

7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §27.53(c) §27.53(g) §27.53(h) §27.53(m)

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 for Band 41 is as noted in the Test Notes on the following page.

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

Test Procedure Used

KDB 971168 D01 v02r02 – 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.

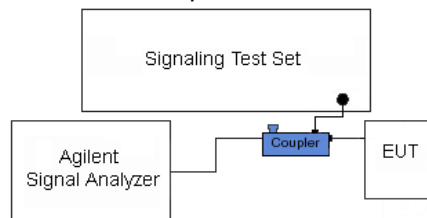


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

Per 22.917(b) 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.

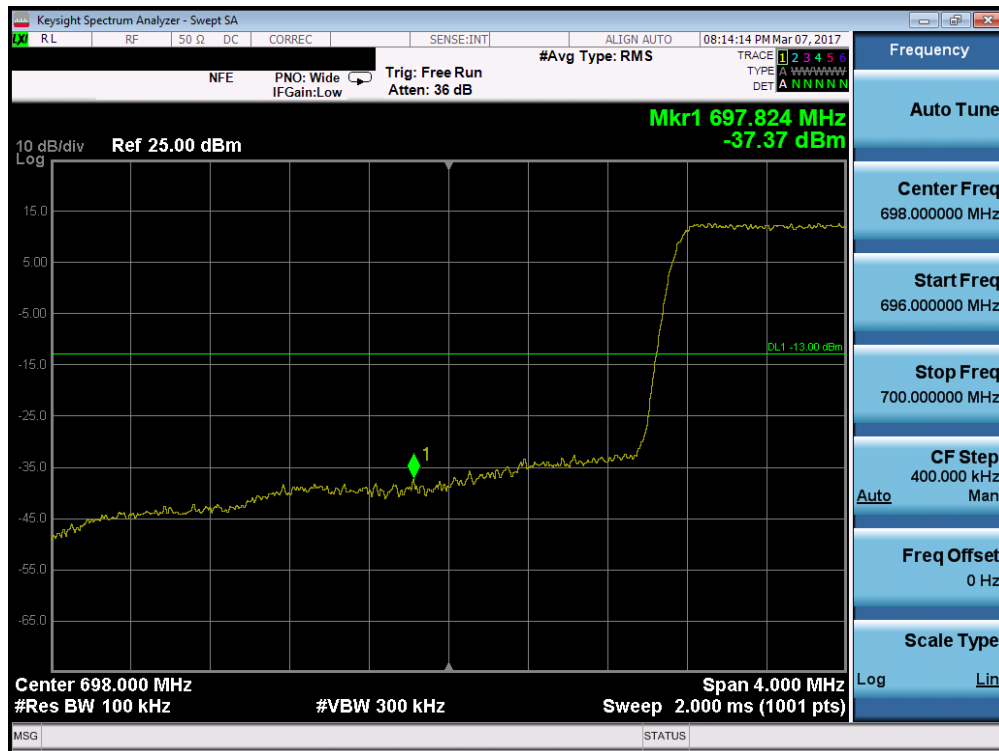
FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset	Page 57 of 116

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

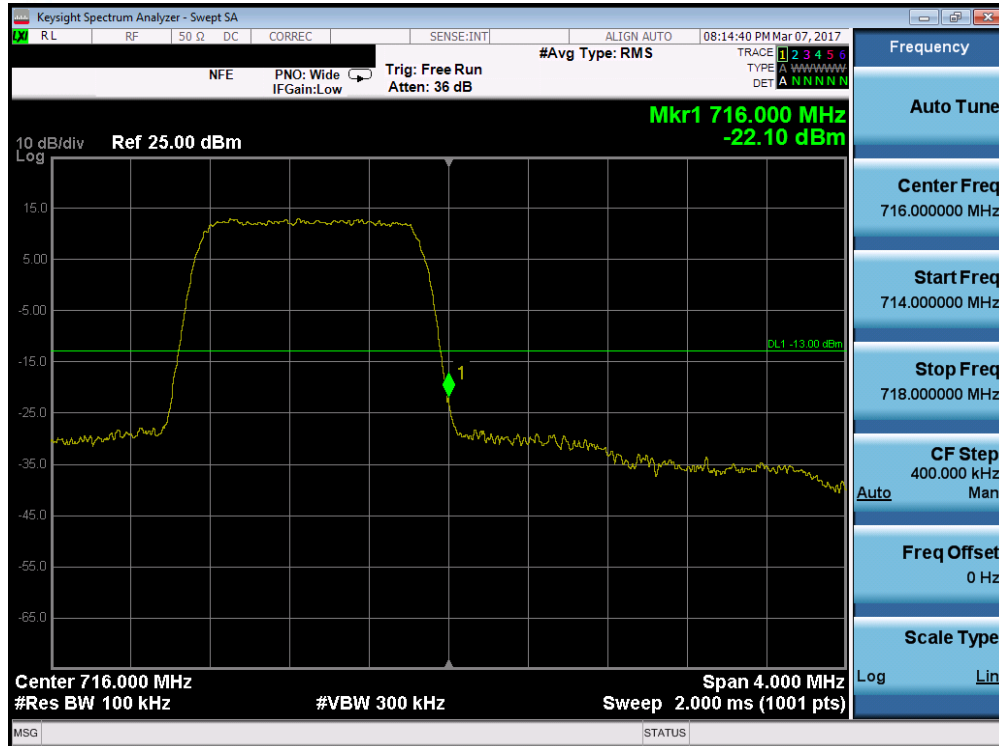
For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is $65 + 10\log_{10}(P) = -35\text{dBm}$ in a 6.25kHz bandwidth.

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

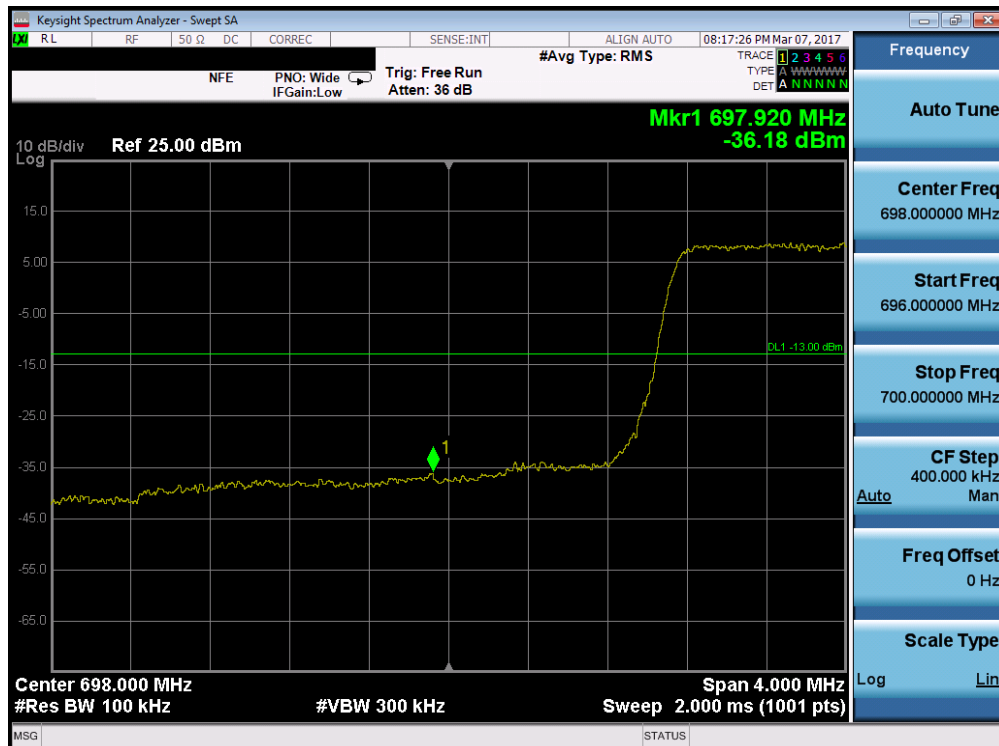


Plot 7-80. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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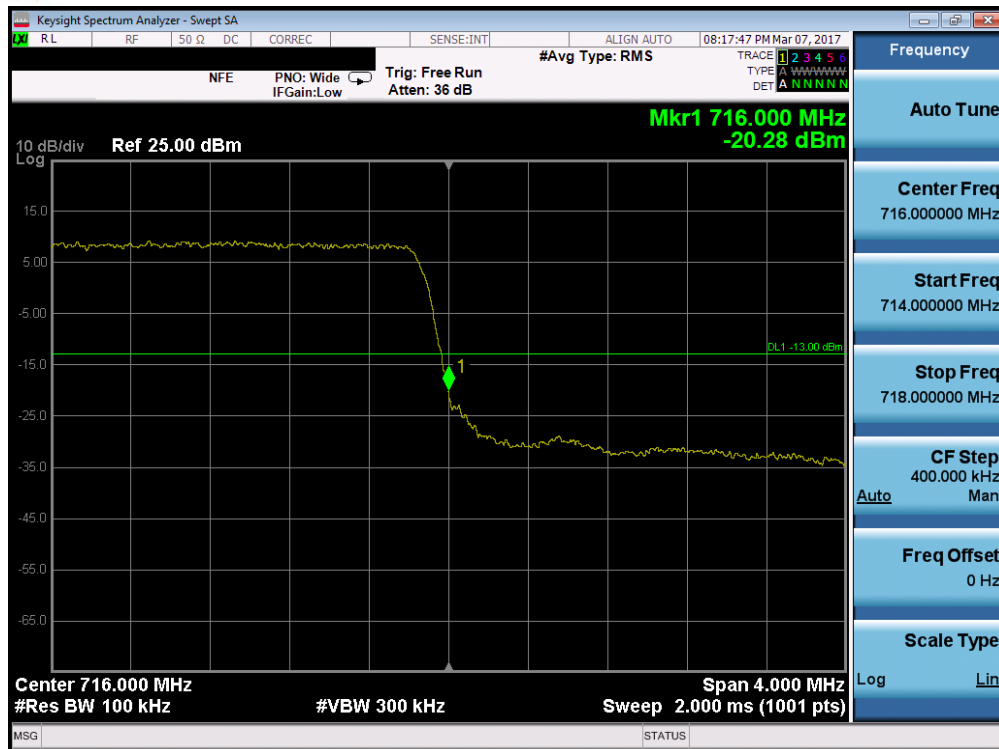


Plot 7-81. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

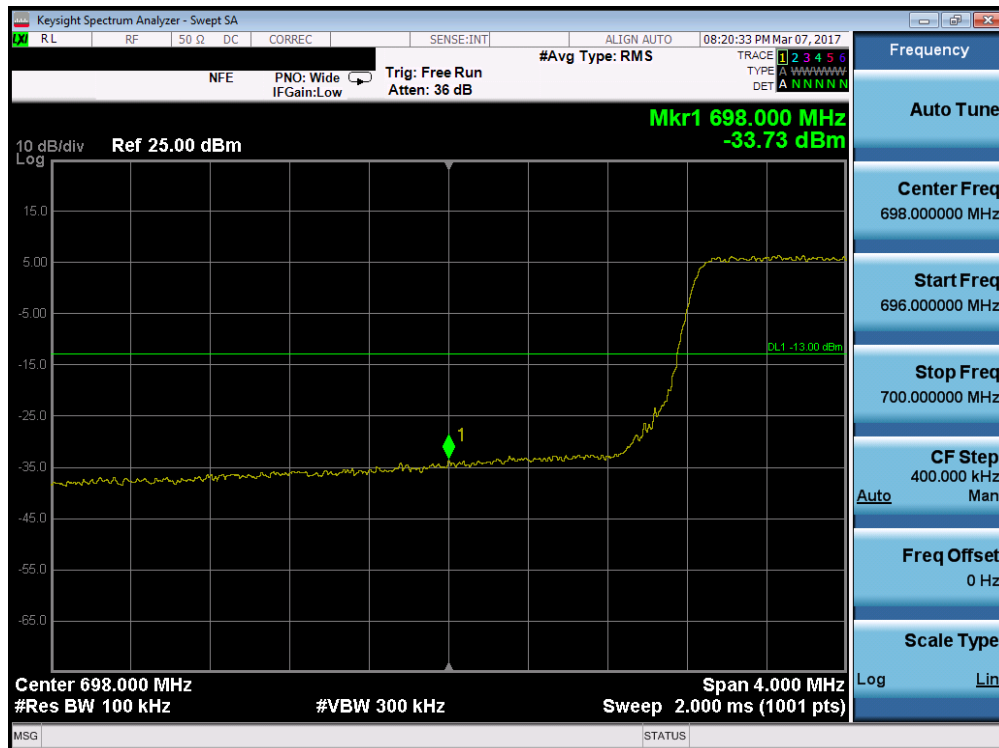


Plot 7-82. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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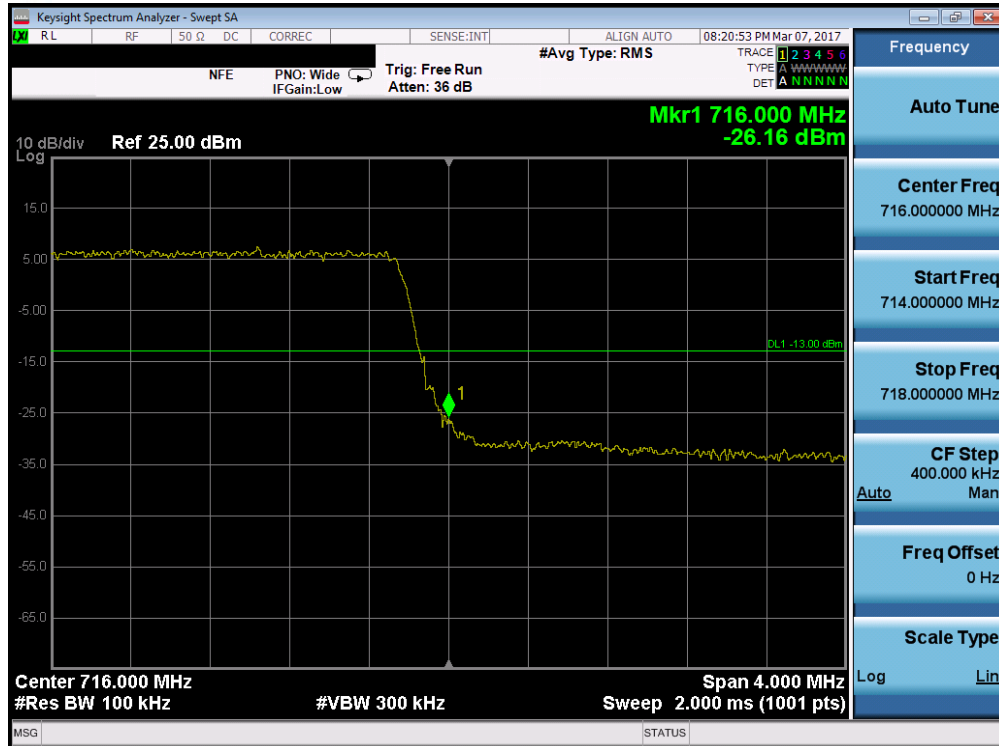


Plot 7-83. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

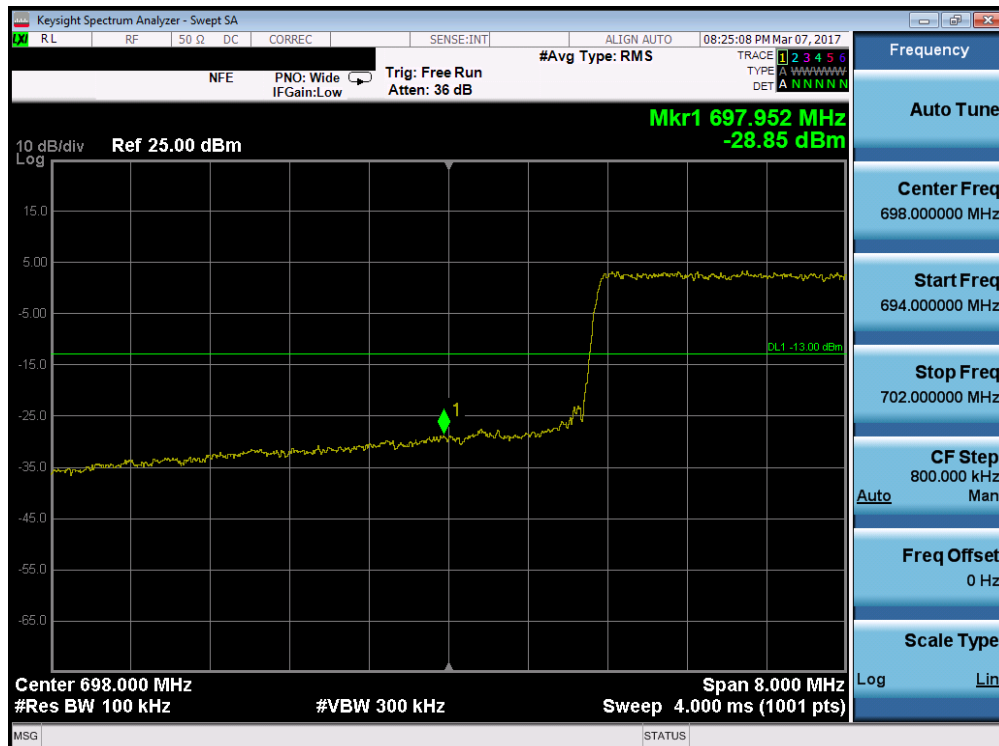


Plot 7-84. Lower Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-85. Upper Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

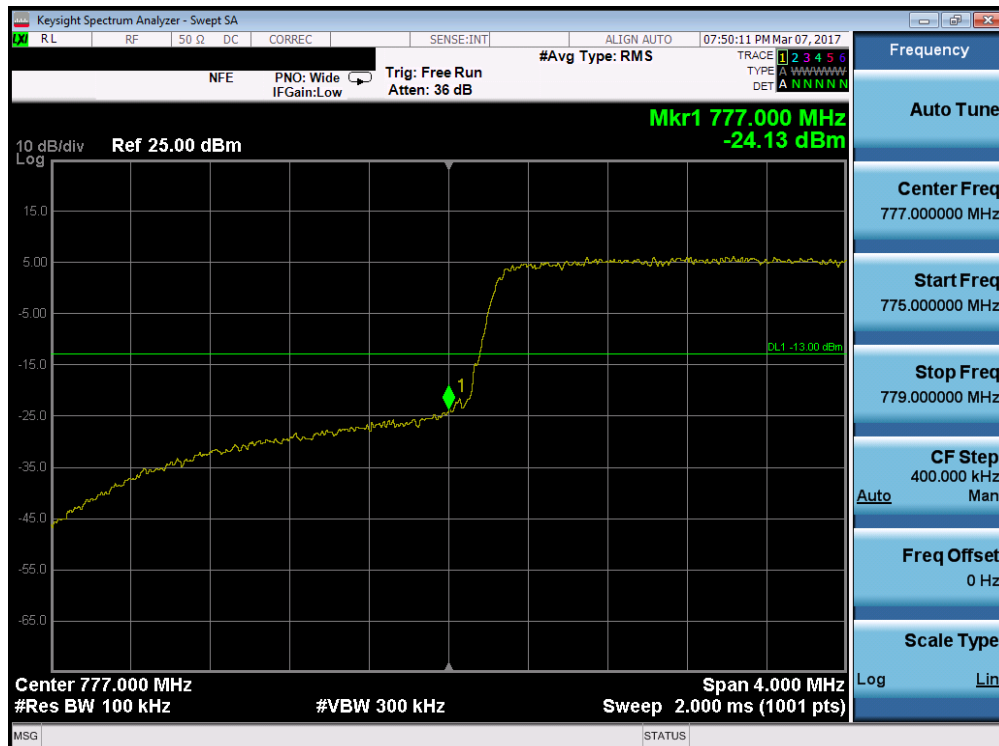


Plot 7-86. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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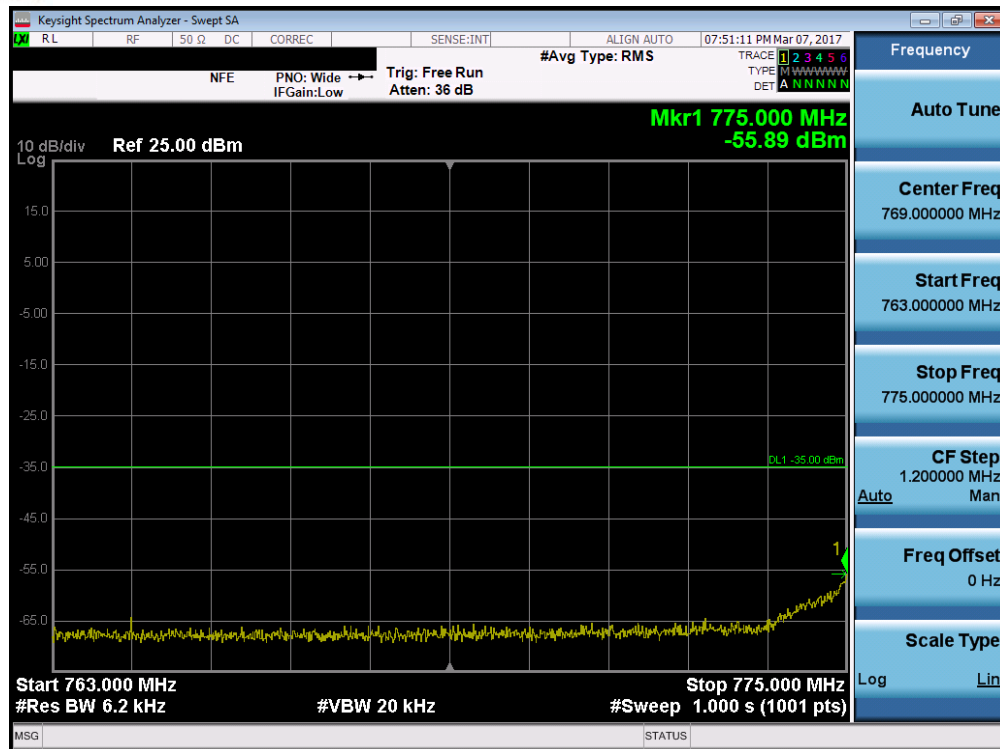


