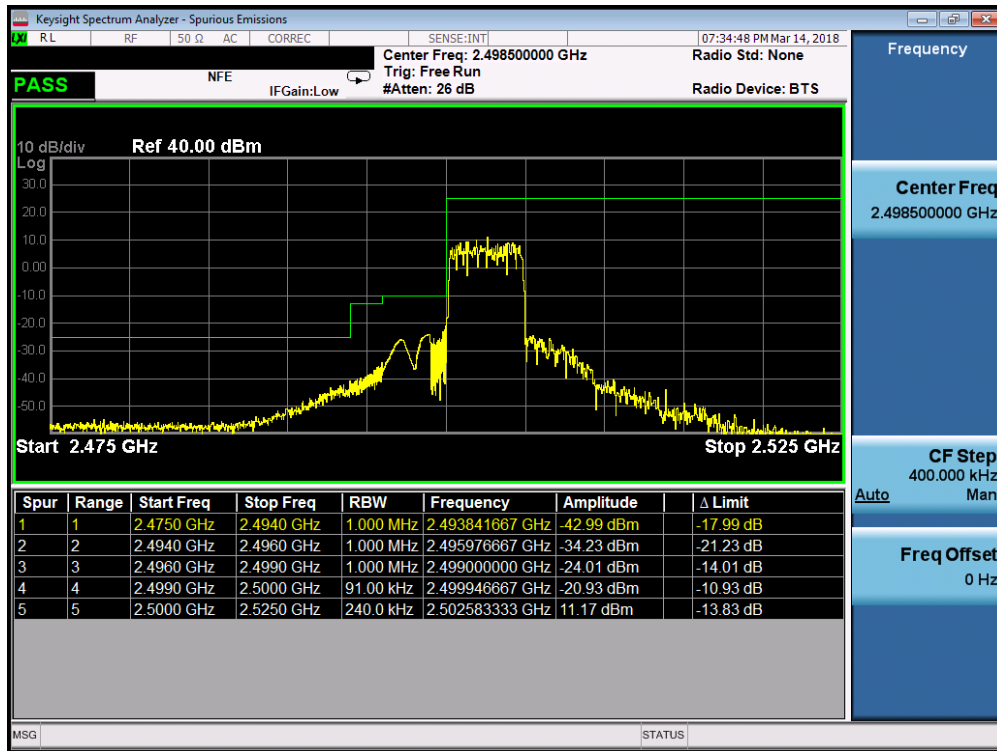
Plot 7-166. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



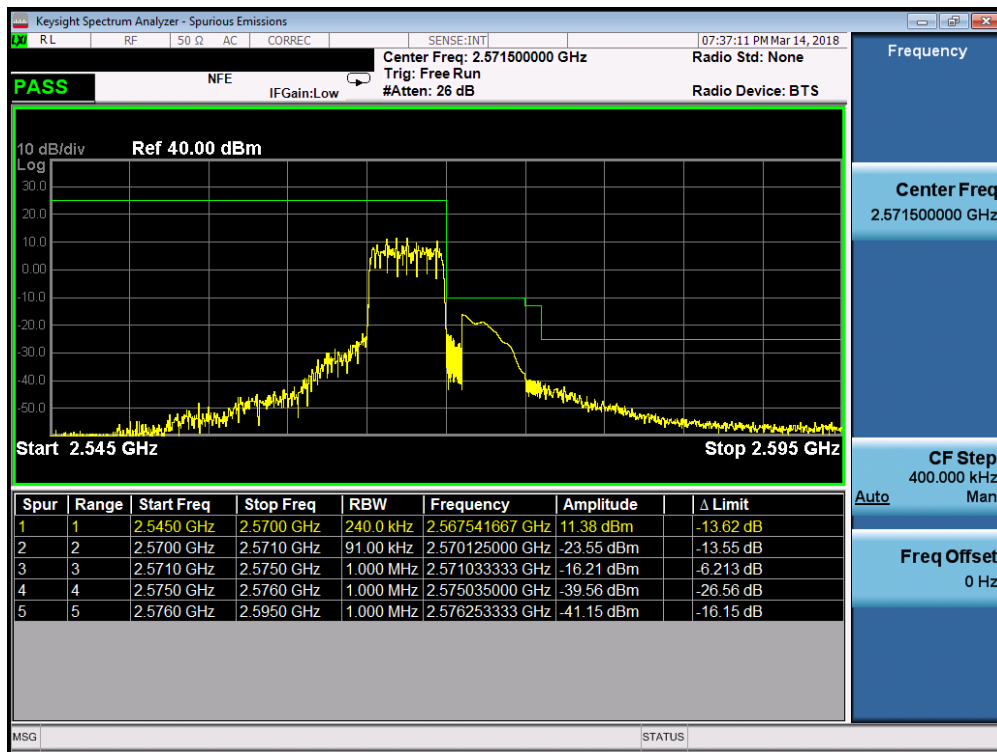
Plot 7-167. Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 105 of 147

Band 7

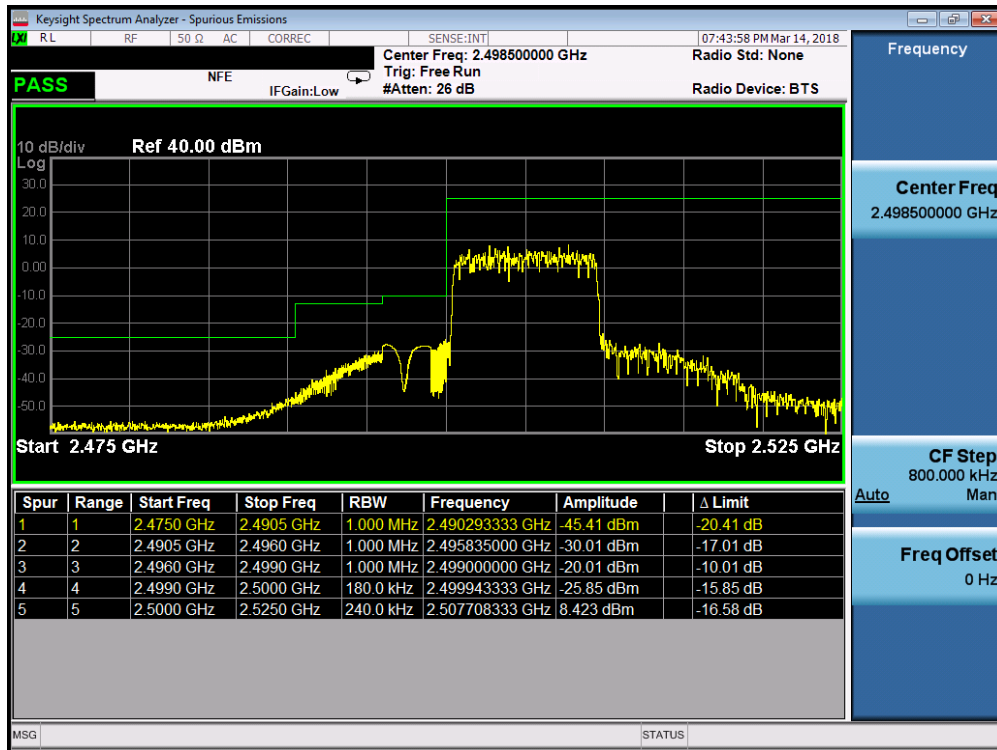


Plot 7-168. Lower ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

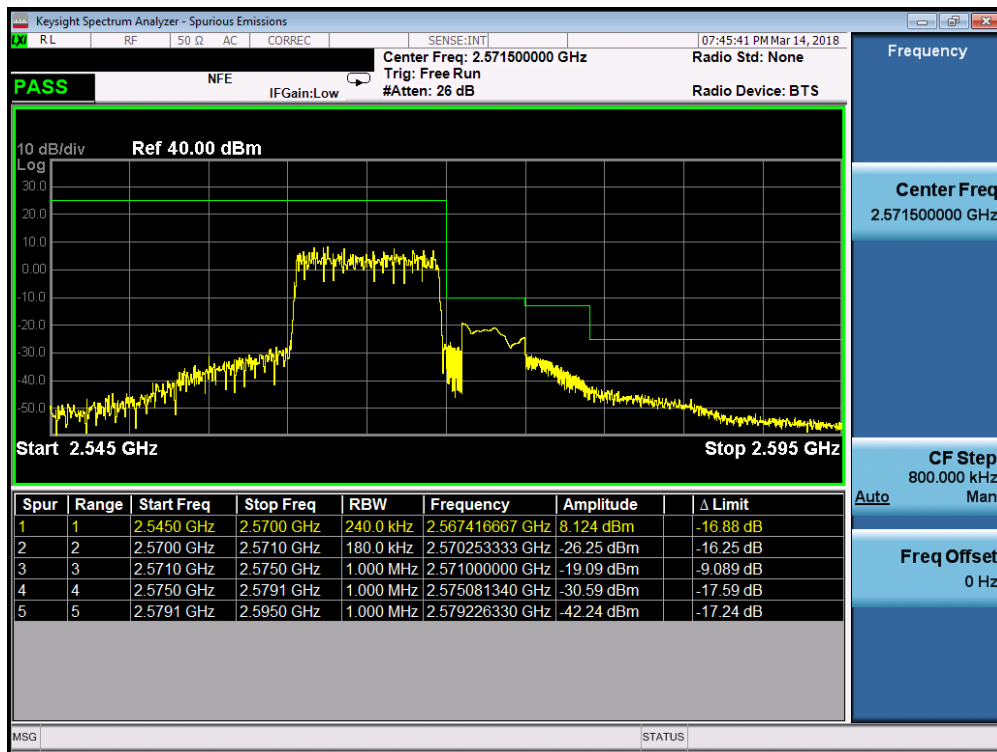


Plot 7-169. Upper ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset		Page 106 of 147

