



6.4. Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a)

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 $43 + \log_{10}(P_{\text{[Watts]}})$, where P is the transmitter power in Watts. Limit equivalent to -13dBm, calculation shown below.

$$43 + 10 \log_{10}(1.567\text{W}) = 44.95 \text{ dB}$$

$$1.567\text{W} = 31.95 \text{ dBm}$$

$$31.95 \text{ dBm} - 44.95 \text{ dB} = -13 \text{ dBm}$$

Test Procedure Used

KDB 971168 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 x RBW
5. Detector = RMS
6. Number of sweep points $\geq$ 2 x Span/RBW
7. Trace mode = max hold
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.

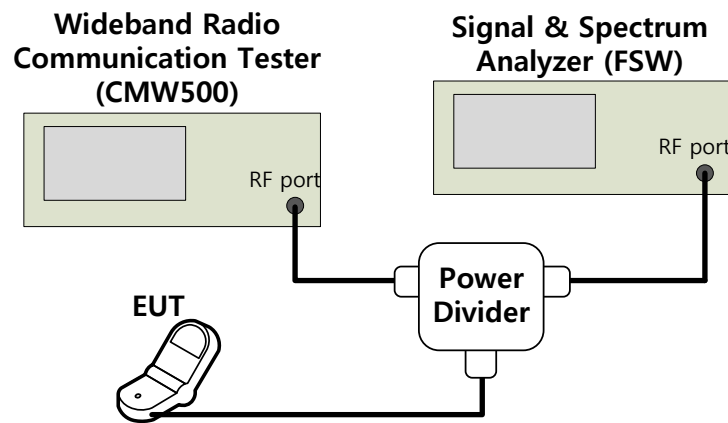


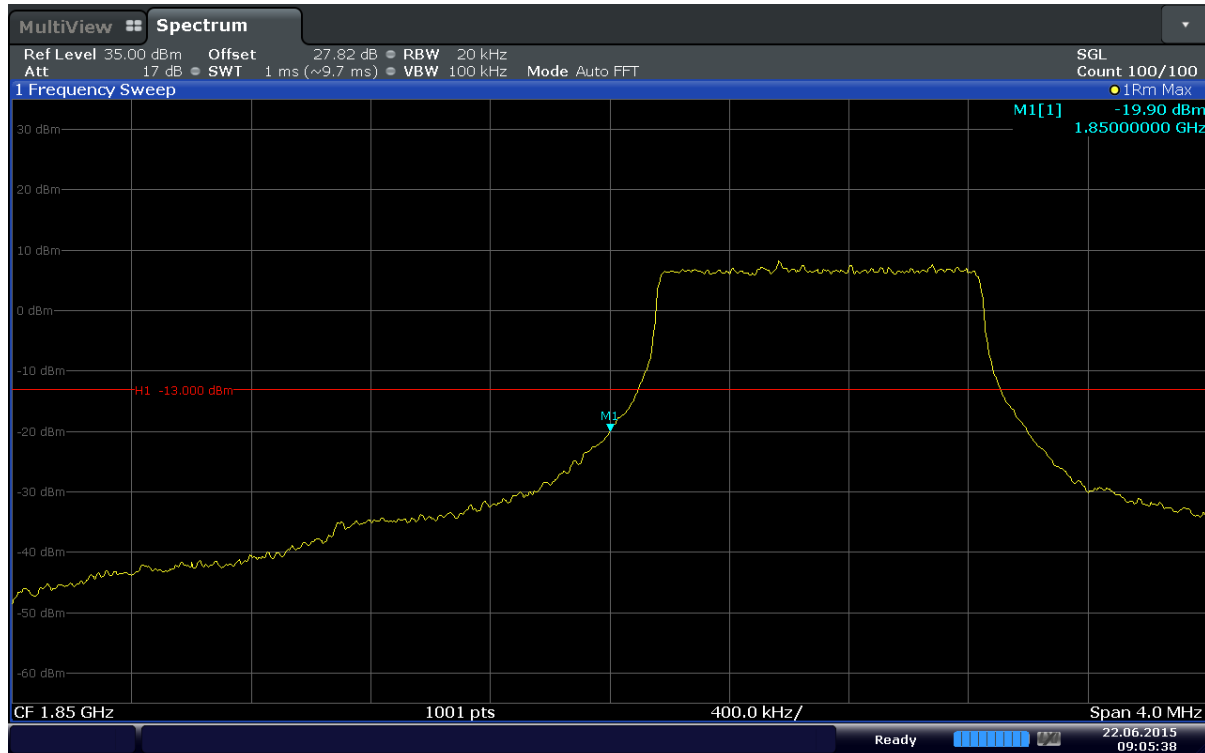
Figure 6-3. Test Instruments & Measurement Setup

Test Notes

1. Per 22.917(b) and 24.238(b), 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.

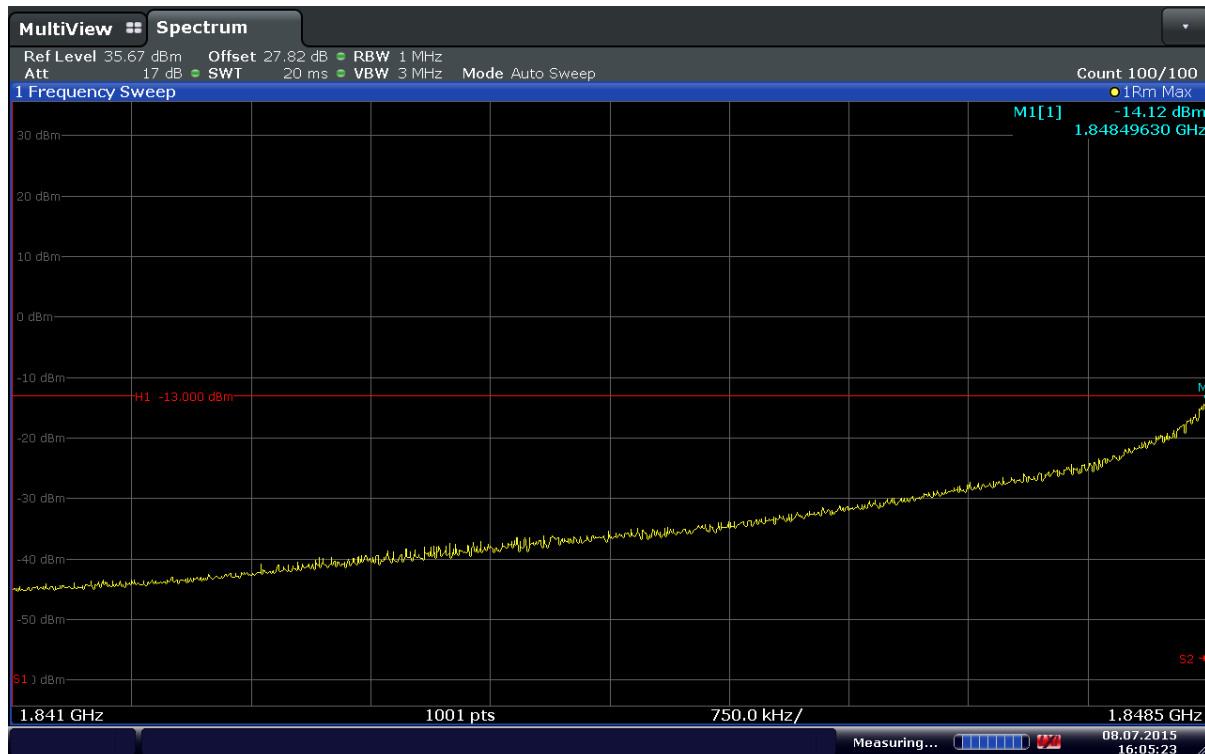
– End of this page –

Test Plots



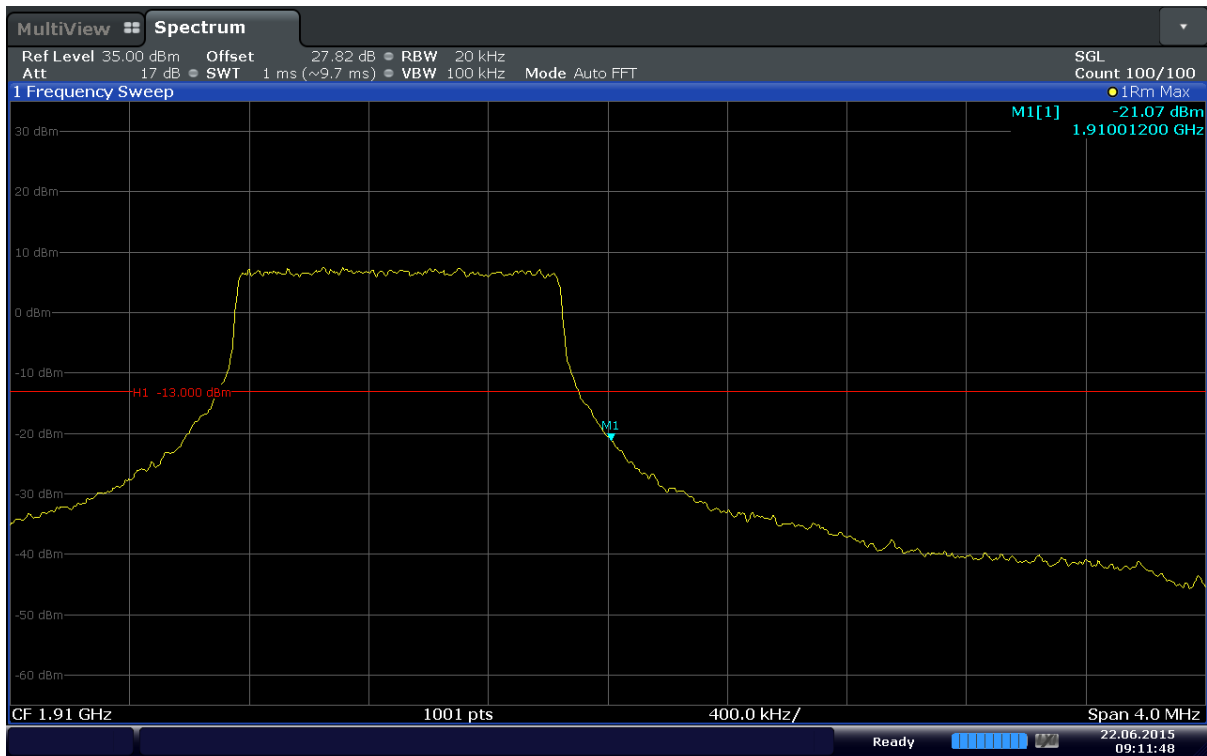
Date: 22 JUN.2015 09:05:38

Plot 6-104. Lower Band Edge Plot (Band2 – 1.4MHz – QPSK – RB Size 6)



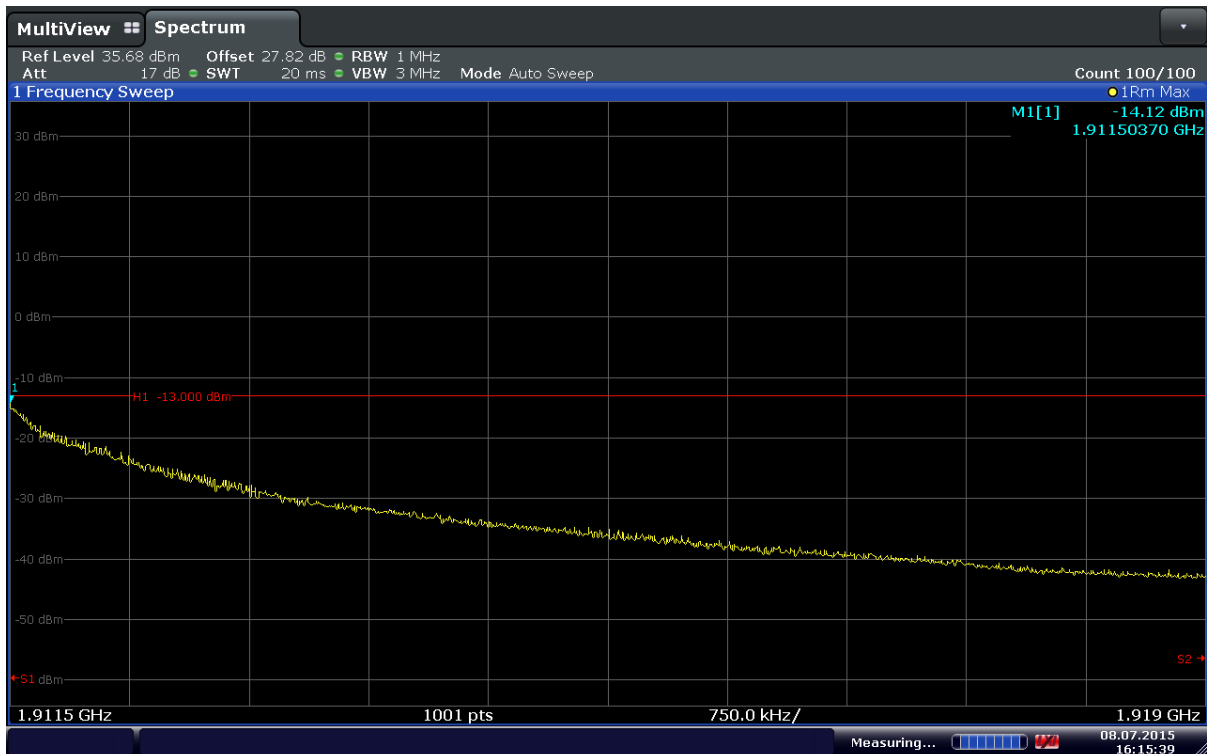
Date: 8 JUL.2015 16:05:23

Plot 6-105. Extended Lower Band Edge Plot (Band2 – 1.4MHz – QPSK – RB Size 6)



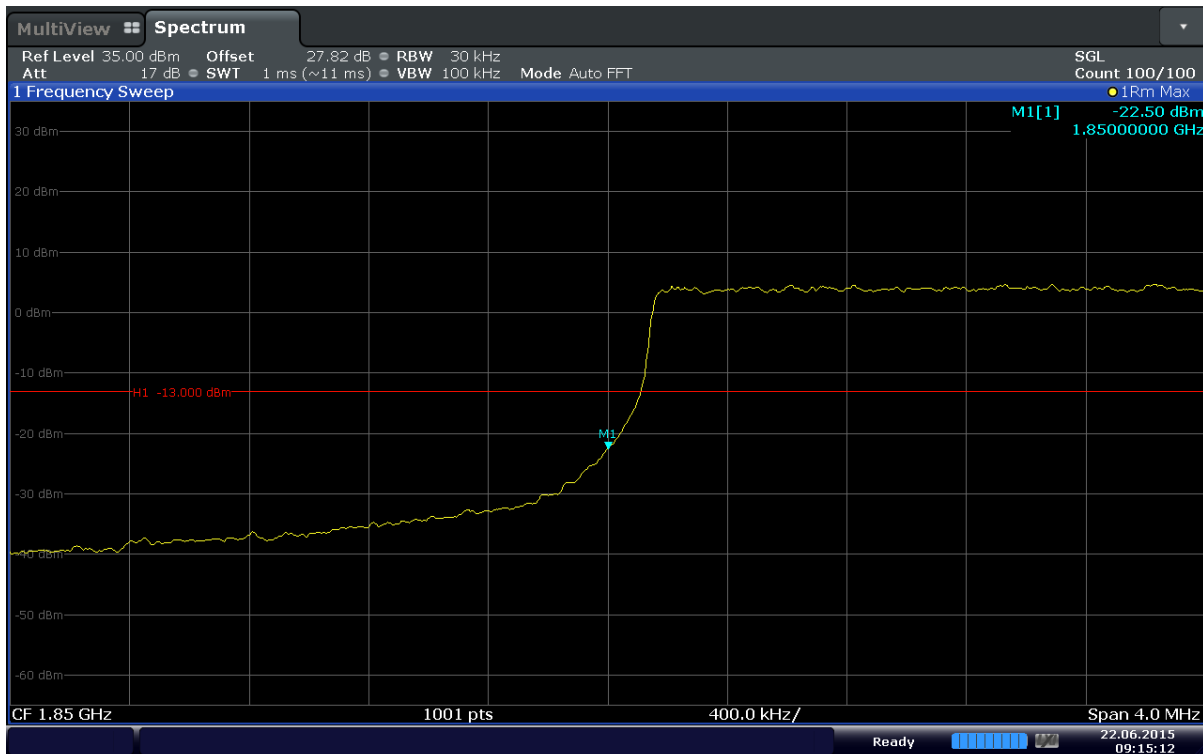
Date: 22 JUN.2015 09:11:48

Plot 6-106. Upper Band Edge Plot (Band2 – 1.4MHz – QPSK – RB Size 6)



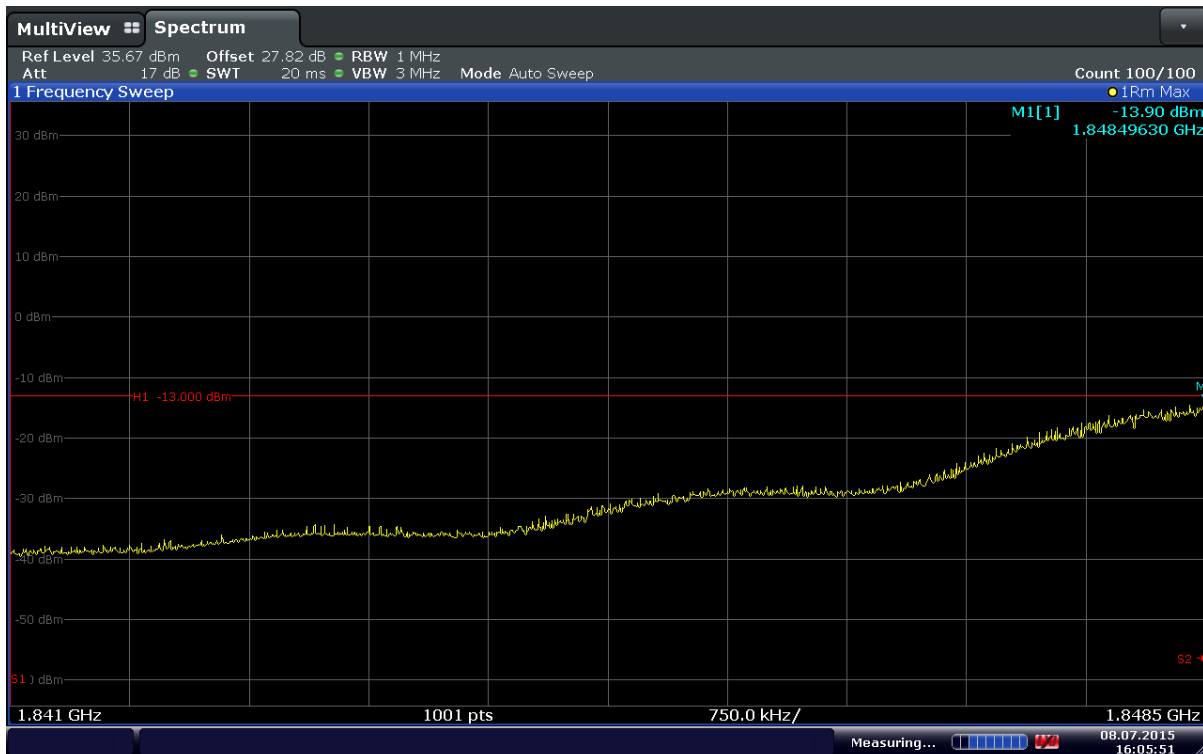
Date: 8 JUL.2015 16:15:40

Plot 6-107. Extended Upper Band Edge Plot (Band2 – 1.4MHz – QPSK – RB Size 6)