Plot 7-87. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)



Plot 7-88. Lower Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSC03J	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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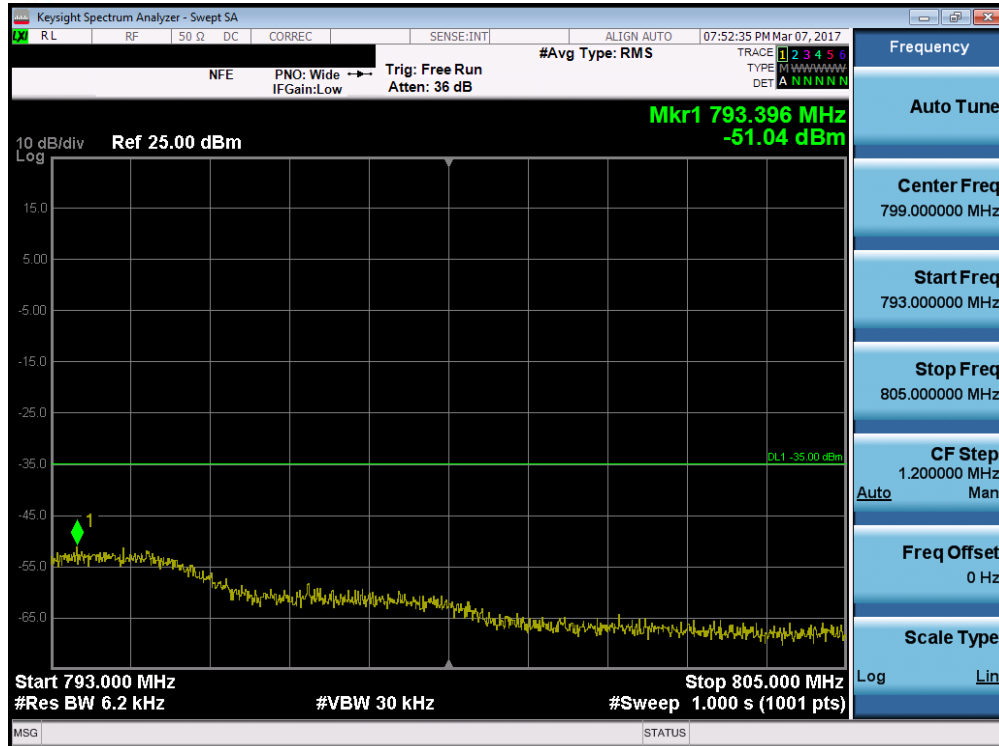


Plot 7-89. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

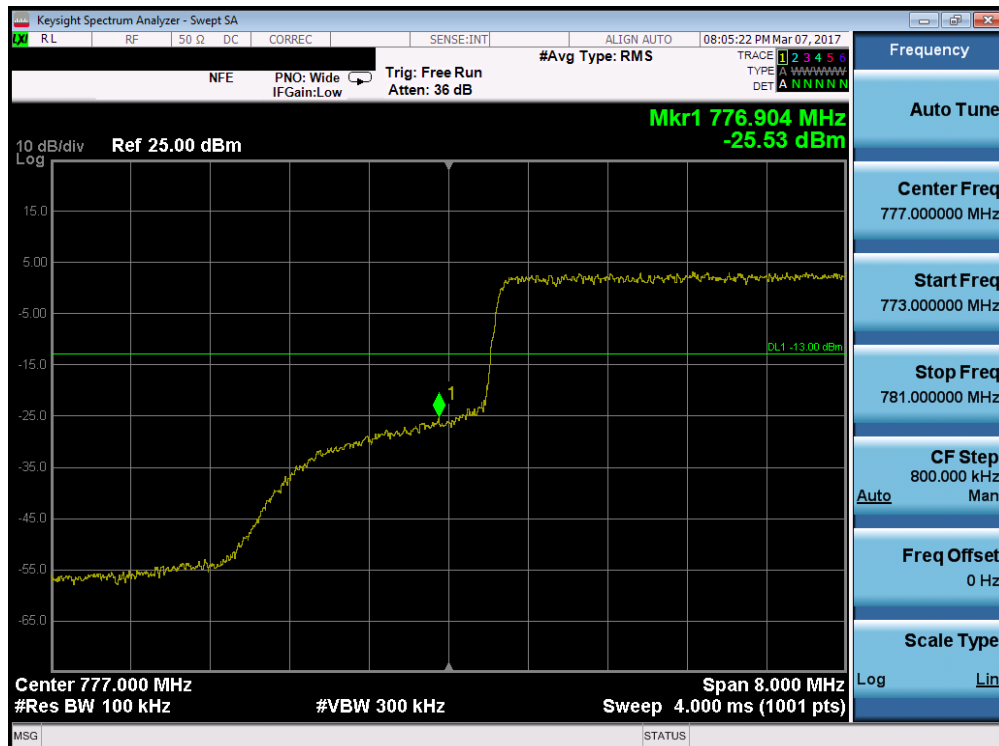


Plot 7-90. Upper Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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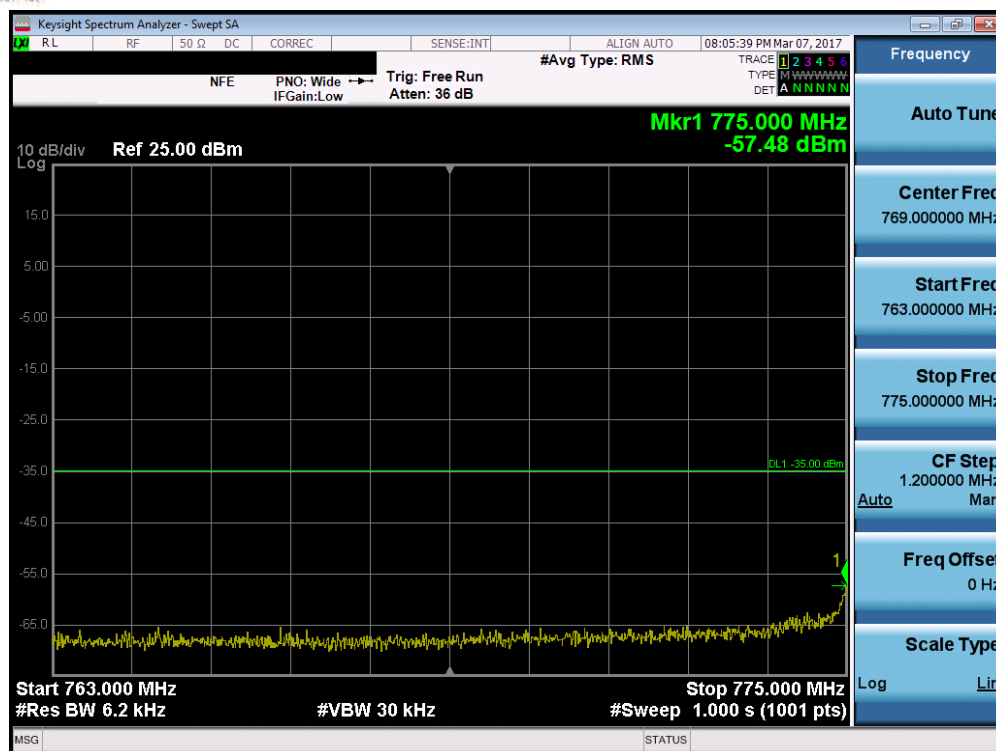


Plot 7-91. Upper Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

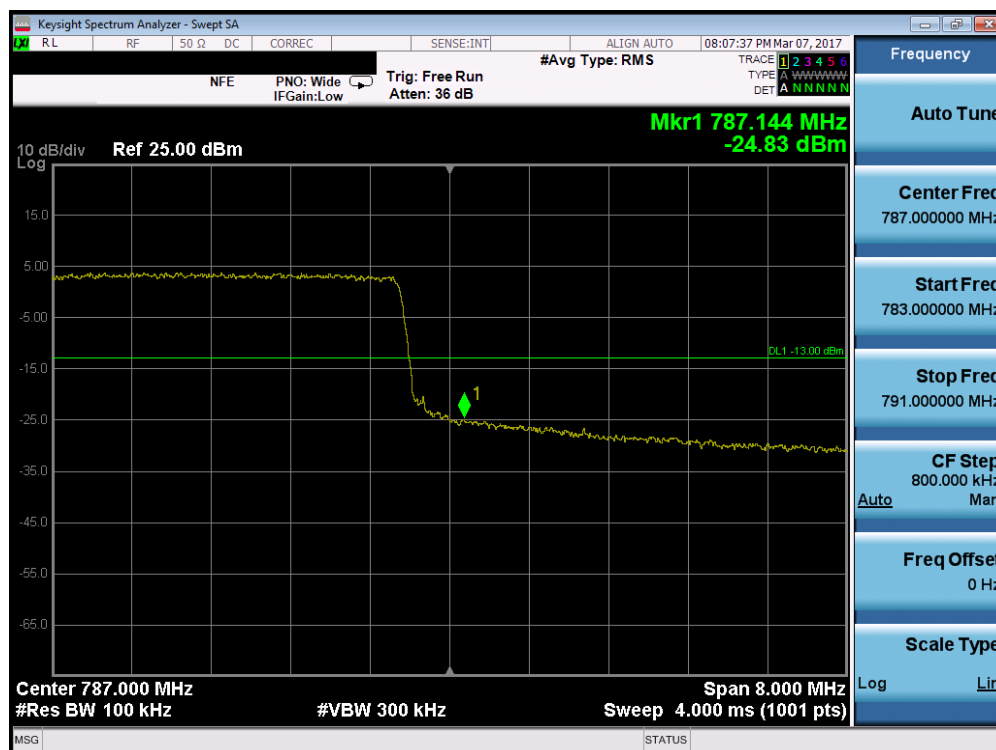


Plot 7-92. Lower Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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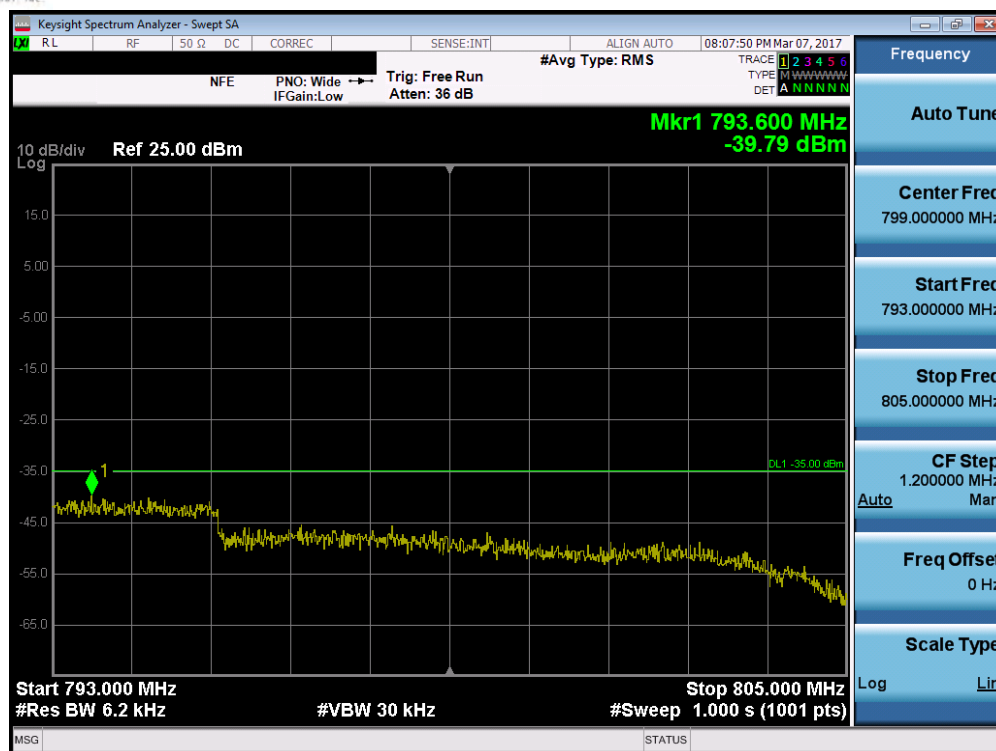


Plot 7-93. Lower Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

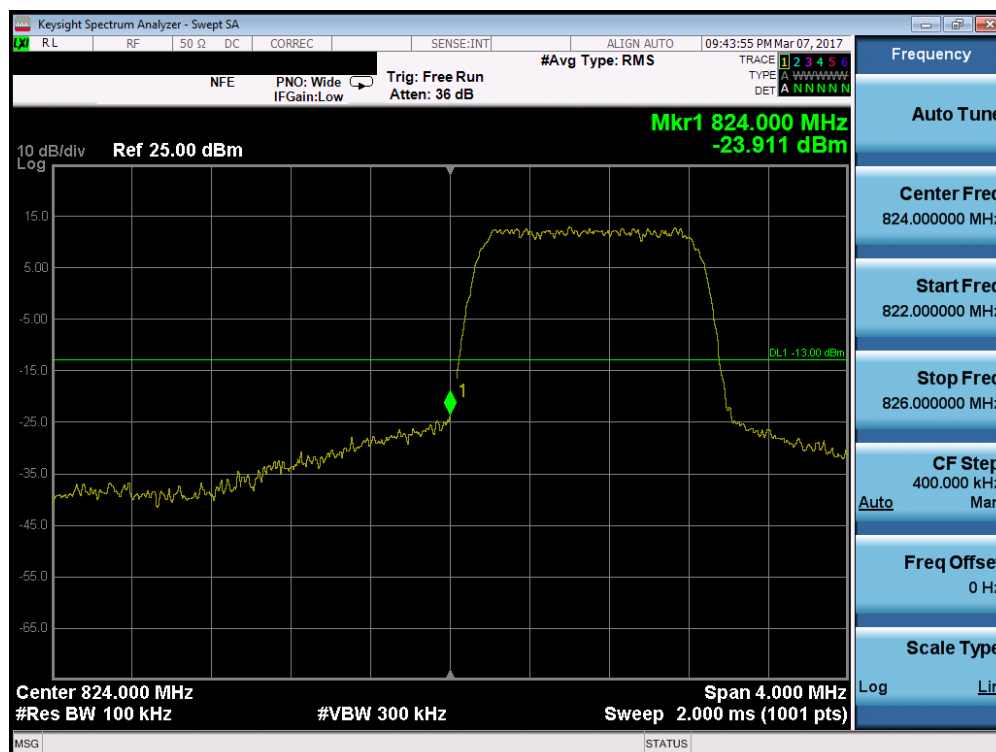


Plot 7-94. Upper Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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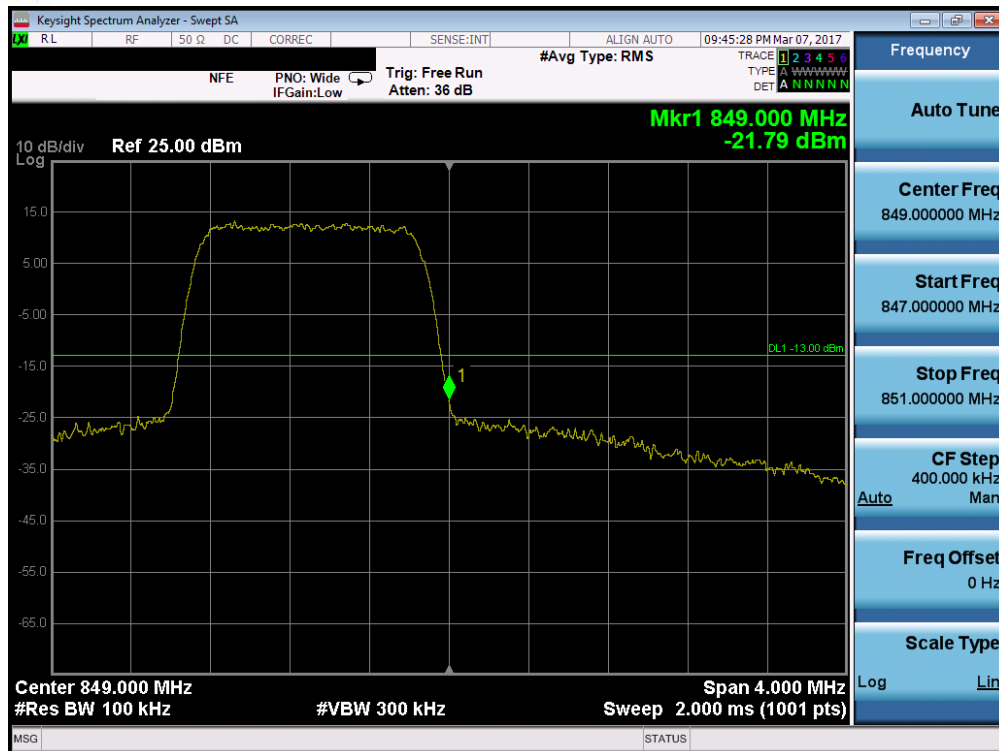


Plot 7-95. Upper Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

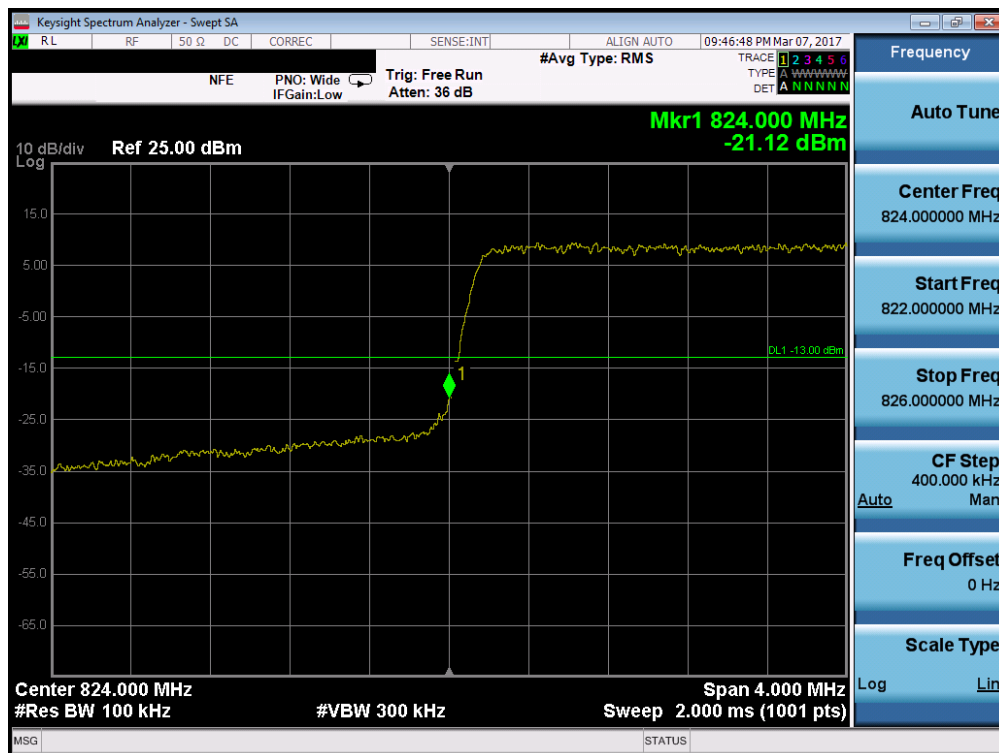


Plot 7-96. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Plot 7-97. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