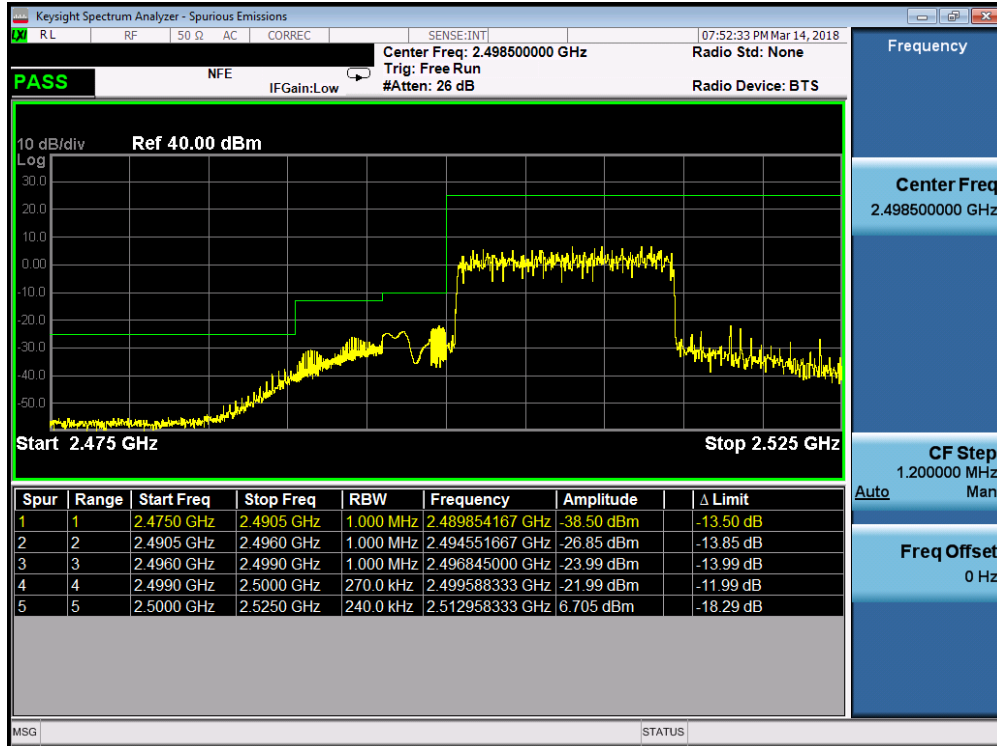


Plot 7-170. Lower ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

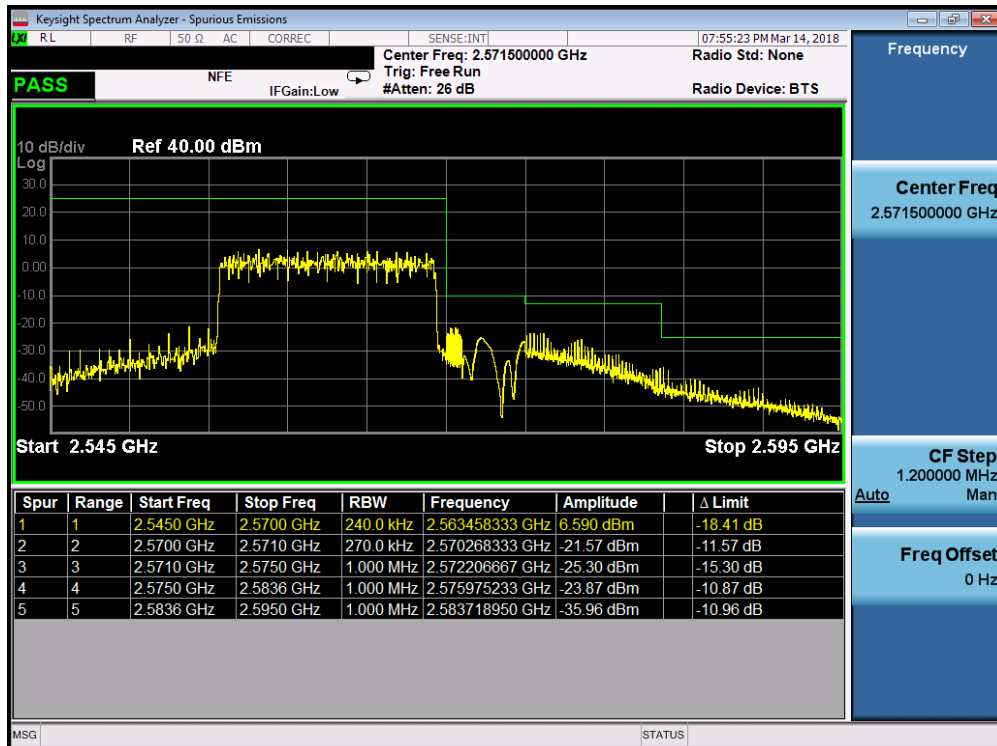


Plot 7-171. Upper ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMJ737A			MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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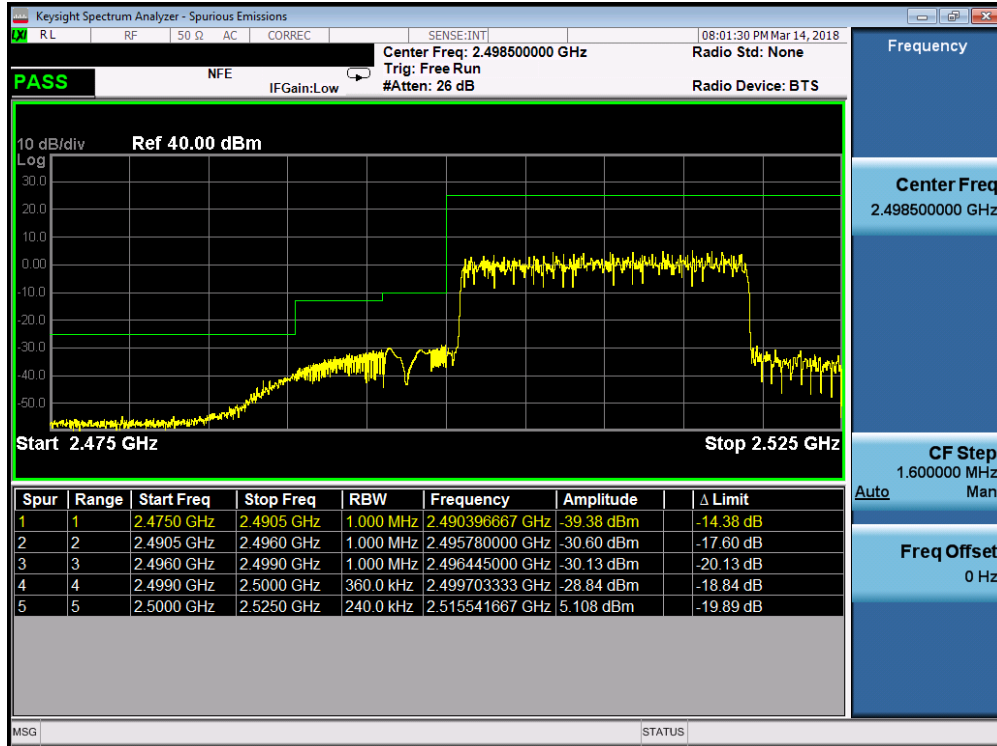


Plot 7-172. Lower ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)

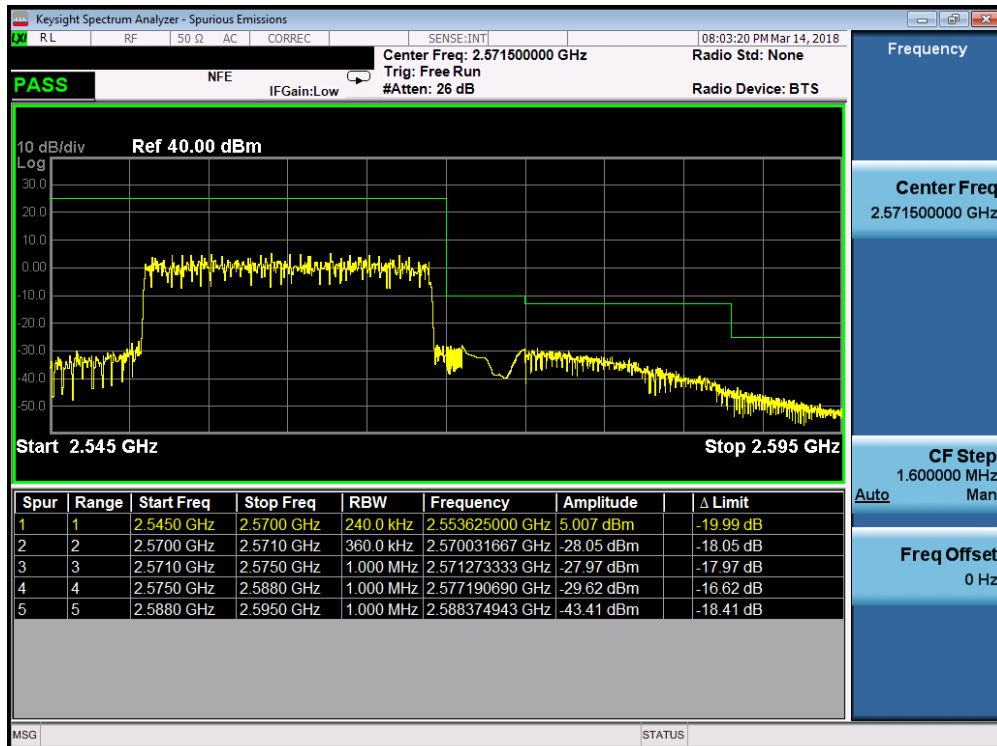


Plot 7-173. Upper ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Plot 7-174. Lower ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100)



Plot 7-175. Upper ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 109 of 147

7.5 Peak-Average Ratio

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

KDB 971168 D01 v03 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

Test Setup

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

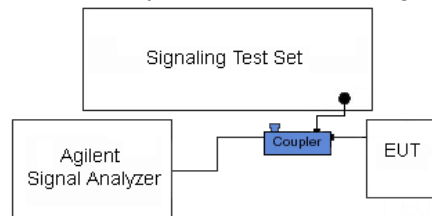


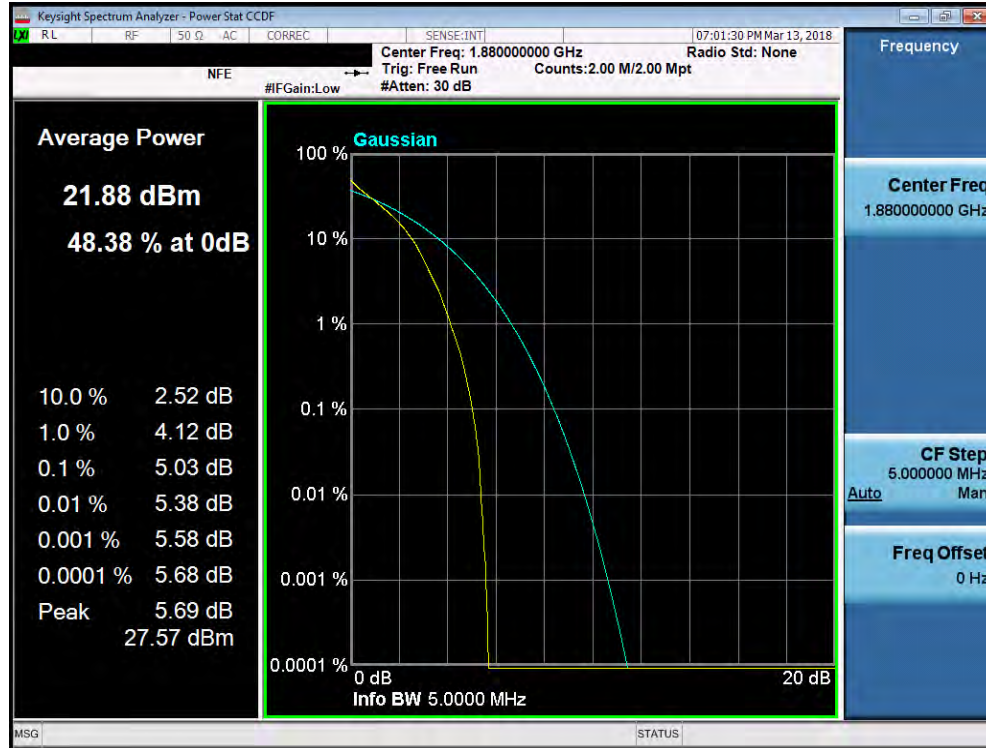
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

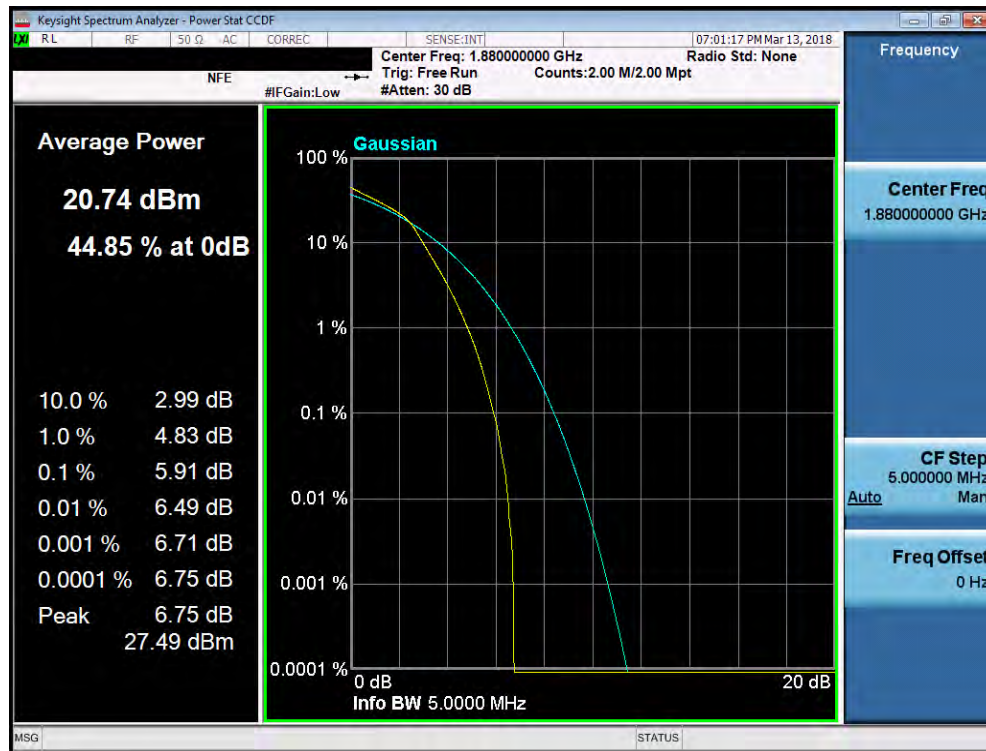
None.

FCC ID: A3LSMJ737A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset		Page 110 of 147