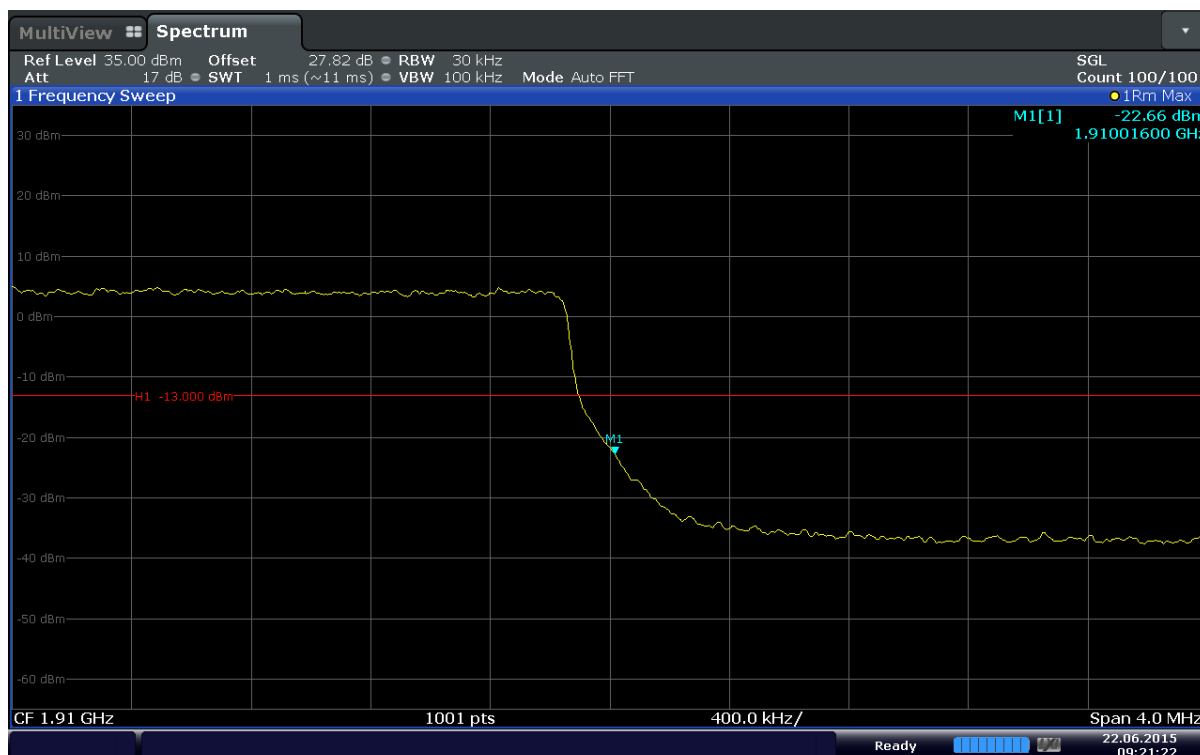
Date: 22 JUN 2015 09:15:12

Plot 6-108. Lower Band Edge Plot (Band2 – 3.0MHz – QPSK – RB Size 15)



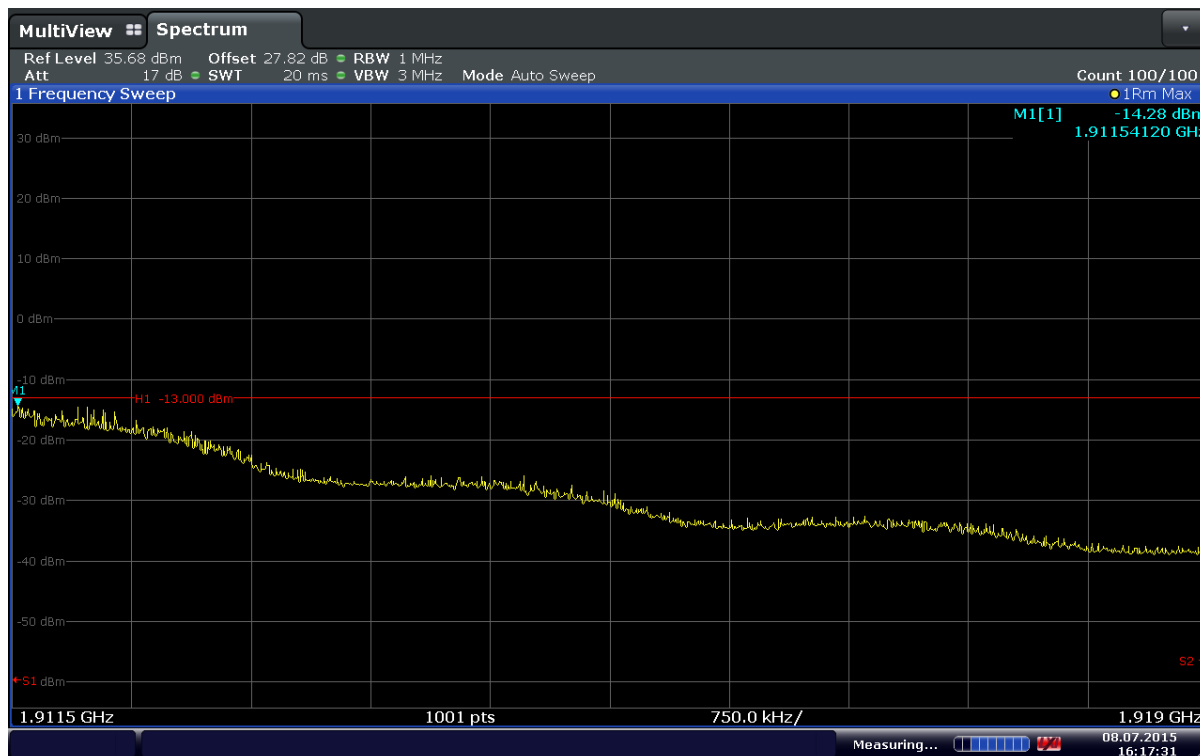
Date: 8 JUL 2015 16:05:52

Plot 6-109. Extended Lower Band Edge Plot (Band2 – 3.0MHz – QPSK – RB Size 15)



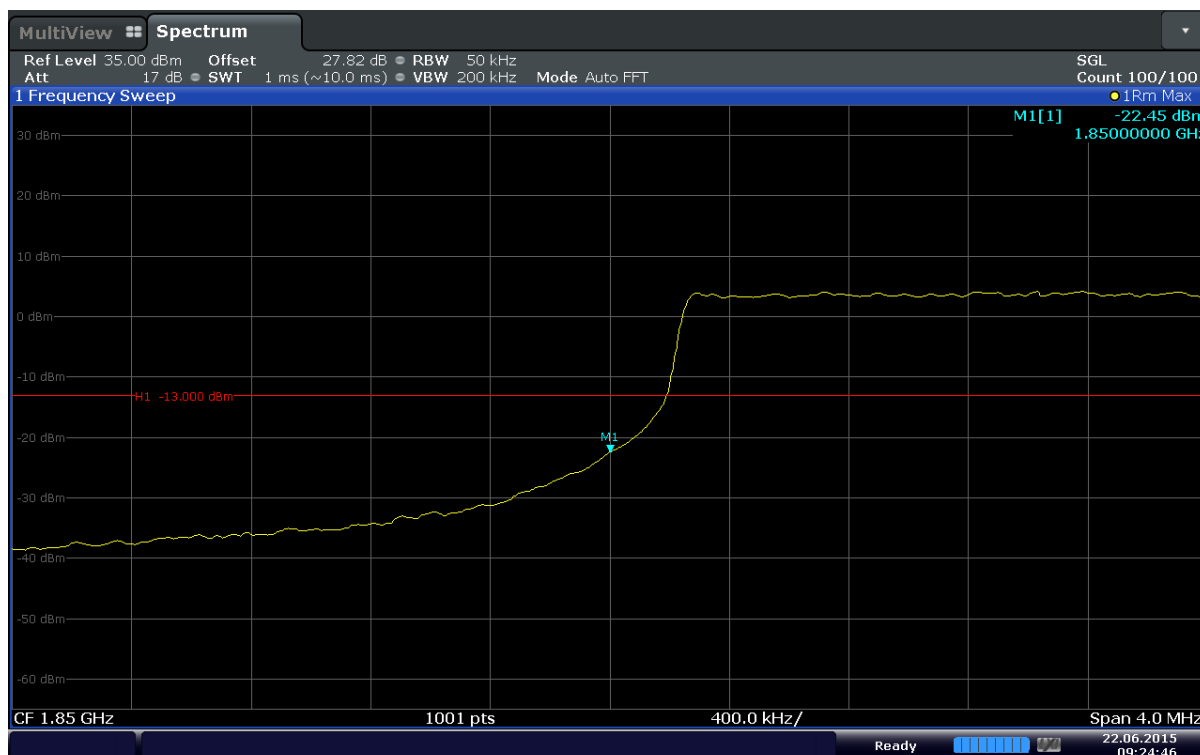
Date: 22 JUN 2015 09:21:22

Plot 6-110. Upper Band Edge Plot (Band2 – 3.0MHz – QPSK – RB Size 15)



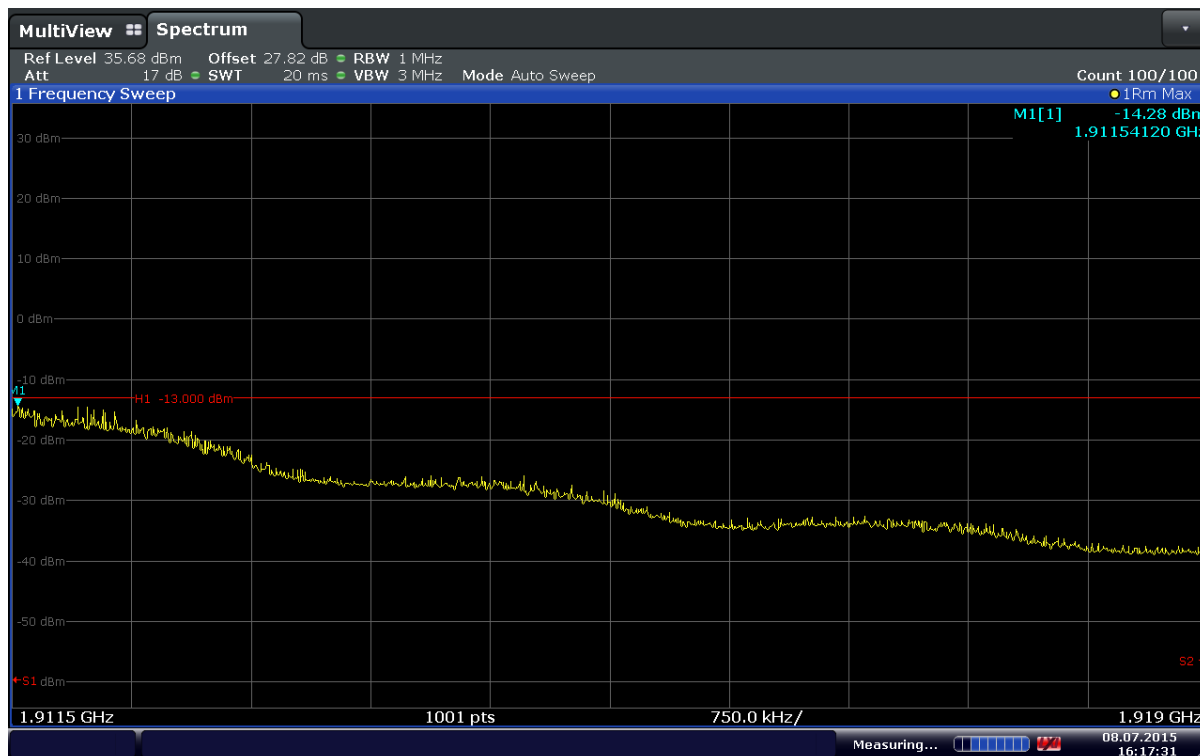
Date: 8 JUL 2015 16:17:31

Plot 6-111. Extended Upper Band Edge Plot (Band2 – 3.0MHz – QPSK – RB Size 15)



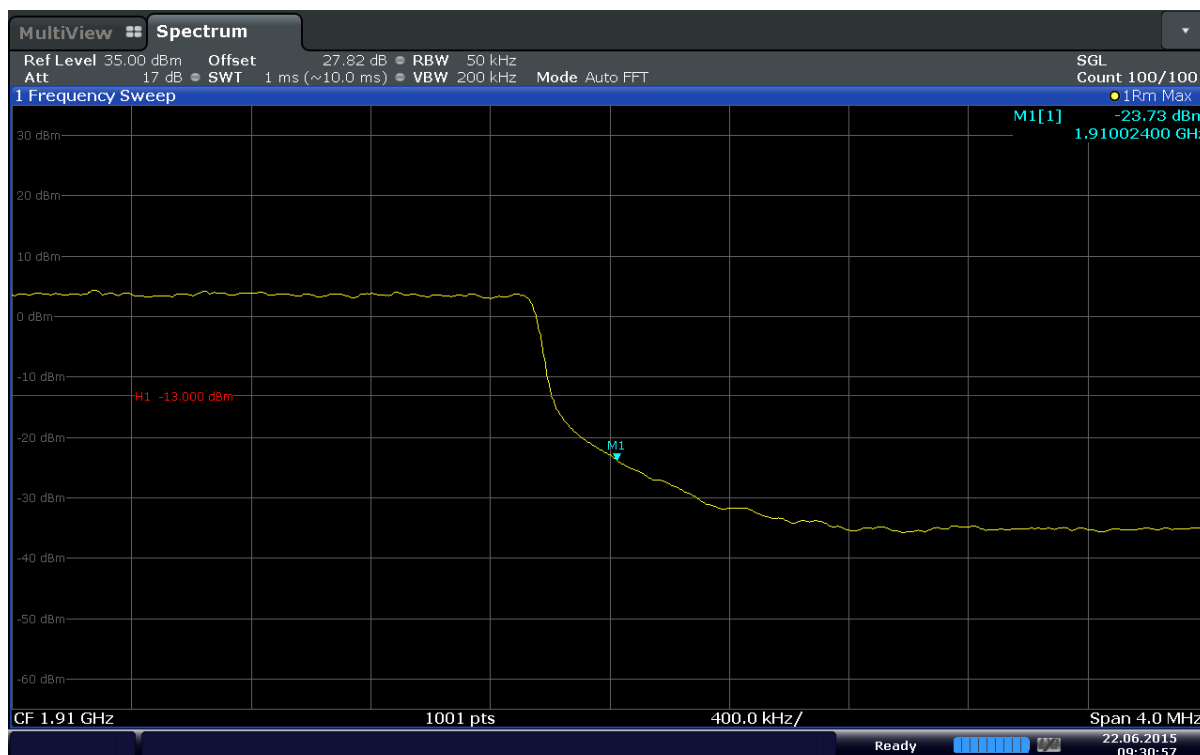
Date: 22 JUN 2015 09:24:46

Plot 6-112. Lower Band Edge Plot (Band2 – 5.0MHz – QPSK – RB Size 25)



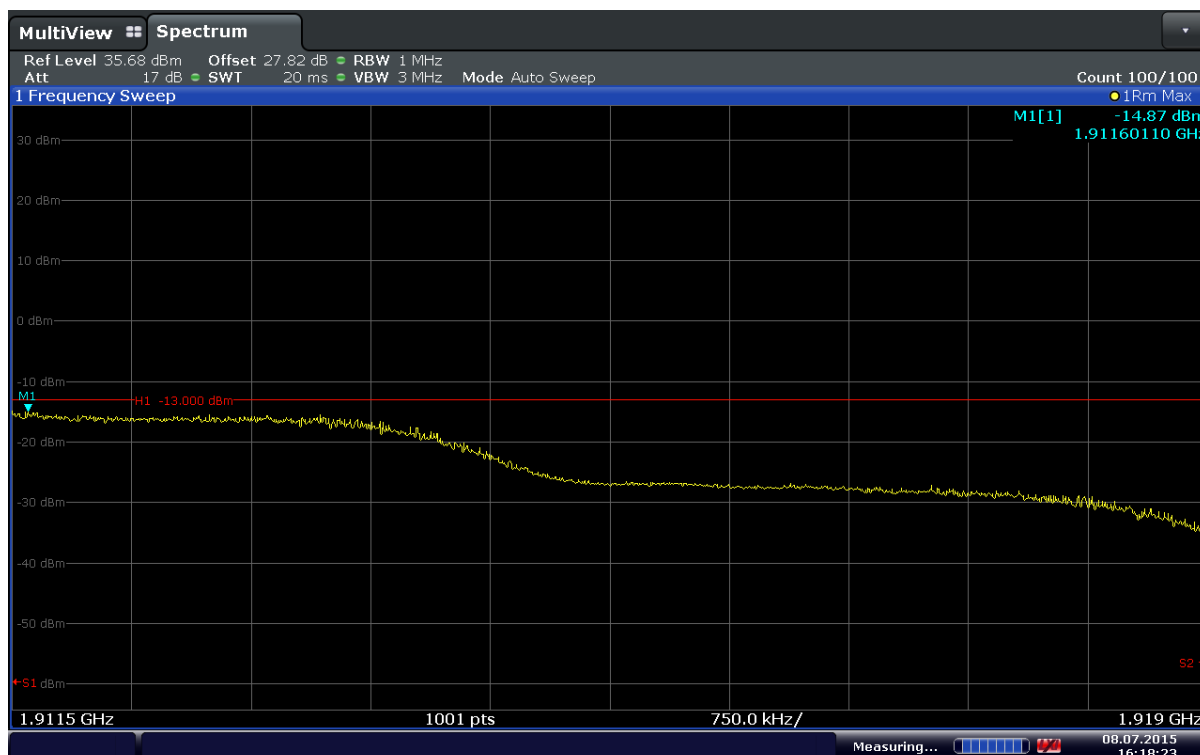
Date: 8 JUL 2015 16:17:31

Plot 6-113. Extended Lower Band Edge Plot (Band2 – 5.0MHz – QPSK – RB Size 25)