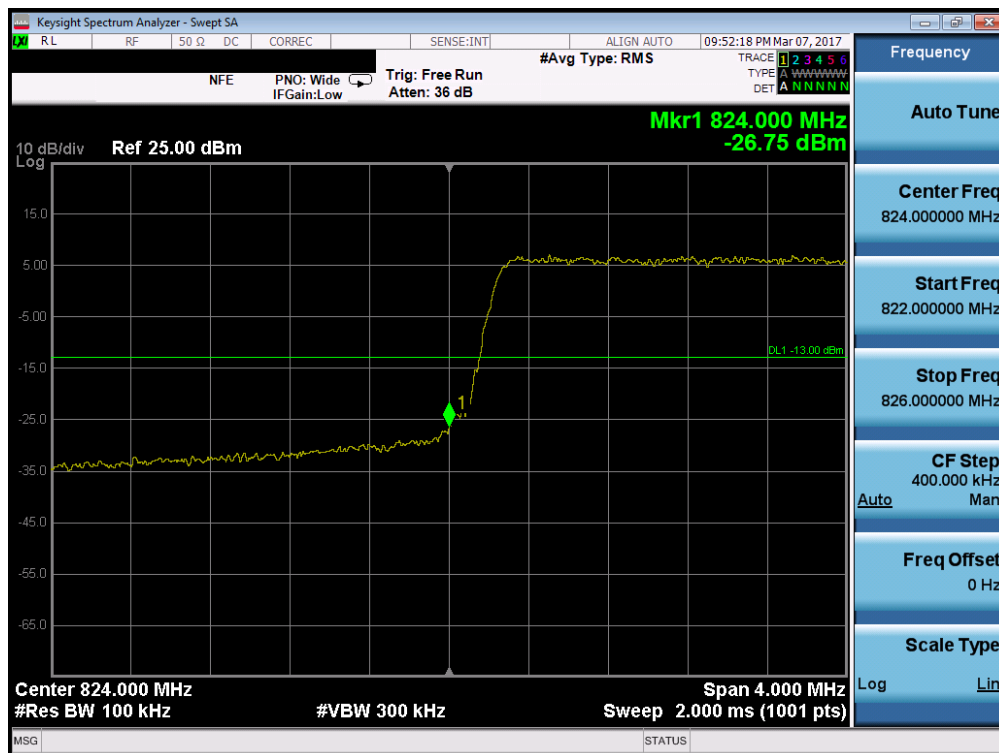


Plot 7-98. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-99. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

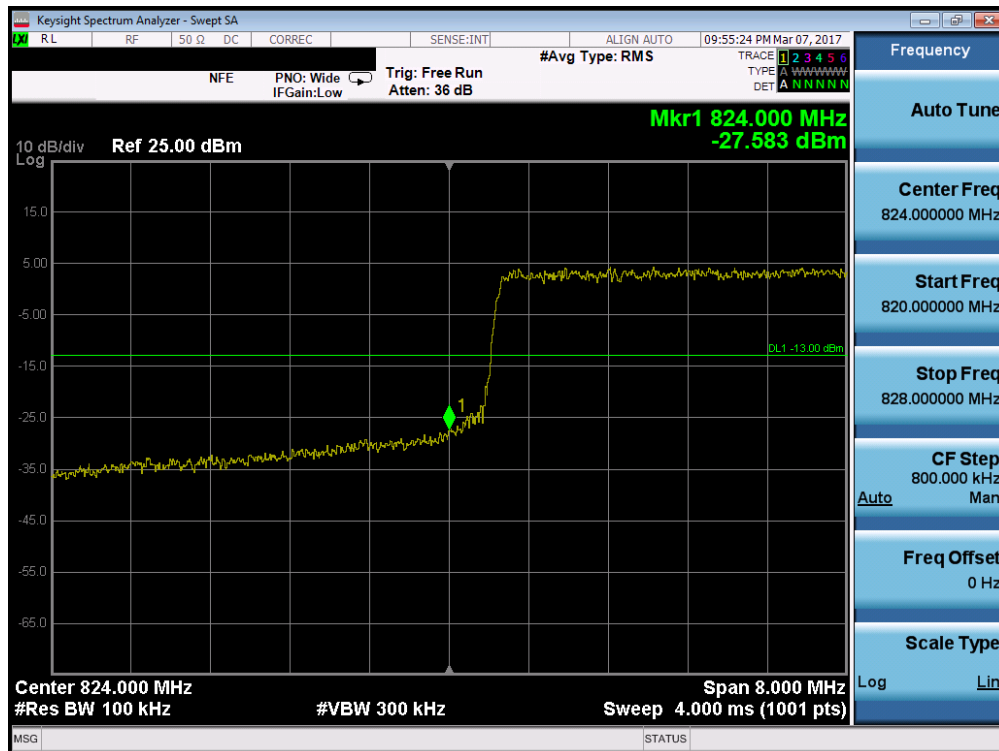


Plot 7-100. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSC03J			FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-101. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - RB Size 25)

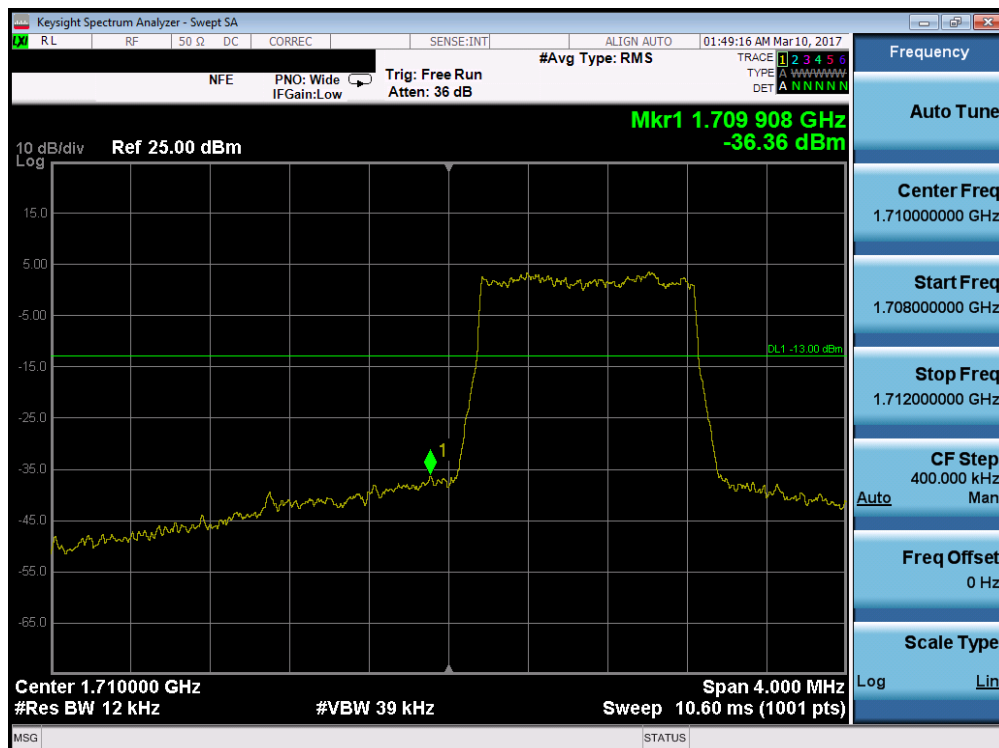


Plot 7-102. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - RB Size 50)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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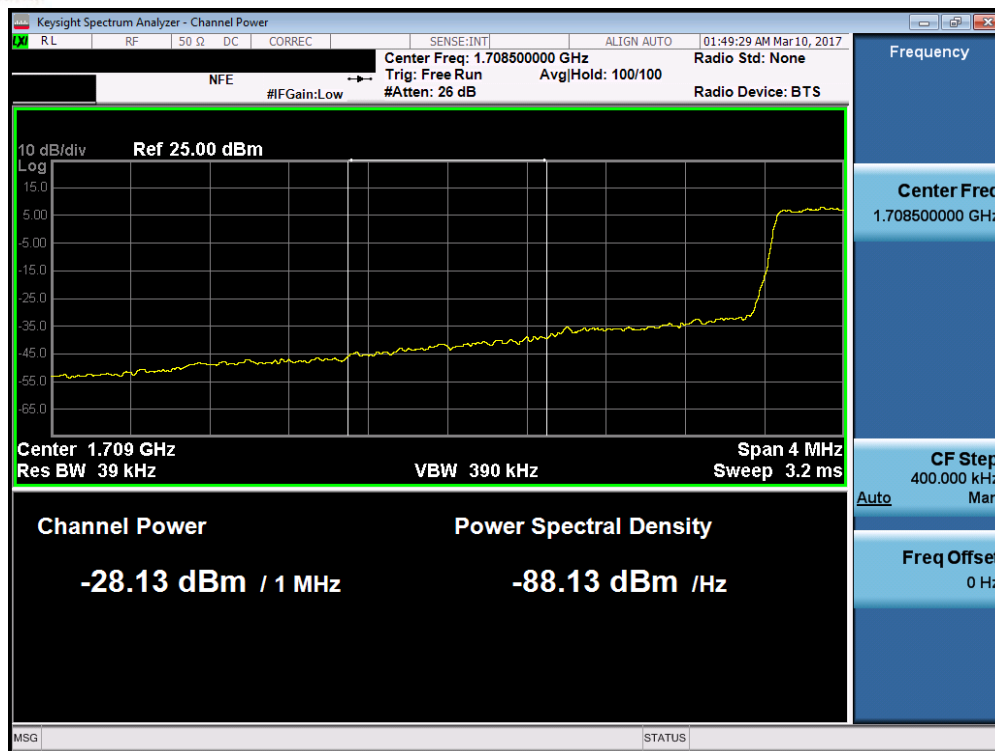


Plot 7-103. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

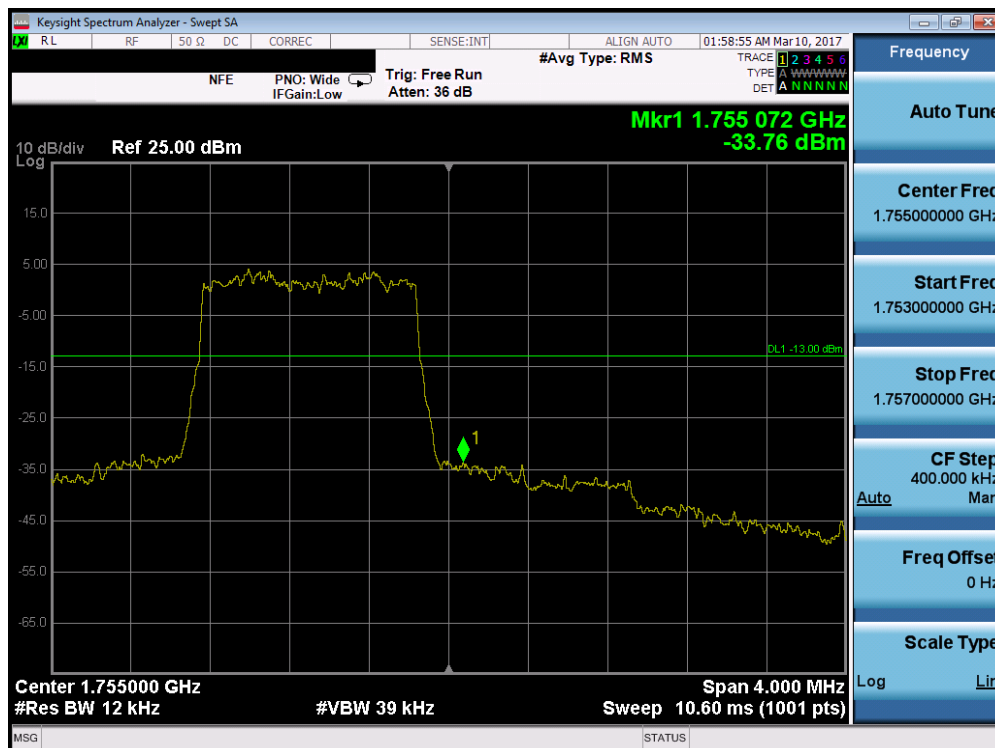


Plot 7-104. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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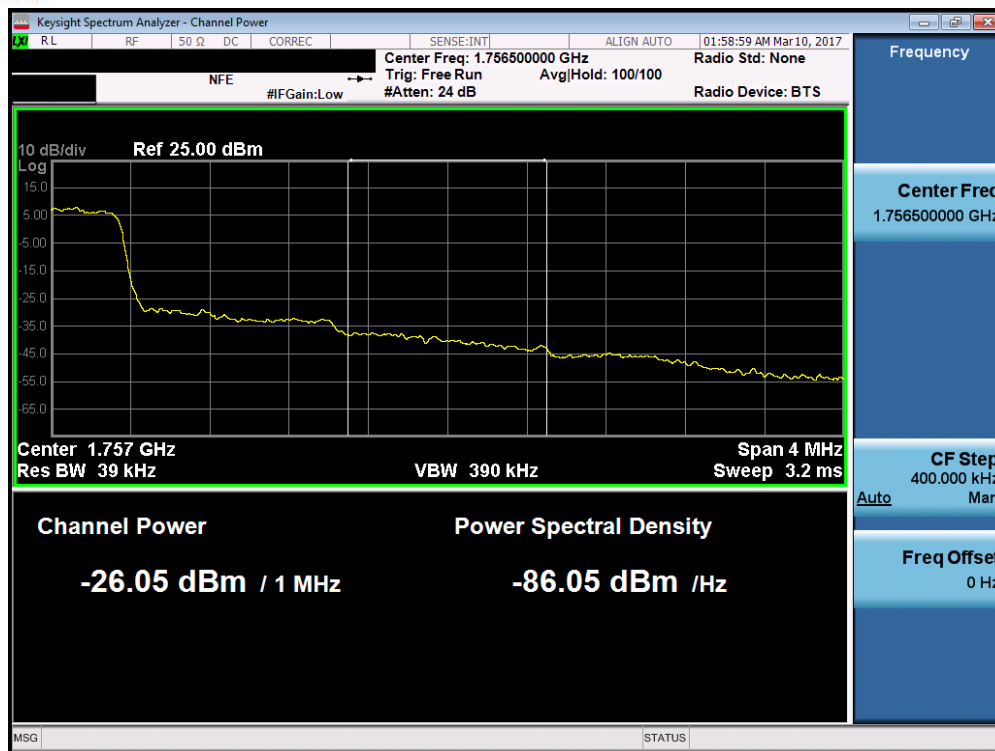


Plot 7-105. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

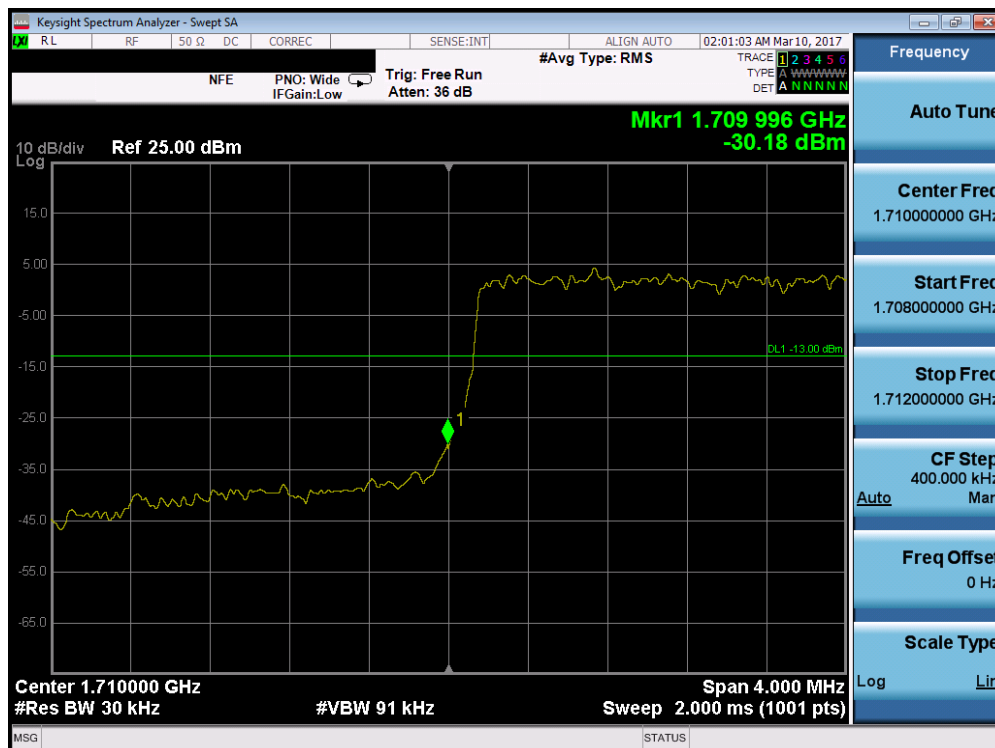


Plot 7-106. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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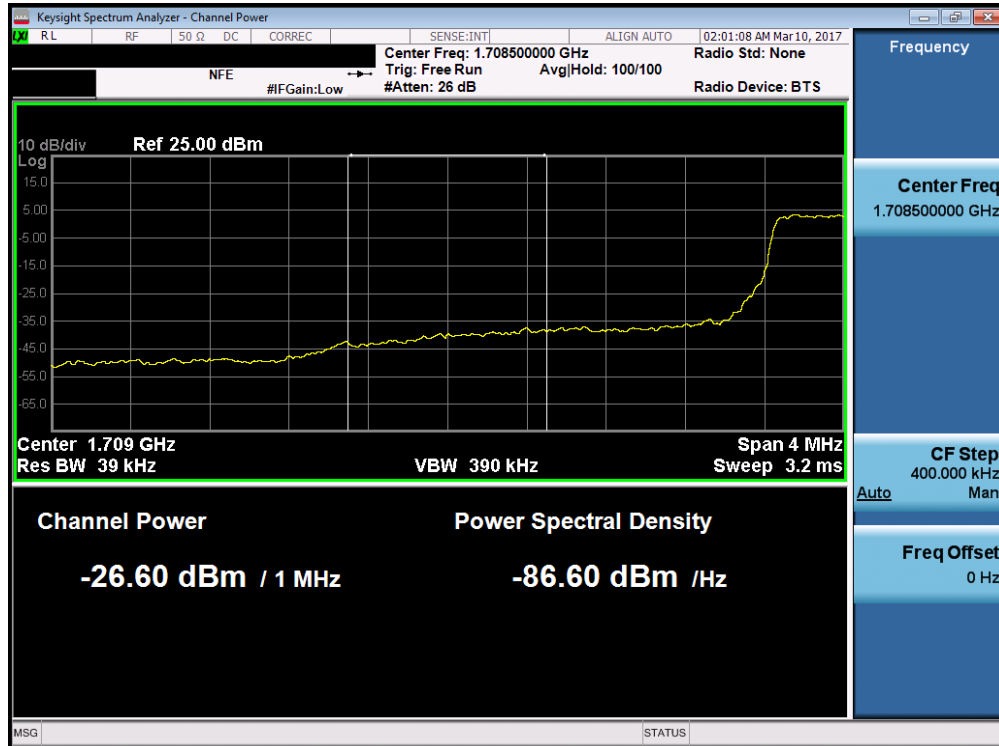


Plot 7-107. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



Plot 7-108. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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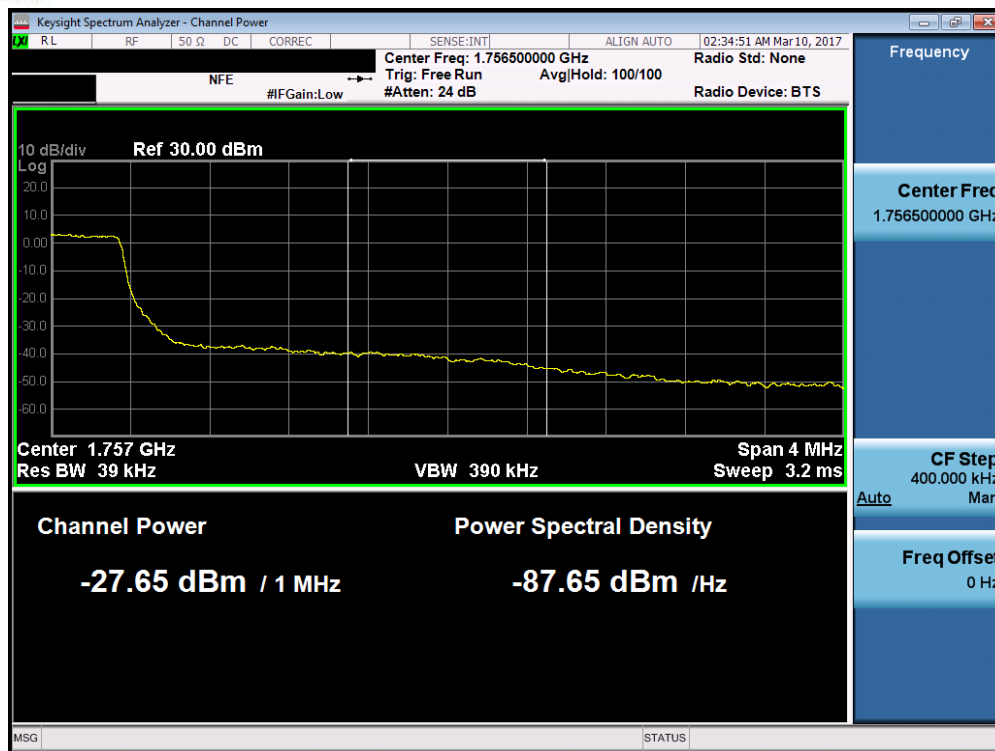