Band 2

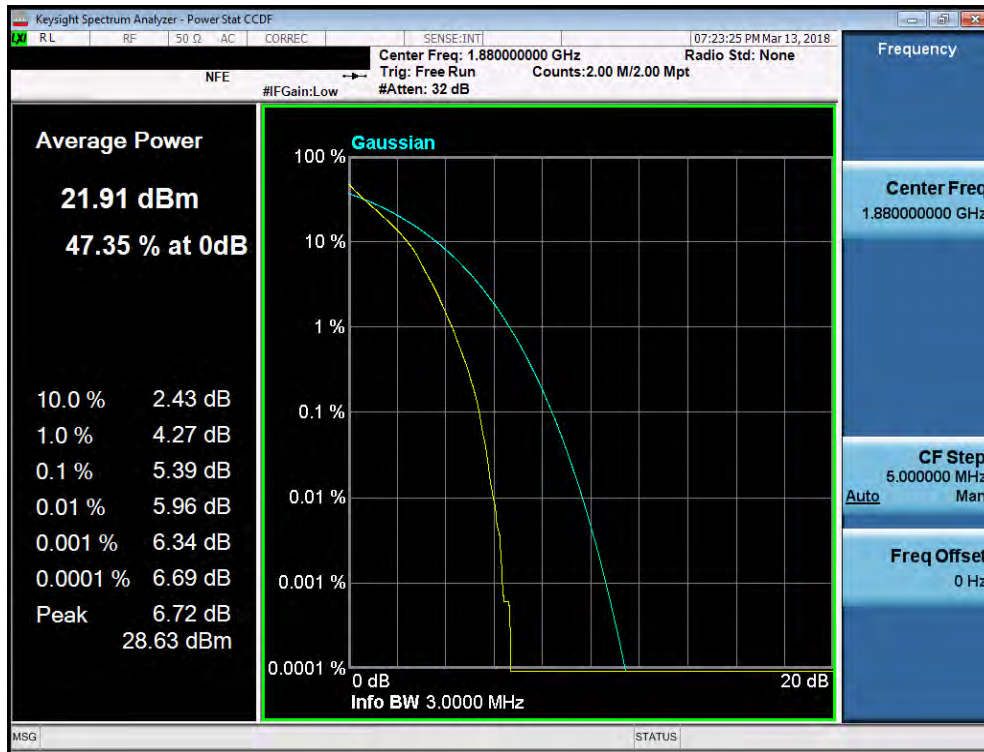


Plot 7-176. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

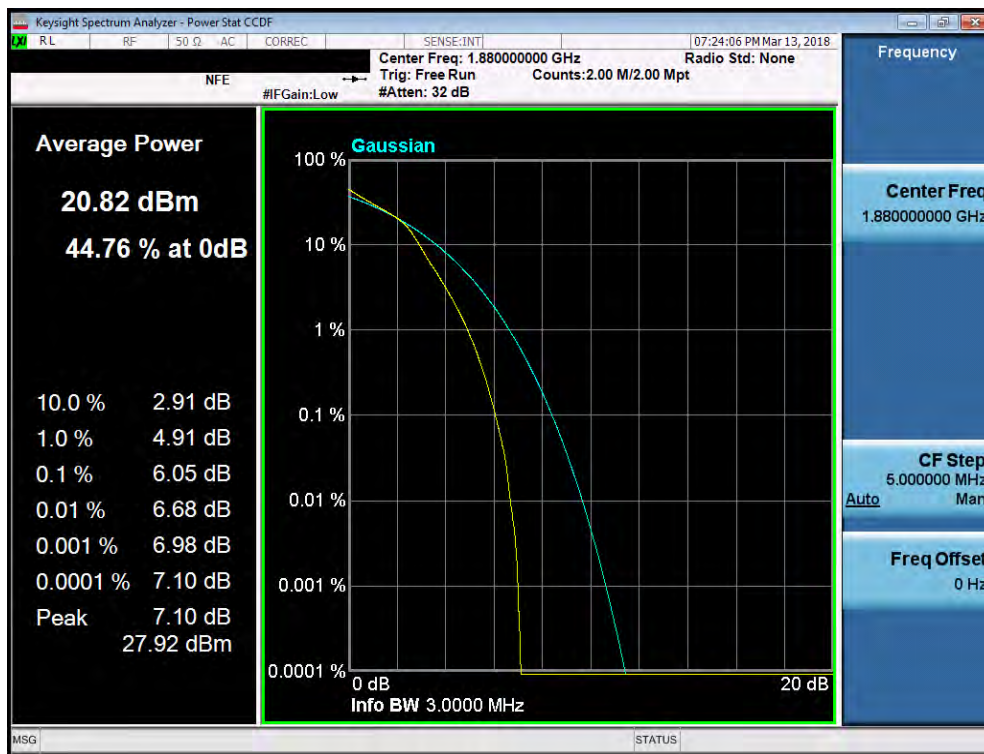


Plot 7-177. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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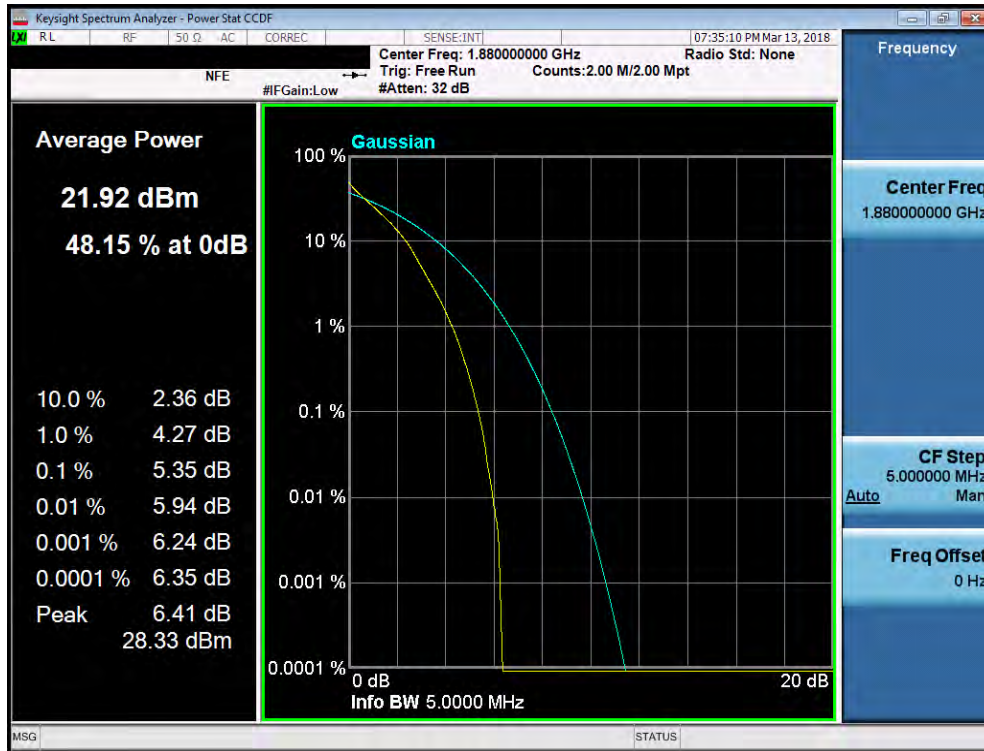


Plot 7-178. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

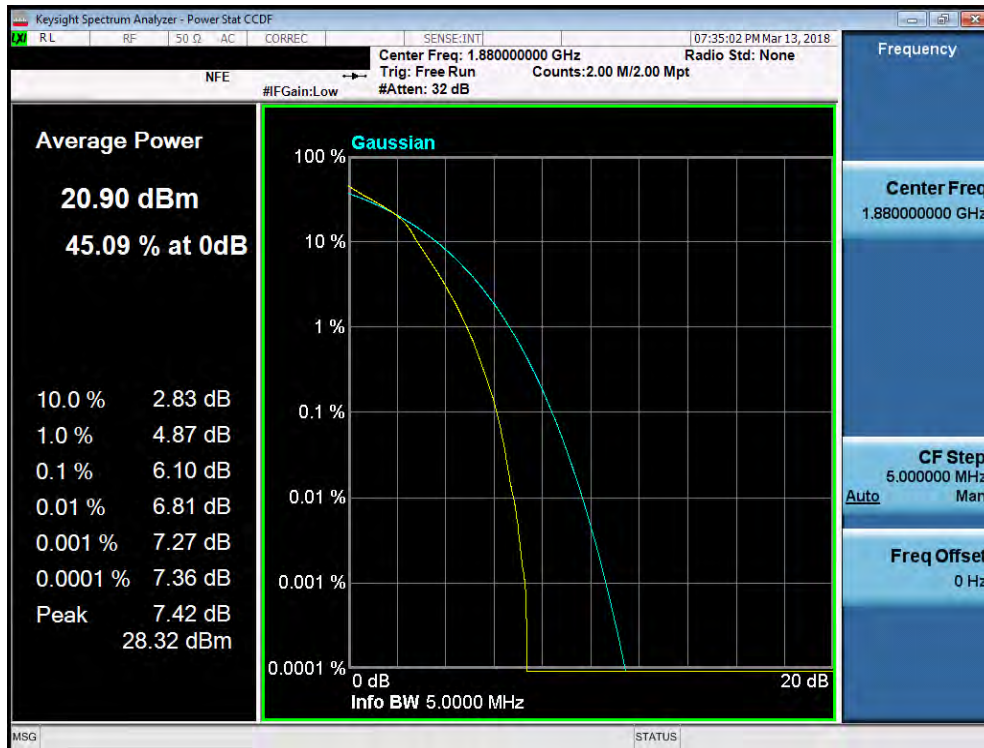


Plot 7-179. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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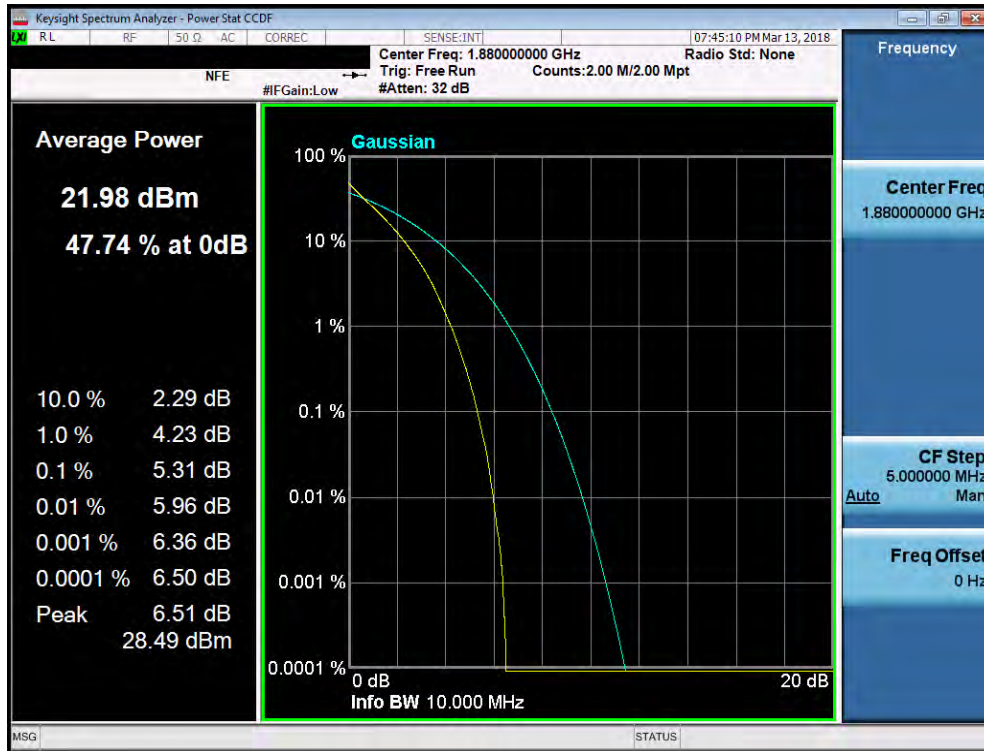