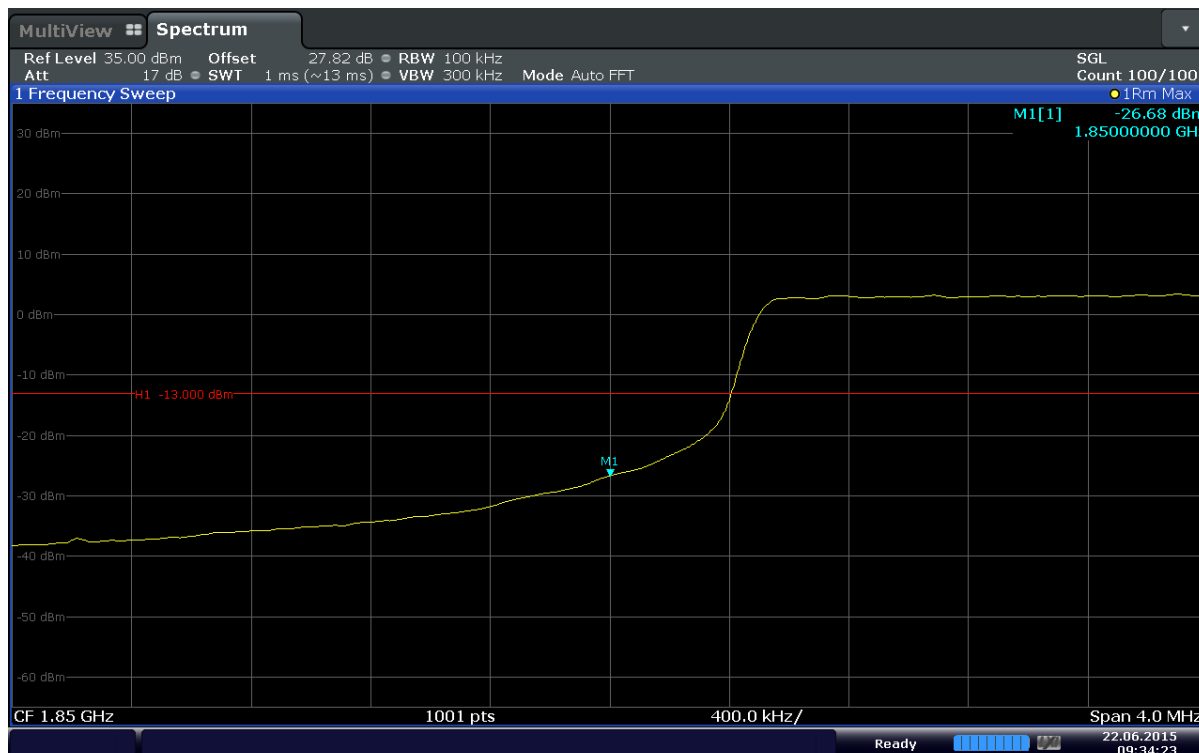
Date: 22 JUN 2015 09:30:57

Plot 6-114. Upper Band Edge Plot (Band2 – 5.0MHz – QPSK – RB Size 25)



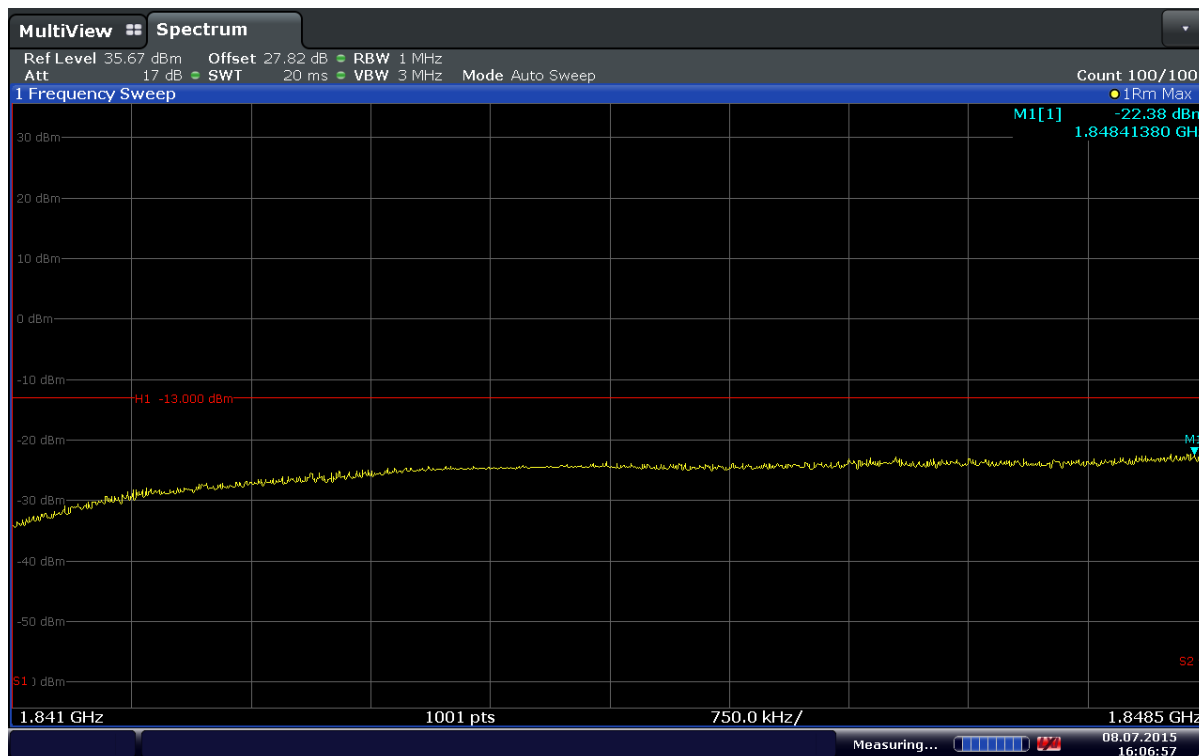
Date: 8 JUL 2015 16:18:24

Plot 6-115. Extended Upper Band Edge Plot (Band2 – 5.0MHz – QPSK – RB Size 25)



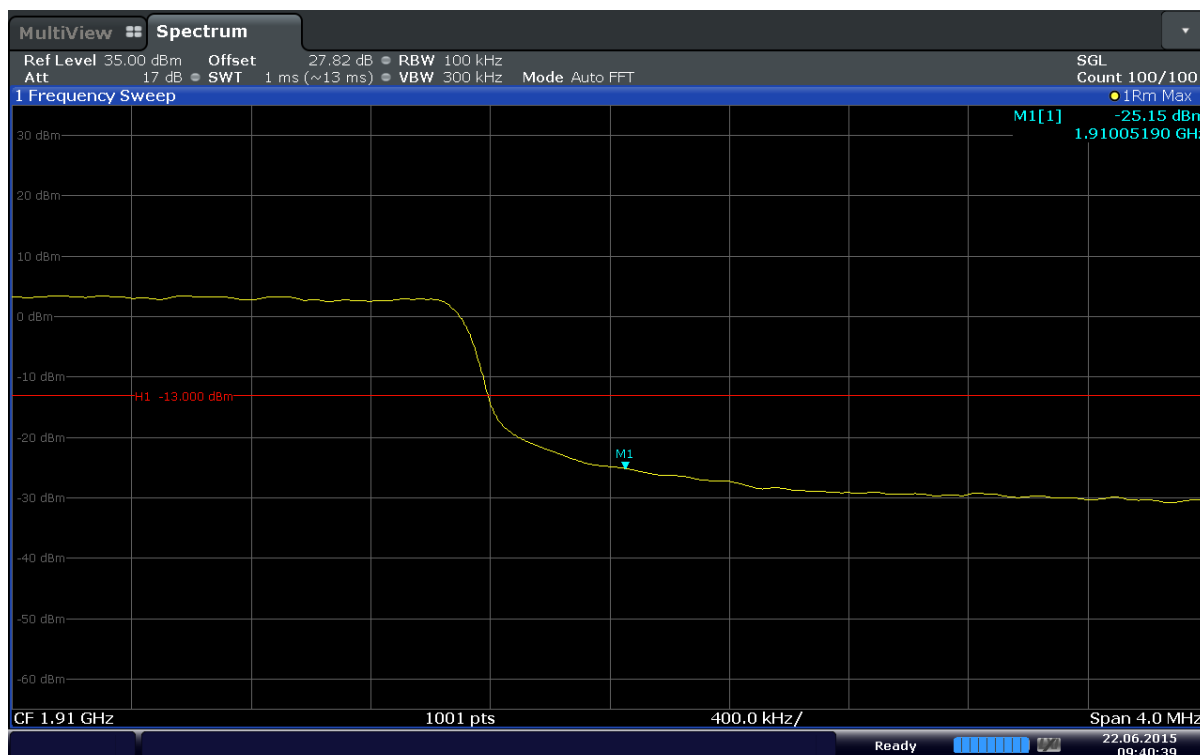
Date: 22 JUN 2015 09:34:23

Plot 6-116. Lower Band Edge Plot (Band2 – 10.0MHz – QPSK – RB Size 50)



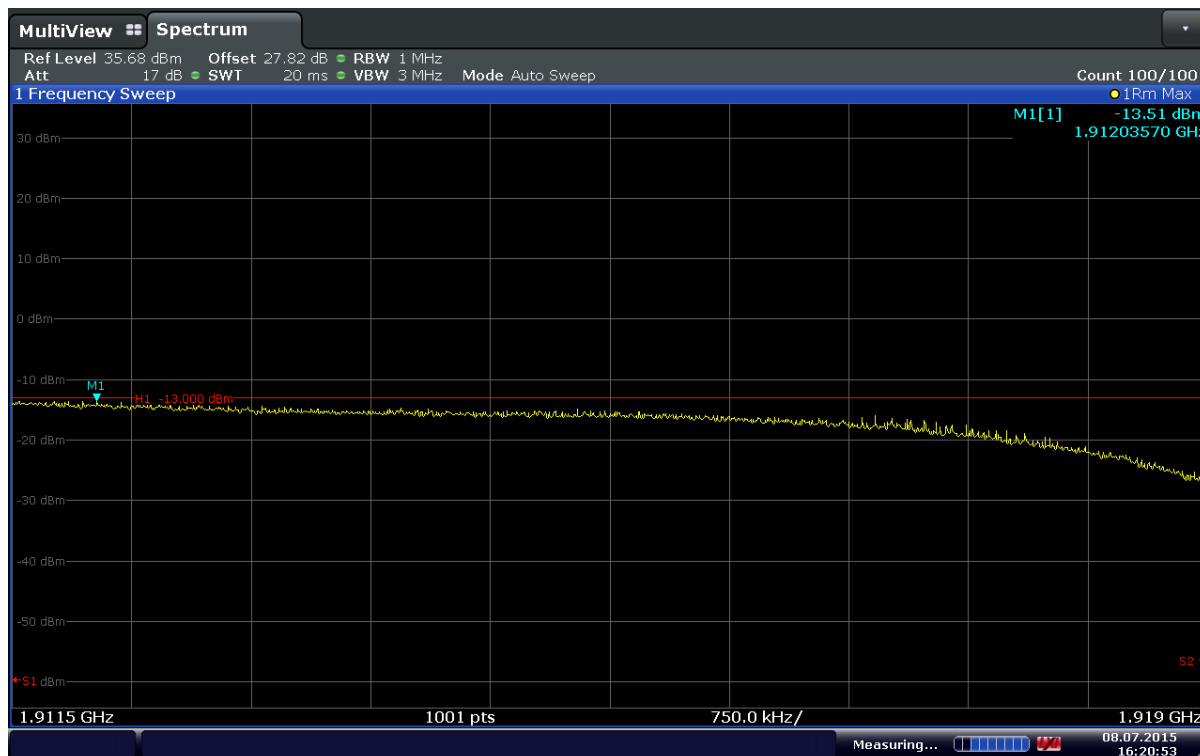
Date: 8 JUL 2015 16:06:57

Plot 6-117. Extended Lower Band Edge Plot (Band2 – 10.0MHz – QPSK – RB Size 50)



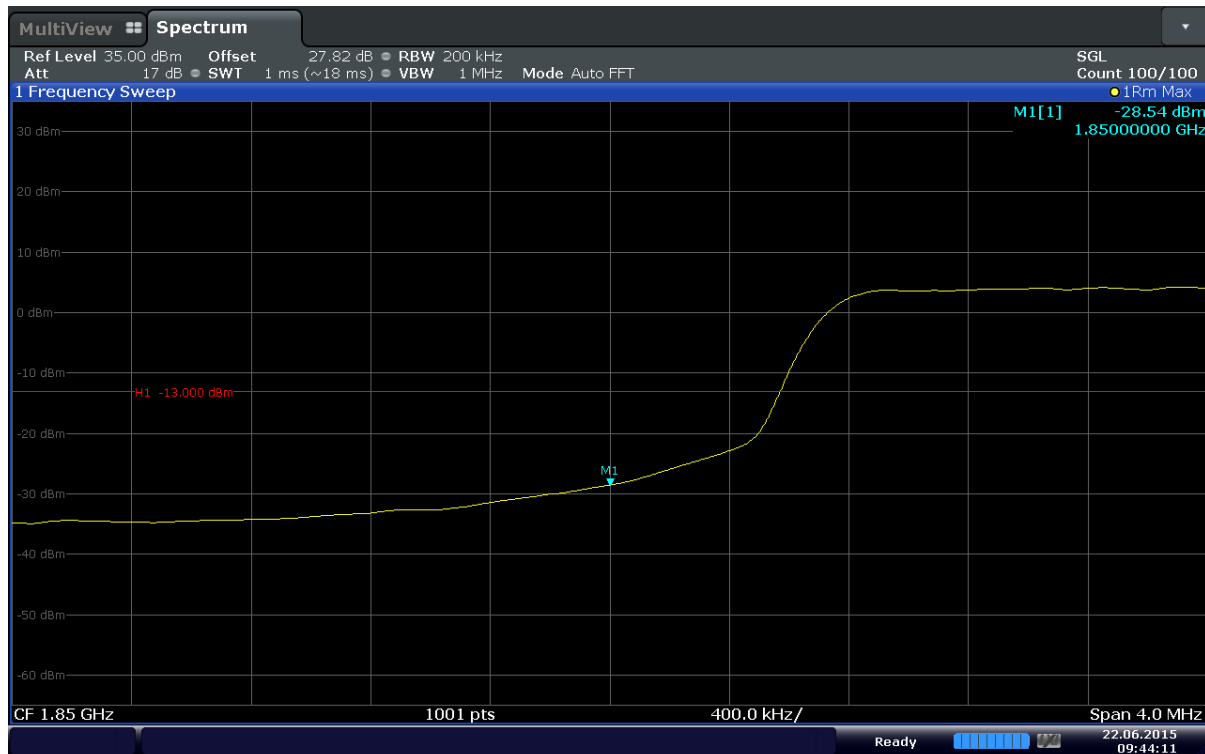
Date: 22 JUN 2015 09:40:39

Plot 6-118. Upper Band Edge Plot (Band2 – 10.0MHz – QPSK – RB Size 50)



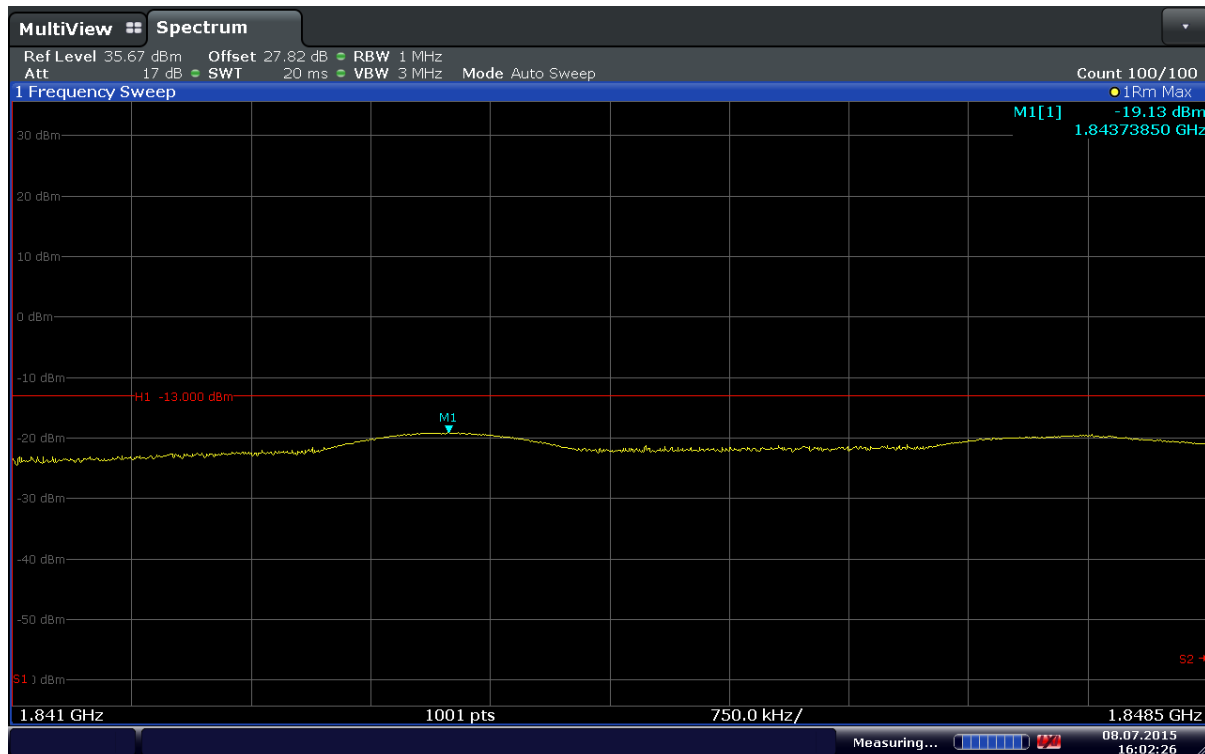
Date: 8 JUL 2015 16:20:53

Plot 6-119. Extended Upper Band Edge Plot (Band2 – 10.0MHz – QPSK – RB Size 50)