Plot 7-109. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

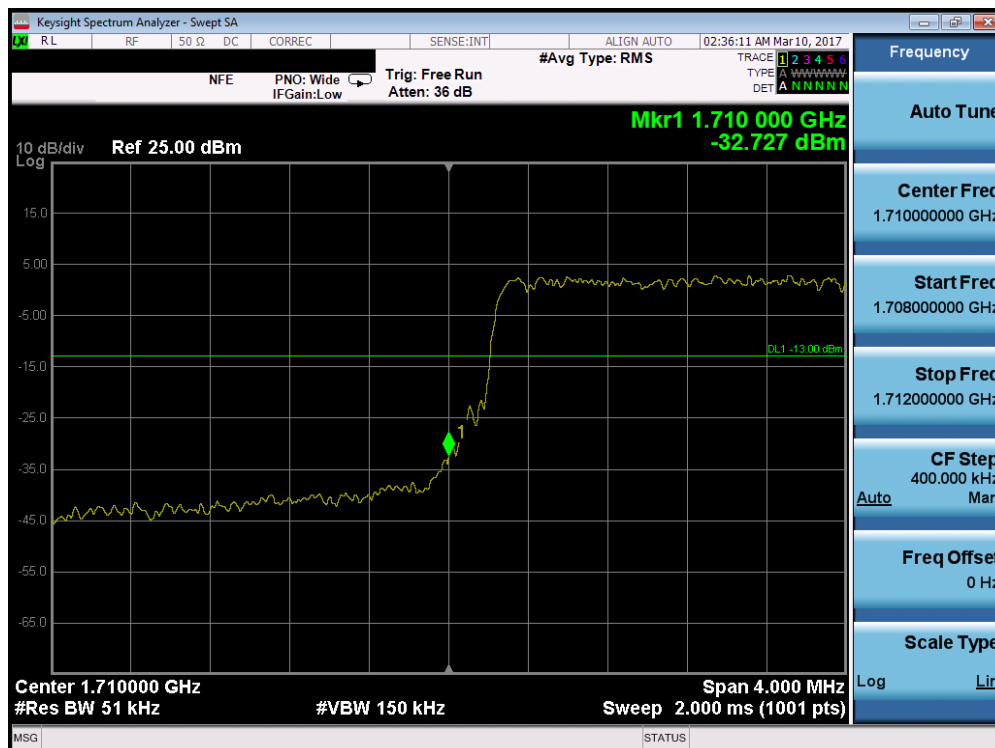


Plot 7-110. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: A3LSC03J	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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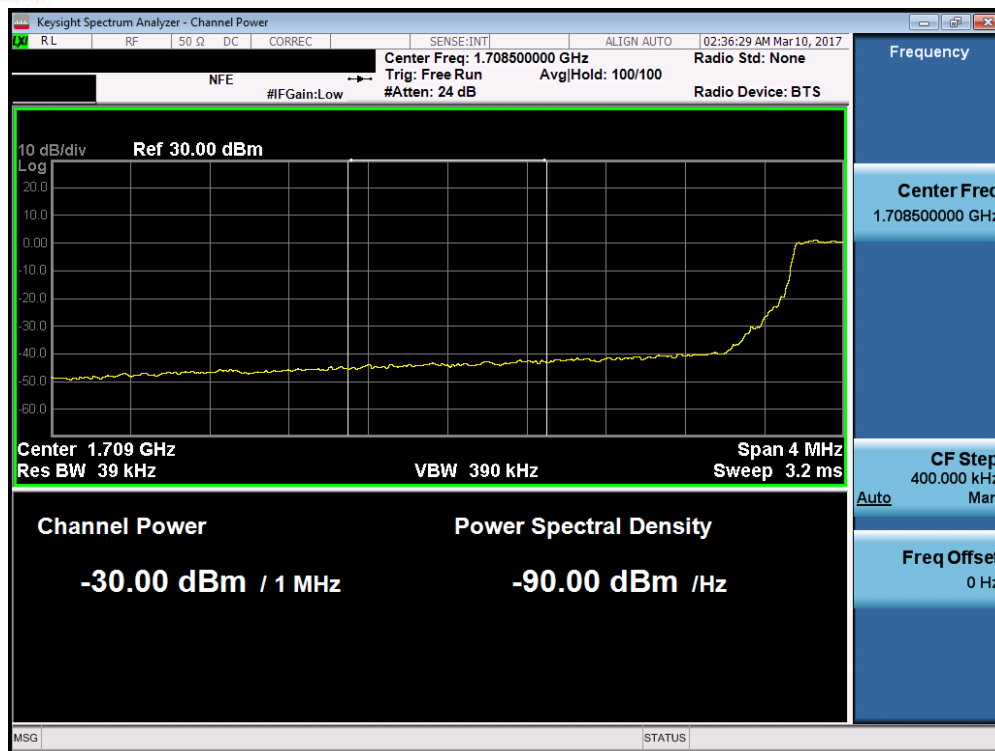


Plot 7-111. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

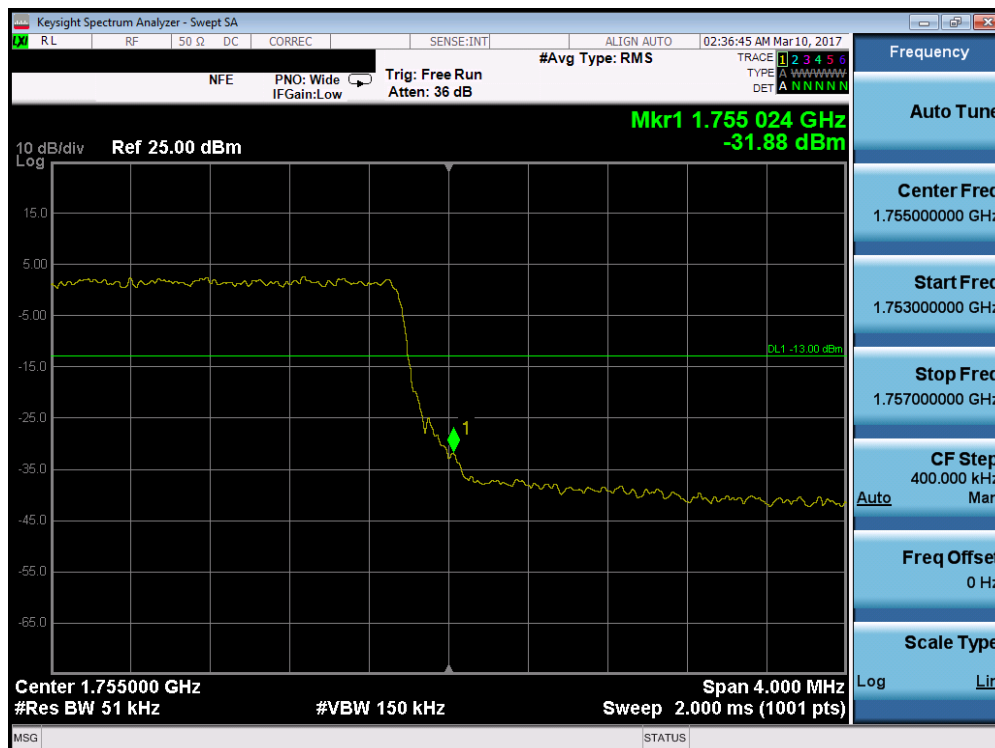


Plot 7-112. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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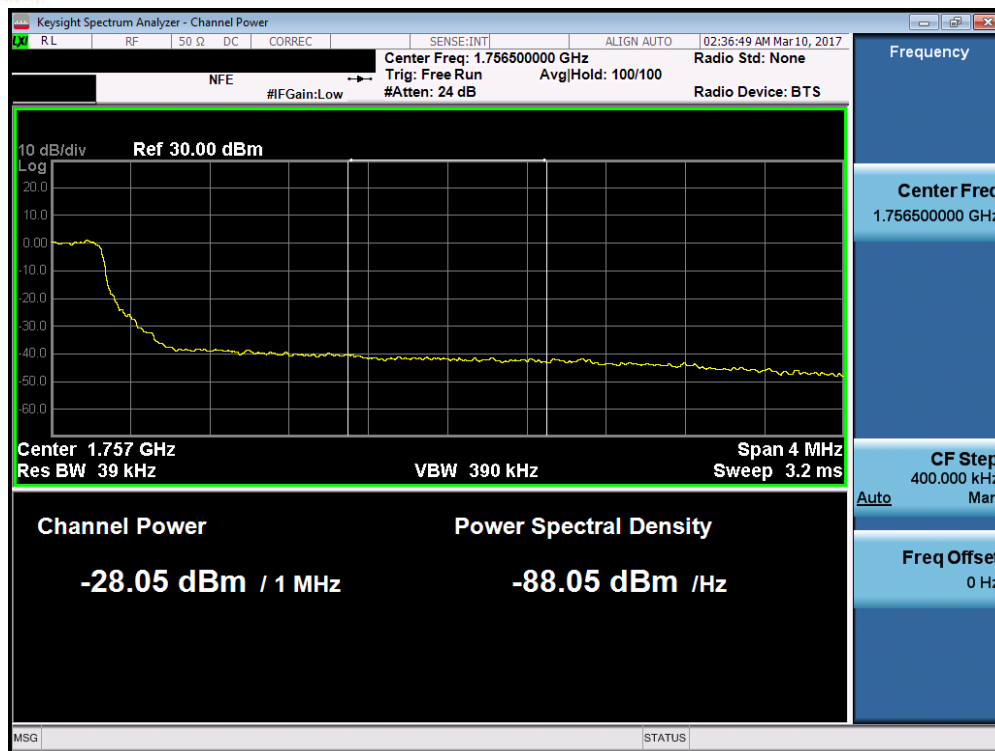


Plot 7-113. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

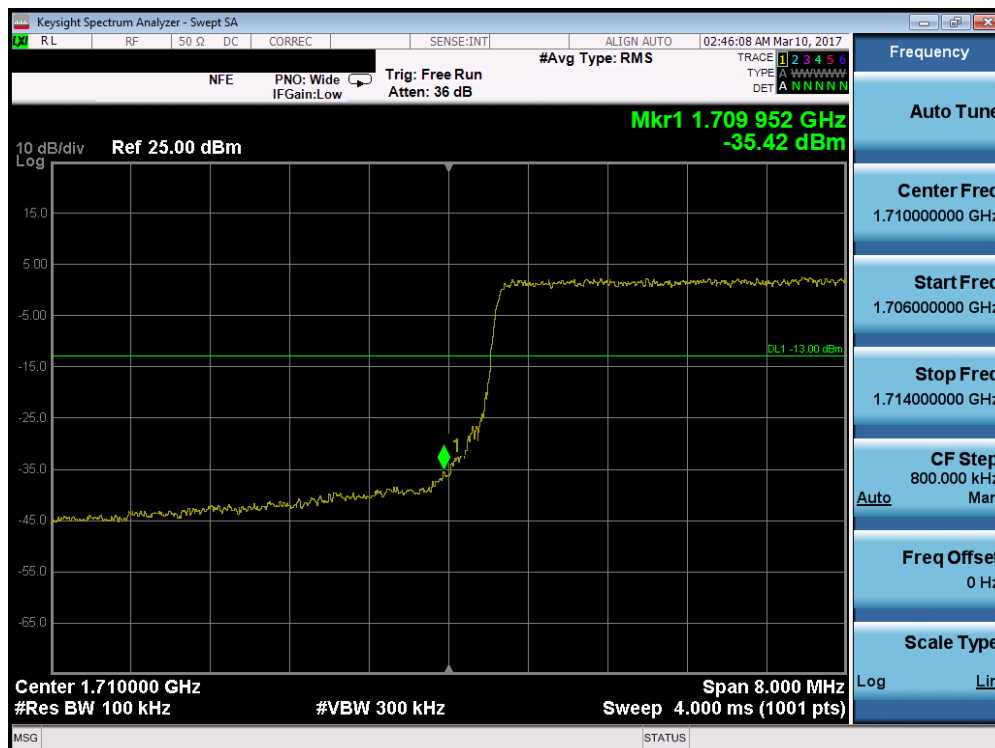


Plot 7-114. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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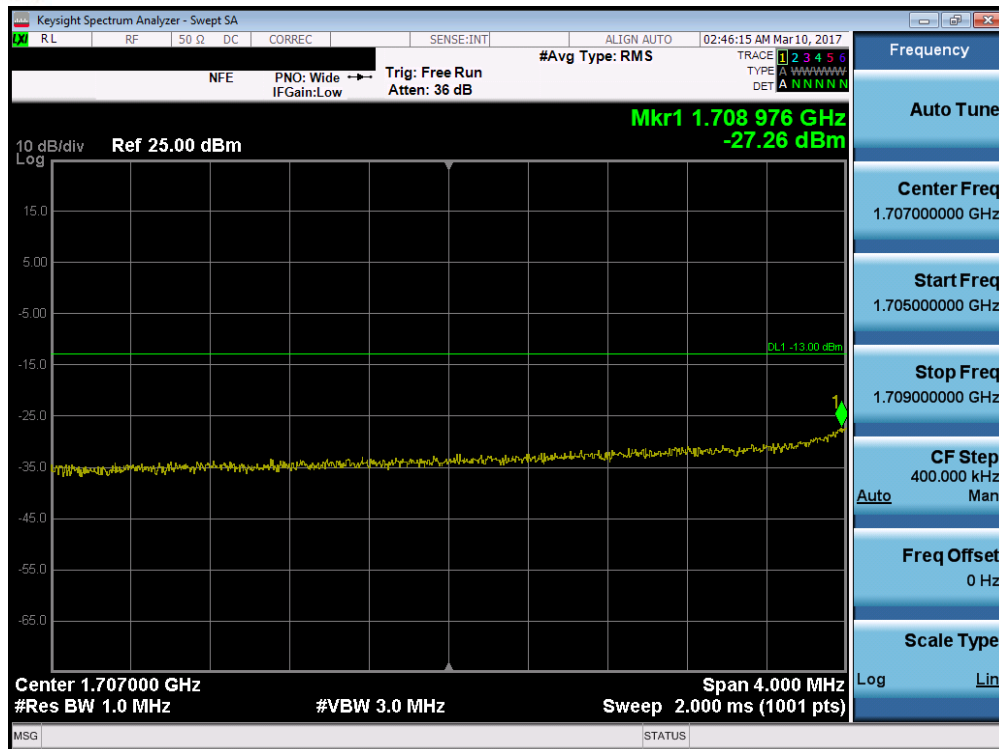


Plot 7-115. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

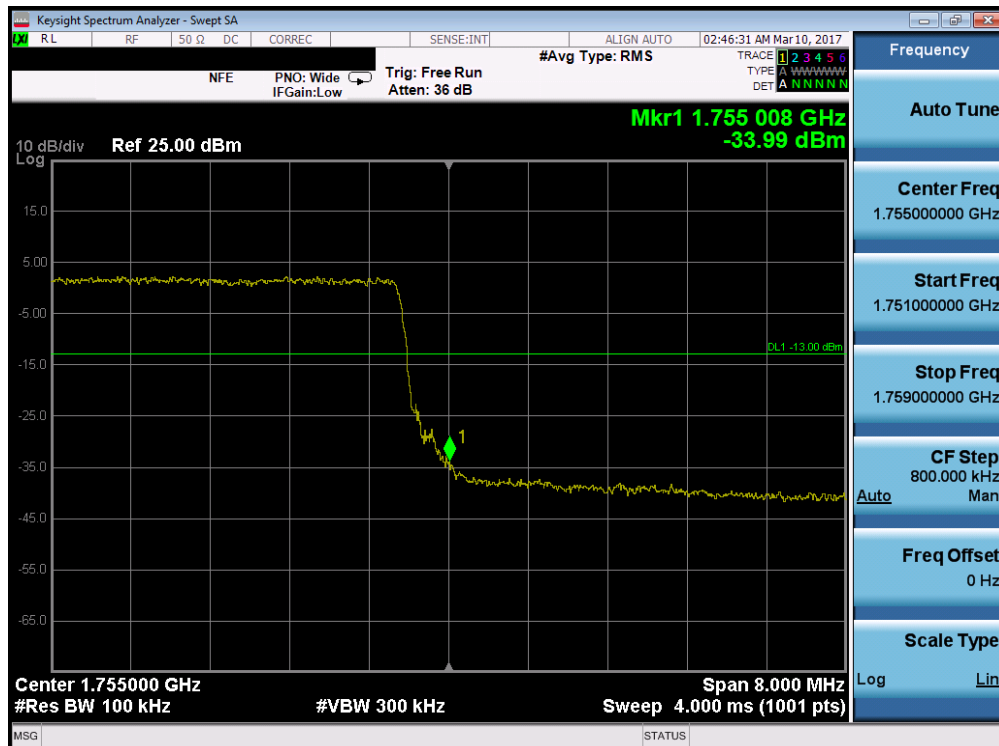


Plot 7-116. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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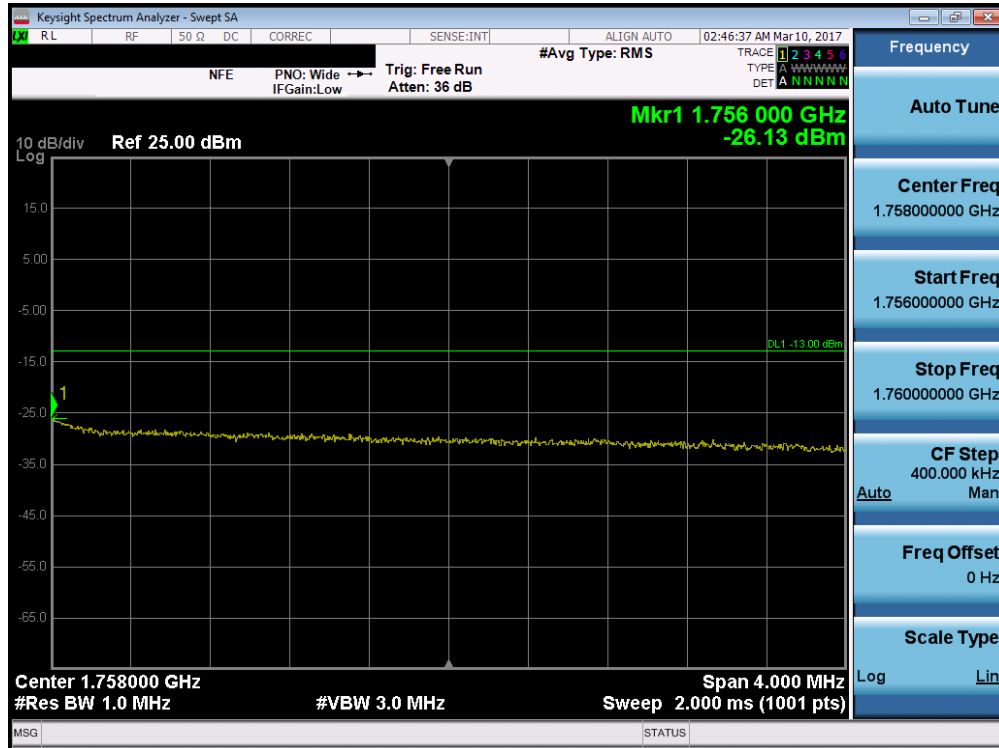


Plot 7-117. Lower Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - RB Size 50)