Plot 7-180. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

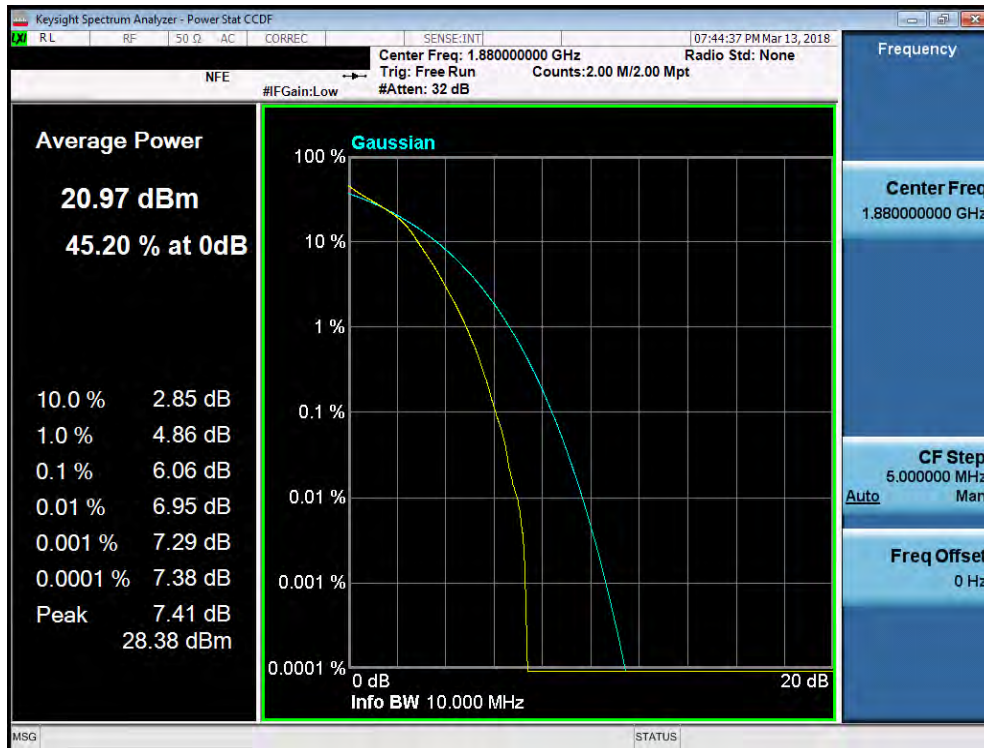


Plot 7-181. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 113 of 147

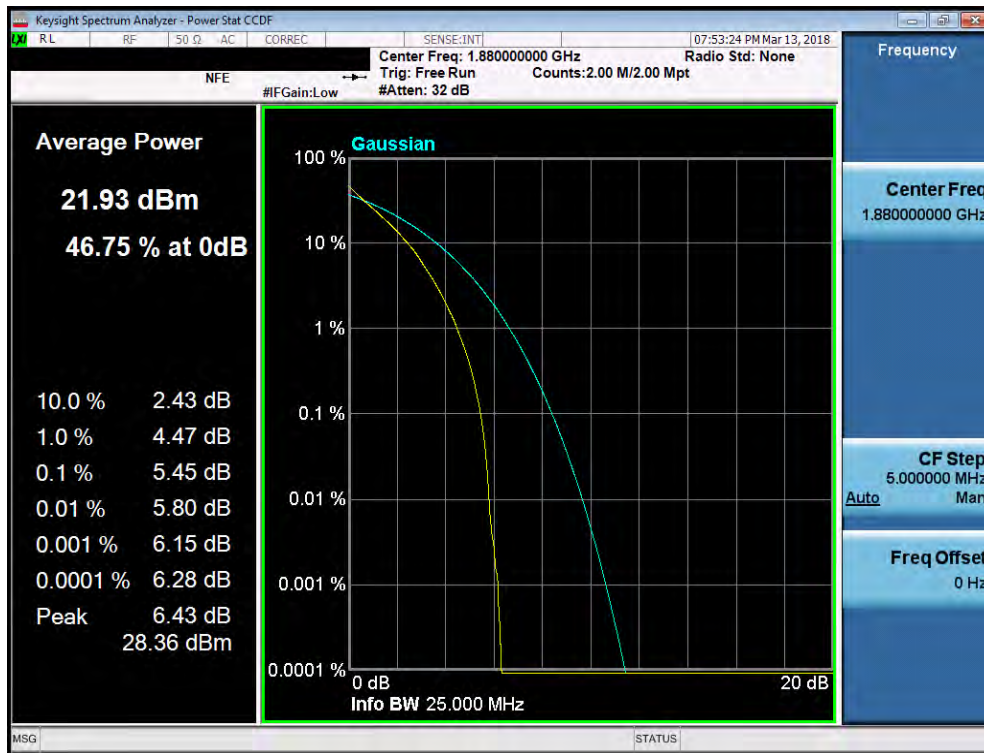


Plot 7-182. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

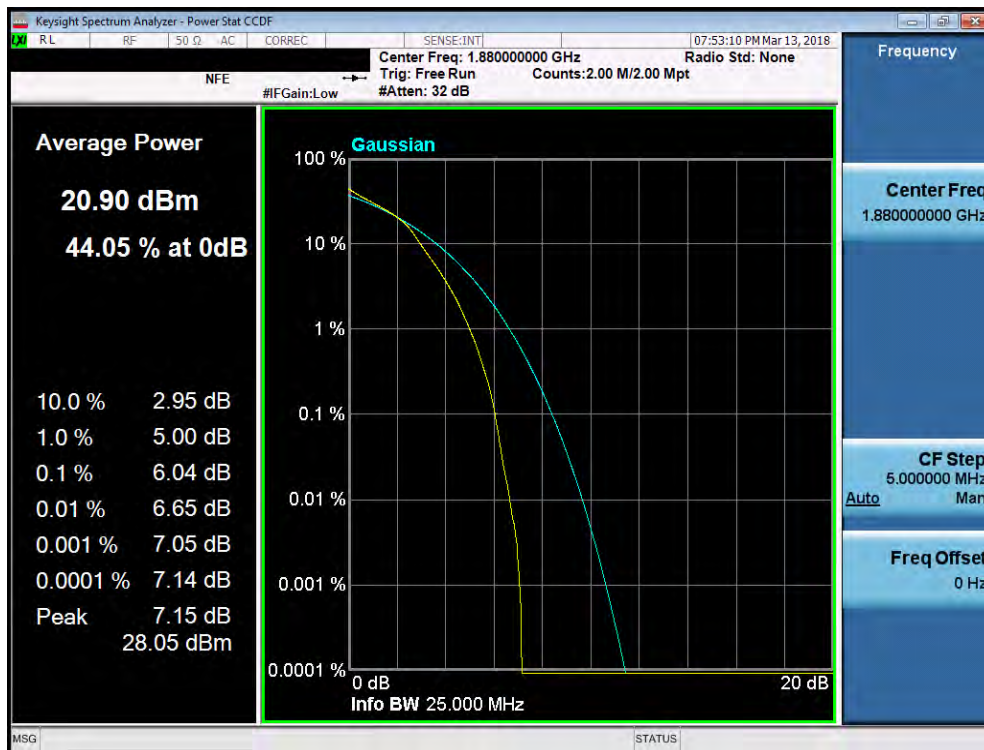


Plot 7-183. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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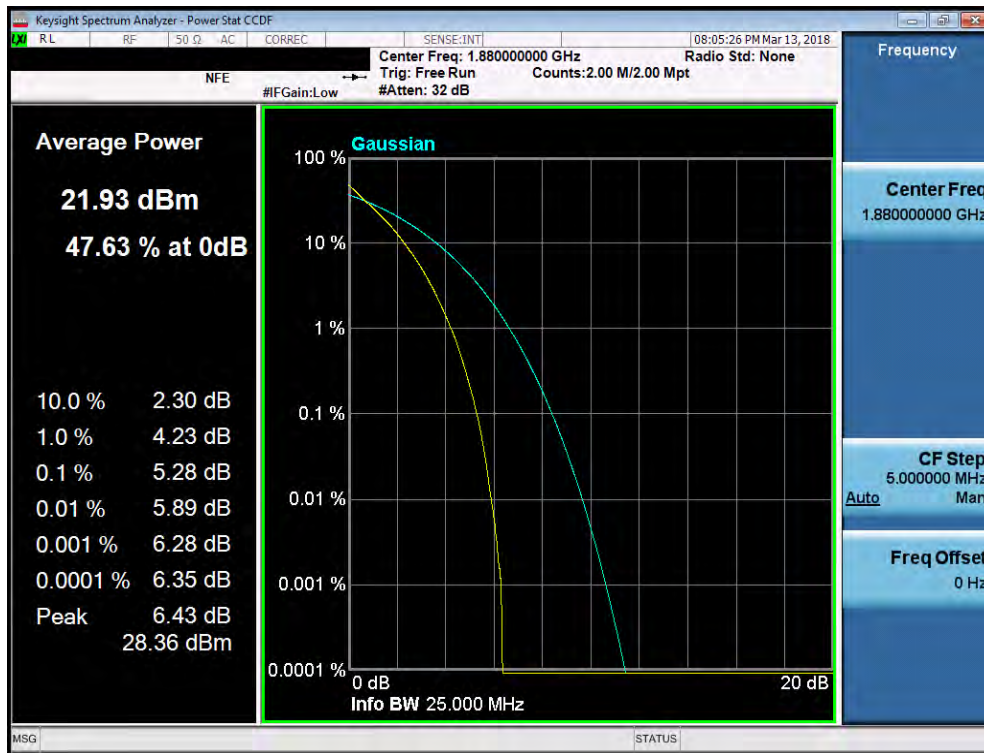


Plot 7-184. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

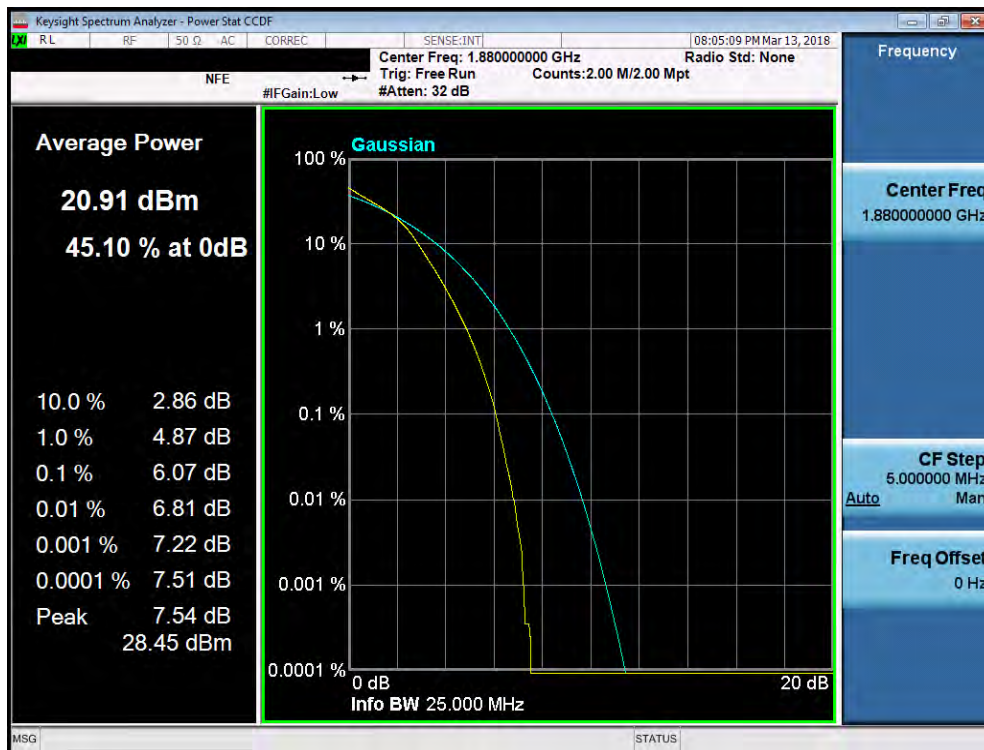


Plot 7-185. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 115 of 147



Plot 7-186. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-187. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 116 of 147

7.6 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW $\geq 3 \times$ RBW
4. Span = 1.5 times the OBW
5. No. of sweep points $\geq 2 \times$ span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Test Setup

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

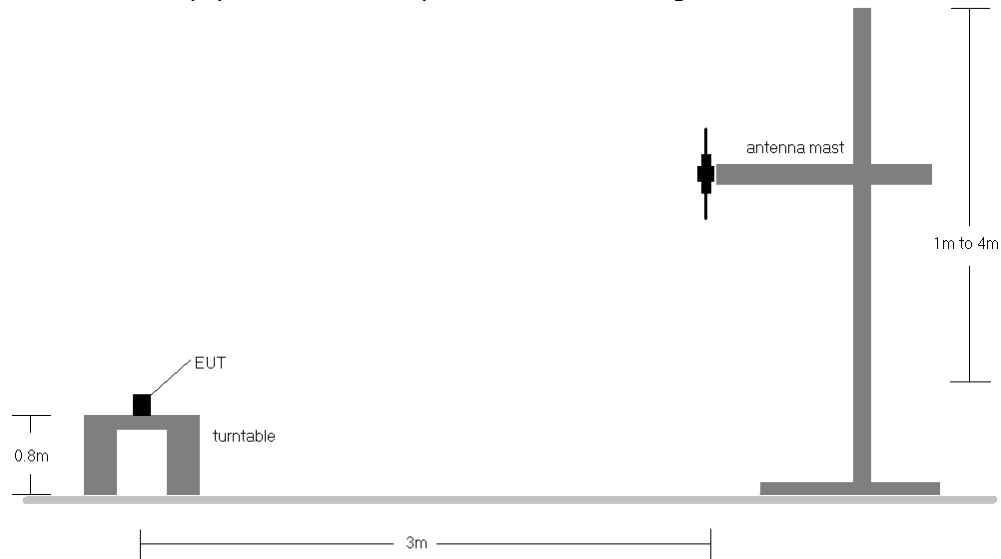


Figure 7-5. Radiated Test Setup <1GHz

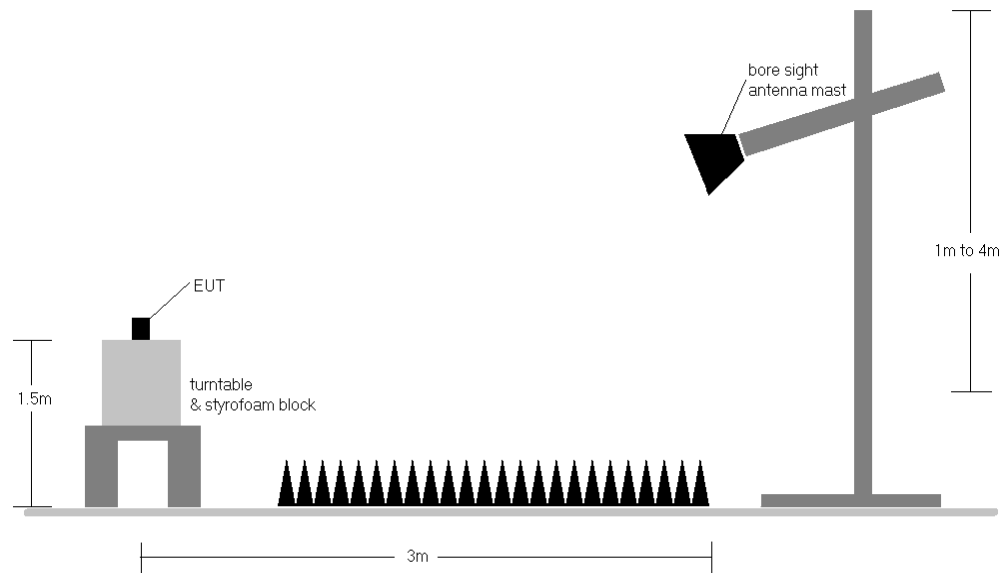


Figure 7-6. Radiated Test Setup >1GHz

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	150	8	1 / 5	20.96	1.10	19.91	0.098	34.77	-14.86	22.06	0.161	36.99	-14.93
707.50	1.4	QPSK	H	150	10	1 / 5	21.11	1.13	20.09	0.102	34.77	-14.68	22.24	0.168	36.99	-14.75
715.30	1.4	QPSK	H	150	8	1 / 0	21.21	1.16	20.22	0.105	34.77	-14.55	22.37	0.173	36.99	-14.62
715.30	1.4	16-QAM	H	150	8	1 / 0	20.24	1.16	19.25	0.084	34.77	-15.52	21.40	0.138	36.99	-15.59
700.50	3	QPSK	H	150	15	1 / 14	20.96	1.10	19.91	0.098	34.77	-14.86	22.06	0.161	36.99	-14.93
707.50	3	QPSK	H	150	13	1 / 14	21.54	1.13	20.52	0.113	34.77	-14.25	22.67	0.185	36.99	-14.32
714.50	3	QPSK	H	150	13	1 / 0	21.53	1.16	20.54	0.113	34.77	-14.23	22.69	0.186	36.99	-14.30
714.50	3	16-QAM	H	150	13	1 / 0	20.97	1.16	19.98	0.100	34.77	-14.79	22.13	0.163	36.99	-14.86
701.50	5	QPSK	H	150	6	1 / 24	21.31	1.11	20.27	0.106	34.77	-14.51	22.42	0.174	36.99	-14.57
707.50	5	QPSK	H	150	3	1 / 24	21.20	1.13	20.18	0.104	34.77	-14.59	22.33	0.171	36.99	-14.66
713.50	5	QPSK	H	150	8	1 / 0	21.31	1.15	20.31	0.108	34.77	-14.46	22.46	0.176	36.99	-14.53
713.50	5	16-QAM	H	150	8	1 / 0	20.28	1.15	19.28	0.085	34.77	-15.49	21.43	0.139	36.99	-15.56
704.00	10	QPSK	H	150	16	1 / 49	21.55	1.12	20.52	0.113	34.77	-14.25	22.67	0.185	36.99	-14.32
707.50	10	QPSK	H	150	18	1 / 49	21.45	1.13	20.43	0.110	34.77	-14.34	22.58	0.181	36.99	-14.41
711.00	10	QPSK	H	150	18	1 / 49	21.31	1.14	20.30	0.107	34.77	-14.47	22.45	0.176	36.99	-14.54
704.00	10	16-QAM	H	150	16	1 / 0	20.31	1.12	19.28	0.085	34.77	-15.49	21.43	0.139	36.99	-15.56
714.50	3	QPSK	V	150	359	1 / 0	21.35	1.16	20.36	0.109	34.77	-14.41	22.51	0.178	36.99	-14.48