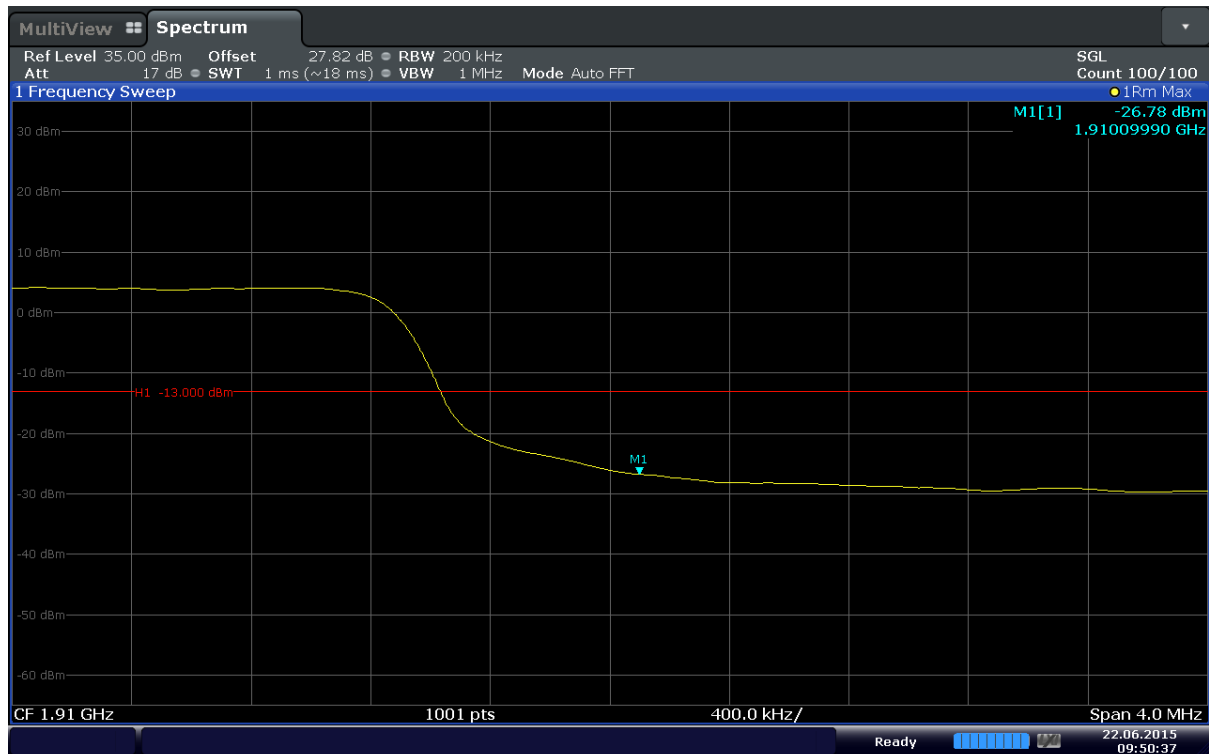
Date: 22 JUN 2015 09:44:11

Plot 6-120. Lower Band Edge Plot (Band2 – 15.0MHz – QPSK – RB Size 75)



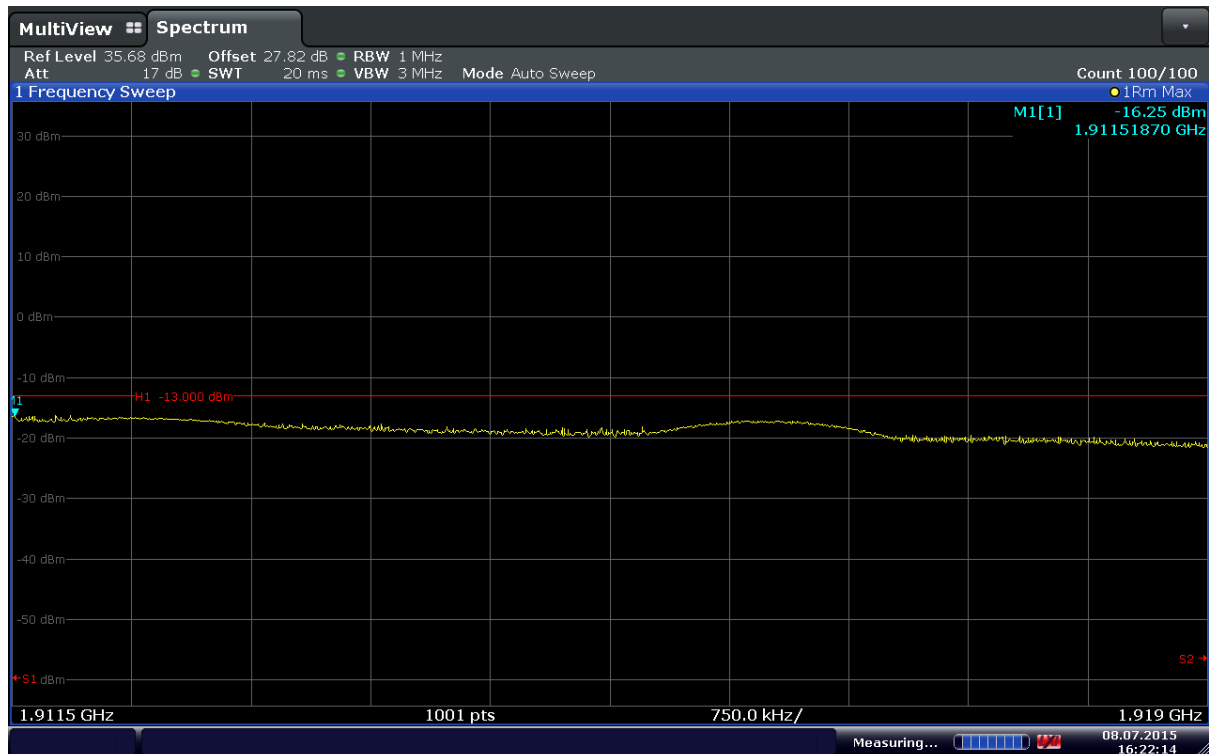
Date: 8 JUL 2015 16:02:26

Plot 6-121. Extended Lower Band Edge Plot (Band2 – 15.0MHz – QPSK – RB Size 75)



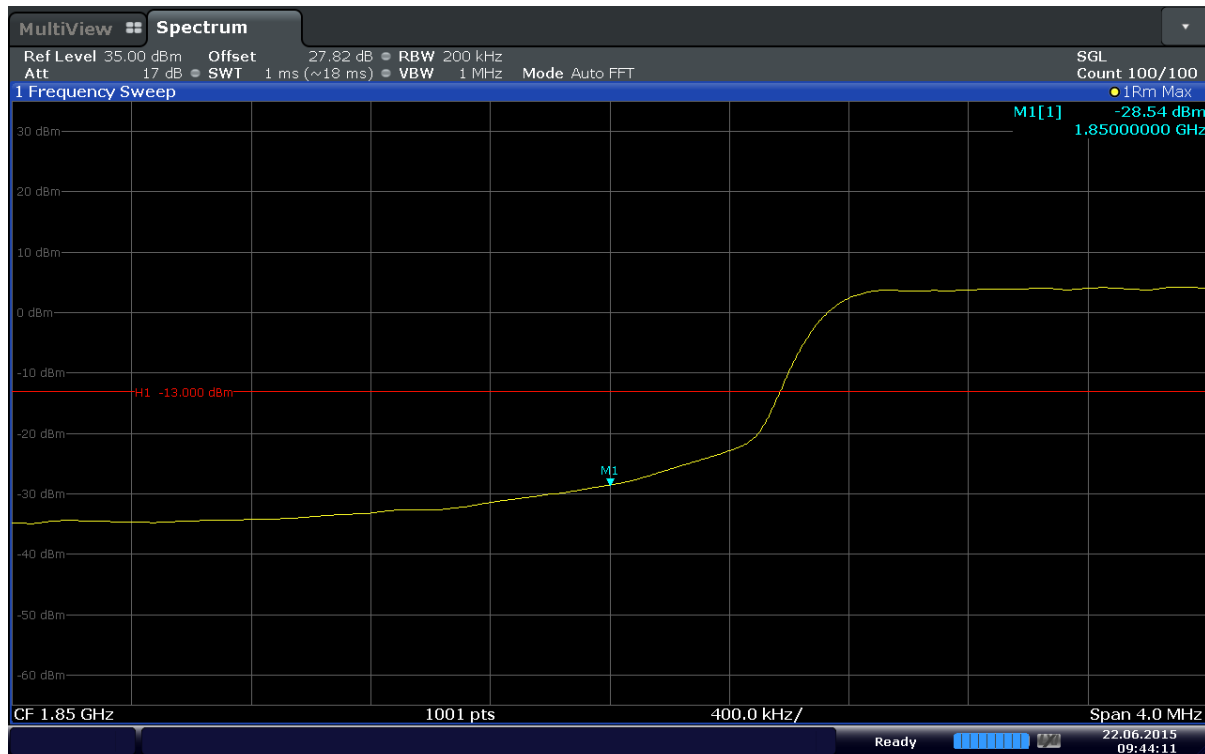
Date: 22 JUN 2015 09:50:38

Plot 6-122. Upper Band Edge Plot (Band2 – 15.0MHz – QPSK – RB Size 75)



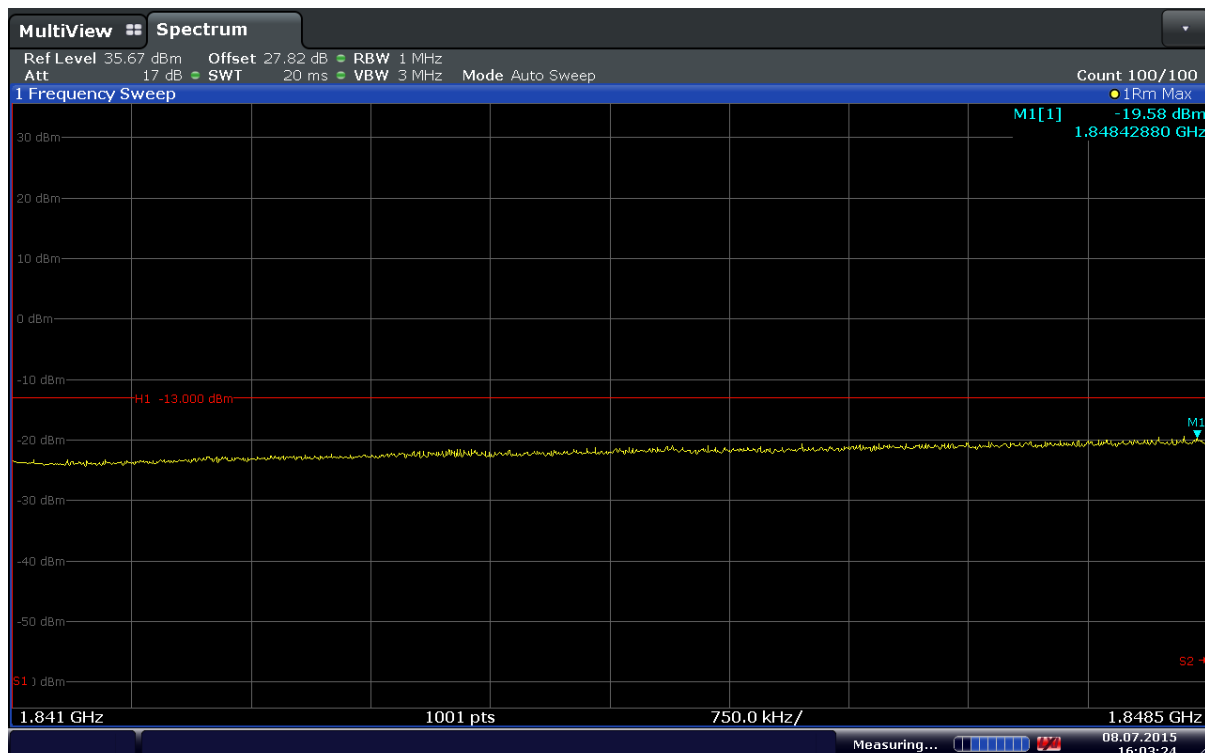
Date: 8 JUL 2015 16:22:14

Plot 6-123. Extended Upper Band Edge Plot (Band2 – 15.0MHz – QPSK – RB Size 75)



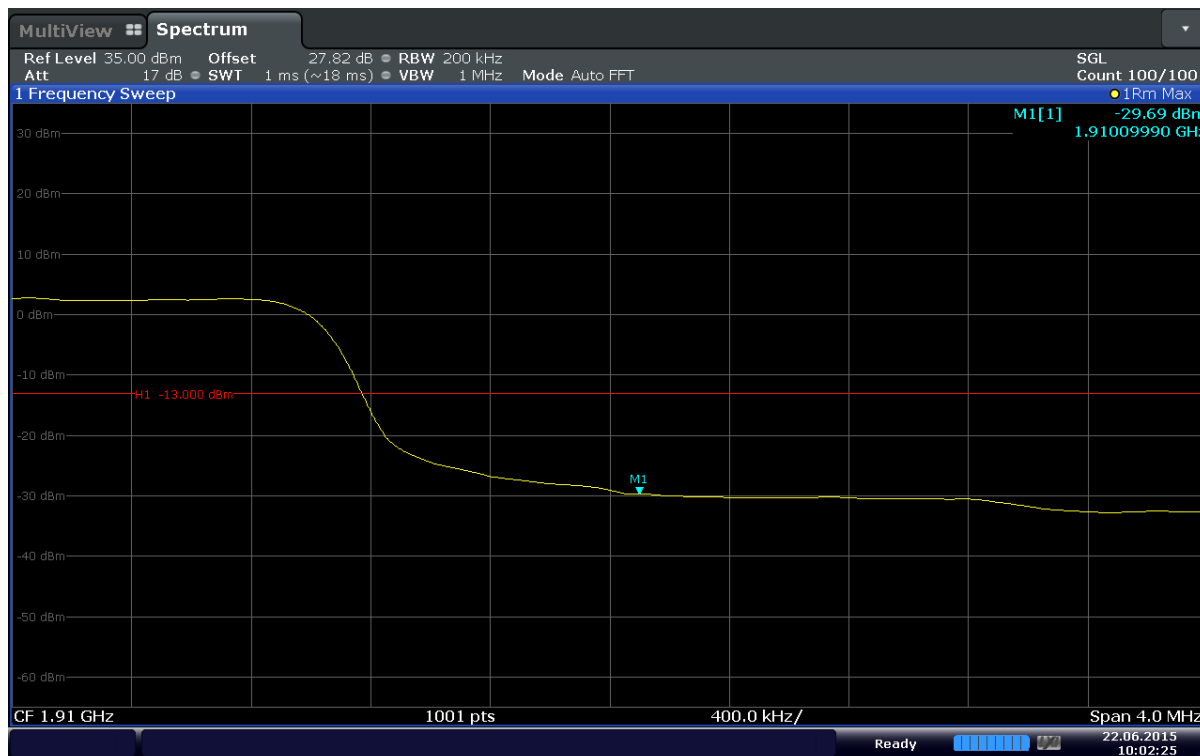
Date: 22 JUN 2015 09:44:11

Plot 6-124. Lower Band Edge Plot (Band2 – 20.0MHz – QPSK – RB Size 100)



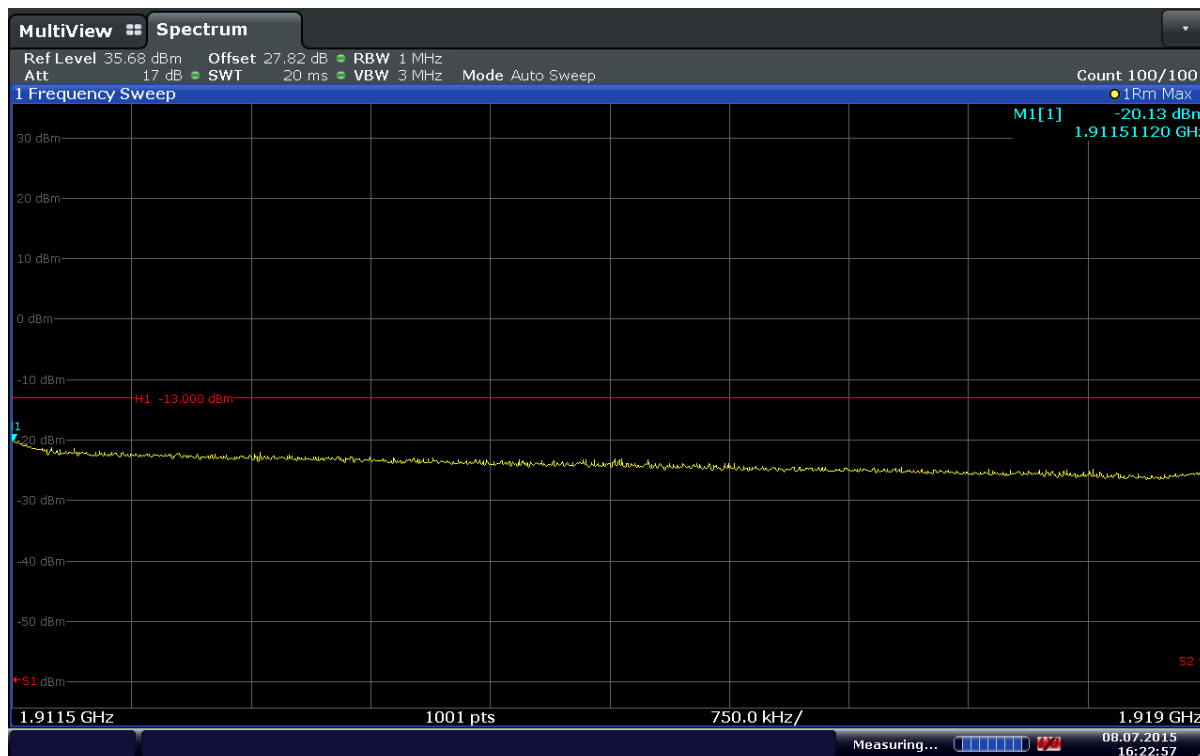
Date: 8 JUL 2015 16:03:25

Plot 6-125. Extended Lower Band Edge Plot (Band2 – 20.0MHz – QPSK – RB Size 100)