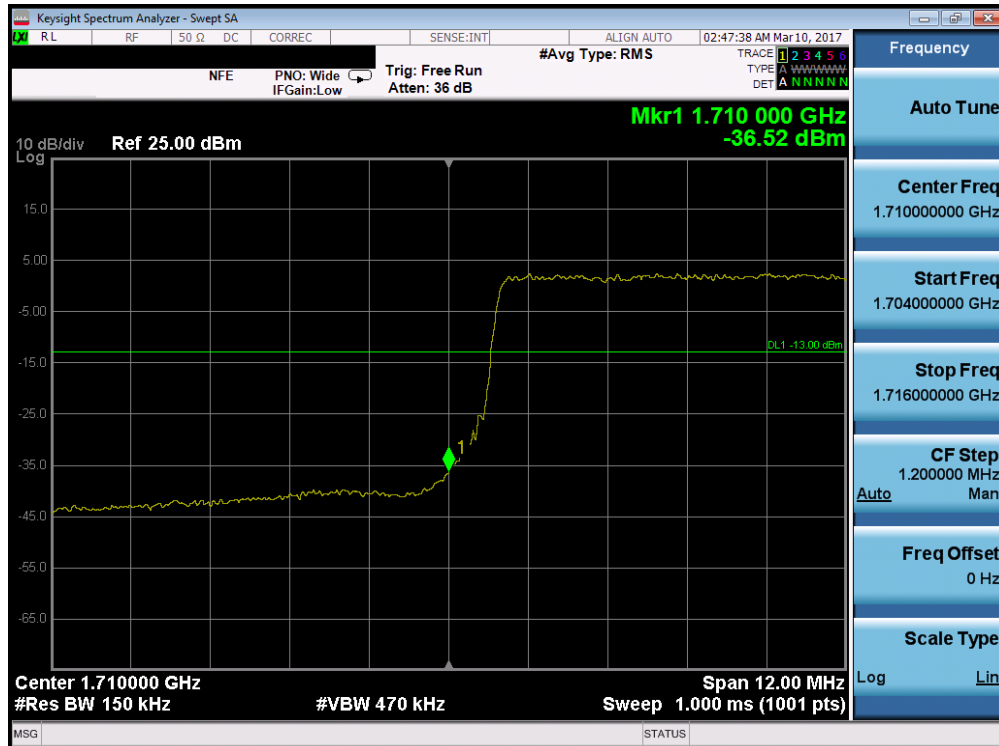


Plot 7-118. Upper Band Edge Plot (Band 4 - 10.0MHz QPSK - RB Size 50)

FCC ID: A3LSC03J			FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset			Page 77 of 116

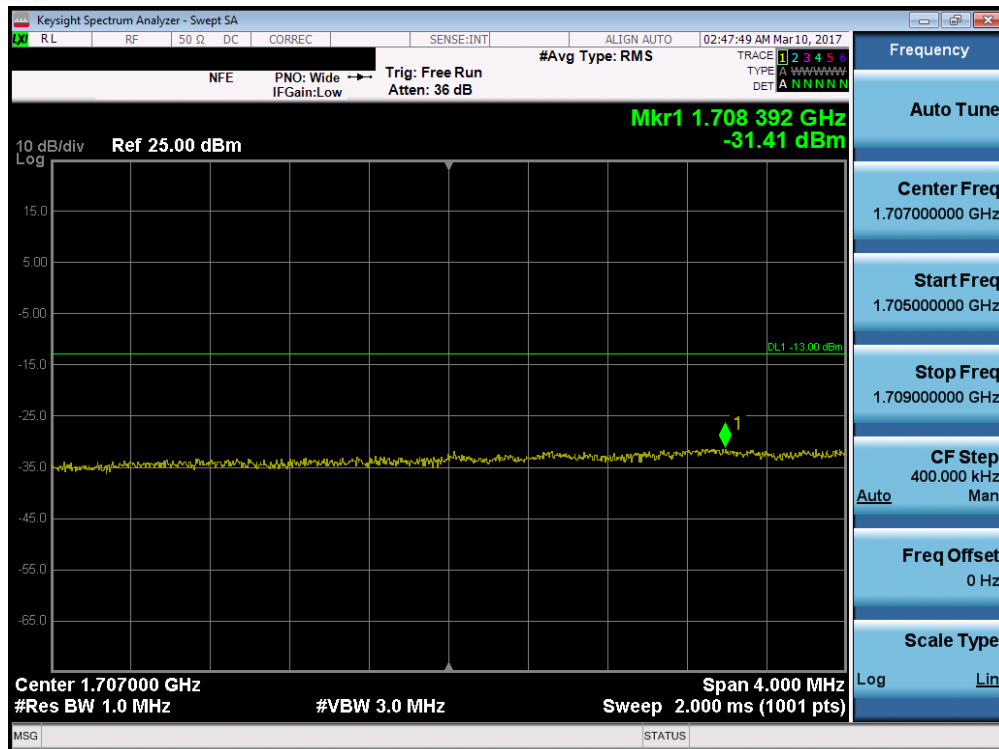


Plot 7-119. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

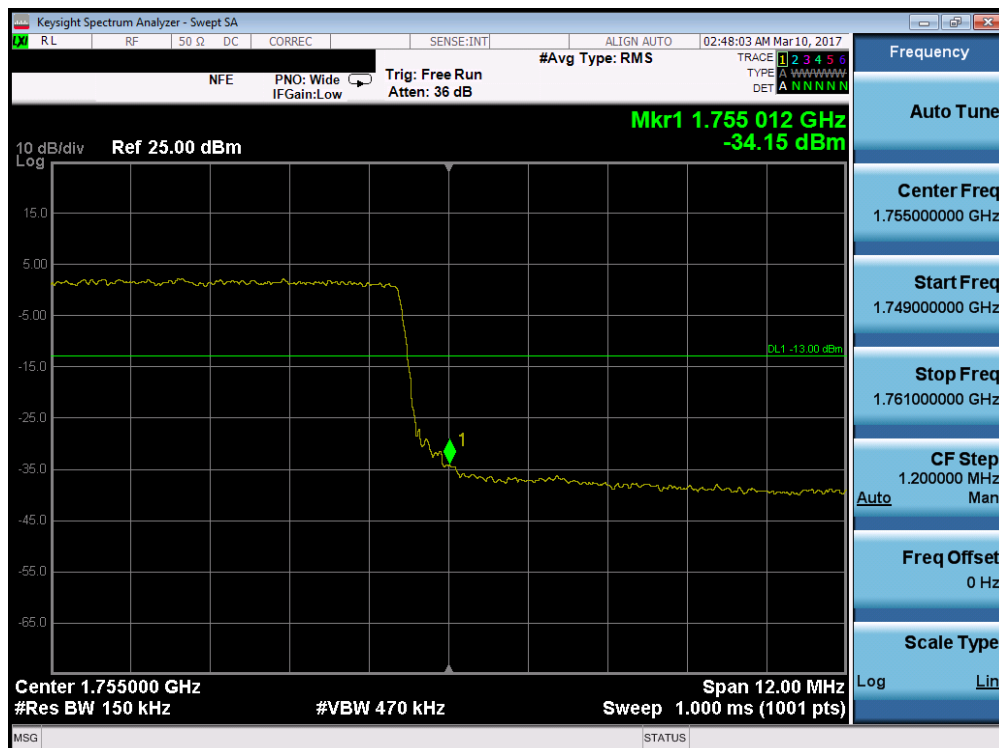


Plot 7-120. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset		Page 78 of 116

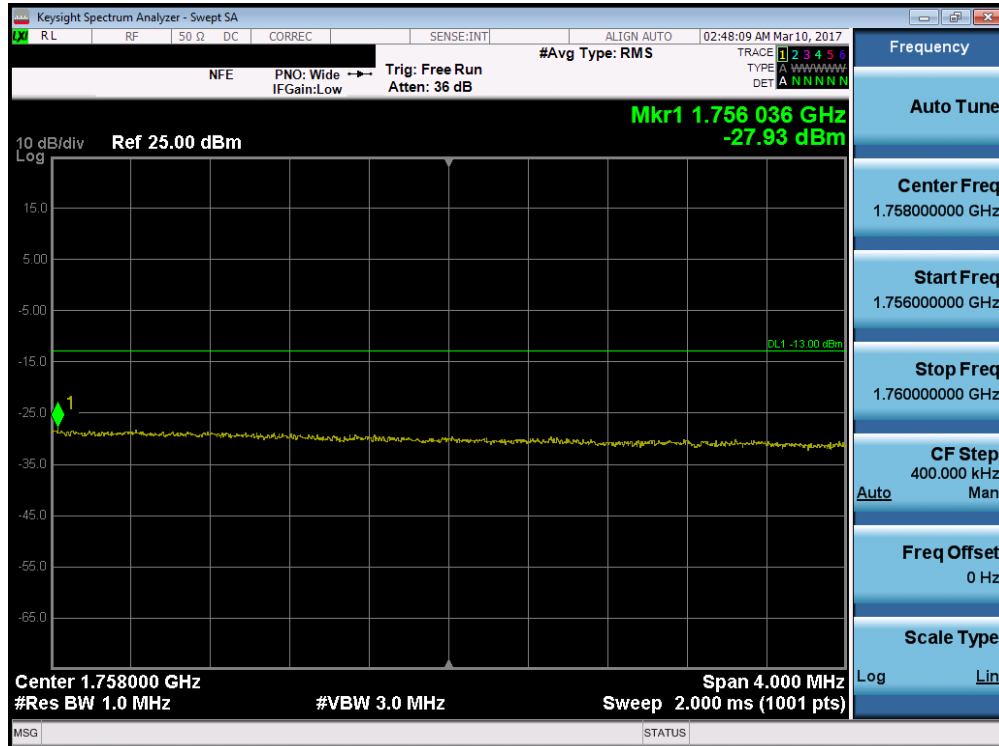


Plot 7-121. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

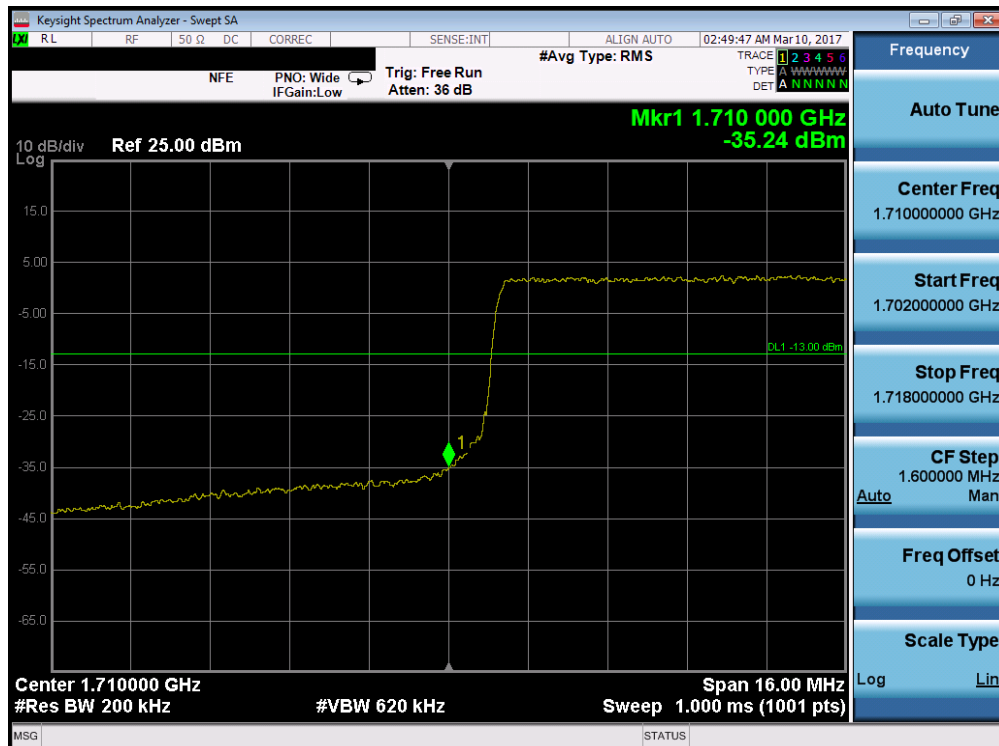


Plot 7-122. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSC03J			FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset			Page 79 of 116

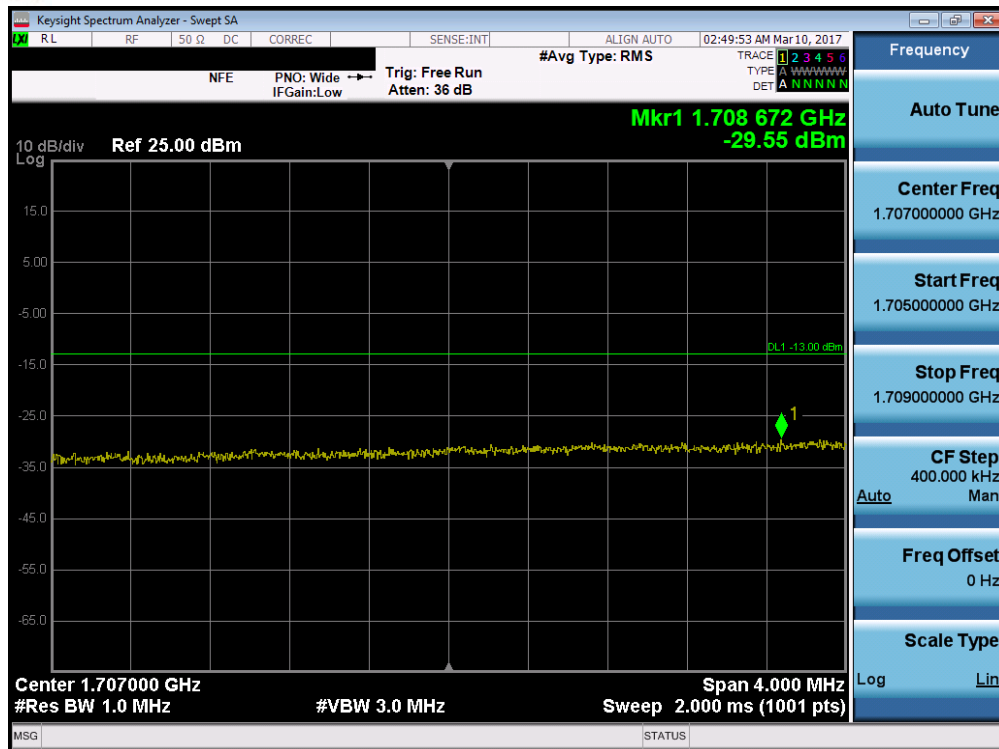


Plot 7-123. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

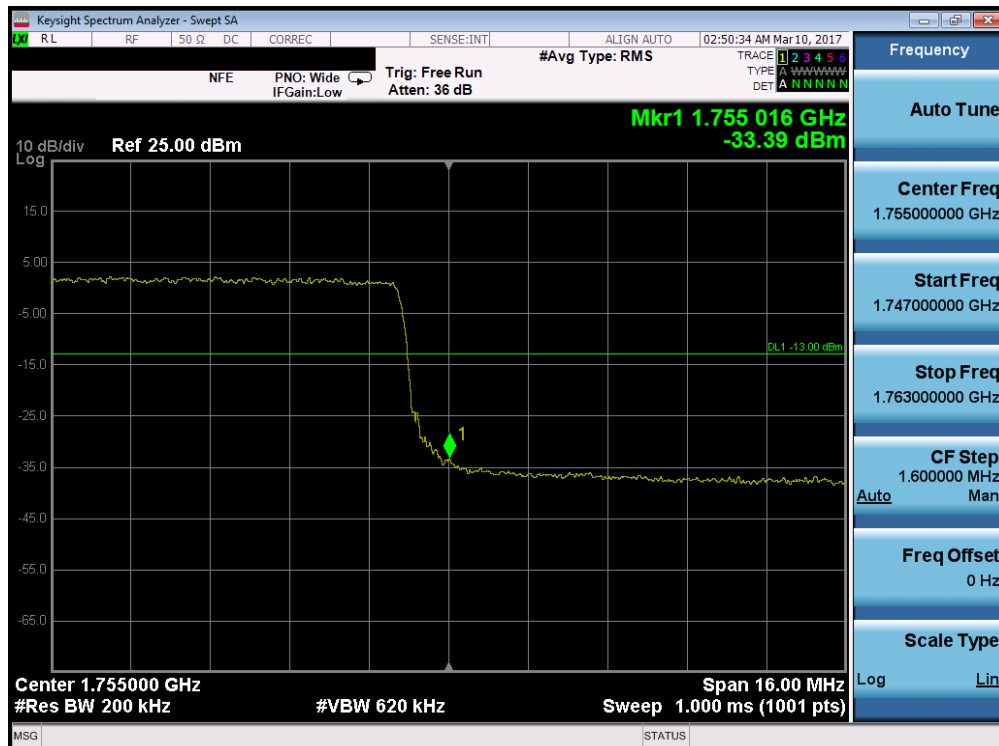


Plot 7-124. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset		Page 80 of 116

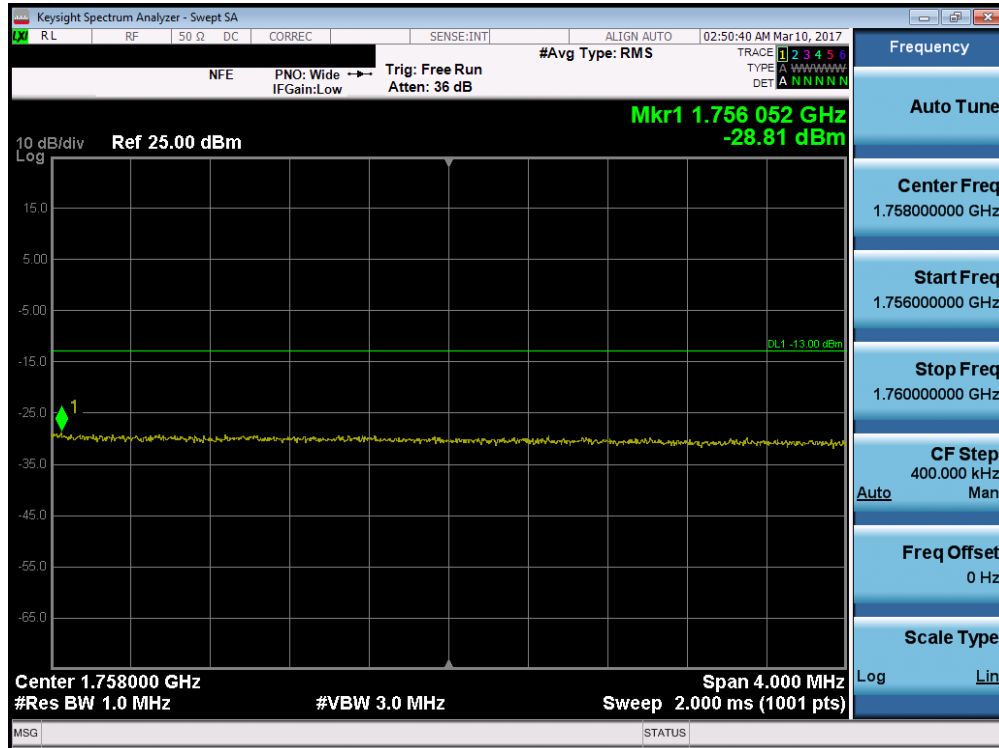


Plot 7-125. Lower Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - RB Size 100)

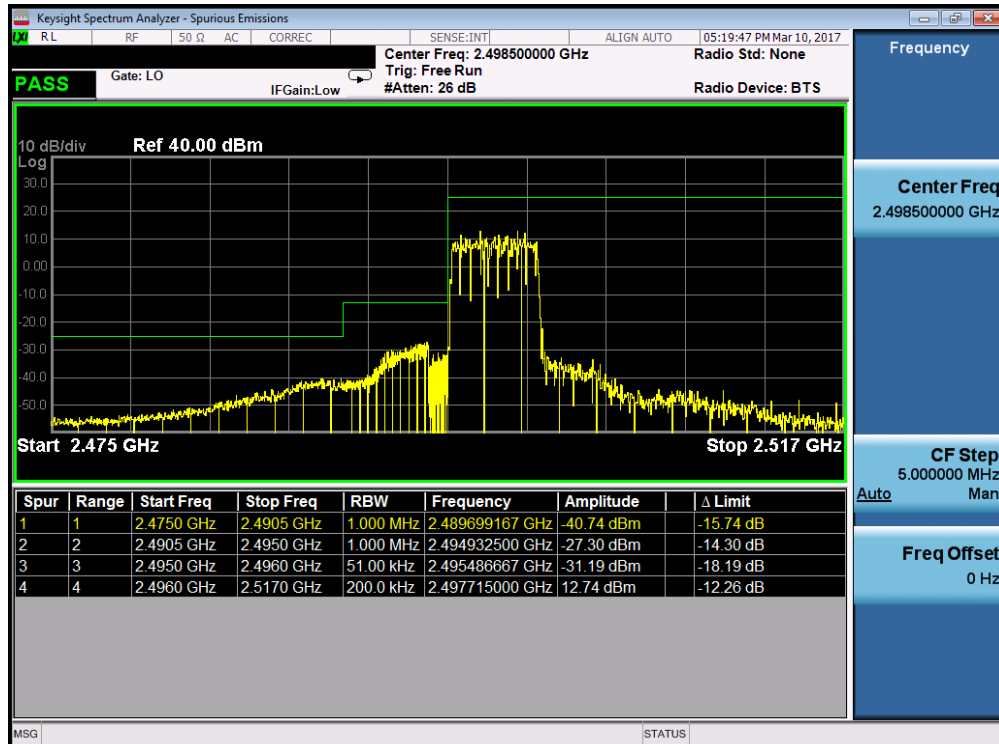


Plot 7-126. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - RB Size 100)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset		Page 81 of 116