Table 7-3. ERP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	150	8	1 / 5	18.11	1.50	17.46	0.056	38.45	-20.99	19.61	0.091	40.61	-21.00
836.50	1.4	QPSK	H	150	6	1 / 0	19.25	1.50	18.60	0.072	38.45	-19.85	20.75	0.119	40.61	-19.86
848.30	1.4	QPSK	H	150	6	1 / 0	20.56	1.50	19.91	0.098	38.45	-18.54	22.06	0.161	40.61	-18.55
848.30	1.4	16-QAM	H	150	6	1 / 0	19.61	1.50	18.96	0.079	38.45	-19.49	21.11	0.129	40.61	-19.50
825.50	3	QPSK	H	150	5	1 / 14	18.51	1.50	17.86	0.061	38.45	-20.59	20.01	0.100	40.61	-20.60
836.50	3	QPSK	H	150	8	1 / 14	19.27	1.50	18.62	0.073	38.45	-19.83	20.77	0.119	40.61	-19.84
847.50	3	QPSK	H	150	6	1 / 0	20.74	1.50	20.09	0.102	38.45	-18.36	22.24	0.167	40.61	-18.37
847.50	3	16-QAM	H	150	6	1 / 0	19.54	1.50	18.89	0.077	38.45	-19.56	21.04	0.127	40.61	-19.57
826.50	5	QPSK	H	150	8	1 / 24	18.90	1.50	18.25	0.067	38.45	-20.20	20.40	0.110	40.61	-20.21
836.50	5	QPSK	H	150	6	1 / 0	19.39	1.50	18.74	0.075	38.45	-19.71	20.89	0.123	40.61	-19.72
846.50	5	QPSK	H	150	8	1 / 0	20.68	1.50	20.03	0.101	38.45	-18.42	22.18	0.165	40.61	-18.43
846.50	5	16-QAM	H	150	8	1 / 24	19.62	1.50	18.97	0.079	38.45	-19.48	21.12	0.129	40.61	-19.49
829.00	10	QPSK	H	150	4	1 / 49	19.22	1.50	18.57	0.072	38.45	-19.88	20.72	0.118	40.61	-19.89
836.50	10	QPSK	H	150	16	1 / 49	18.77	1.50	18.12	0.065	38.45	-20.33	20.27	0.106	40.61	-20.34
844.00	10	QPSK	H	150	359	1 / 49	19.76	1.50	19.11	0.081	38.45	-19.34	21.26	0.134	40.61	-19.35
844.00	10	16-QAM	H	150	359	1 / 49	19.16	1.50	18.51	0.071	38.45	-19.94	20.66	0.116	40.61	-19.95
847.50	3	QPSK	V	150	0	1 / 0	19.39	1.50	18.74	0.075	38.45	-19.71	20.89	0.123	40.61	-19.72

Table 7-4. ERP Data (Band 5)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	150	10	1 / 5	17.23	5.56	22.79	0.190	30.00	-7.21
1732.50	1.4	QPSK	H	150	3	1 / 0	17.34	5.41	22.75	0.188	30.00	-7.25
1754.30	1.4	QPSK	H	150	0	1 / 5	17.52	5.26	22.78	0.190	30.00	-7.22
1732.50	1.4	16-QAM	H	150	3	1 / 5	16.41	5.41	21.82	0.152	30.00	-8.18
1711.50	3	QPSK	H	150	6	1 / 14	17.23	5.55	22.78	0.190	30.00	-7.22
1732.50	3	QPSK	H	150	0	1 / 0	17.39	5.41	22.80	0.190	30.00	-7.20
1753.50	3	QPSK	H	150	6	1 / 14	17.45	5.26	22.71	0.187	30.00	-7.29
1711.50	3	16-QAM	H	150	6	1 / 0	16.27	5.55	21.82	0.152	30.00	-8.18
1712.50	5	QPSK	H	150	3	1 / 24	17.29	5.55	22.84	0.192	30.00	-7.16
1732.50	5	QPSK	H	150	3	1 / 0	17.49	5.41	22.90	0.195	30.00	-7.10
1752.50	5	QPSK	H	150	3	1 / 24	17.76	5.27	23.03	0.201	30.00	-6.97
1752.50	5	16-QAM	H	150	3	1 / 0	16.92	5.27	22.19	0.166	30.00	-7.81
1715.00	10	QPSK	H	150	2	1 / 49	17.35	5.53	22.88	0.194	30.00	-7.12
1732.50	10	QPSK	H	150	3	1 / 0	17.35	5.41	22.76	0.189	30.00	-7.24
1750.00	10	QPSK	H	150	2	1 / 49	17.67	5.29	22.96	0.198	30.00	-7.04
1732.50	10	16-QAM	H	150	3	1 / 0	16.43	5.41	21.84	0.153	30.00	-8.16
1717.50	15	QPSK	H	150	7	1 / 0	17.57	5.51	23.08	0.203	30.00	-6.92
1732.50	15	QPSK	H	150	0	1 / 74	17.28	5.41	22.69	0.186	30.00	-7.31
1747.50	15	QPSK	H	150	3	1 / 74	17.14	5.31	22.45	0.176	30.00	-7.55
1717.50	15	16-QAM	H	150	7	1 / 74	16.38	5.51	21.89	0.155	30.00	-8.11
1720.00	20	QPSK	H	150	3	1 / 99	17.36	5.49	22.85	0.193	30.00	-7.15
1732.50	20	QPSK	H	150	3	1 / 99	17.24	5.41	22.65	0.184	30.00	-7.35
1745.00	20	QPSK	H	150	3	1 / 0	17.60	5.32	22.92	0.196	30.00	-7.08
1720.00	20	16-QAM	H	150	3	1 / 0	16.36	5.49	21.85	0.153	30.00	-8.15
1717.50	15	QPSK	V	150	84	1 / 99	16.14	5.27	21.41	0.138	30.00	-8.59

Table 7-5. EIRP Data (Band 4)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 120 of 147

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	V	150	356	1 / 0	18.98	4.82	23.80	0.240	33.01	-9.21
1880.00	1.4	QPSK	V	150	356	1 / 0	18.69	4.74	23.43	0.220	33.01	-9.58
1909.30	1.4	QPSK	V	150	356	1 / 5	18.52	4.68	23.20	0.209	33.01	-9.81
1850.70	1.4	16-QAM	V	150	356	1 / 0	17.73	4.82	22.55	0.180	33.01	-10.46
1851.50	3	QPSK	V	150	359	1 / 0	18.91	4.82	23.73	0.236	33.01	-9.28
1880.00	3	QPSK	V	150	359	1 / 0	18.54	4.74	23.28	0.213	33.01	-9.73
1908.50	3	QPSK	V	150	359	1 / 0	18.41	4.68	23.09	0.204	33.01	-9.92
1908.50	3	16-QAM	V	150	359	1 / 0	18.43	4.68	23.11	0.205	33.01	-9.90
1852.50	5	QPSK	V	150	1	1 / 0	18.87	4.81	23.68	0.234	33.01	-9.33
1880.00	5	QPSK	V	150	1	1 / 24	18.82	4.74	23.56	0.227	33.01	-9.45
1907.50	5	QPSK	V	150	356	1 / 0	18.55	4.68	23.23	0.211	33.01	-9.78
1852.50	5	16-QAM	V	150	1	1 / 0	17.61	4.81	22.42	0.175	33.01	-10.59
1855.00	10	QPSK	V	150	0	1 / 0	19.12	4.81	23.93	0.247	33.01	-9.08
1880.00	10	QPSK	V	150	350	1 / 0	18.75	4.74	23.49	0.223	33.01	-9.52
1905.00	10	QPSK	V	150	0	1 / 0	18.21	4.68	22.89	0.195	33.01	-10.12
1855.00	10	16-QAM	V	150	0	1 / 0	17.83	4.81	22.64	0.184	33.01	-10.37
1857.50	15	QPSK	V	150	359	1 / 0	19.03	4.80	23.83	0.242	33.01	-9.18
1880.00	15	QPSK	V	150	0	1 / 0	18.69	4.74	23.43	0.220	33.01	-9.58
1902.50	15	QPSK	V	150	359	1 / 0	18.28	4.69	22.97	0.198	33.01	-10.04
1857.50	15	16-QAM	V	150	359	1 / 0	17.83	4.80	22.63	0.183	33.01	-10.38
1860.00	20	QPSK	V	150	0	1 / 0	19.21	4.79	24.00	0.251	33.01	-9.01
1880.00	20	QPSK	V	150	359	1 / 0	18.75	4.74	23.49	0.223	33.01	-9.52
1900.00	20	QPSK	V	150	0	1 / 0	18.18	4.69	22.87	0.194	33.01	-10.14
1860.00	20	16-QAM	V	150	0	1 / 0	17.88	4.79	22.67	0.185	33.01	-10.34
1860.00	20	QPSK	H	150	3	1 / 0	13.67	4.79	18.46	0.070	33.01	-14.55

Table 7-6. EIRP Data (Band 2)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 121 of 147

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	H	150	344	1 / 24	16.96	5.74	22.70	0.186	33.01	-10.31
2535.00	5	QPSK	H	150	344	1 / 24	17.75	5.86	23.61	0.230	33.01	-9.40
2567.50	5	QPSK	H	150	342	1 / 24	17.83	5.98	23.81	0.240	33.01	-9.20
2567.50	5	16-QAM	H	150	342	1 / 24	17.38	5.98	23.36	0.217	33.01	-9.65
2505.00	10	QPSK	H	150	344	1 / 0	16.92	5.75	22.67	0.185	33.01	-10.34
2535.00	10	QPSK	H	150	342	1 / 0	17.45	5.86	23.31	0.214	33.01	-9.70
2565.00	10	QPSK	H	150	345	1 / 49	17.86	5.97	23.83	0.242	33.01	-9.18
2565.00	10	16-QAM	H	150	345	1 / 0	17.63	5.97	23.60	0.229	33.01	-9.41
2507.50	15	QPSK	H	150	345	1 / 74	17.21	5.76	22.97	0.198	33.01	-10.04
2535.00	15	QPSK	H	150	345	1 / 74	17.93	5.86	23.79	0.239	33.01	-9.22
2562.50	15	QPSK	H	150	347	1 / 0	17.55	5.96	23.51	0.224	33.01	-9.50
2535.00	15	16-QAM	H	150	345	1 / 74	17.53	5.86	23.39	0.218	33.01	-9.62
2510.00	20	QPSK	H	150	349	1 / 99	16.69	5.77	22.46	0.176	33.01	-10.55
2535.00	20	QPSK	H	150	347	1 / 99	17.76	5.86	23.62	0.230	33.01	-9.39
2560.00	20	QPSK	H	150	349	1 / 0	16.93	5.95	22.88	0.194	33.01	-10.13
2535.00	20	16-QAM	H	150	347	1 / 99	17.79	5.86	23.65	0.232	33.01	-9.36
2565.00	10	QPSK	V	150	80	1 / 99	16.14	6.07	22.21	0.166	33.01	-10.80

Table 7-7. EIRP Data (Band 7)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 122 of 147

7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Test Setup

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

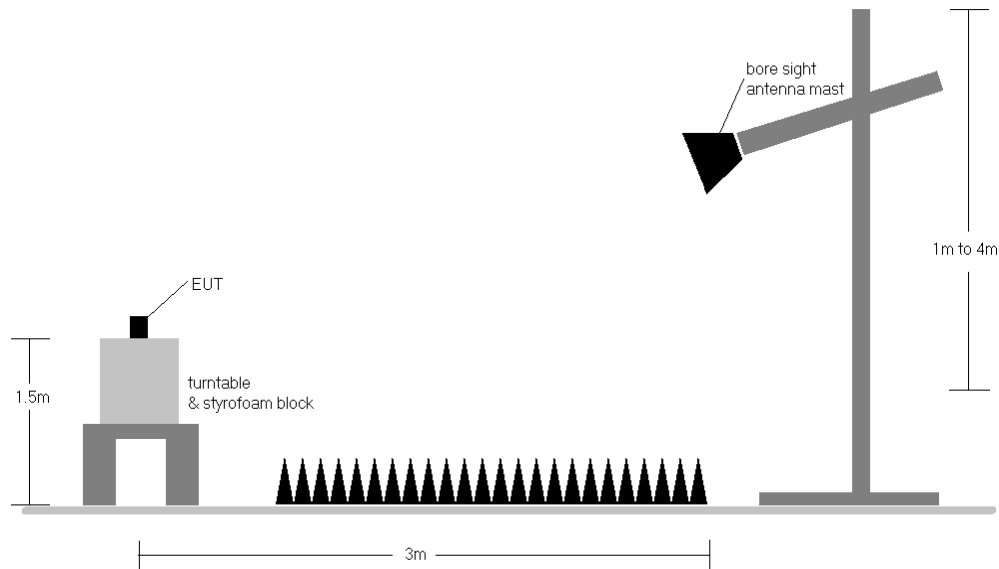


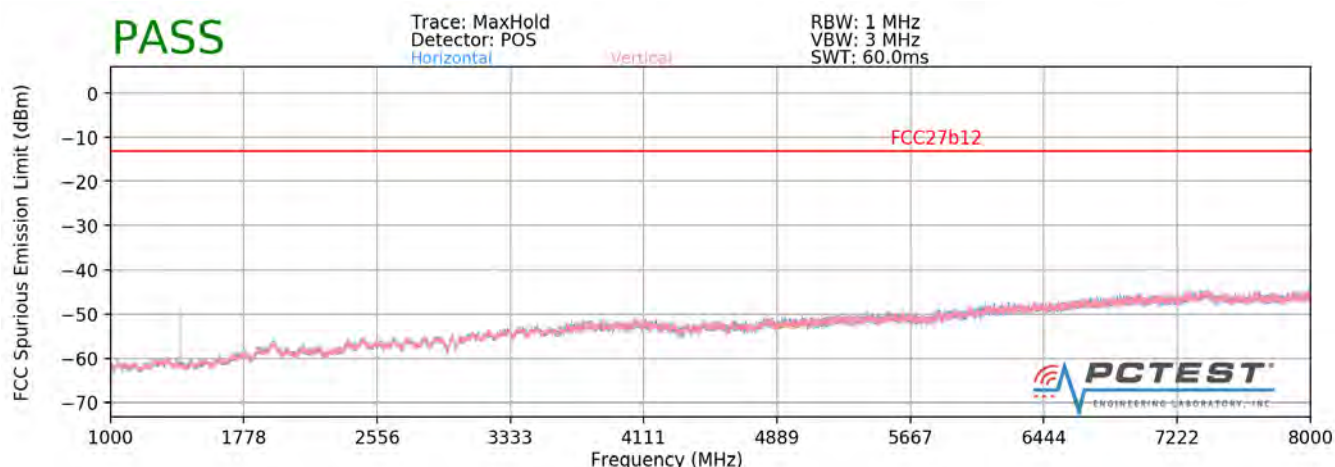
Figure 7-7. Test Instrument & Measurement Setup

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) 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.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 12



Plot 7-188. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY: 700.50 MHz
CHANNEL: 23025
MODULATION SIGNAL: QPSK
BANDWIDTH: 3.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1401.00	H	109	315	-62.06	8.34	-53.72	-40.7
2101.50	H	191	296	-75.13	9.00	-66.13	-53.1
2802.00	H	-	-	-77.08	10.04	-67.04	-54.0

Table 7-8. Radiated Spurious Data (Band 12 – Low Channel)