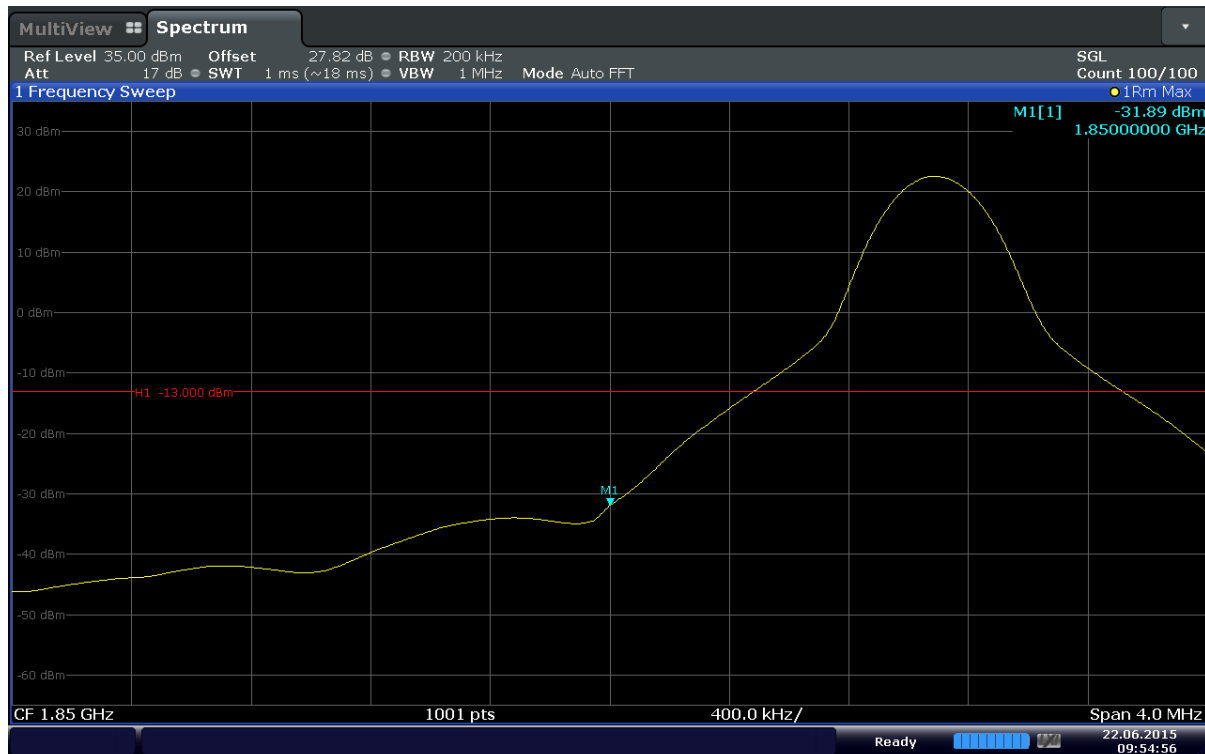
Date: 22 JUN 2015 10:02:25

Plot 6-126. Upper Band Edge Plot (Band2 – 20.0MHz – QPSK – RB Size 100)



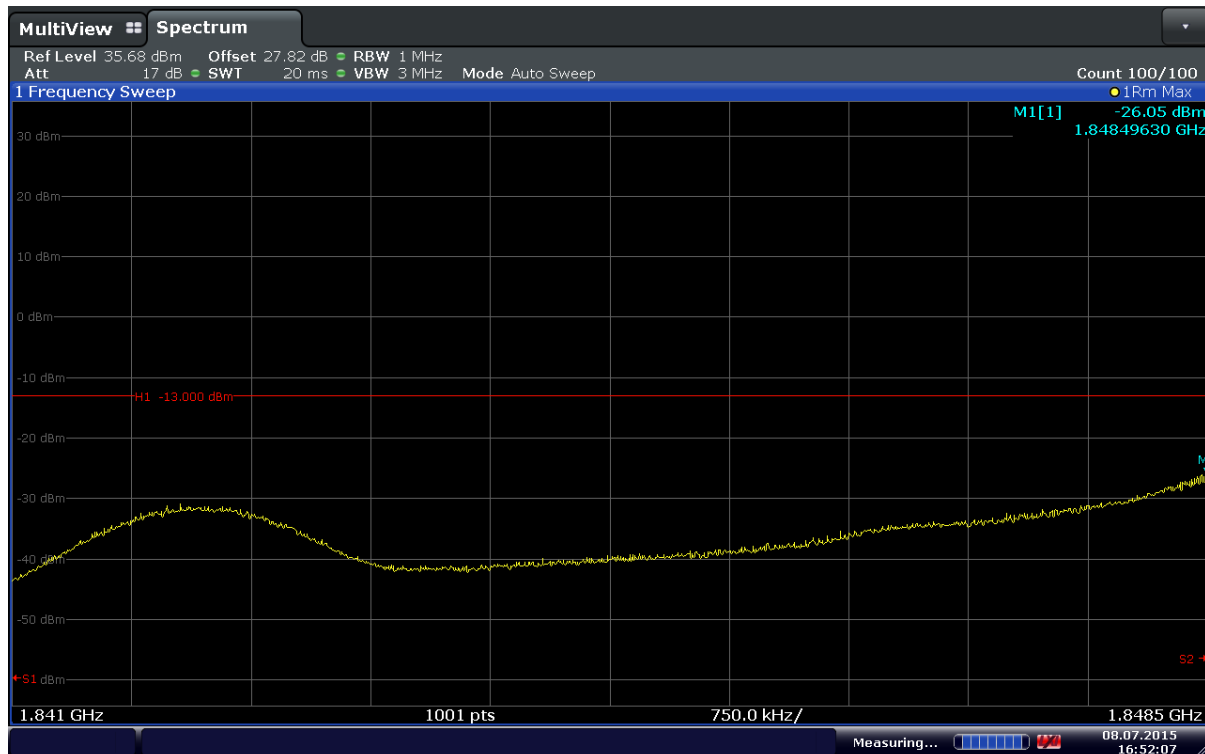
Date: 8 JUL 2015 16:22:57

Plot 6-127. Extended Upper Band Edge Plot (Band2 – 20.0MHz – QPSK – RB Size 100)



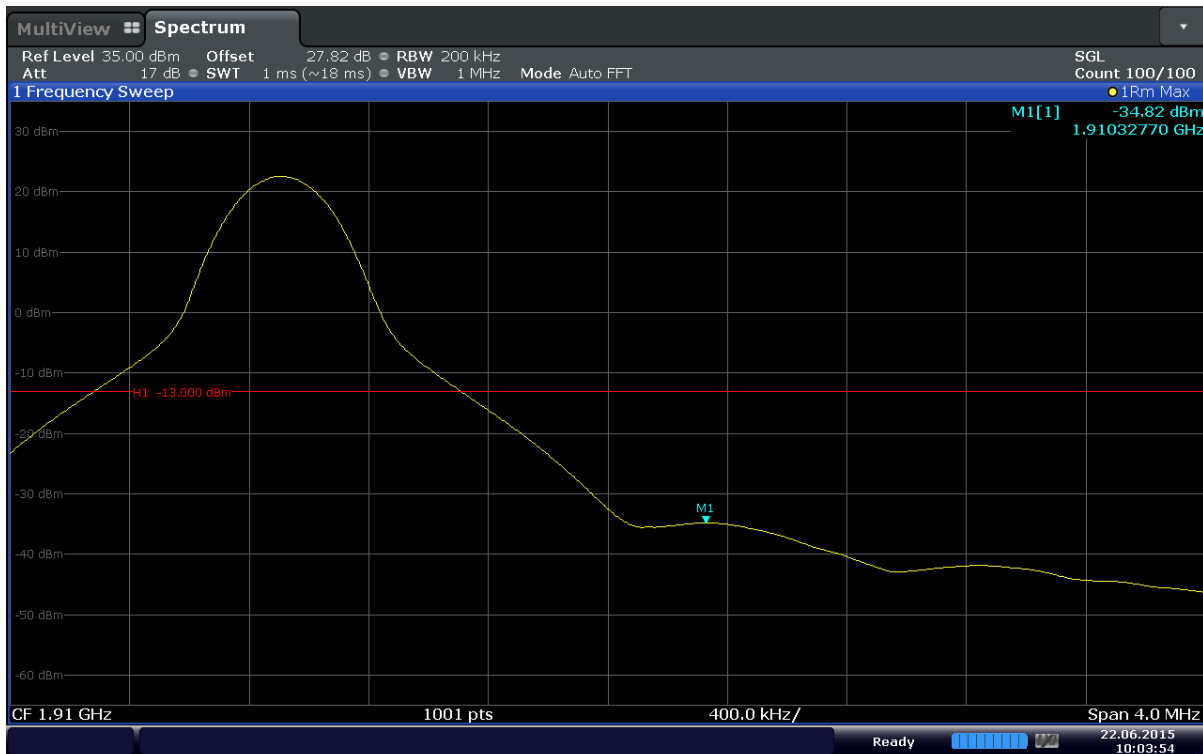
Date: 22 JUN 2015 09:54:55

Plot 6-128. Lower Band Edge Plot (Band2 – 20.0MHz – QPSK – RB Size 1 – RB Offset 0)



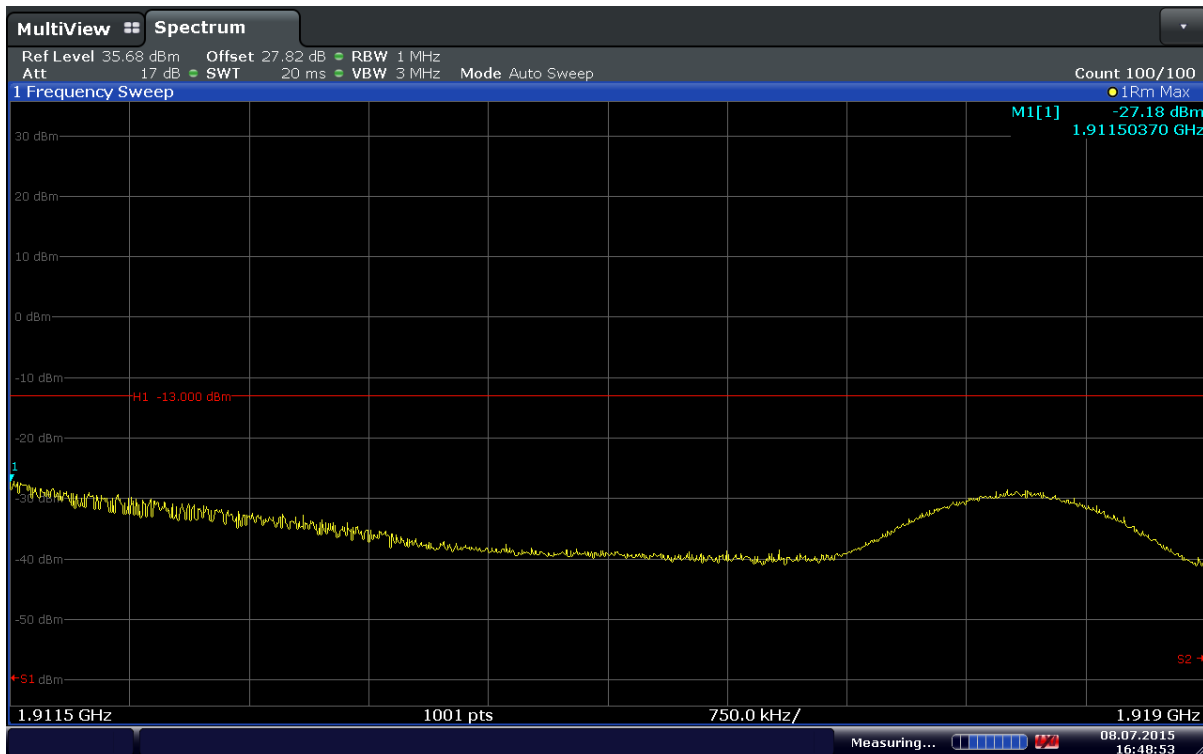
Date: 8 JUL 2015 16:52:06

Plot 6-129. Extended Lower Band Edge Plot (Band2 – 20.0MHz – QPSK – RB Size 1 – RB Offset 0)



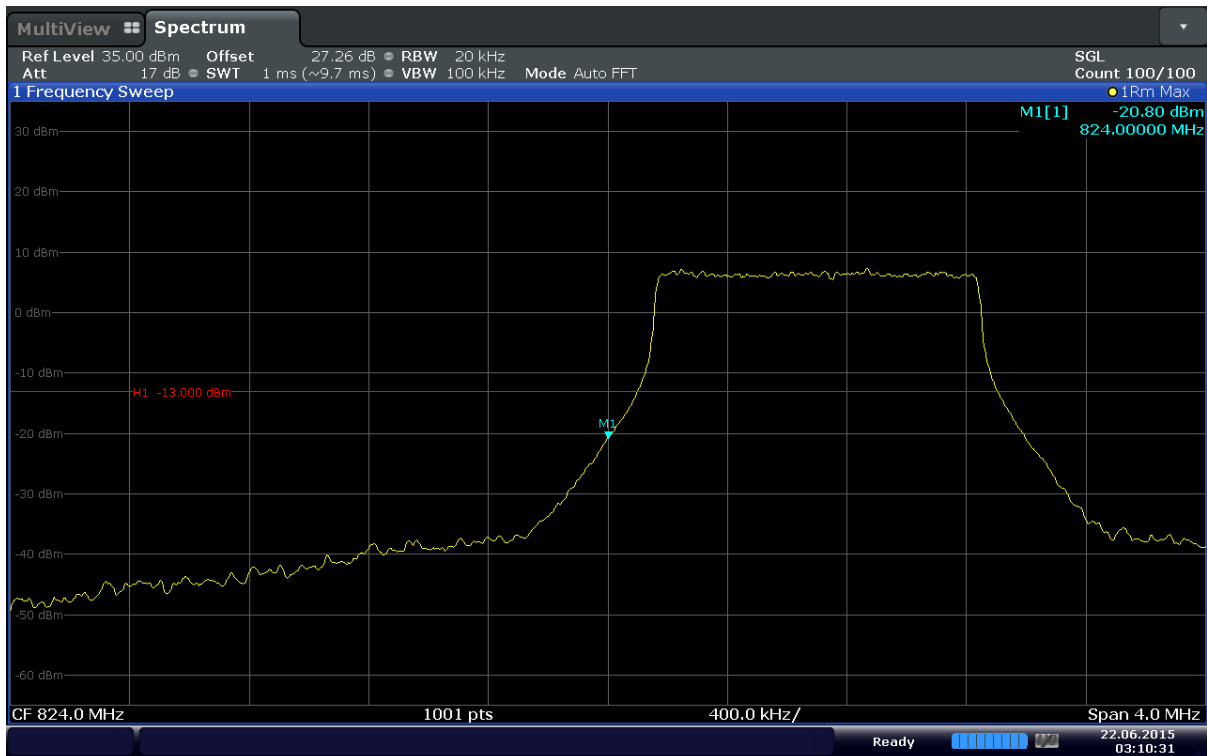
Date: 22 JUN 2015 10:03:54

Plot 6-130. Upper Band Edge Plot (Band2 – 20.0MHz – QPSK – RB Size 1 – RB Offset 99)



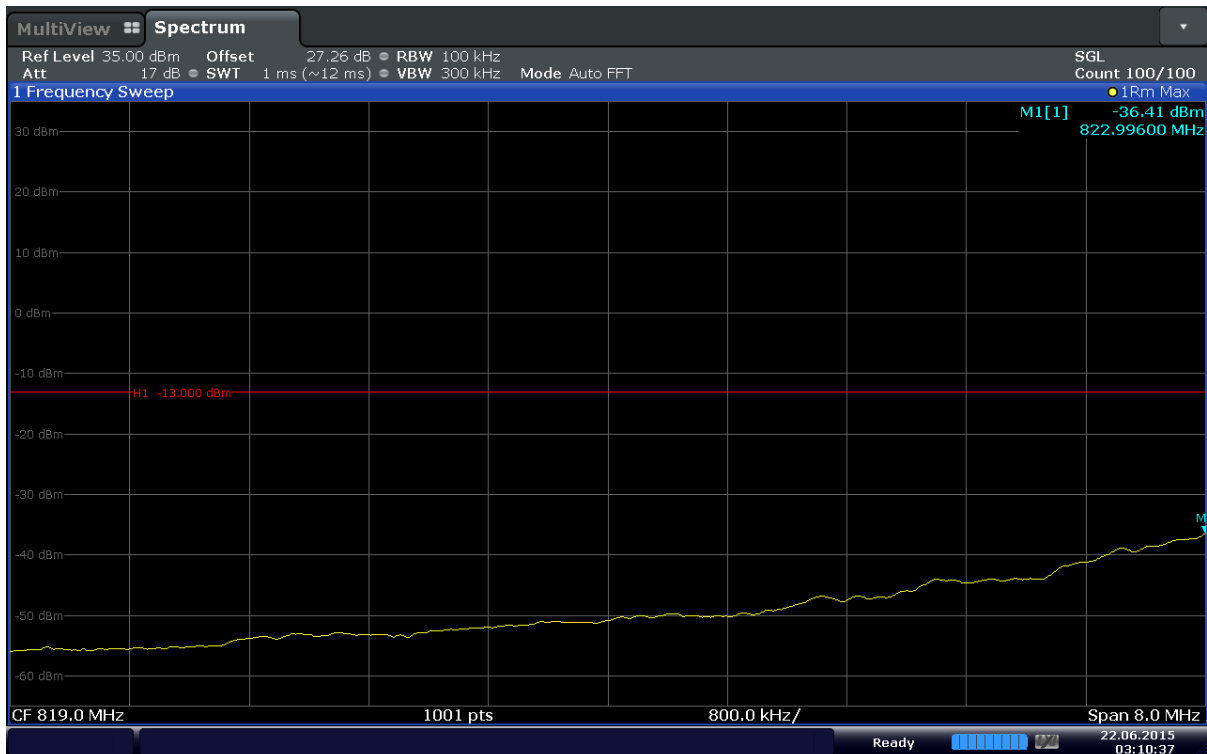
Date: 8 JUL 2015 16:48:53

Plot 6-131. Extended Upper Band Edge Plot (Band2 – 20.0MHz – QPSK – RB Size 1 – RB Offset 99)