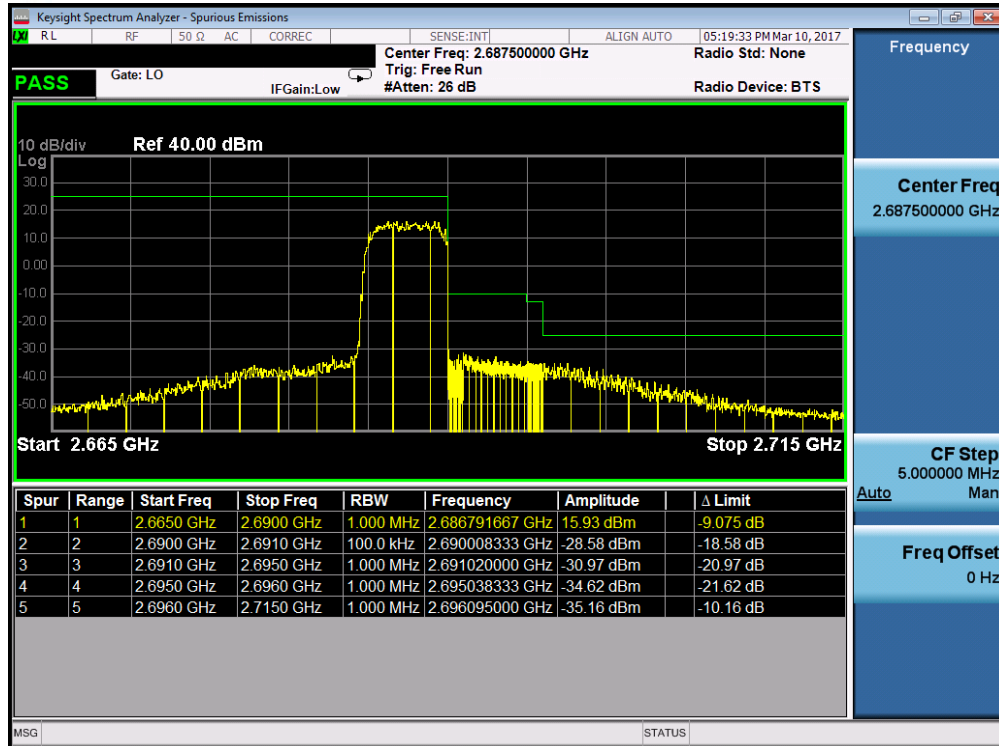


Plot 7-127. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

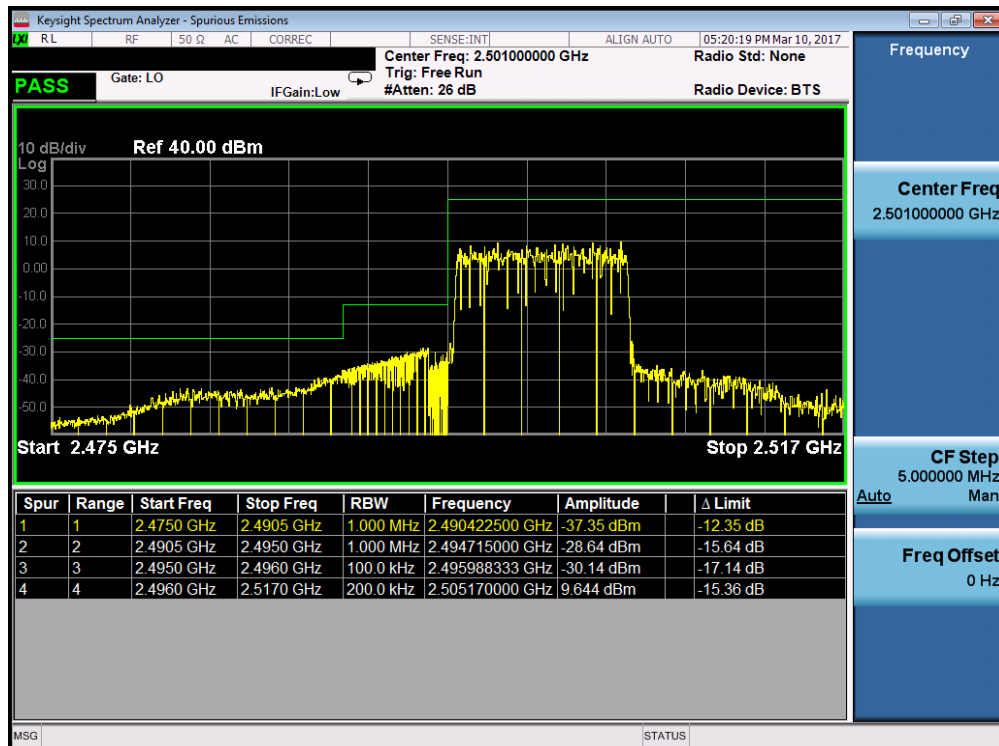


Plot 7-128. Lower ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)

FCC ID: A3LSC03J	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Plot 7-129. Upper ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)



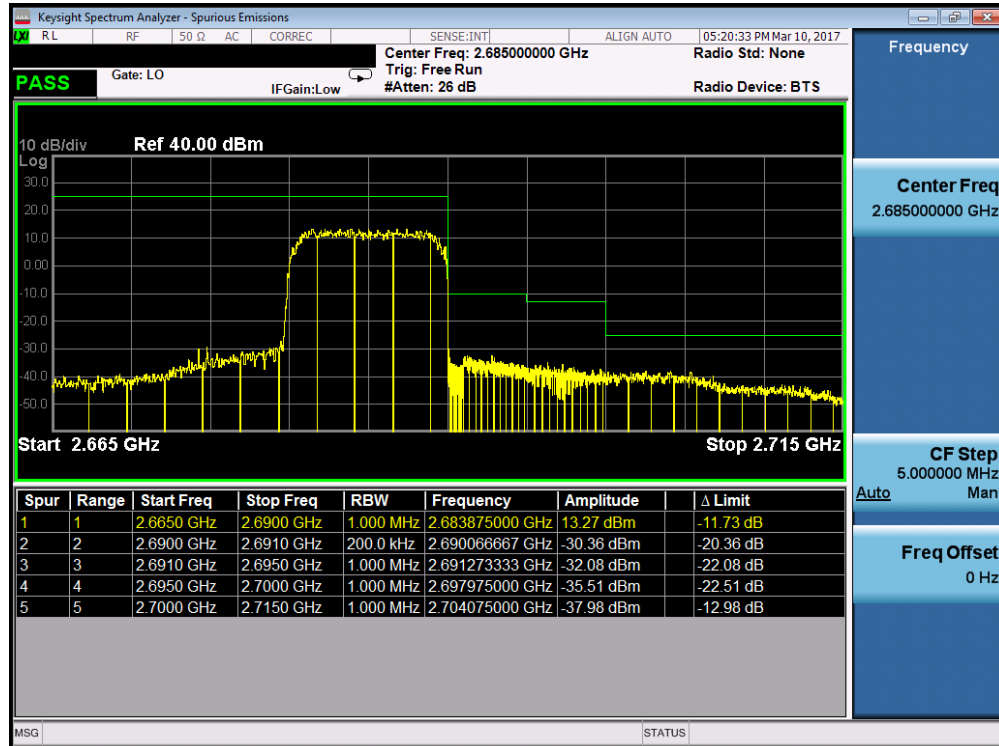
Plot 7-130. Lower ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset			Page 83 of 116

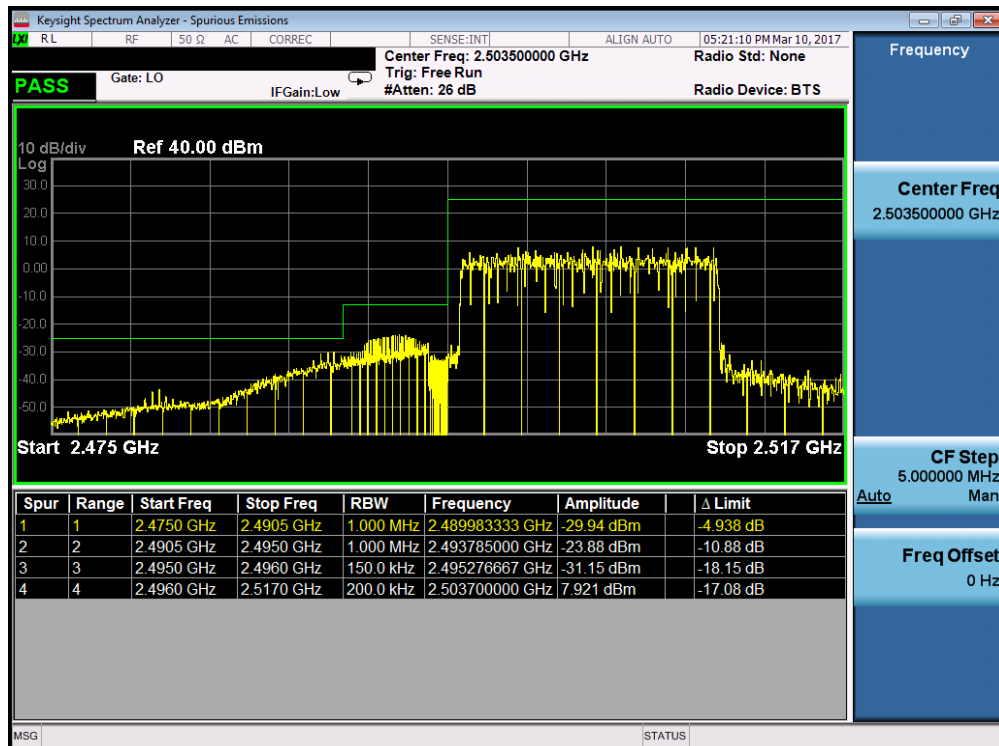
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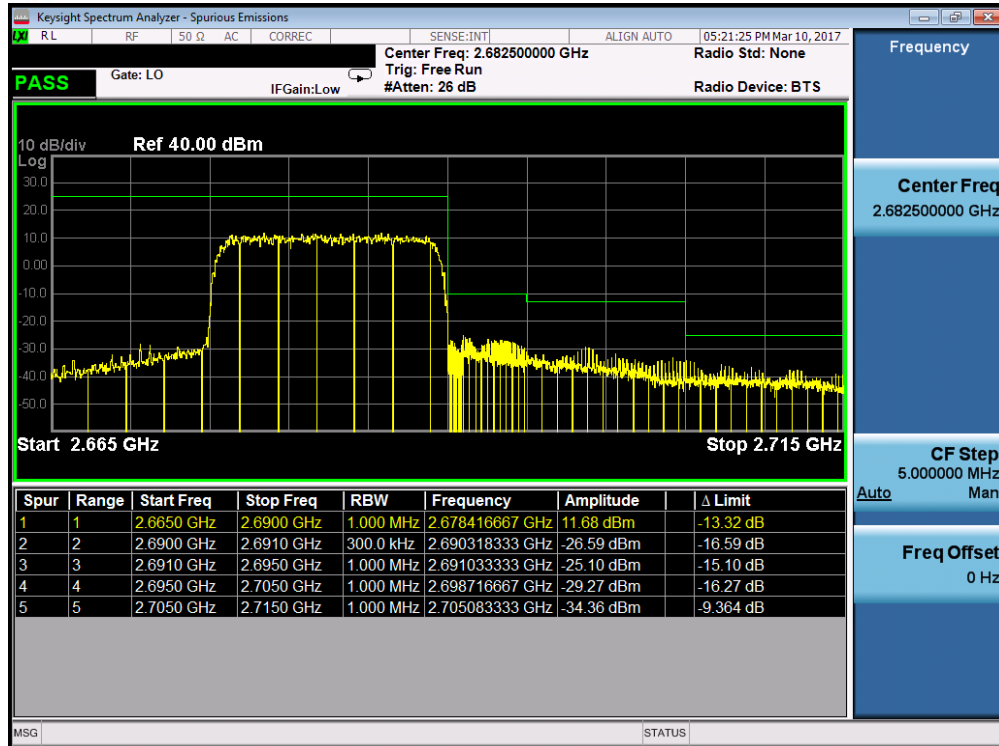


Plot 7-131. Upper ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)

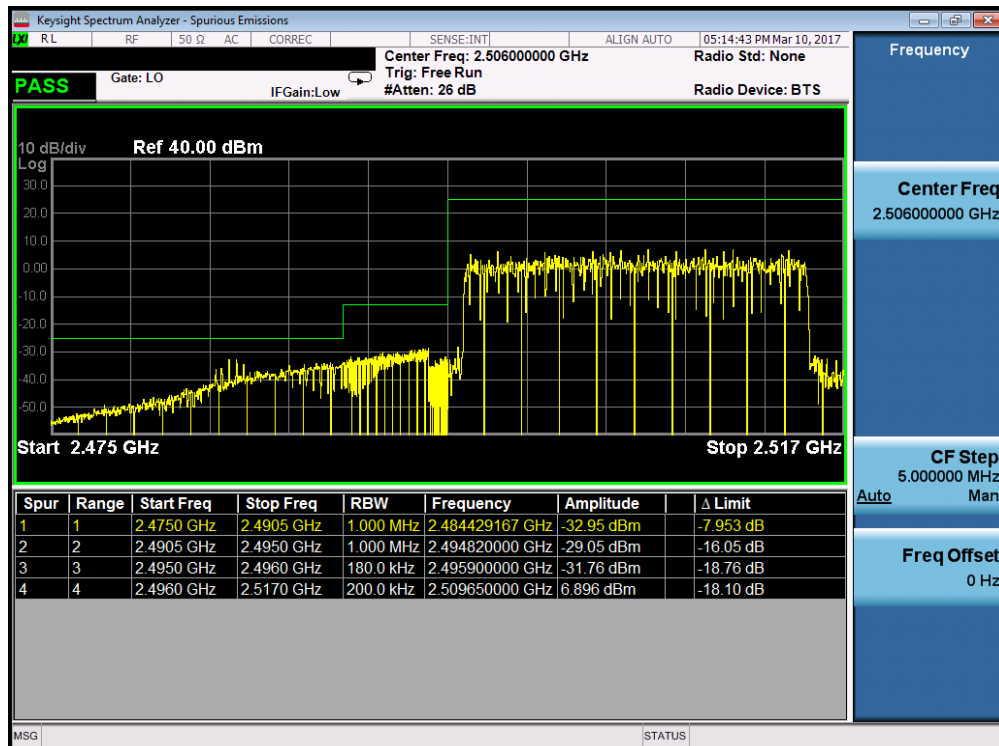


Plot 7-132. Lower ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)

FCC ID: A3LSC03J	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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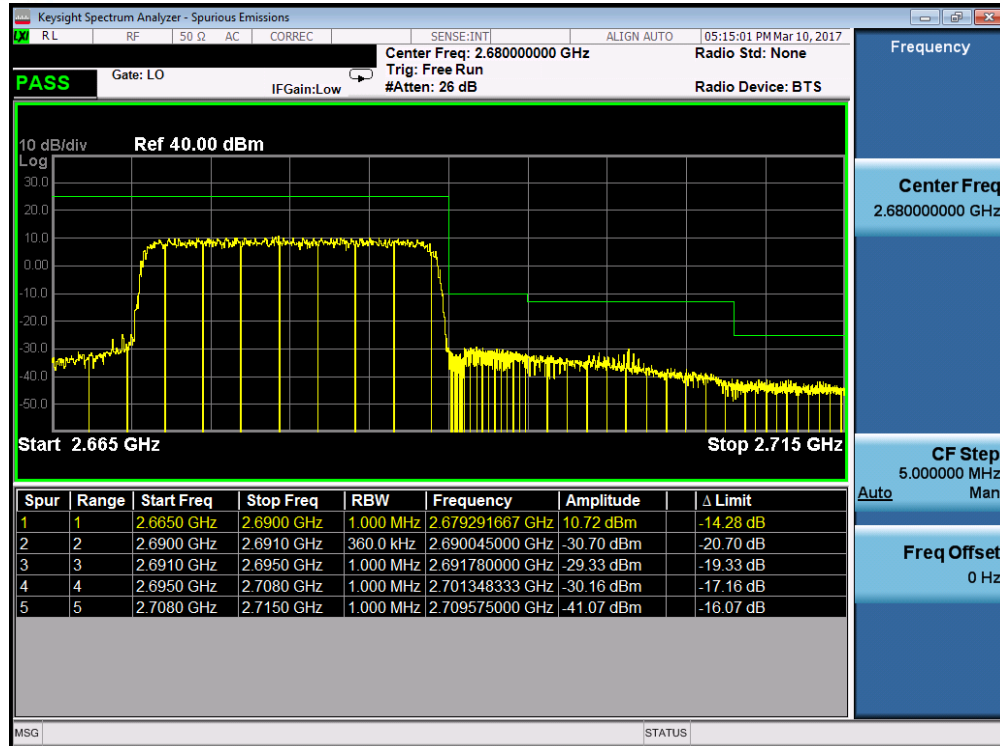


Plot 7-133. Upper ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)



Plot 7-134. Lower ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSC03J	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset	Page 85 of 116



Plot 7-135. Upper ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)

FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset		Page 86 of 116

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7.5 Radiated Power (ERP/EIRP)

§22.913(a.2) §24.232(c.2) §27.50(h.2) §27.50(b.10) §27.50(c.10) §27.50(d.4)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 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 v02r02 – Section 5.2.1

ANSI/TIA-603-D-2010 – 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. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
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".
Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE 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.

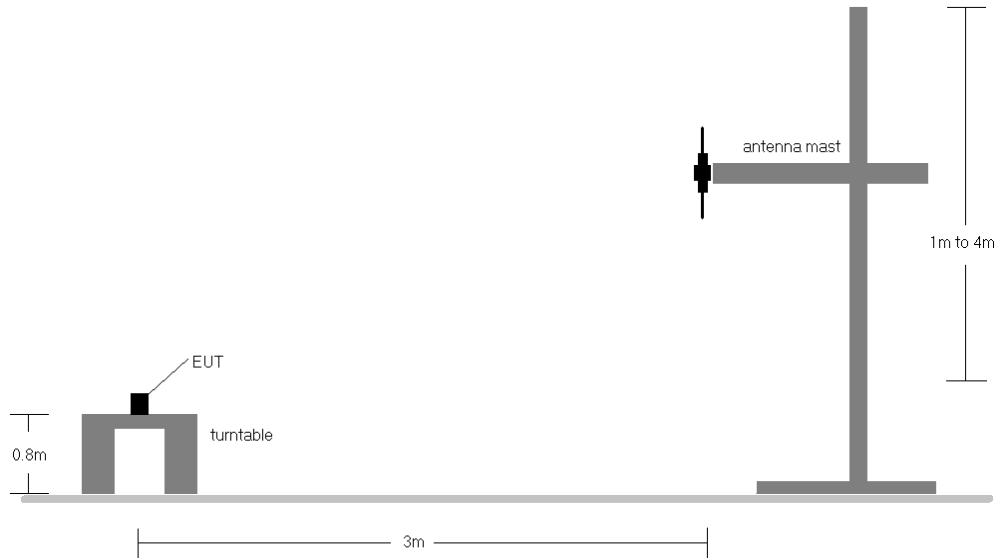


Figure 7-4. Radiated Test Setup <1GHz

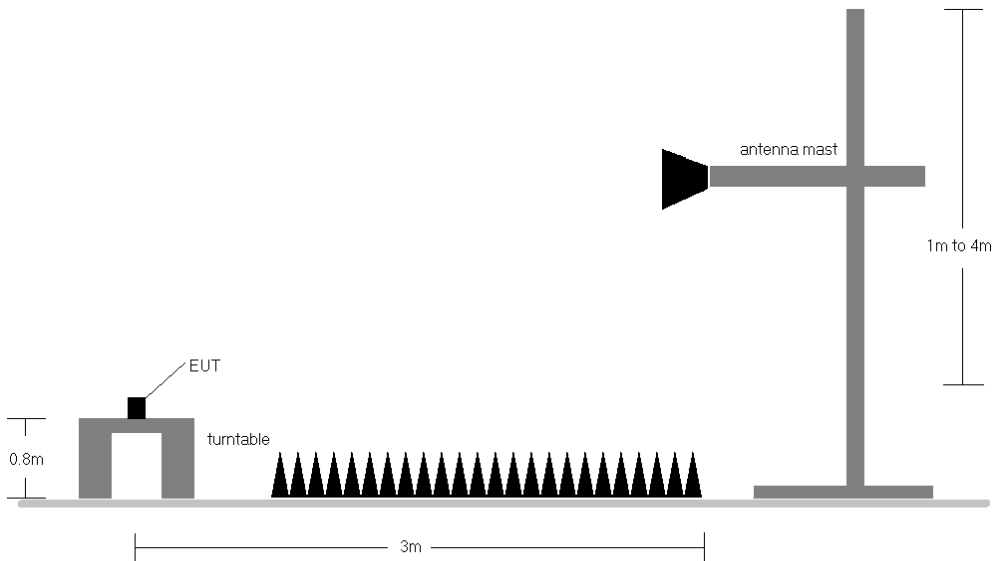


Figure 7-5. Radiated Test Setup >1GHz

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.