FCC ID: A3LSMJ737A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset		Page 125 of 147

OPERATING FREQUENCY: 707.50 MHz
 CHANNEL: 23095
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	H	158	307	-59.46	8.41	-51.05	-38.1
2122.50	H	104	7	-73.97	8.95	-65.03	-52.0
2830.00	H	135	36	-75.65	10.11	-65.54	-52.5
3537.50	H	-	-	-74.25	9.72	-64.53	-51.5

Table 7-9. Radiated Spurious Data (Band 12 – Mid Channel)

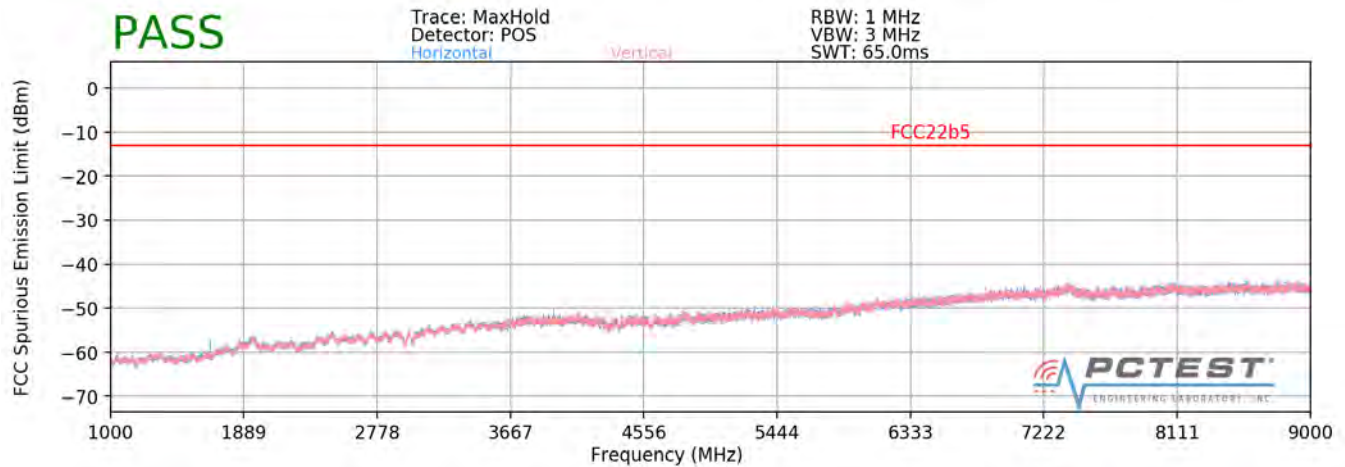
OPERATING FREQUENCY: 714.50 MHz
 CHANNEL: 23165
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1429.00	H	134	317	-61.03	8.47	-52.56	-39.6
2143.50	H	113	21	-73.76	8.90	-64.86	-51.9
2858.00	H	172	202	-76.52	10.17	-66.34	-53.3
3572.50	H	-	-	-73.76	9.79	-63.98	-51.0

Table 7-10. Radiated Spurious Data (Band 12 – High Channel)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 126 of 147

Band 5



Plot 7-189. Radiated Spurious Plot above 1GHz (Band 5)

OPERATING FREQUENCY: 825.50 MHz
CHANNEL: 20415
MODULATION SIGNAL: QPSK
BANDWIDTH: 3.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1651.00	H	135	49	-74.12	9.01	-65.11	-52.1
2476.50	H	159	135	-74.00	9.12	-64.88	-51.9
3302.00	H	-	-	-73.90	9.37	-64.54	-51.5

Table 7-11. Radiated Spurious Data (Band 5 – Low Channel)

FCC ID: A3LSMJ737A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset		Page 127 of 147

OPERATING FREQUENCY: 836.50 MHz
 CHANNEL: 20525
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	H	104	44	-78.45	8.85	-69.60	-56.6
2509.50	H	-	-	-76.27	9.17	-67.10	-54.1
3346.00	H	-	-	-73.96	9.36	-64.60	-51.6

Table 7-12. Radiated Spurious Data (Band 5 – Mid Channel)

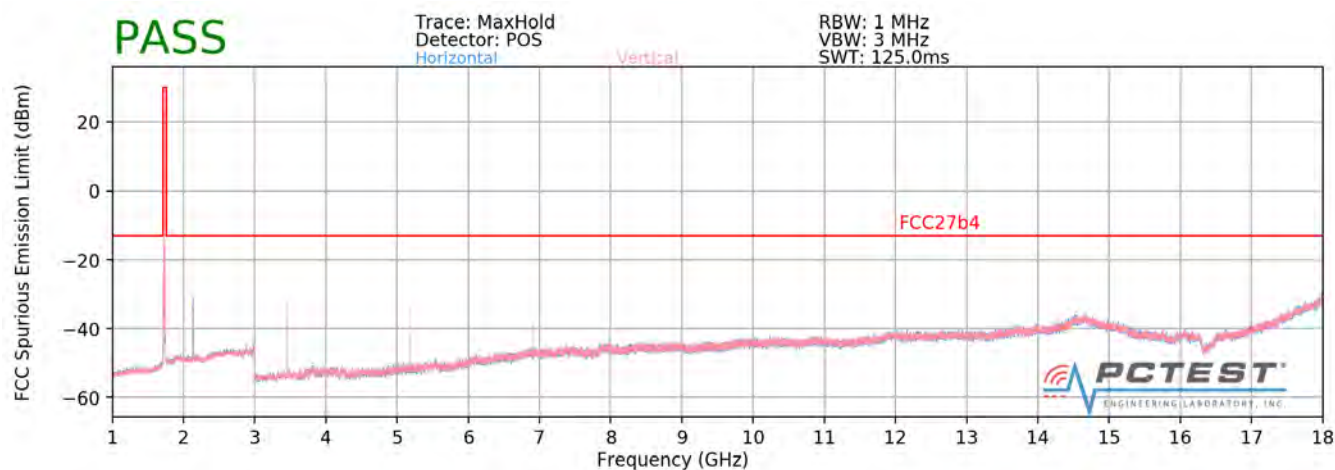
OPERATING FREQUENCY: 847.50 MHz
 CHANNEL: 20635
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 3.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1695.00	H	104	50	-75.02	8.69	-66.33	-53.3
2542.50	H	120	50	-75.33	9.27	-66.06	-53.1
3390.00	H	-	-	-72.82	9.45	-63.37	-50.4

Table 7-13. Radiated Spurious Data (Band 5 – High Channel)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 128 of 147

Band 4



Plot 7-190. Radiated Spurious Plot above 1GHz (Band 4)

OPERATING FREQUENCY: 1712.50 MHz
CHANNEL: 19975
MODULATION SIGNAL: QPSK
BANDWIDTH: 5.0 MHz
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3425.00	H	135	49	-48.64	9.52	-39.13	-26.1
5137.50	H	100	219	-55.85	10.81	-45.04	-32.0
6850.00	H	100	210	-54.28	10.84	-43.44	-30.4
8562.50	H	-	-	-63.59	11.66	-51.92	-38.9

Table 7-14. Radiated Spurious Data (Band 4 – Low Channel)

FCC ID: A3LSMJ737A	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 129 of 147

OPERATING FREQUENCY: 1732.50 MHz
 CHANNEL: 20175
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3465.00	H	140	0	-47.93	9.59	-38.33	-25.3
5197.50	H	113	222	-52.95	10.83	-42.12	-29.1
6930.00	H	104	132	-56.62	10.90	-45.72	-32.7
8662.50	H	-	-	-67.79	11.76	-56.03	-43.0

Table 7-15. Radiated Spurious Data (Band 4 – Mid Channel)

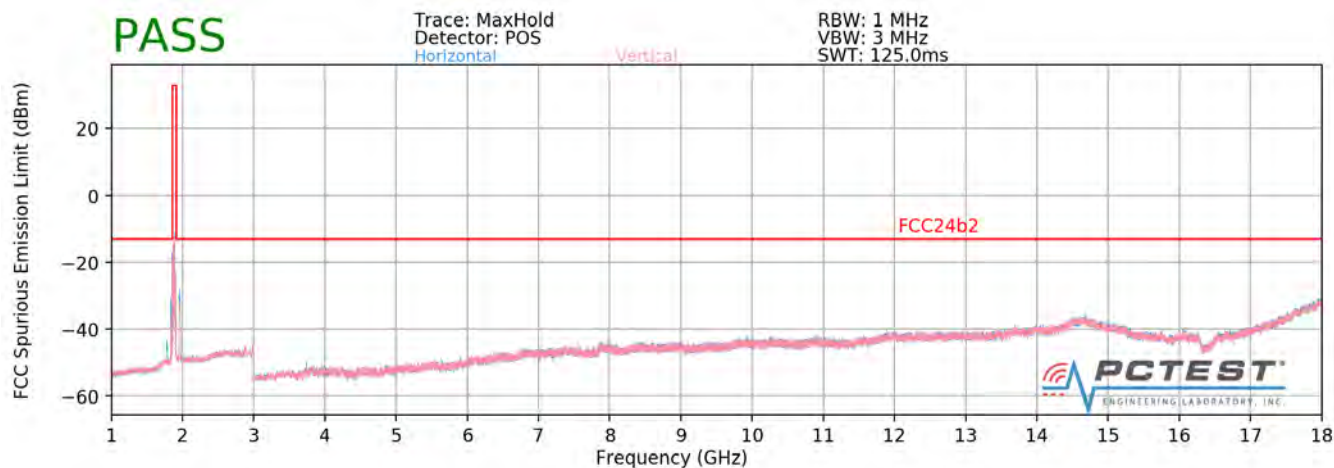
OPERATING FREQUENCY: 1752.50 MHz
 CHANNEL: 20375
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3505.00	H	113	37	-52.38	9.67	-42.71	-29.7
5257.50	H	104	222	-50.34	10.97	-39.37	-26.4
7010.00	H	100	133	-58.23	11.00	-47.23	-34.2
8762.50	H	-	-	-63.62	11.89	-51.74	-38.7

Table 7-16. Radiated Spurious Data (Band 4 – High Channel)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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Band 2



Plot 7-191. Radiated Spurious Plot above 1GHz (Band 2)

OPERATING FREQUENCY: 1860.00 MHz

CHANNEL: 18700

MODULATION SIGNAL: QPSK

BANDWIDTH: 20.0 MHz

DISTANCE: 3 meters

LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3720.00	H	109	36	-57.50	9.66	-47.84	-34.8
5580.00	H	-	-	-67.61	11.03	-56.58	-43.6
7440.00	H	-	-	-62.86	10.86	-52.00	-39.0

Table 7-17. Radiated Spurious Data (Band 2 – Low Channel)

FCC ID: A3LSMJ737A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset		Page 131 of 147

OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 18900
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	H	104	38	-65.14	9.50	-55.64	-42.6
5640.00	H	-	-	-67.70	11.16	-56.54	-43.5
7520.00	H	-	-	-63.47	11.03	-52.44	-39.4

Table 7-18. Radiated Spurious Data (Band 2 – Mid Channel)

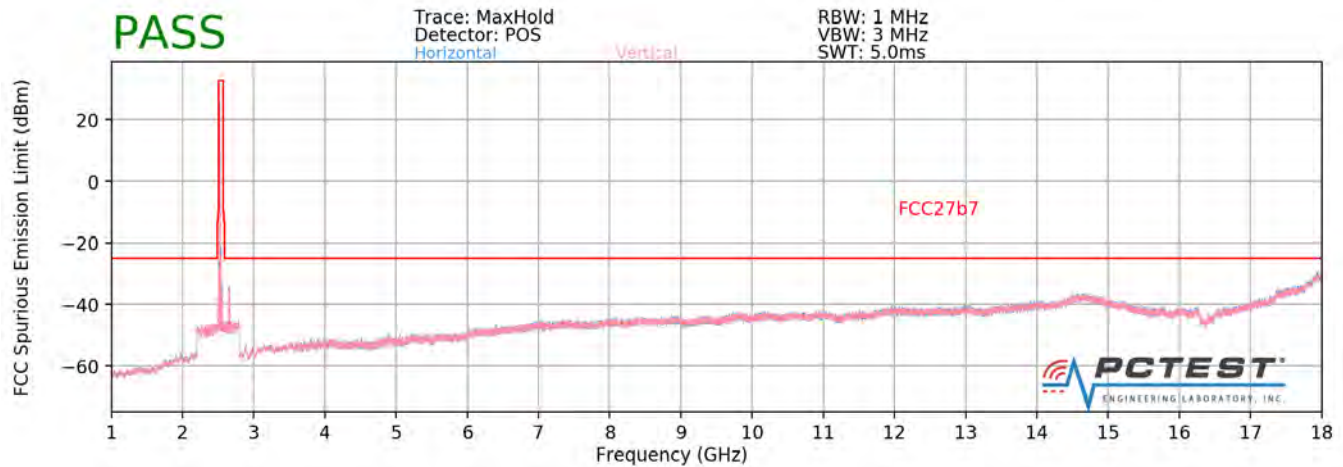
OPERATING FREQUENCY: 1900.00 MHz
 CHANNEL: 19100
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3800.00	H	100	36	-61.56	9.35	-52.21	-39.2
5700.00	H	-	-	-68.31	11.30	-57.02	-44.0
7600.00	H	-	-	-63.54	11.21	-52.32	-39.3