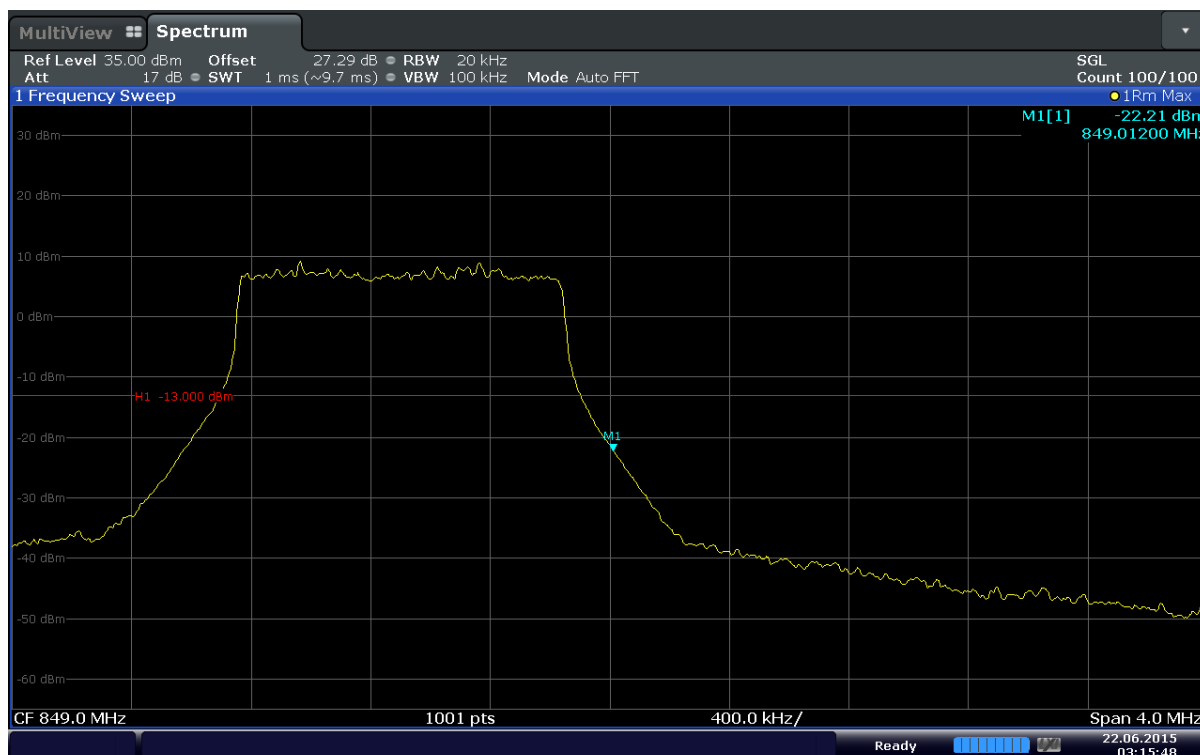
Date: 22 JUN 2015 03:10:32

Plot 6-132. Lower Band Edge Plot (Band26 – 1.4MHz – QPSK – RB Size 6)



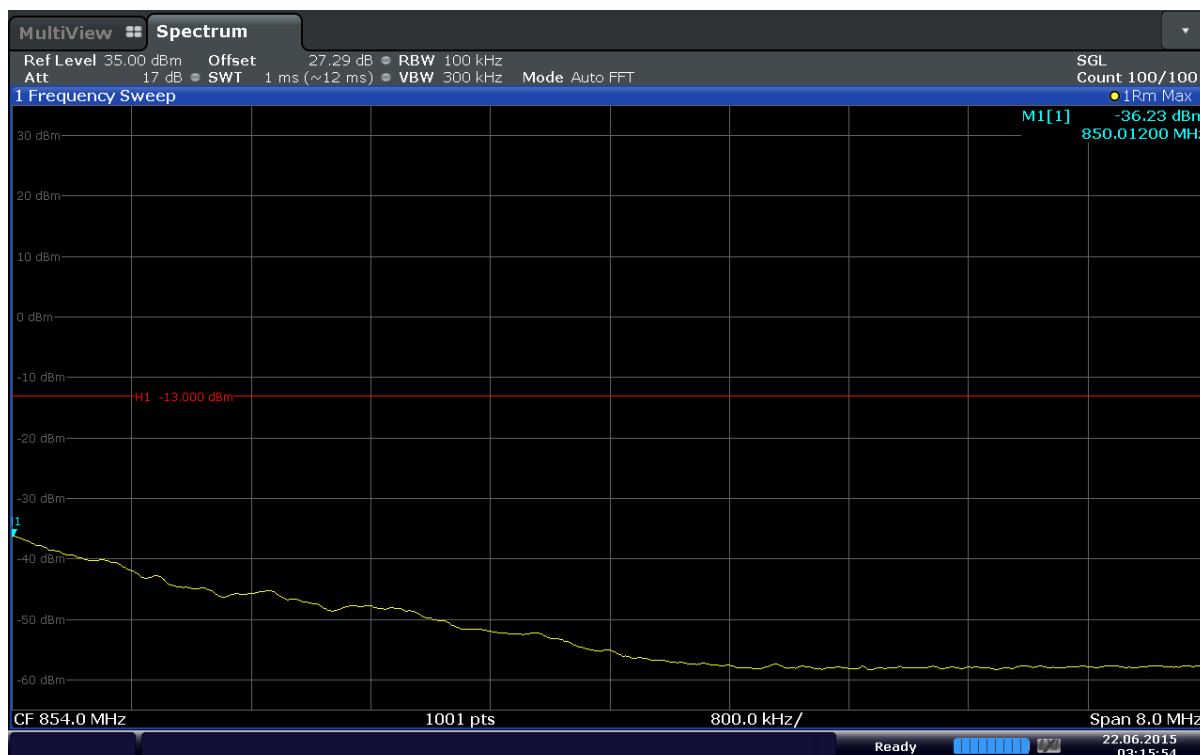
Date: 22 JUN 2015 03:10:38

Plot 6-133. Extended Lower Band Edge Plot (Band26 – 1.4MHz – QPSK – RB Size 6)



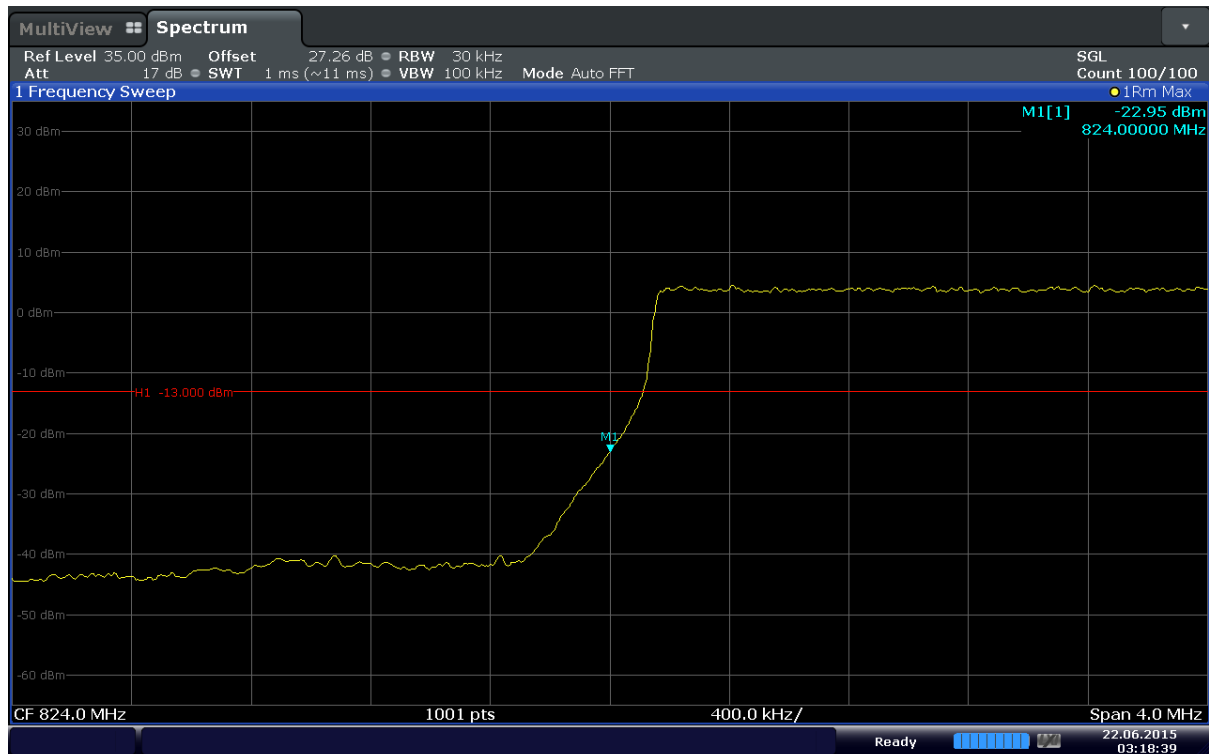
Date: 22 JUN 2015 03:15:48

Plot 6-134. Upper Band Edge Plot (Band26 – 1.4MHz – QPSK – RB Size 6)



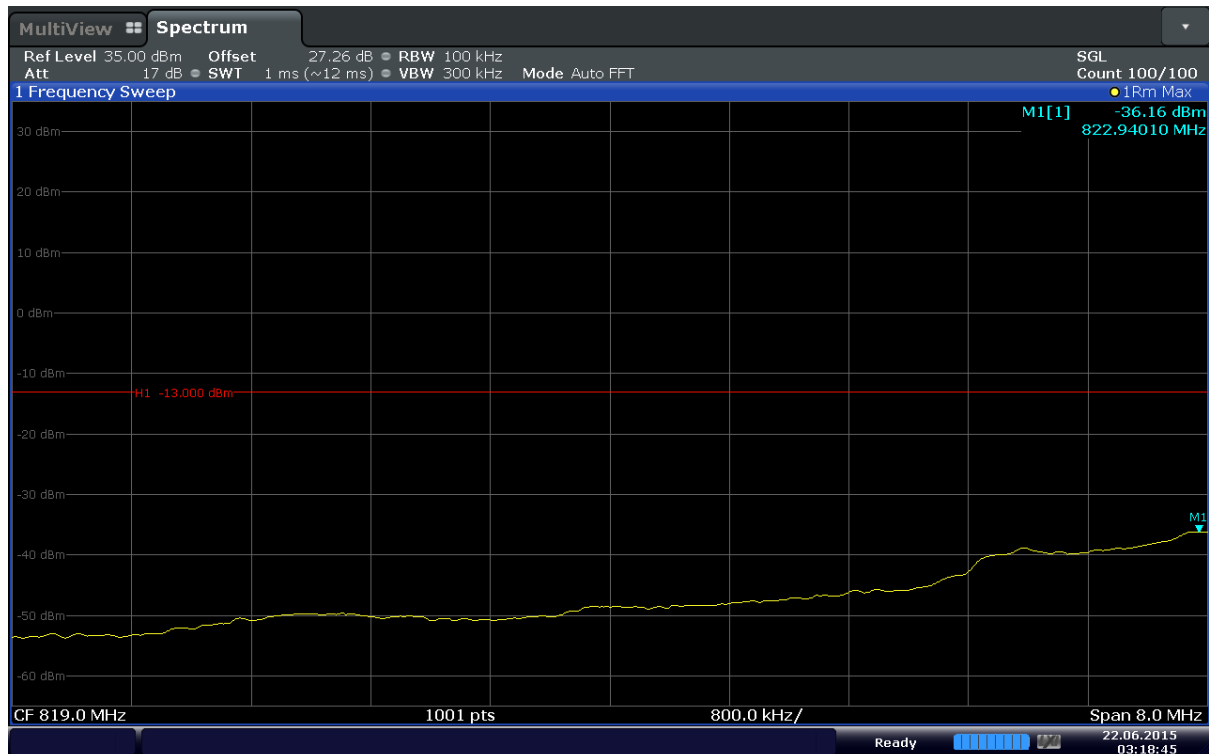
Date: 22 JUN 2015 03:15:54

Plot 6-135. Extended Upper Band Edge Plot (Band26 – 1.4MHz – QPSK – RB Size 6)



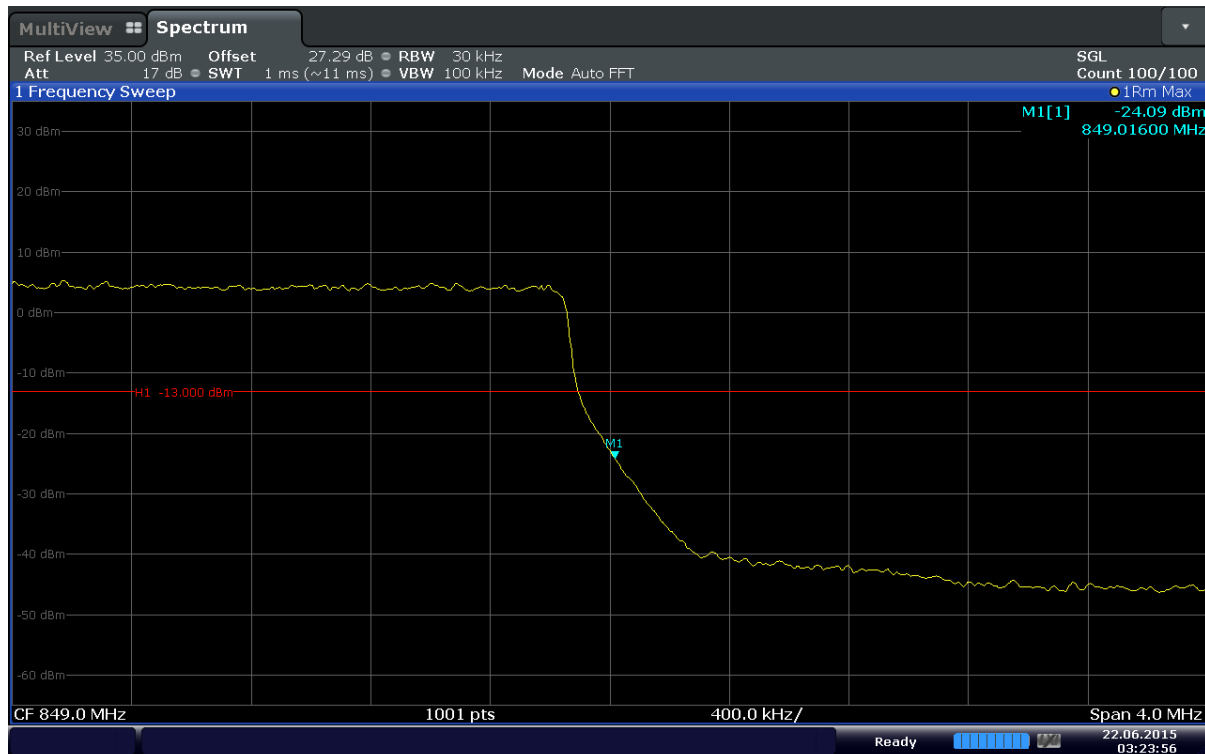
Date: 22 JUN 2015 03:18:39

Plot 6-136. Lower Band Edge Plot (Band26 – 3.0MHz – QPSK – RB Size 15)



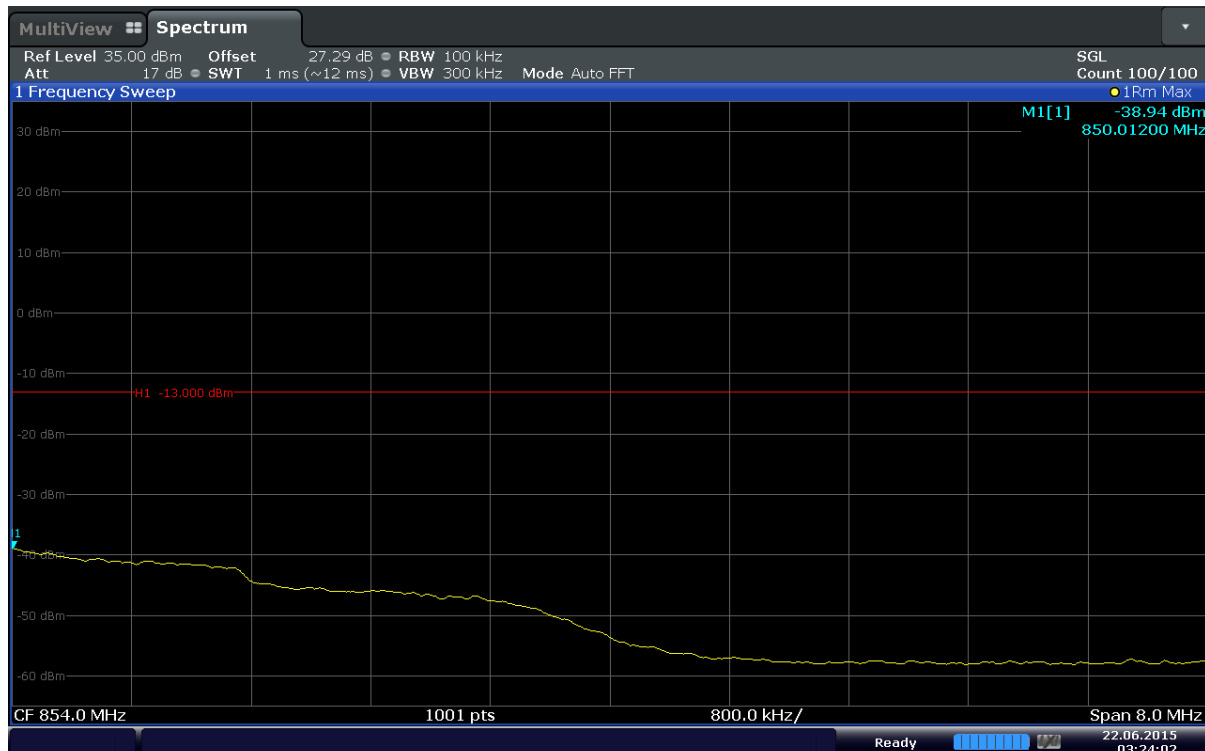
Date: 22 JUN 2015 03:18:45

Plot 6-137. Extended Lower Band Edge Plot (Band26 – 3.0MHz – QPSK – RB Size 15)