FCC ID: A3LSC03J	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	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 [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	171	247	3 / 2	17.39	-0.25	17.14	34.77	-17.63
707.50	1.4	QPSK	H	175	262	3 / 2	18.04	-0.28	17.76	34.77	-17.01
715.30	1.4	QPSK	H	187	244	1 / 5	17.83	-0.31	17.52	34.77	-17.25
707.50	1.4	16-QAM	H	175	262	3 / 2	16.96	-0.28	16.68	34.77	-18.09
700.50	3	QPSK	H	190	255	1 / 14	17.64	-0.25	17.39	34.77	-17.38
707.50	3	QPSK	H	197	262	1 / 0	17.99	-0.28	17.71	34.77	-17.06
714.50	3	QPSK	H	193	260	1 / 0	18.43	-0.31	18.12	34.77	-16.65
714.50	3	16-QAM	H	193	260	1 / 0	17.47	-0.31	17.16	34.77	-17.61

Table 7-2. 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 [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
701.50	5	QPSK	H	190	251	1 / 24	18.02	-0.26	17.76	34.77	-17.01
707.50	5	QPSK	H	189	259	1 / 0	18.44	-0.28	18.16	34.77	-16.61
713.50	5	QPSK	H	189	255	1 / 0	18.63	-0.30	18.33	34.77	-16.45
713.50	5	16-QAM	H	189	255	1 / 0	17.73	-0.30	17.43	34.77	-17.35
704.00	10	QPSK	H	183	247	1 / 49	18.22	-0.27	17.95	34.77	-16.82
707.50	10	QPSK	H	180	251	1 / 49	18.32	-0.28	18.04	34.77	-16.73
711.00	10	QPSK	H	186	254	1 / 0	18.52	-0.29	18.23	34.77	-16.55
711.00	10	16-QAM	H	186	254	1 / 0	17.56	-0.29	17.27	34.77	-17.51
713.50	5	QPSK	V	21	201	1 / 74	18.88	-1.20	17.68	34.77	-17.09
713.50	5 (WCP)	QPSK	H	185	264	1 / 0	18.17	-0.30	17.87	34.77	-16.91

Table 7-3. ERP Data (Band 12/17)

FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 			Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset		Page 89 of 116

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
779.50	5	QPSK	H	150	237	1 / 0	16.84	-0.57	16.27	34.77	-18.50
782.00	5	QPSK	H	150	256	1 / 0	16.70	-0.58	16.12	34.77	-18.65
784.50	5	QPSK	H	150	235	1 / 0	16.46	-0.59	15.87	34.77	-18.90
779.50	5	16-QAM	H	150	237	1 / 0	16.15	-0.57	15.58	34.77	-19.19
782.00	10	QPSK	H	150	255	1 / 0	16.92	-0.58	16.34	34.77	-18.43
782.00	10	16-QAM	H	150	255	1 / 0	16.00	-0.58	15.42	34.77	-19.35
782.00	10	QPSK	V	150	134	1 / 0	16.17	-0.58	15.59	34.77	-19.18
782.00	10 (WCP)	QPSK	H	150	249	1 / 0	16.19	-0.58	15.61	34.77	-19.16

Table 7-4. ERP Data (Band 13)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	356	272	3 / 2	17.85	-0.75	17.10	38.45	-21.35
836.50	1.4	QPSK	H	0	265	3 / 2	18.17	-0.84	17.33	38.45	-21.12
848.30	1.4	QPSK	H	358	261	3 / 2	18.23	-0.94	17.29	38.45	-21.16
836.50	1.4	16-QAM	H	0	265	3 / 2	17.18	-0.84	16.34	38.45	-22.11
825.50	3	QPSK	H	358	271	1 / 14	17.96	-0.75	17.21	38.45	-21.25
836.50	3	QPSK	H	350	269	1 / 14	17.96	-0.84	17.12	38.45	-21.33
847.50	3	QPSK	H	355	273	1 / 0	18.33	-0.93	17.40	38.45	-21.05
847.50	3	16-QAM	H	355	273	1 / 0	17.35	-0.93	16.42	38.45	-22.03
826.50	5	QPSK	H	0	275	1 / 24	18.20	-0.76	17.44	38.45	-21.01
836.50	5	QPSK	H	0	269	1 / 24	18.35	-0.84	17.51	38.45	-20.94
846.50	5	QPSK	H	354	264	1 / 0	18.59	-0.92	17.67	38.45	-20.78
846.50	5	16-QAM	H	354	264	1 / 0	17.66	-0.92	16.74	38.45	-21.71
829.00	10	QPSK	H	355	275	1 / 49	18.29	-0.78	17.51	38.45	-20.94
836.50	10	QPSK	H	359	271	1 / 49	18.54	-0.84	17.70	38.45	-20.75
844.00	10	QPSK	H	0	267	1 / 49	18.82	-0.90	17.92	38.45	-20.53
844.00	10	16-QAM	H	0	267	1 / 49	17.89	-0.90	16.99	38.45	-21.46
844.00	10	QPSK	V	36	231	1 / 74	18.26	-1.37	16.89	38.45	-21.56
844.00	10 (WCP)	QPSK	H	0	267	1 / 99	17.88	-0.90	16.98	38.45	-21.47

Table 7-5. ERP Data (Band 5)

FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset	Page 90 of 116

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 Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	110	199	1 / 5	12.15	9.62	21.77	30.00	-8.23
1732.50	1.4	QPSK	H	116	207	1 / 0	10.78	9.50	20.28	30.00	-9.72
1754.30	1.4	QPSK	H	110	200	1 / 5	10.35	9.38	19.73	30.00	-10.27
1710.70	1.4	16-QAM	H	110	199	1 / 5	11.20	9.62	20.82	30.00	-9.18
1711.50	3	QPSK	H	117	197	1 / 14	11.96	9.62	21.58	30.00	-8.42
1732.50	3	QPSK	H	107	197	1 / 0	11.12	9.50	20.62	30.00	-9.38
1753.50	3	QPSK	H	110	192	1 / 14	10.35	9.39	19.74	30.00	-10.26
1711.50	3	16-QAM	H	117	197	1 / 14	10.98	9.62	20.60	30.00	-9.40
1712.50	5	QPSK	H	116	205	1 / 0	12.14	9.61	21.75	30.00	-8.25
1732.50	5	QPSK	H	108	199	1 / 0	11.65	9.50	21.15	30.00	-8.85
1752.50	5	QPSK	H	108	205	1 / 24	10.43	9.39	19.82	30.00	-10.18
1712.50	5	16-QAM	H	116	205	1 / 0	11.25	9.61	20.86	30.00	-9.14
1715.00	10	QPSK	H	110	195	1 / 0	12.08	9.60	21.68	30.00	-8.32
1732.50	10	QPSK	H	111	201	1 / 0	11.73	9.50	21.23	30.00	-8.77
1750.00	10	QPSK	H	114	199	1 / 0	10.45	9.41	19.86	30.00	-10.14
1715.00	10	16-QAM	H	110	195	1 / 0	11.12	9.60	20.72	30.00	-9.28
1717.50	15	QPSK	H	105	200	1 / 0	11.95	9.58	21.53	30.00	-8.47
1732.50	15	QPSK	H	107	197	1 / 0	11.85	9.50	21.35	30.00	-8.65
1747.50	15	QPSK	H	113	195	1 / 0	10.86	9.42	20.28	30.00	-9.72
1717.50	15	16-QAM	H	105	200	1 / 0	11.02	9.58	20.60	30.00	-9.40
1720.00	20	QPSK	H	116	196	1 / 0	11.97	9.57	21.54	30.00	-8.46
1732.50	20	QPSK	H	109	191	1 / 0	11.76	9.50	21.26	30.00	-8.74
1745.00	20	QPSK	H	107	199	1 / 0	11.09	9.43	20.52	30.00	-9.48
1720.00	20	16-QAM	H	116	196	1 / 0	11.01	9.57	20.58	30.00	-9.42
1710.70	1.4	QPSK	V	100	81	1 / 0	9.71	9.62	19.33	30.00	-10.67
1710.70	1.4 (WCP)	QPSK	H	121	207	1 / 0	11.25	9.62	20.87	30.00	-9.13

Table 7-6. EIRP Data (Band 4)

FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 			Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset		Page 91 of 116

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 Limit [dBm]	Margin [dB]
2498.50	5	QPSK	H	0	192	1 / 0	15.26	5.73	20.99	33.01	-12.02
2593.00	5	QPSK	H	0	213	1 / 0	15.51	6.07	21.58	33.01	-11.43
2687.50	5	QPSK	H	0	197	1 / 0	15.15	6.48	21.63	33.01	-11.38
2687.50	5	16-QAM	H	0	197	1 / 0	14.13	6.48	20.61	33.01	-12.40
2501.00	10	QPSK	H	0	200	1 / 49	15.96	5.73	21.69	33.01	-11.32
2593.00	10	QPSK	H	0	193	1 / 0	15.78	6.07	21.85	33.01	-11.16
2685.00	10	QPSK	H	0	197	1 / 0	15.15	6.47	21.62	33.01	-11.39
2593.00	10	16-QAM	H	0	193	1 / 0	14.69	6.07	20.76	33.01	-12.25
2503.50	15	QPSK	H	0	194	1 / 74	15.57	5.74	21.31	33.01	-11.70
2593.00	15	QPSK	H	0	191	1 / 0	15.76	6.07	21.83	33.01	-11.18
2682.50	15	QPSK	H	0	195	1 / 0	15.05	6.46	21.51	33.01	-11.50
2593.00	15	16-QAM	H	0	191	1 / 0	14.77	6.07	20.84	33.01	-12.17
2506.00	20	QPSK	H	0	203	1 / 0	15.59	5.75	21.34	33.01	-11.67
2593.00	20	QPSK	H	0	197	1 / 0	15.67	6.07	21.74	33.01	-11.27
2680.00	20	QPSK	H	0	190	1 / 0	15.01	6.45	21.46	33.01	-11.55
2593.00	20	16-QAM	H	0	197	1 / 0	14.66	6.07	20.73	33.01	-12.28
2593.00	10	QPSK	V	42	161	1 / 0	14.51	6.07	20.58	33.01	-12.43
2593.00	10 (WCP)	QPSK	H	0	201	1 / 0	15.09	6.07	21.16	33.01	-11.85

Table 7-7. EIRP Data (Band 41)

FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1702210070-03.A3L	Test Dates: 3/5-3/24/2017, 4/6/2017	EUT Type: Portable Handset	Page 92 of 116

7.6 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h) §27.53(m)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 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 peak 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 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – 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

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Test Setup

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

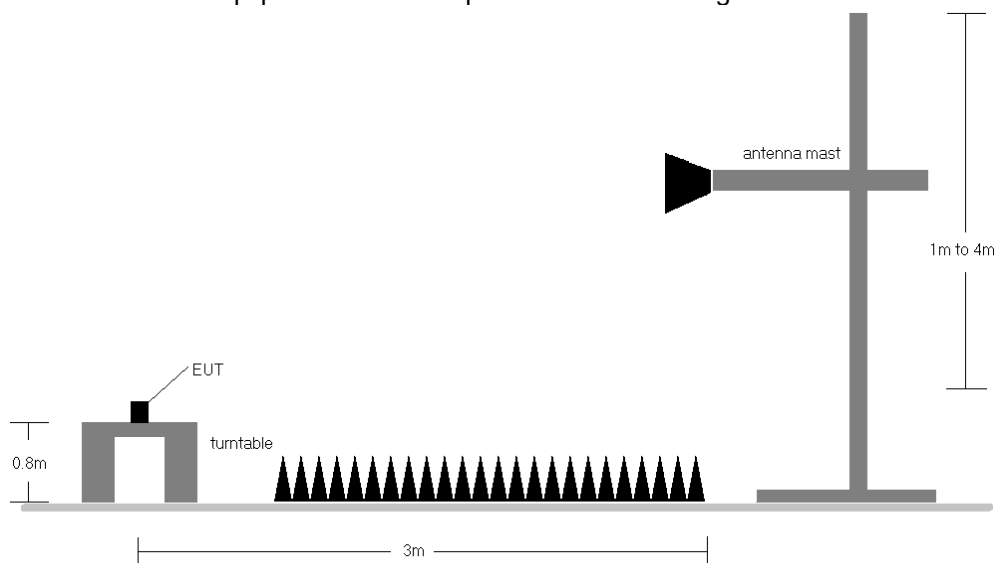


Figure 7-6. Test Instrument & Measurement Setup

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.

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OPERATING FREQUENCY: 701.50 MHz
 CHANNEL: 23035
 MEASURED OUTPUT POWER: 17.76 dBm = 0.060 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 30.76 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1403.00	H	149	194	-69.82	5.92	-63.90	81.7
2104.50	H	128	219	-65.37	6.80	-58.57	76.3
2806.00	H	-	-	-66.94	8.12	-58.82	76.6

Table 7-8. Radiated Spurious Data (Band 12/17 – Low Channel)

OPERATING FREQUENCY: 707.50 MHz
 CHANNEL: 23095
 MEASURED OUTPUT POWER: 18.16 dBm = 0.065 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 31.16 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	H	-	-	-75.59	5.96	-69.62	87.8
2122.50	H	123	11	-66.18	6.84	-59.33	77.5
2830.00	H	-	-	-66.68	8.13	-58.55	76.7

Table 7-9. Radiated Spurious Data (Band 12/17 – Mid Channel)

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OPERATING FREQUENCY: 713.50 MHz
 CHANNEL: 23155
 MEASURED OUTPUT POWER: 18.33 dBm = 0.068 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 31.33 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1427.00	H	136	172	-68.72	6.01	-62.71	81.0
2140.50	H	121	175	-65.42	6.89	-58.53	76.9
2854.00	H	-	-	-66.77	8.15	-58.62	76.9

Table 7-10. Radiated Spurious Data (Band 12/17 – High Channel)

OPERATING FREQUENCY: 713.50 MHz
 CHANNEL: 23155
 MEASURED OUTPUT POWER: 17.87 dBm = 0.061 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 30.87 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1427.00	H	100	6	-70.25	6.01	-64.24	82.1
2140.50	H	106	171	-69.23	6.89	-62.34	80.2
2854.00	H	-	-	-68.84	8.15	-60.69	78.6

Table 7-11. Radiated Spurious Data with WCP (Band 12/17 – High Channel)

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OPERATING FREQUENCY: 782.00 MHz
 CHANNEL: 23230
 MEASURED OUTPUT POWER: 16.34 dBm = 0.043 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 29.34 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2346.00	H	-	-	-67.25	7.00	-60.25	76.6
3128.00	H	-	-	-63.90	7.21	-56.69	73.0

Table 7-12. Radiated Spurious Data (Band 13 – Mid Channel)

MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.00 MHz
 DISTANCE: 3 meters
 NARROWBAND EMISSION LIMIT: -50 dBm
 WIDEBAND EMISSION LIMIT: -40 dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	H	143	150	-68.59	6.41	-62.18	-22.2

Table 7-13. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

FCC ID: A3LSC03J		FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 782.00 MHz
 CHANNEL: 23230
 MEASURED OUTPUT POWER: 15.61 dBm = 0.036 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 28.61 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2346.00	H	-	-	-67.17	7.00	-60.17	75.8
3128.00	H	-	-	-63.88	7.21	-56.67	72.3

Table 7-14. Radiated Spurious Data with WCP (Band 13 – Mid Channel)

MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.00 MHz
 DISTANCE: 3 meters
 NARROWBAND EMISSION LIMIT: -50 dBm
 WIDEBAND EMISSION LIMIT: -40 dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	H	126	181	-67.95	6.41	-61.54	-21.5

Table 7-15. Radiated Spurious Data with WCP (Band 13 – 1559-1610MHz Band)

FCC ID: A3LSC03J	 FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION) 			Approved by: Quality Manager
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OPERATING FREQUENCY: 829.00 MHz
 CHANNEL: 26840
 MEASURED OUTPUT POWER: 17.51 dBm = 0.056 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 30.51 dBc

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]	[dBc]
1658.00	H	-	-	-75.27	6.26	-69.00	86.5
2487.00	H	-	-	-72.32	6.84	-65.48	83.0

Table 7-16. Radiated Spurious Data (Band 5 – Low Channel)

OPERATING FREQUENCY: 836.50 MHz
 CHANNEL: 26915
 MEASURED OUTPUT POWER: 17.70 dBm = 0.059 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 30.70 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.00	H	-	-	-75.31	6.21	-69.10	86.8
2509.50	H	-	-	-72.49	6.86	-65.63	83.3

Table 7-17. Radiated Spurious Data (Band 5 – Mid Channel)

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OPERATING FREQUENCY: 844.00 MHz
 CHANNEL: 26990
 MEASURED OUTPUT POWER: 17.92 dBm = 0.062 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 30.92 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1688.00	H	-	-	-76.01	6.15	-69.86	87.8
2532.00	H	-	-	-73.19	6.93	-66.27	84.2

Table 7-18. Radiated Spurious Data (Band 5 – High Channel)

OPERATING FREQUENCY: 844.00 MHz
 CHANNEL: 26990
 MEASURED OUTPUT POWER: 16.98 dBm = 0.050 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 29.98 dBc

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1688.00	H	-	-	-75.97	6.15	-69.82	86.8
2532.00	H	-	-	-73.33	6.93	-66.41	83.4

Table 7-19. Radiated Spurious Data with WCP (Band 5 – High Channel)

FCC ID: A3LSC03J		FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1710.70 MHz
 CHANNEL: 19957
 MEASURED OUTPUT POWER: 21.77 dBm = 0.150 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 34.77 dBc

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]	[dBc]
3421.40	H	100	73	-65.30	9.64	-55.66	77.4
5132.10	H	-	-	-66.69	10.92	-55.76	77.5
6842.80	H	-	-	-60.17	10.78	-49.40	71.2

Table 7-20. Radiated Spurious Data (Band 4 – Low Channel)

OPERATING FREQUENCY: 1732.50 MHz
 CHANNEL: 20175
 MEASURED OUTPUT POWER: 20.28 dBm = 0.107 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 33.28 dBc

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]	[dBc]
3465.00	H	100	33	-64.66	9.77	-54.88	75.2
5197.50	H	-	-	-66.61	10.81	-55.80	76.1
6930.00	H	-	-	-59.86	10.89	-48.98	69.3

Table 7-21. Radiated Spurious Data (Band 4 – Mid Channel)

FCC ID: A3LSC03J		FCC Pt. 22 & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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OPERATING FREQUENCY: 1754.30 MHz
 CHANNEL: 20393
 MEASURED OUTPUT POWER: 19.73 dBm = 0.094 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 32.73 dBc

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]	[dBc]
3508.60	H	121	167	-61.24	9.89	-51.35	71.1
5262.90	H	-	-	-66.41	10.93	-55.48	75.2
7017.20	H	-	-	-60.34	11.07	-49.27	69.0

Table 7-22. Radiated Spurious Data (Band 4 – High Channel)

OPERATING FREQUENCY: 1710.70 MHz
 CHANNEL: 19957
 MEASURED OUTPUT POWER: 20.87 dBm = 0.122 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 33.87 dBc

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]	[dBc]
3421.40	H	135	127	-60.82	9.64	-51.18	72.0
5132.10	H	-	-	-67.14	10.92	-56.21	77.1
6842.80	H	-	-	-59.95	10.78	-49.18	70.0

Table 7-23. Radiated Spurious Data with WCP (Band 4 – Low Channel)

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OPERATING FREQUENCY: 2501.00 MHz
 CHANNEL: 39700
 MEASURED OUTPUT POWER: 21.69 dBm = 0.148 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $55 + 10 \log_{10}(W)$ 46.69 dBc

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]	[dBc]
5002.00	H	100	328	-56.58	11.16	-45.42	67.1
7503.00	H	-	-	-48.37	11.21	-37.16	58.9
10004.00	H	-	-	-47.96	12.57	-35.39	57.1
12505.00	H	-	-	-44.10	13.04	-31.06	52.8

Table 7-24. Radiated Spurious Data (Band 41 – Low Channel)

OPERATING FREQUENCY: 2593.00 MHz
 CHANNEL: 40620
 MEASURED OUTPUT POWER: 21.85 dBm = 0.153 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $55 + 10 \log_{10}(W)$ 46.85 dBc

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]	[dBc]
5186.00	H	123	48	-48.59	10.83	-37.76	59.6
7779.00	H	119	27	-44.85	11.60	-33.25	55.1
10372.00	H	-	-	-47.78	12.74	-35.04	56.9
12965.00	H	-	-	-41.82	12.83	-28.99	50.8
15558.00	H	-	-	-43.72	14.91	-28.81	50.7

Table 7-25. Radiated Spurious Data (Band 41 – Mid Channel)

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OPERATING FREQUENCY: 2685.00 MHz
 CHANNEL: 41540
 MEASURED OUTPUT POWER: 21.62 dBm = 0.145 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $55 + 10 \log_{10}(W)$ 46.62 dBc

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]	[dBc]
5370.00	H	-	-	-55.92	11.08	-44.84	66.5
8055.00	H	-	-	-47.64	11.54	-36.10	57.7
10740.00	H	-	-	-47.79	12.97	-34.82	56.4

Table 7-26. Radiated Spurious Data (Band 41 – High Channel)

OPERATING FREQUENCY: 2593.00 MHz
 CHANNEL: 40620
 MEASURED OUTPUT POWER: 21.16 dBm = 0.131 W
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: $55 + 10 \log_{10}(W)$ 46.16 dBc

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]	[dBc]
5186.00	H	130	63	-48.76	10.83	-37.93	59.1
7779.00	H	126	81	-45.92	11.60	-34.32	55.5
10372.00	H	-	-	-47.01	12.74	-34.27	55.4
12965.00	H	-	-	-40.90	12.83	-28.07	49.2
15558.00	H	-	-	-44.08	14.91	-29.17	50.3

Table 7-27. Radiated Spurious Data with WCP (Band 41 – Mid Channel)

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7.7 Frequency Stability / Temperature Variation

\$2.1055 \$22.355 \$27.54

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-D-2010. 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 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-D-2010

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

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Band 12/17 Frequency Stability Measurements

\$2.1055 \$27.54

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)	707,499,960	-40	-0.0000057
100 %		- 30	707,499,962	-38	-0.0000054
100 %		- 20	707,499,980	-20	-0.0000028
100 %		- 10	707,500,126	126	0.0000178
100 %		0	707,500,018	18	0.0000025
100 %		+ 10	707,500,389	389	0.0000550
100 %		+ 20	707,500,060	60	0.0000085
100 %		+ 30	707,499,630	-370	-0.0000523
100 %		+ 40	707,500,280	280	0.0000396
100 %		+ 50	707,499,822	-178	-0.0000252
BATT. ENDPOINT	3.45	+ 20	707,500,048	48	0.0000068

Table 7-28. Frequency Stability Data (Band 12/17)

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.