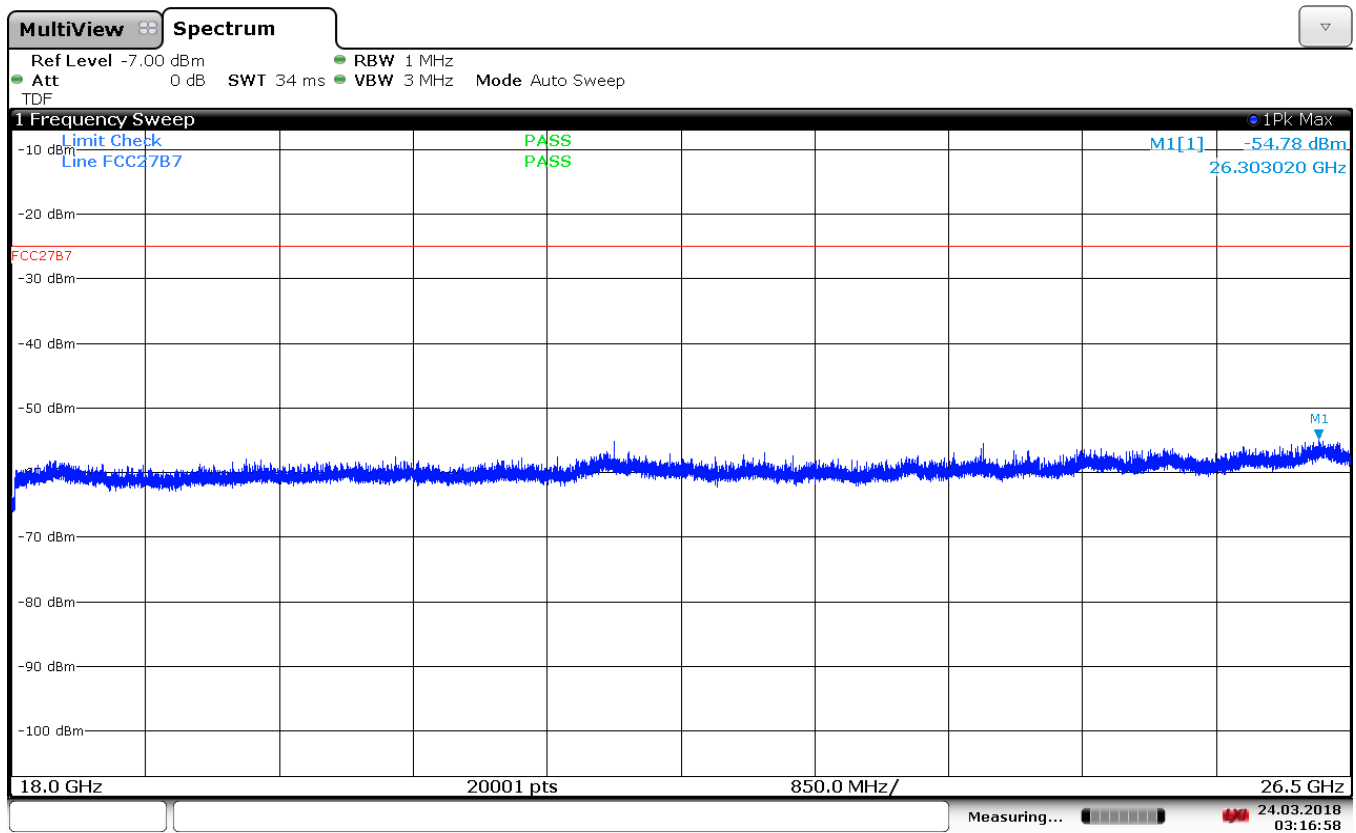
Table 7-19. Radiated Spurious Data (Band 2 – High Channel)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 132 of 147

Band 7



Plot 7-192. Radiated Spurious Plot 1GHz - 18GHz (Band 7)



03:16:59 24.03.2018

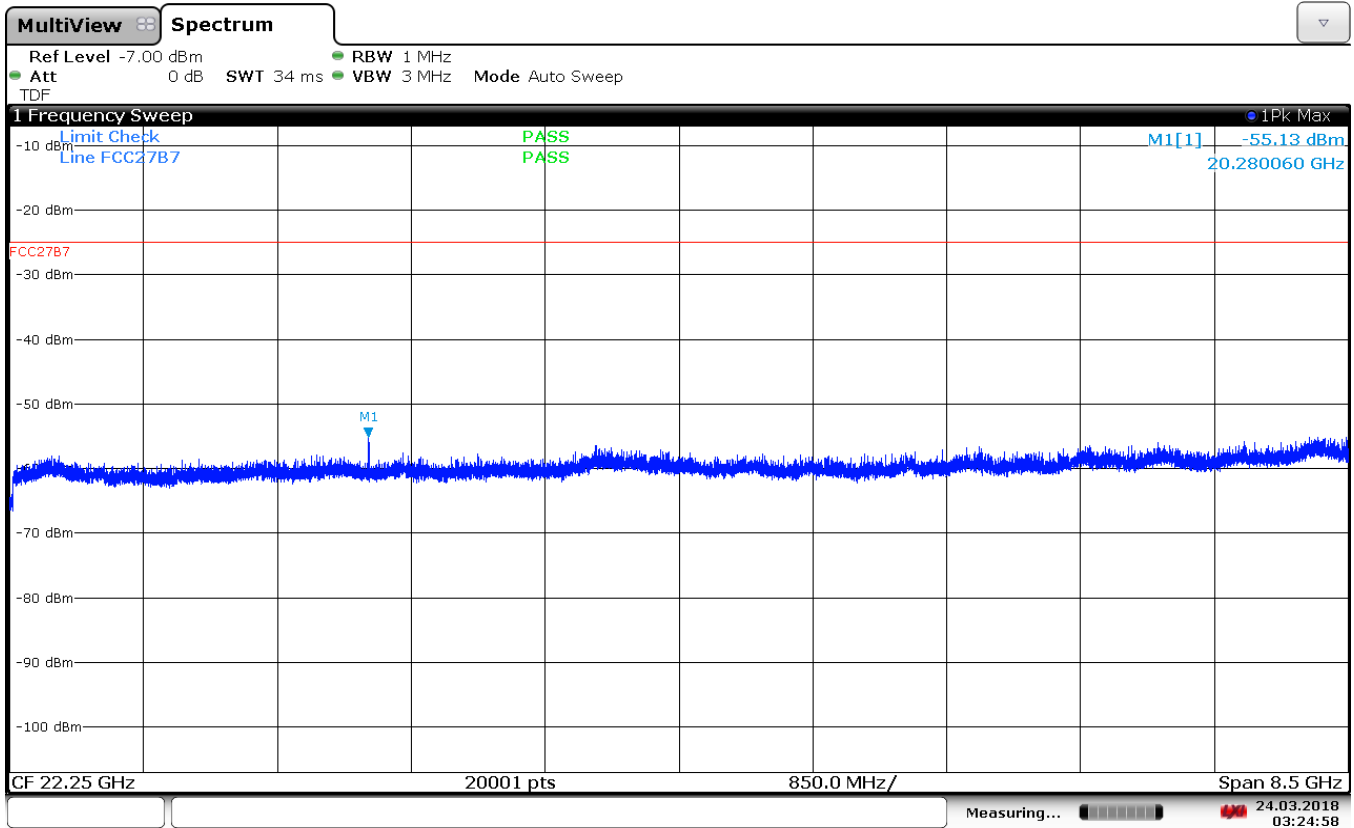
Plot 7-193. Radiated Spurious Plot 18GHz – 26.5GHz (Band 7) – Horizontal

FCC ID: A3LSMJ737A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset		Page 133 of 147

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V 7.5 2/26/2018



03:24:59 24.03.2018

Plot 7-194. Radiated Spurious Plot 18GHz – 26.5GHz (Band 7) – Vertical

OPERATING FREQUENCY: 2505.00 MHz
 CHANNEL: 20800
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5010.00	V	117	51	-67.01	11.12	-55.89	-30.9
7515.00	V	100	188	-59.90	10.99	-48.90	-23.9
10020.00	V	-	-	-66.20	12.15	-54.04	-29.0

Table 7-20. Radiated Spurious Data (Band 7 – Low Channel)

FCC ID: A3LSMJ737A	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset		Page 134 of 147

OPERATING FREQUENCY: 2535.00 MHz
 CHANNEL: 21100
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5070.00	V	100	129	-64.55	10.93	-53.61	-28.6
7605.00	V	100	192	-60.08	11.22	-48.86	-23.9
10140.00	V	-	-	-66.21	12.31	-53.90	-28.9

Table 7-21. Radiated Spurious Data (Band 7 – Mid Channel)

OPERATING FREQUENCY: 2565.00 MHz
 CHANNEL: 21400
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5130.00	V	100	124	-62.36	10.77	-51.60	-26.6
7695.00	V	104	171	-61.36	11.39	-49.98	-25.0
10260.00	V	-	-	-65.90	12.47	-53.43	-28.4

Table 7-22. Radiated Spurious Data (Band 7 – High Channel)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 135 of 147

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency. For Part 24, Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 12 Frequency Stability Measurements

OPERATING FREQUENCY: 707,500,000 Hz
 CHANNEL: 23790
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,499,862	-138	-0.0000195
100 %		- 30	707,500,144	144	0.0000204
100 %		- 20	707,500,171	171	0.0000242
100 %		- 10	707,500,149	149	0.0000211
100 %		0	707,500,345	345	0.0000488
100 %		+ 10	707,500,039	39	0.0000055
100 %		+ 20	707,499,875	-125	-0.0000177
100 %		+ 30	707,500,027	27	0.0000038
100 %		+ 40	707,500,030	30	0.0000042
100 %		+ 50	707,500,372	372	0.0000526
BATT. ENDPOINT	3.45	+ 20	707,500,012	12	0.0000017

Table 7-23. Frequency Stability Data (Band 12)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 12 Frequency Stability Measurements

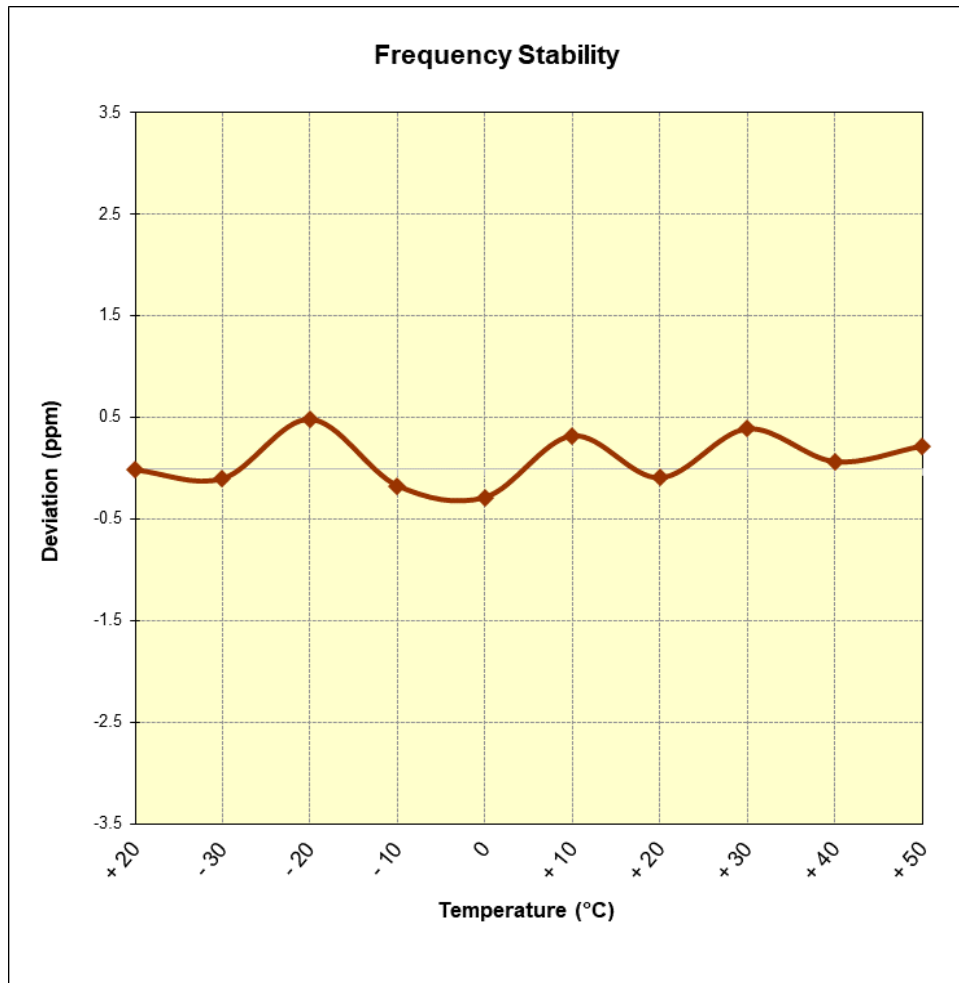


Figure 7-8. Frequency Stability Graph (Band 12)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 5 Frequency Stability Measurements

OPERATING FREQUENCY: 836,500,000 Hz
 CHANNEL: 20525
 REFERENCE VOLTAGE: 3.85 VDC
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,500,302	302	0.0000361
100 %		- 30	836,499,966	-34	-0.0000041
100 %		- 20	836,500,341	341	0.0000408
100 %		- 10	836,499,850	-150	-0.0000179
100 %		0	836,499,965	-35	-0.0000042
100 %		+ 10	836,500,030	30	0.0000036
100 %		+ 20	836,500,172	172	0.0000206
100 %		+ 30	836,499,862	-138	-0.0000165
100 %		+ 40	836,499,849	-151	-0.0000181
100 %		+ 50	836,499,853	-147	-0.0000176
BATT. ENDPOINT		+ 20	836,499,977	-23	-0.0000027

Table 7-24. Frequency Stability Data (Band 5)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 5 Frequency Stability Measurements