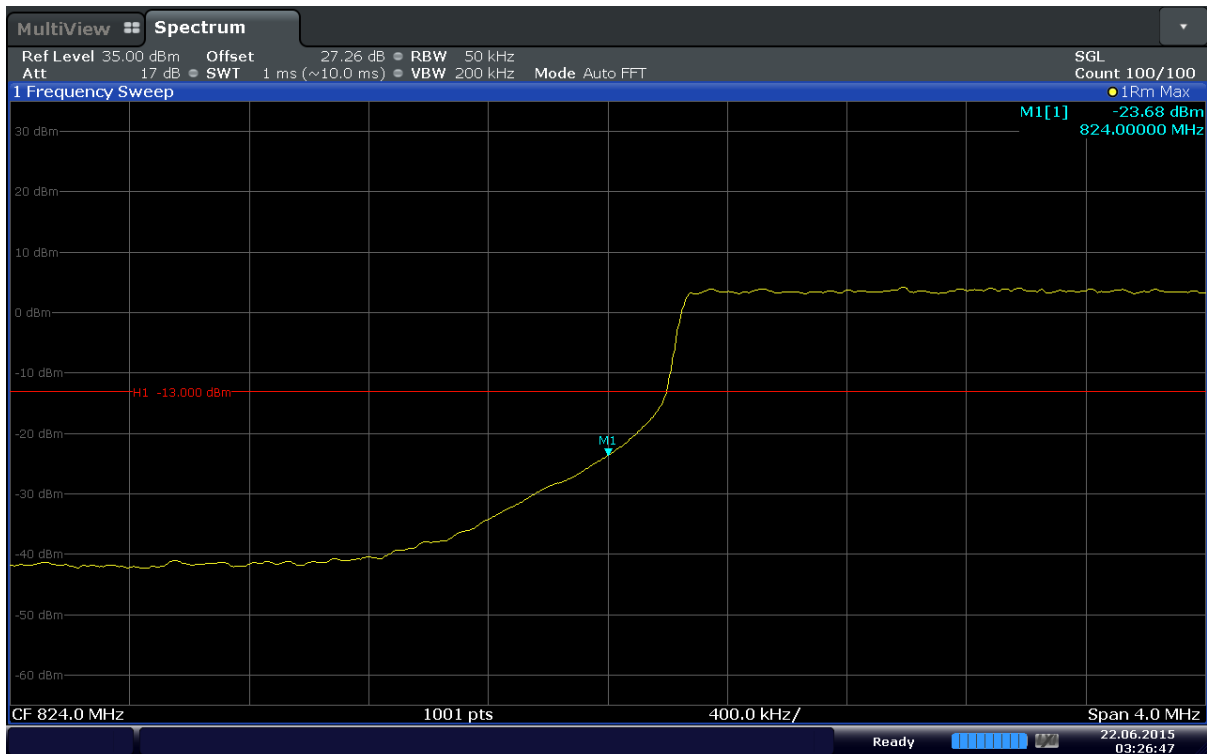
Date: 22 JUN 2015 03:23:57

Plot 6-138. Upper Band Edge Plot (Band26 – 3.0MHz – QPSK – RB Size 15)



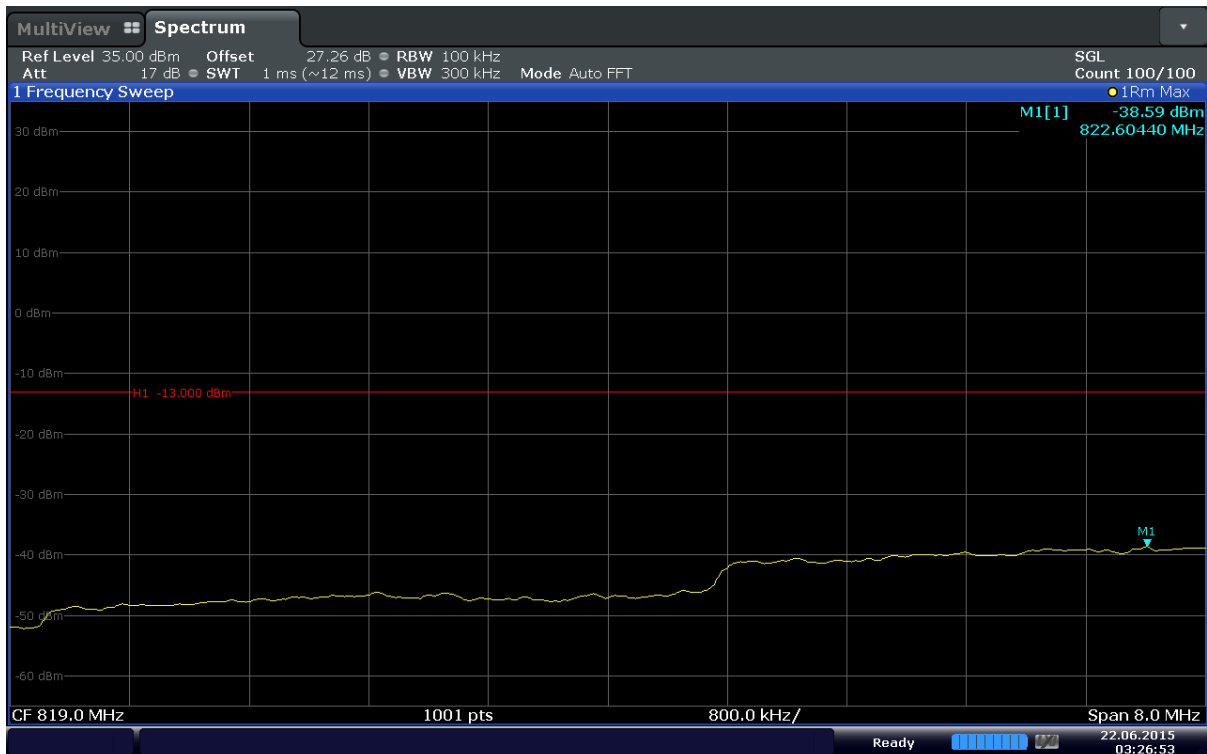
Date: 22 JUN 2015 03:24:03

Plot 6-139. Extended Upper Band Edge Plot (Band26 – 3.0MHz – QPSK – RB Size 15)



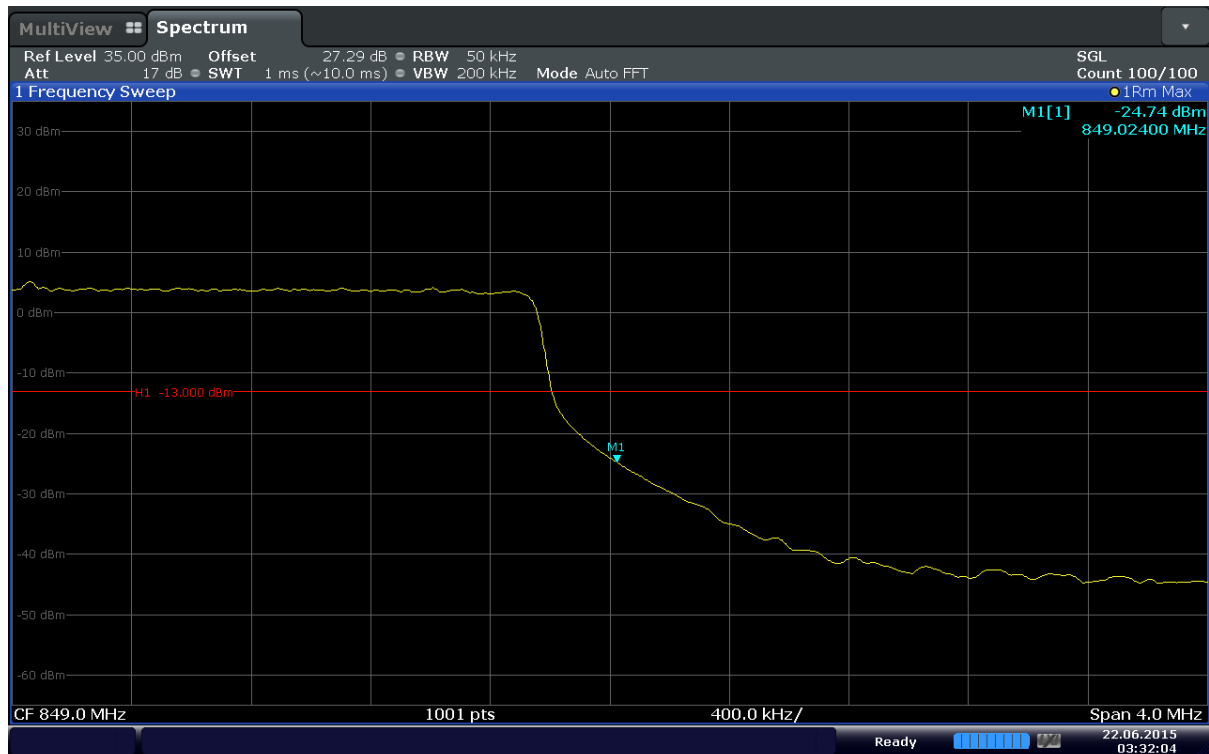
Date: 22 JUN 2015 03:26:47

Plot 6-140. Lower Band Edge Plot (Band26 – 5.0MHz – QPSK – RB Size 25)



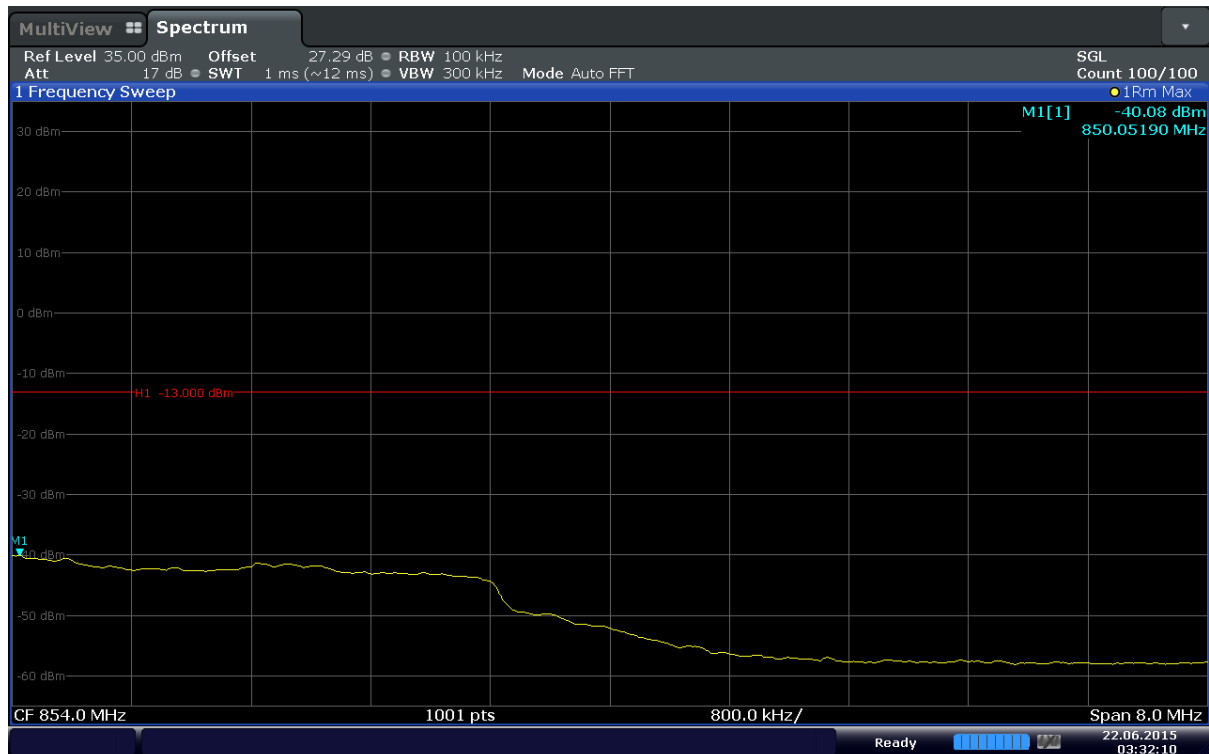
Date: 22 JUN 2015 03:26:53

Plot 6-141. Extended Lower Band Edge Plot (Band26 – 5.0MHz – QPSK – RB Size 25)



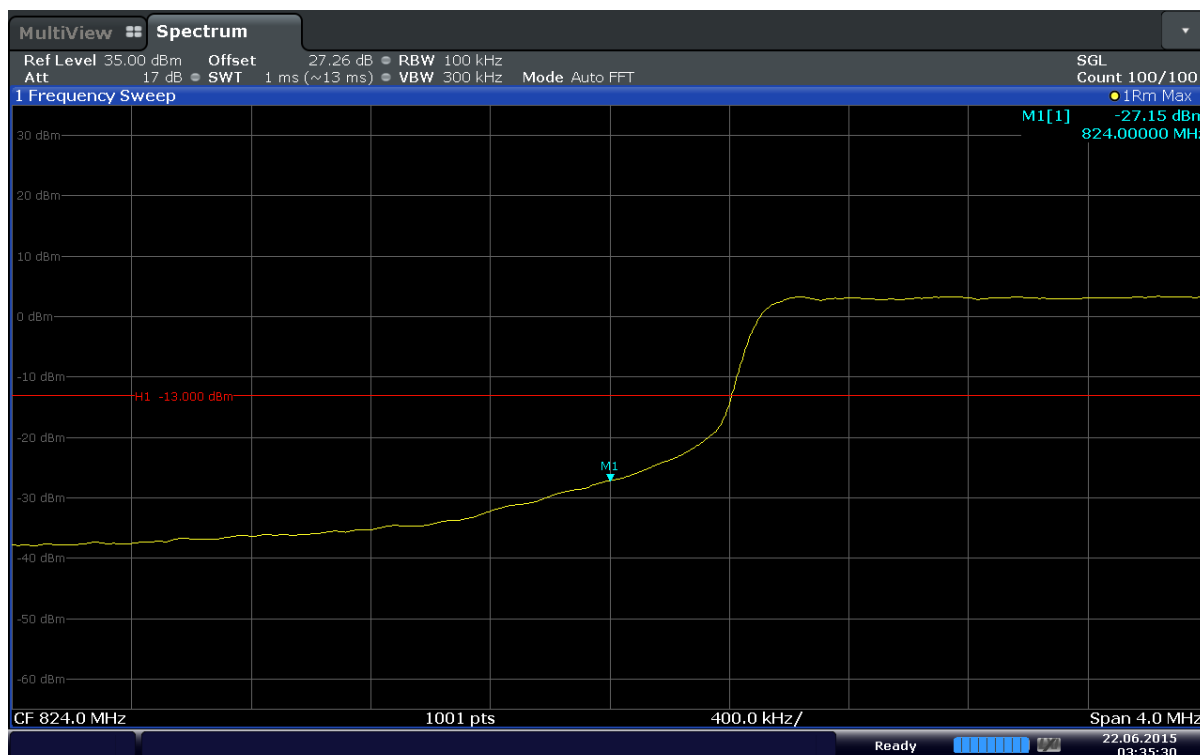
Date: 22 JUN 2015 03:32:04

Plot 6-142. Upper Band Edge Plot (Band26 – 5.0MHz – QPSK – RB Size 25)



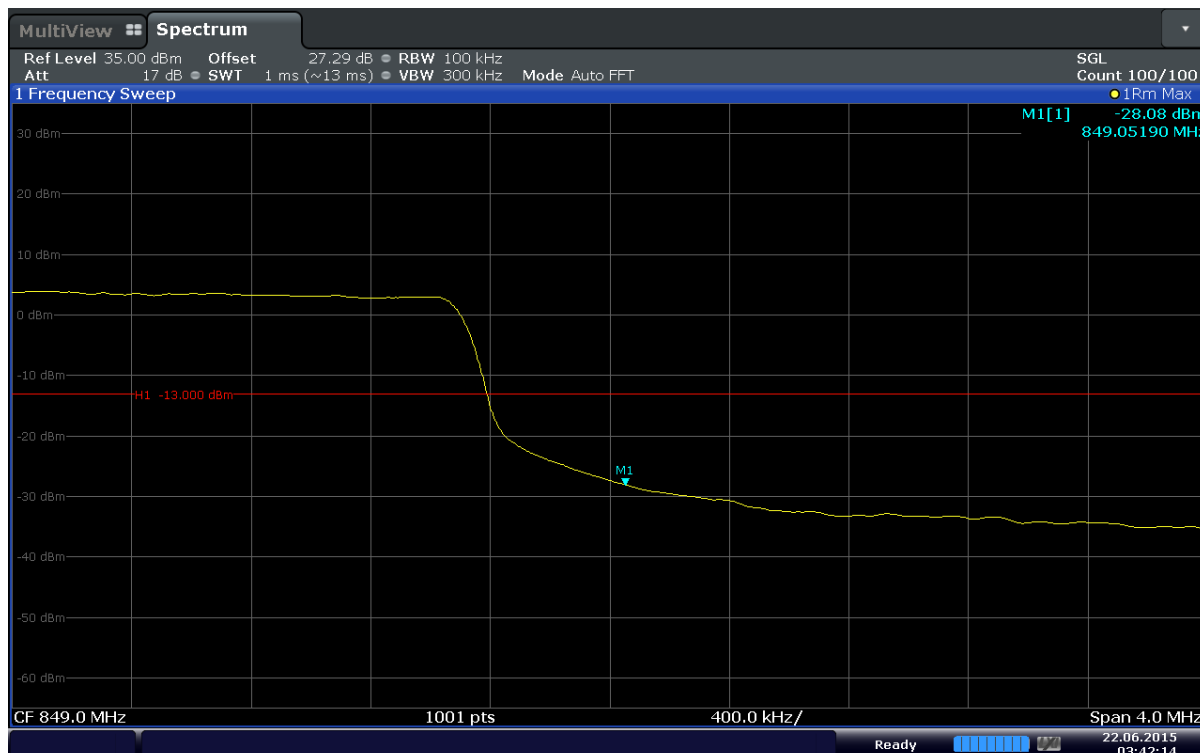
Date: 22 JUN 2015 03:32:10

Plot 6-143. Extended Upper Band Edge Plot (Band26 – 5.0MHz – QPSK – RB Size 25)