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Band 12/17 Frequency Stability Measurements

§2.1055 §27.54

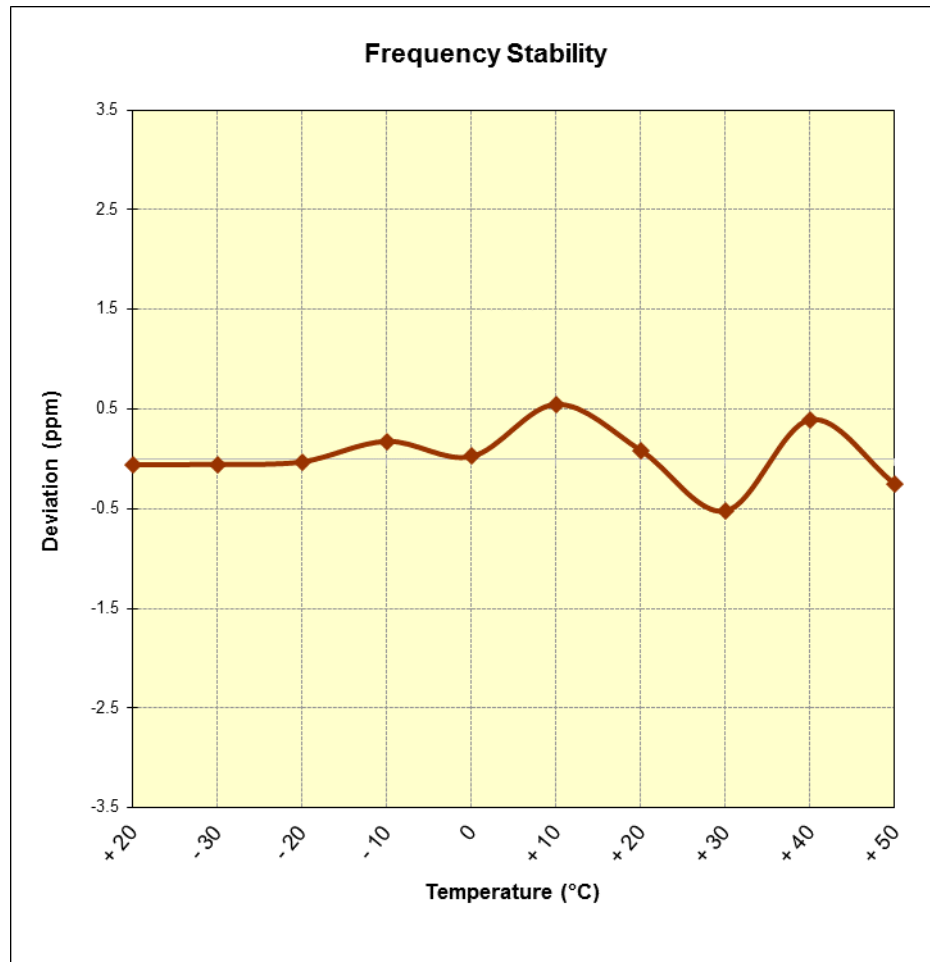


Figure 7-7. Frequency Stability Graph (Band 12/17)

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Band 13 Frequency Stability Measurements

\$2.1055 \$27.54

OPERATING FREQUENCY: 782,000,000 Hz
 CHANNEL: 23230
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	781,999,682	-318	-0.0000407
100 %		- 30	781,999,840	-160	-0.0000205
100 %		- 20	782,000,008	8	0.0000010
100 %		- 10	782,000,106	106	0.0000136
100 %		0	781,999,905	-95	-0.0000121
100 %		+ 10	781,999,696	-304	-0.0000389
100 %		+ 20	782,000,004	4	0.0000005
100 %		+ 30	781,999,825	-175	-0.0000224
100 %		+ 40	781,999,997	-3	-0.0000004
100 %		+ 50	781,999,953	-47	-0.0000060
BATT. ENDPOINT	3.45	+ 20	782,000,251	251	0.0000321

Table 7-29. Frequency Stability Data (Band 13)

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.

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Band 13 Frequency Stability Measurements

§2.1055 §27.54

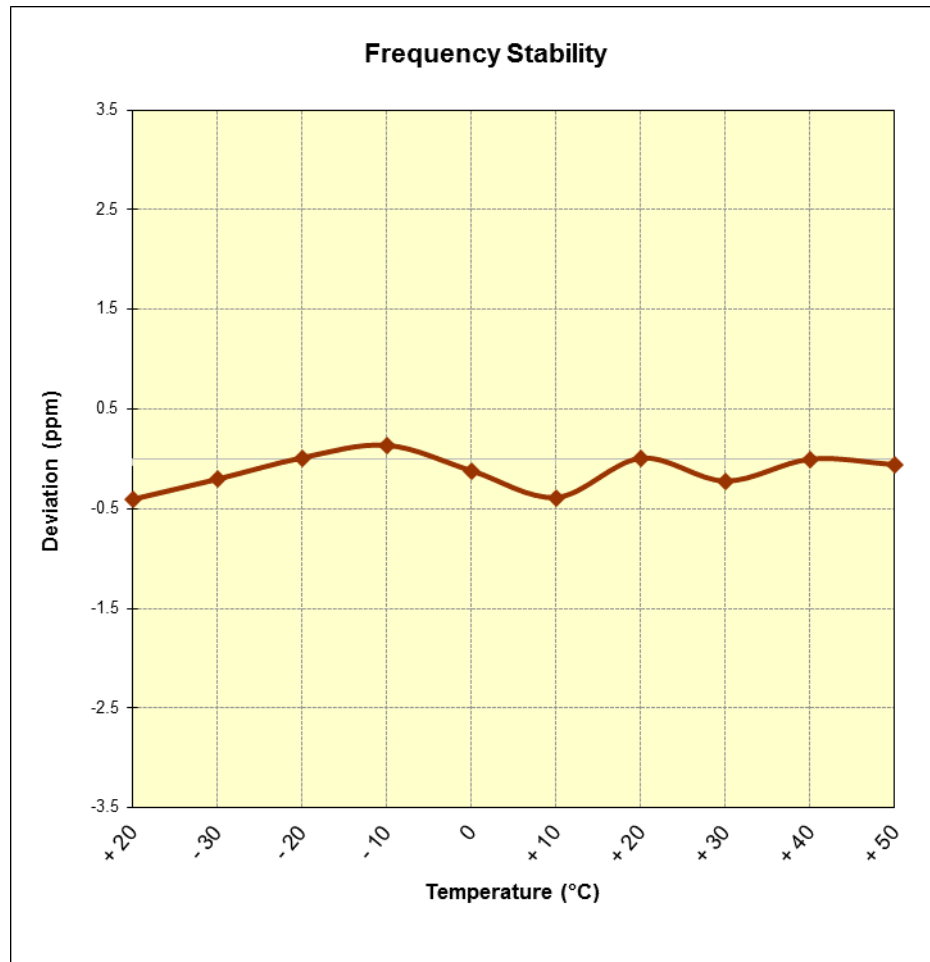


Figure 7-8. Frequency Stability Graph (Band 13)

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Band 5 Frequency Stability Measurements

§2.1055 §22.355

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)	836,499,778	-222	-0.0000265
100 %		- 30	836,499,871	-129	-0.0000154
100 %		- 20	836,499,867	-133	-0.0000159
100 %		- 10	836,500,288	288	0.0000344
100 %		0	836,499,946	-54	-0.0000065
100 %		+ 10	836,499,964	-36	-0.0000043
100 %		+ 20	836,499,831	-169	-0.0000202
100 %		+ 30	836,500,020	20	0.0000024
100 %		+ 40	836,499,975	-25	-0.0000030
100 %		+ 50	836,499,845	-155	-0.0000185
BATT. ENDPOINT	3.45	+ 20	836,499,881	-119	-0.0000142

Table 7-30. Frequency Stability Data (Band 5)

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Band 5 Frequency Stability Measurements

§2.1055 §22.355

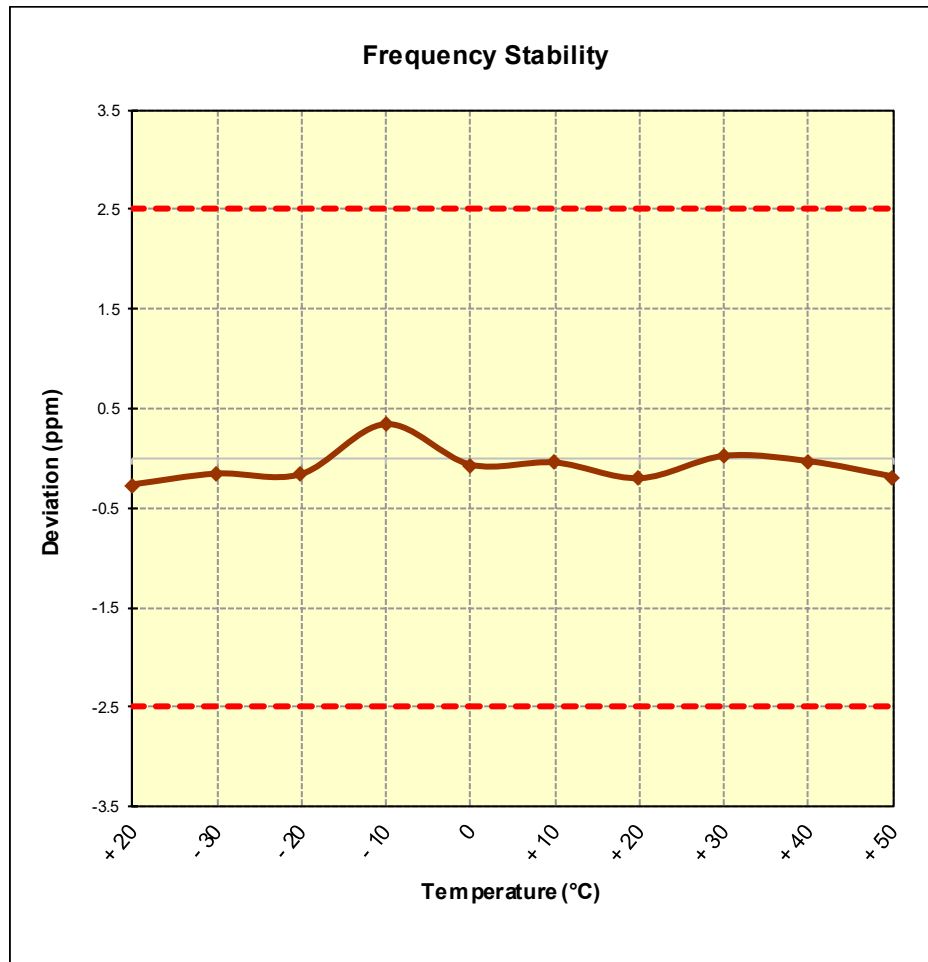


Figure 7-9. Frequency Stability Graph (Band 5)

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Band 4 Frequency Stability Measurements

\$2.1055 \$27.54

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)	1,732,500,036	36	0.0000021
100 %		- 30	1,732,500,204	204	0.0000118
100 %		- 20	1,732,499,763	-237	-0.0000137
100 %		- 10	1,732,500,108	108	0.0000062
100 %		0	1,732,500,202	202	0.0000117
100 %		+ 10	1,732,500,136	136	0.0000078
100 %		+ 20	1,732,500,125	125	0.0000072
100 %		+ 30	1,732,499,793	-207	-0.0000119
100 %		+ 40	1,732,500,226	226	0.0000130
100 %		+ 50	1,732,499,807	-193	-0.0000111
BATT. ENDPOINT	3.45	+ 20	1,732,500,184	184	0.0000106

Table 7-31. 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.

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Band 4 Frequency Stability Measurements

§2.1055 §§27.54

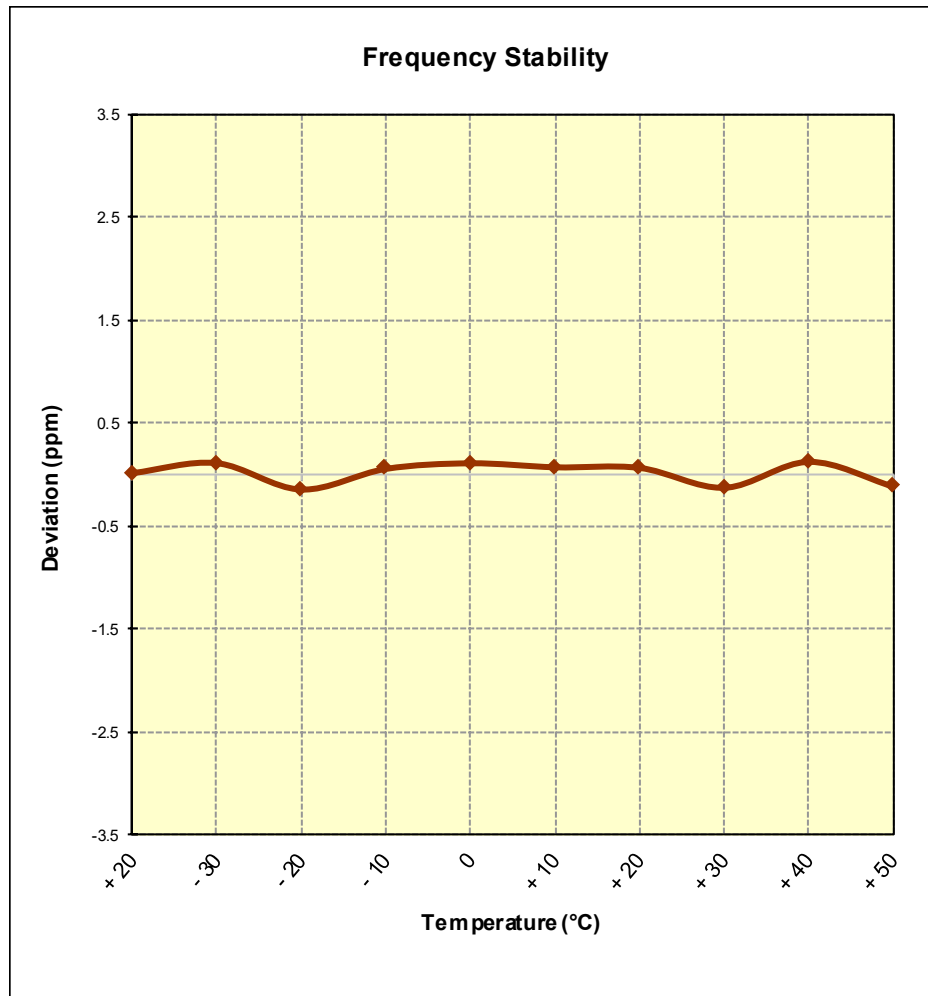


Figure 7-10. Frequency Stability Graph (Band 4)

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Band 41 Frequency Stability Measurements

\$2.1055 \$27.54

OPERATING FREQUENCY: 2,593,000,000 Hz
 CHANNEL: 40620
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,592,999,977	-23	-0.0000009
100 %		- 30	2,592,999,917	-83	-0.0000032
100 %		- 20	2,592,999,594	-406	-0.0000157
100 %		- 10	2,593,000,307	307	0.0000118
100 %		0	2,593,000,056	56	0.0000022
100 %		+ 10	2,593,000,290	290	0.0000112
100 %		+ 20	2,592,999,966	-34	-0.0000013
100 %		+ 30	2,593,000,106	106	0.0000041
100 %		+ 40	2,593,000,114	114	0.0000044
100 %		+ 50	2,592,999,940	-60	-0.0000023
BATT. ENDPOINT	3.45	+ 20	2,592,999,647	-353	-0.0000136

Table 7-32. Frequency Stability Data (Band 41)

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.

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Band 41 Frequency Stability Measurements

§2.1055 §27.54

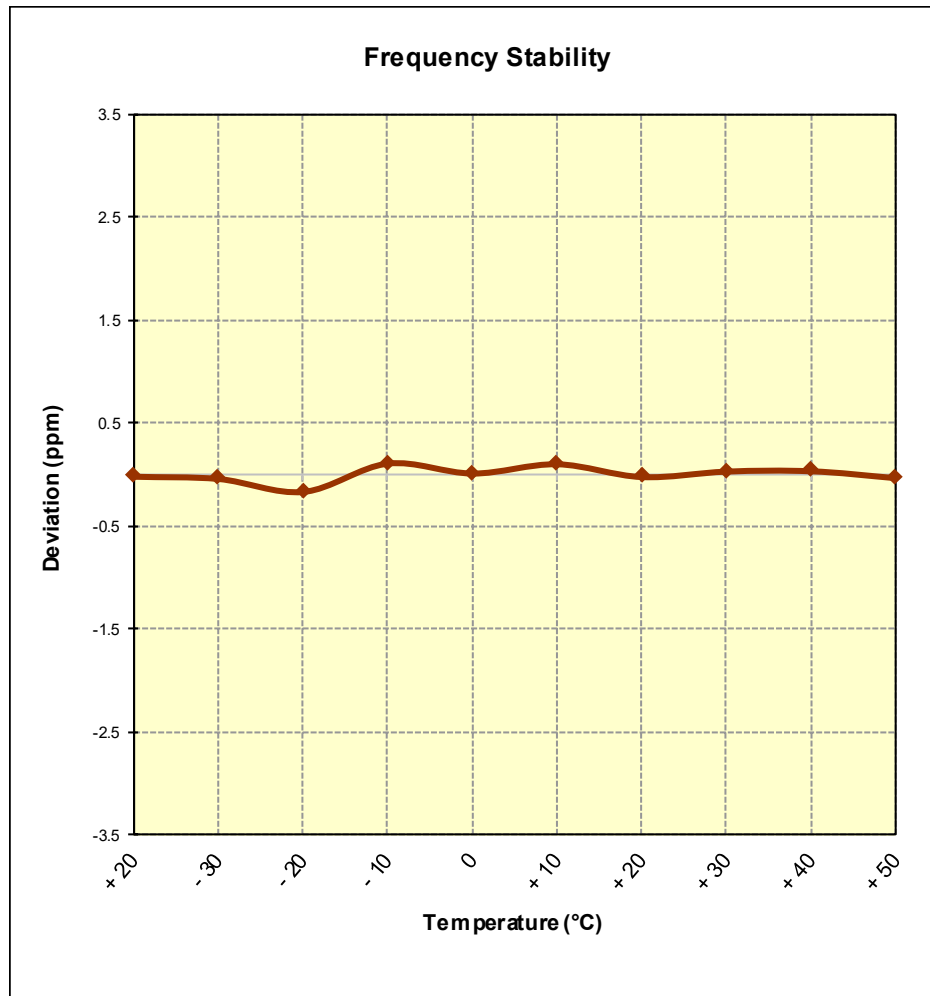


Figure 7-11. Frequency Stability Graph (Band 41)

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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: A3LSC03J** complies with all the requirements of Parts 22 & 27 of the FCC rules for LTE operation only.

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