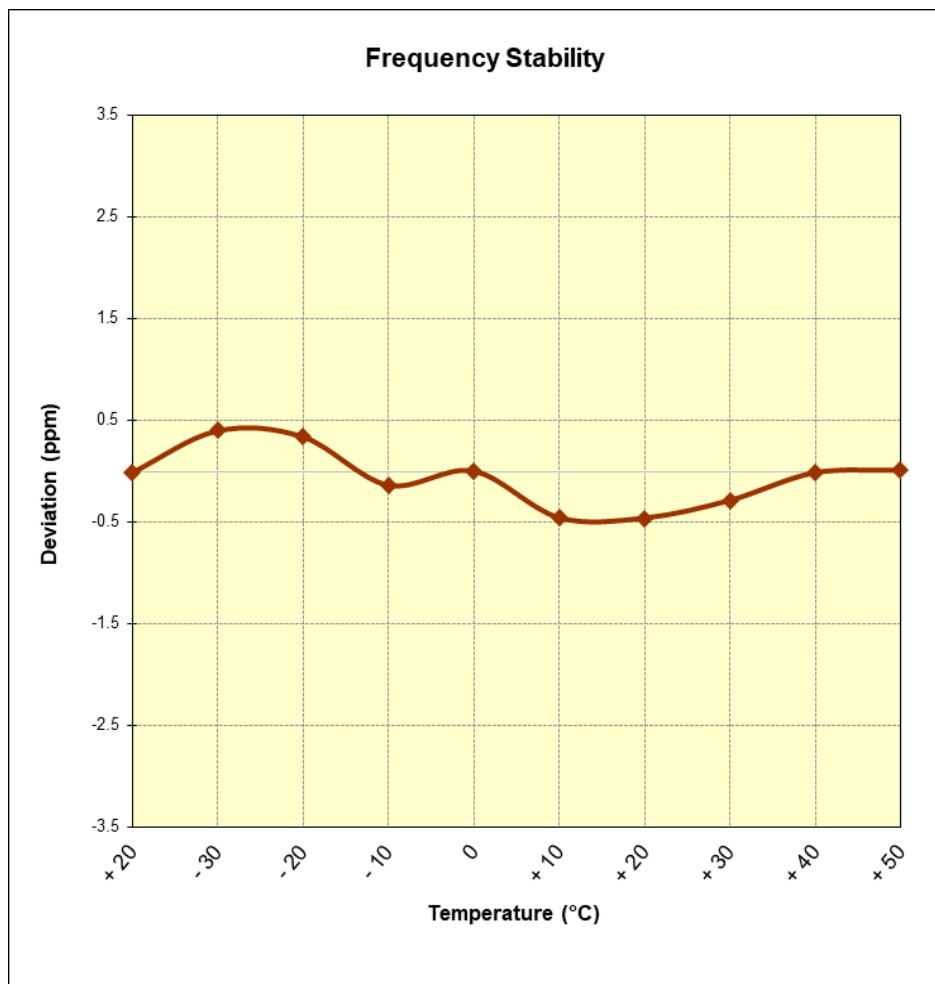


Figure 7-9. Frequency Stability Graph (Band 5)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,732,500,000 Hz
 CHANNEL: 20175
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,732,500,326	326	0.0000188
100 %		- 30	1,732,499,742	-258	-0.0000149
100 %		- 20	1,732,499,814	-186	-0.0000107
100 %		- 10	1,732,499,979	-21	-0.0000012
100 %		0	1,732,499,663	-337	-0.0000195
100 %		+ 10	1,732,499,682	-318	-0.0000184
100 %		+ 20	1,732,500,115	115	0.0000066
100 %		+ 30	1,732,500,152	152	0.0000088
100 %		+ 40	1,732,499,985	-15	-0.0000009
100 %		+ 50	1,732,499,904	-96	-0.0000055
BATT. ENDPOINT	3.45	+ 20	1,732,500,009	9	0.0000005

Table 7-25. Frequency Stability Data (Band 4)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 4 Frequency Stability Measurements

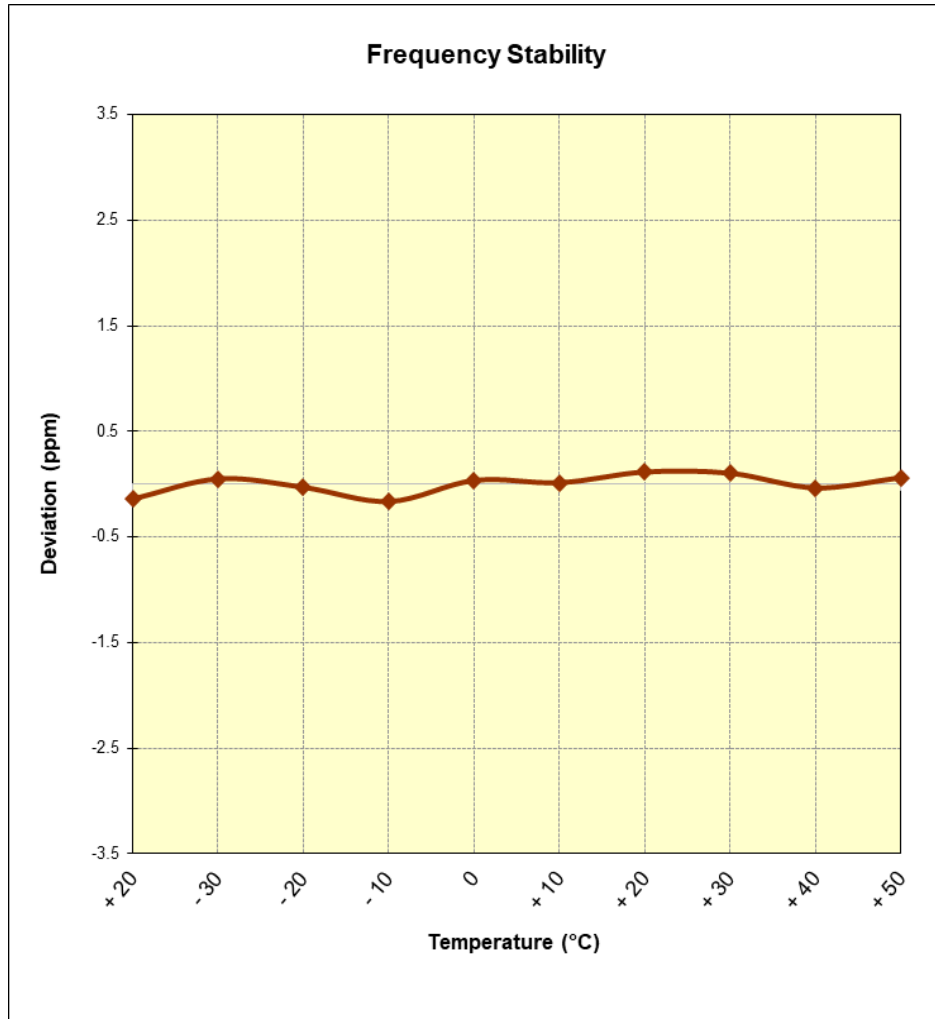


Figure 7-10. Frequency Stability Graph (Band 4)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 2 Frequency Stability Measurements

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 18900

REFERENCE VOLTAGE: 3.85 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,879,999,833	-167	-0.0000089
100 %		- 30	1,879,999,985	-15	-0.0000008
100 %		- 20	1,879,999,999	-1	-0.0000001
100 %		- 10	1,879,999,612	-388	-0.0000206
100 %		0	1,880,000,063	63	0.0000034
100 %		+ 10	1,880,000,020	20	0.0000011
100 %		+ 20	1,880,000,330	330	0.0000176
100 %		+ 30	1,880,000,233	233	0.0000124
100 %		+ 40	1,880,000,109	109	0.0000058
100 %		+ 50	1,880,000,129	129	0.0000069
BATT. ENDPOINT	3.45	+ 20	1,880,000,236	236	0.0000126

Table 7-26. Frequency Stability Data (Band 2)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 2 Frequency Stability Measurements

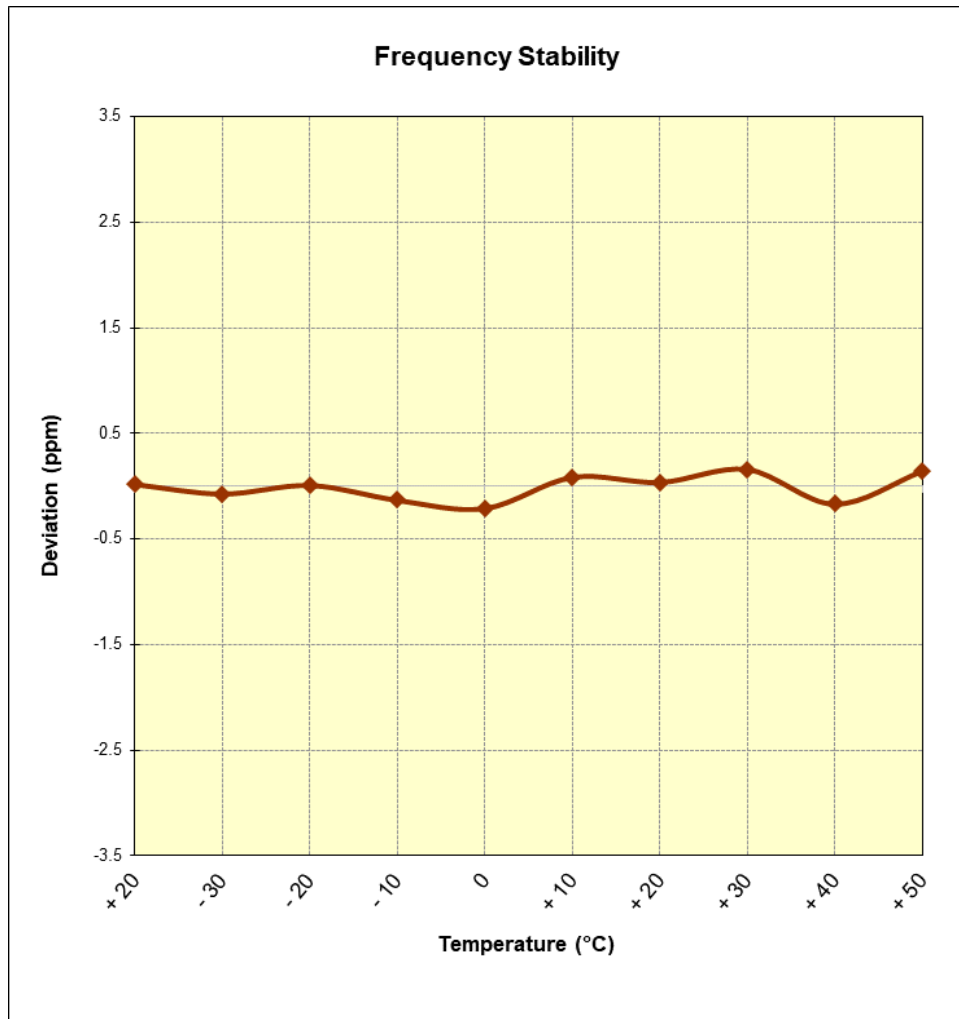


Figure 7-11. Frequency Stability Graph (Band 2)

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 7 Frequency Stability Measurements

OPERATING FREQUENCY: 2,535,000,000 Hz
 CHANNEL: 21100
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,535,000,018	18	0.0000007
100 %		- 30	2,535,000,005	5	0.0000002
100 %		- 20	2,534,999,865	-135	-0.0000053
100 %		- 10	2,534,999,927	-73	-0.0000029
100 %		0	2,534,999,743	-257	-0.0000101
100 %		+ 10	2,535,000,043	43	0.0000017
100 %		+ 20	2,534,999,763	-237	-0.0000093
100 %		+ 30	2,535,000,270	270	0.0000107
100 %		+ 40	2,535,000,100	100	0.0000039
100 %		+ 50	2,535,000,459	459	0.0000181
BATT. ENDPOINT	3.45	+ 20	2,534,999,771	-229	-0.0000090

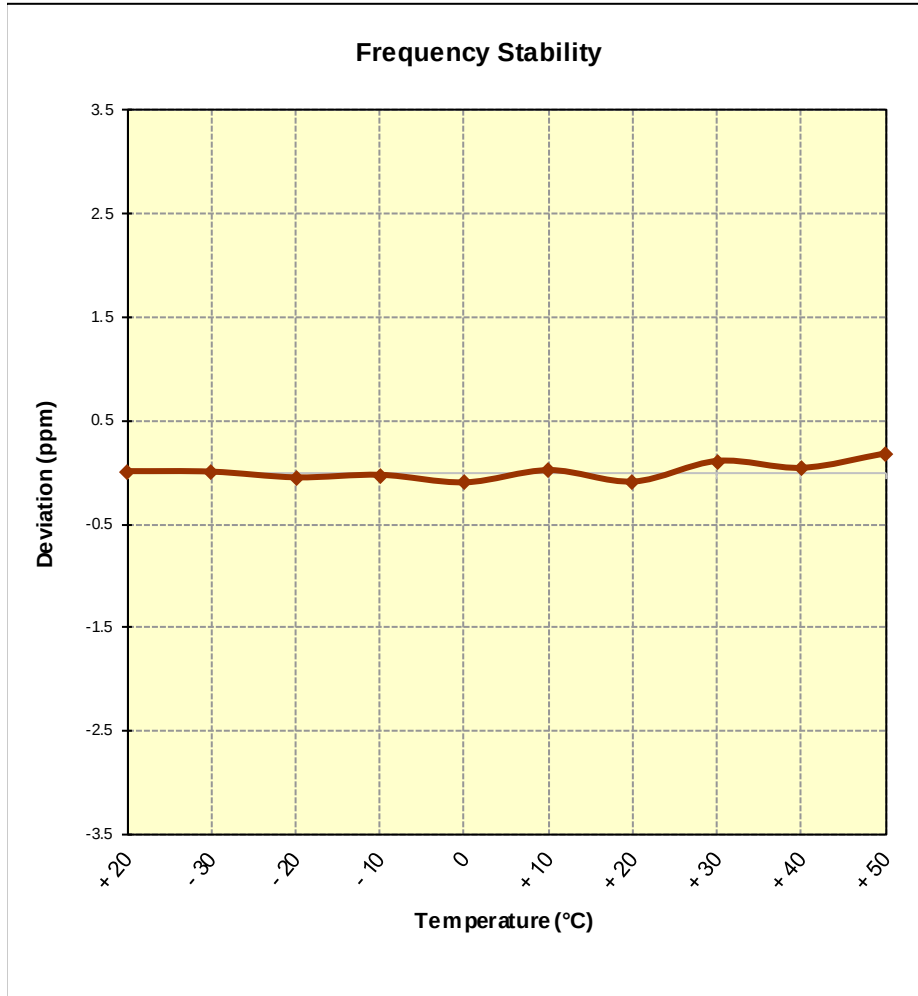
Table 7-27. Frequency Stability Data (Band 7)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: A3LSMJ737A	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 7 Frequency Stability Measurements



7-12. Frequency Stability Graph (Band 7)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMJ737A** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

FCC ID: A3LSMJ737A		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1803080036-03.A3L	Test Dates: 3/8-4/5/2018	EUT Type: Portable Handset	Page 147 of 147	