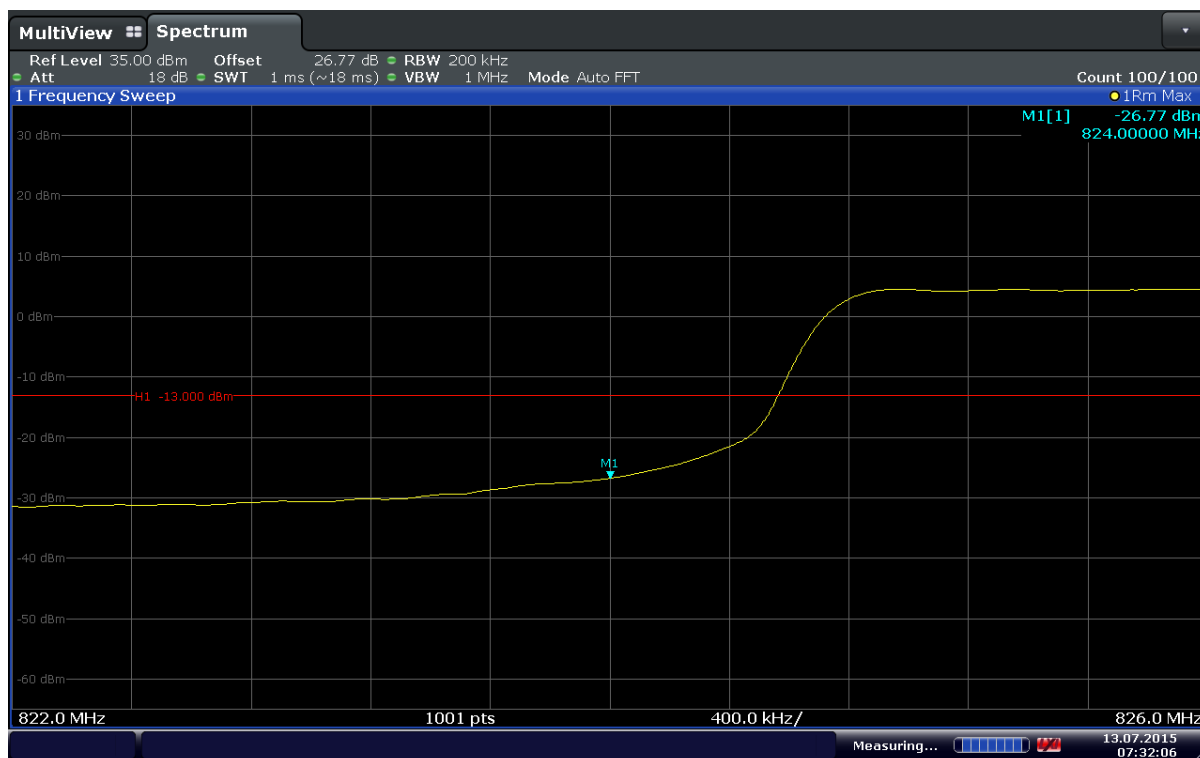
Date: 22 JUN 2015 03:35:30

Plot 6-144. Lower Band Edge Plot (Band26 – 10.0MHz – QPSK – RB Size 50)



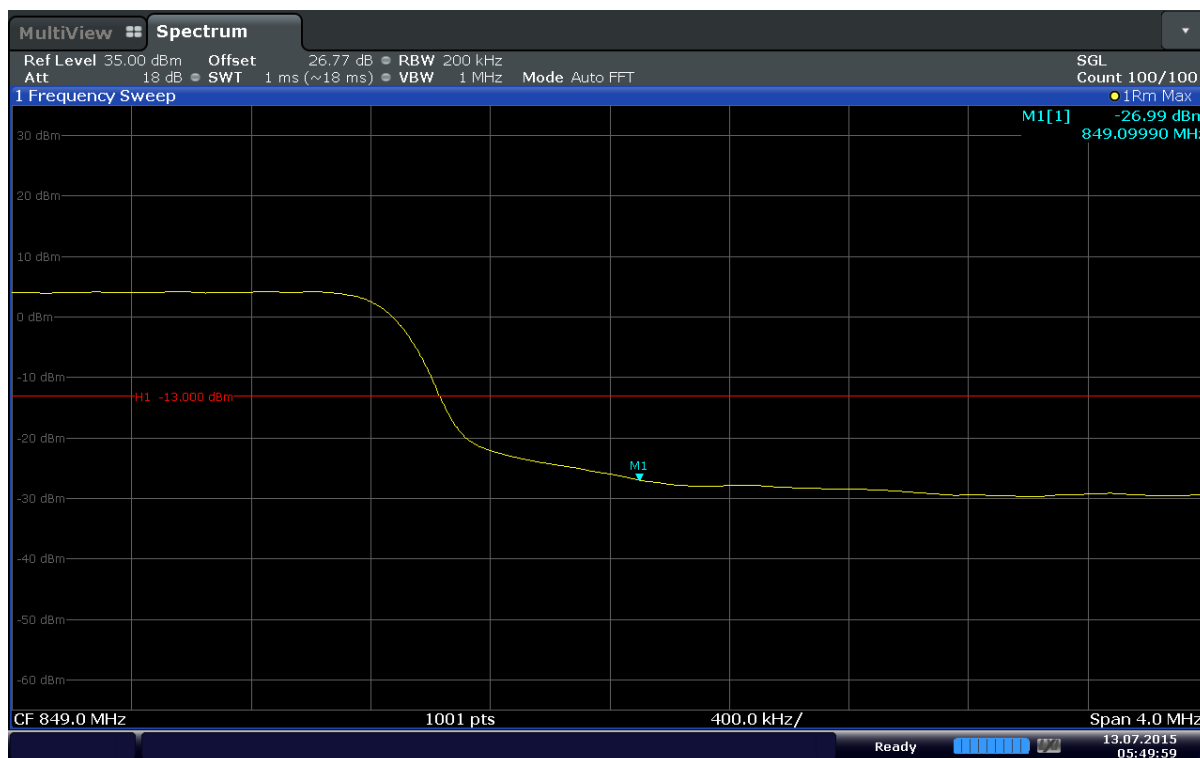
Date: 22 JUN 2015 03:42:15

Plot 6-145. Upper Band Edge Plot (Band26 – 10.0MHz – QPSK – RB Size 50)



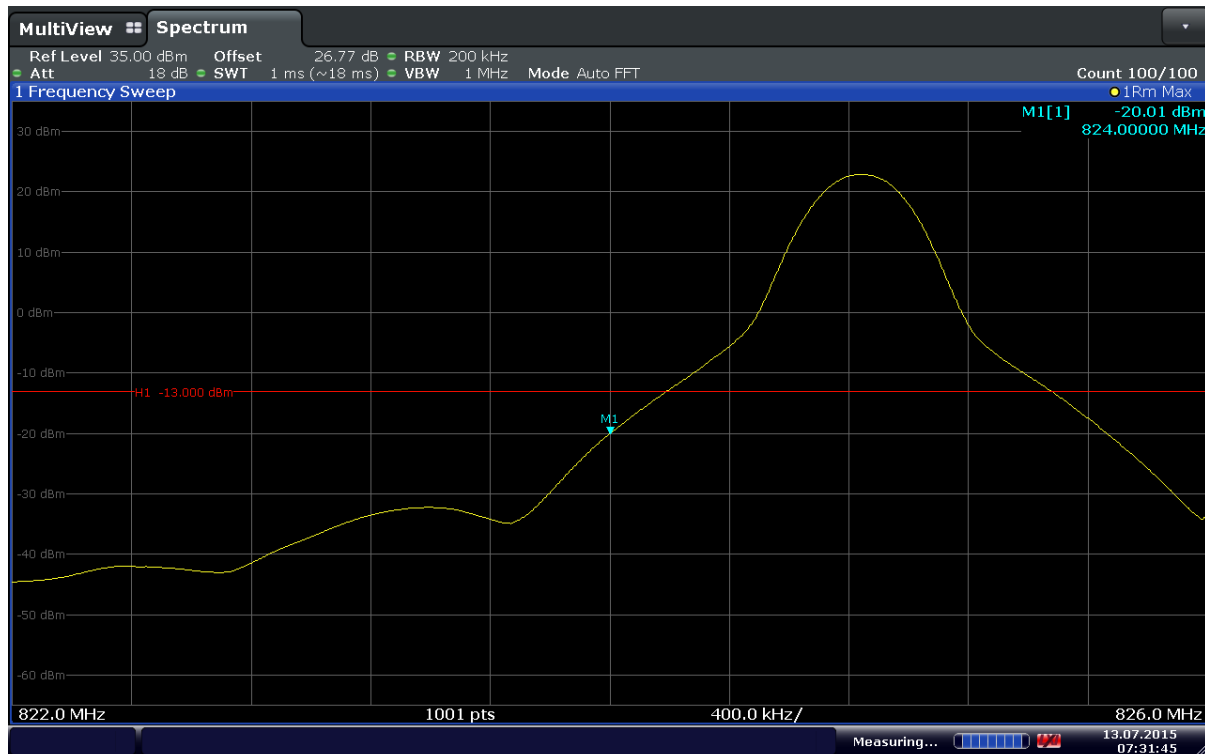
Date: 13 JUL 2015 07:32:06

Plot 6-146. Lower Band Edge Plot (Band26 – 15.0MHz – QPSK – RB Size 75)



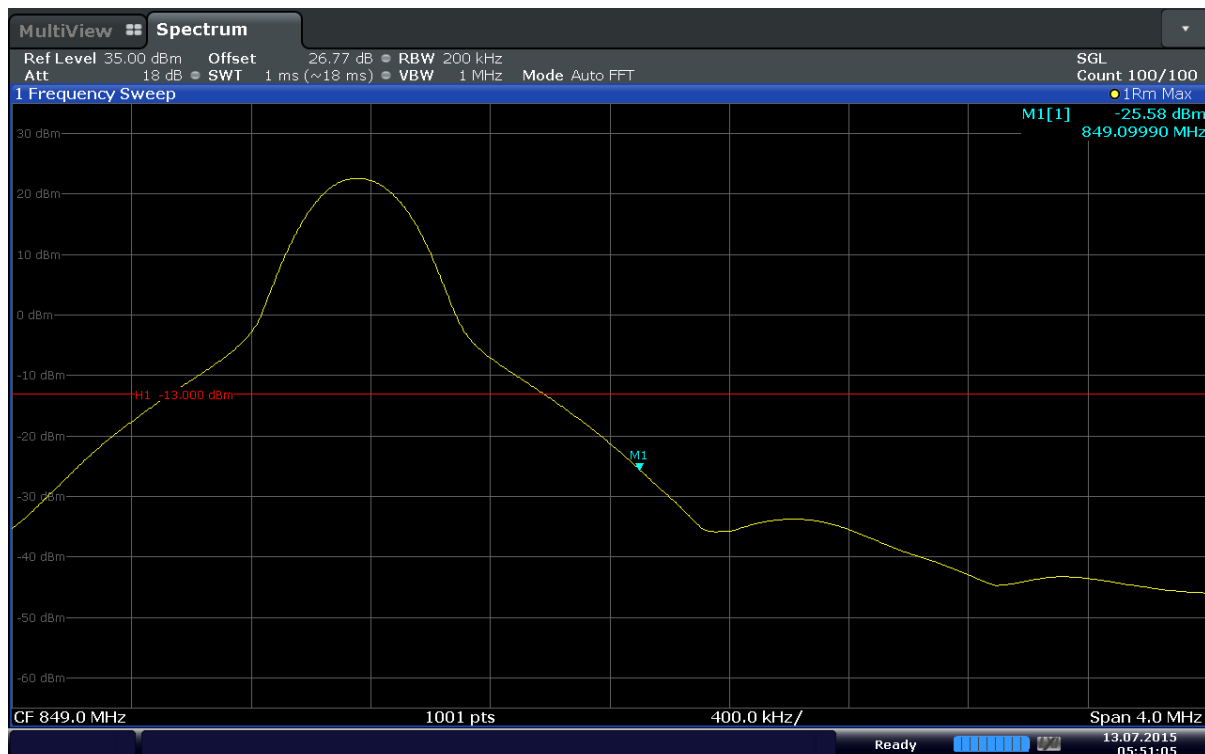
Date: 13 JUL 2015 05:50:00

Plot 6-147. Upper Band Edge Plot (Band26 – 15.0MHz – QPSK – RB Size 75)



Date: 13.JUL.2015 07:31:44

Plot 6-148. Lower Band Edge Plot (Band26 – 15.0MHz – QPSK – RB Size 1 – RB Offset 0)



Date: 13.JUL.2015 05:51:05

Plot 6-149. Upper Band Edge Plot (Band26 – 15.0MHz – QPSK – RB Size 1 – RB Offset 74)

6.5. Peak-Average Ratio §24.232(d)

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 v02r02 – 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 1 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. For burst transmissions, the spectrum analyzer was set to use an interval "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

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

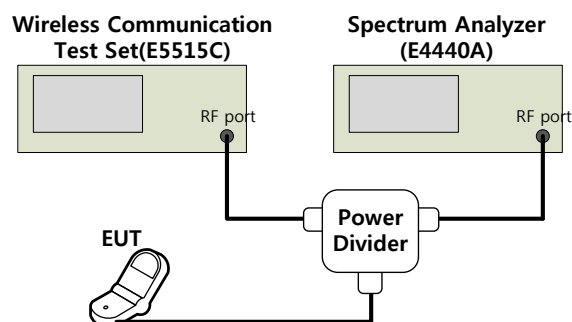


Figure 6-4. Test Instruments & Measurement Setup

Test Plots



Date: 8 JUL 2015 10:42:20

Plot 6-150. Peak-Average Ratio Plot (Band 2 – 1.4MHz QPSK - RB Size 6)



Date: 8 JUL 2015 10:42:27

Plot 6-151. Peak-Average Ratio Plot (Band 2 – 1.4MHz 16QAM - RB Size 6)



Date: 8 JUL 2015 10:43:45

Plot 6-152. Peak-Average Ratio Plot (Band 2 – 3.0MHz QPSK - RB Size 15)



Date: 8 JUL 2015 10:43:51

Plot 6-153. Peak-Average Ratio Plot (Band 2 – 3.0MHz 16QAM - RB Size 15)



Date: 8 JUL 2015 10:45:08

Plot 6-154. Peak-Average Ratio Plot (Band 2 – 5.0MHz QPSK - RB Size 25)



Date: 8 JUL 2015 10:45:14

Plot 6-155. Peak-Average Ratio Plot (Band 2 – 5.0MHz 16QAM - RB Size 25)



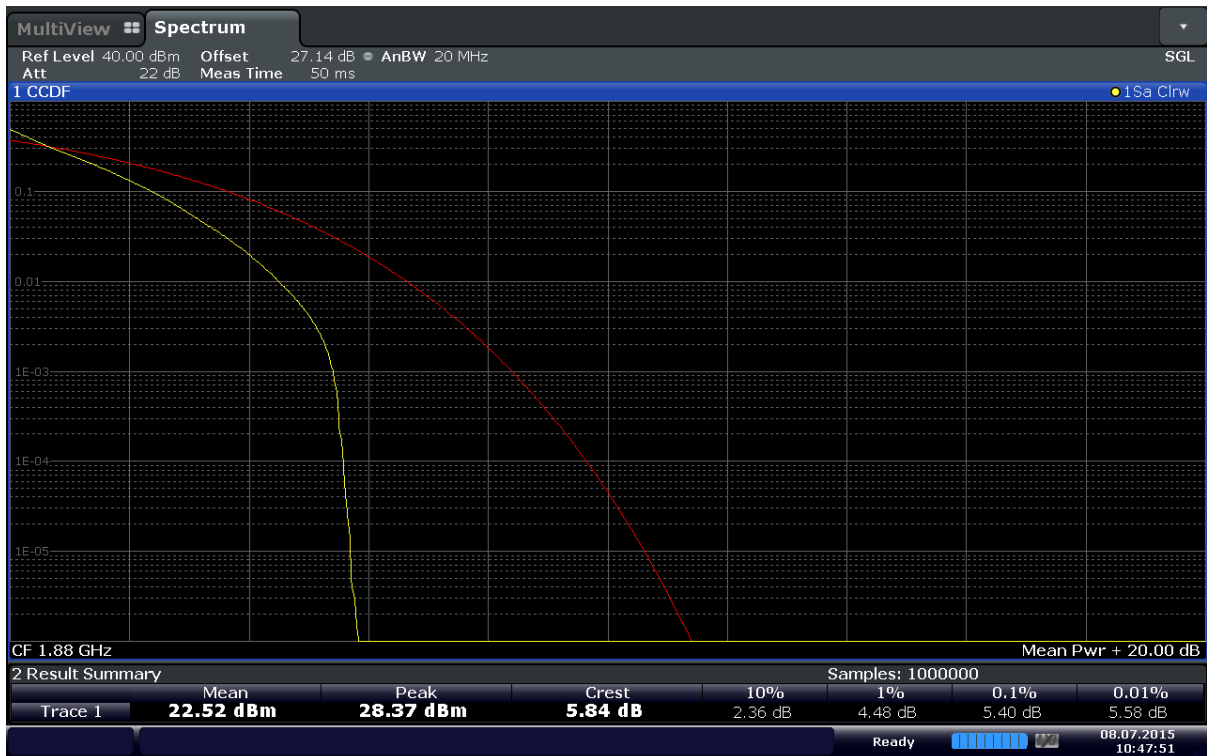
Date: 8 JUL 2015 10:46:30

Plot 6-156. Peak-Average Ratio Plot (Band 2 – 10.0MHz QPSK - RB Size 50)



Date: 8 JUL 2015 10:46:35

Plot 6-157. Peak-Average Ratio Plot (Band 2 – 10.0MHz 16QAM - RB Size 50)



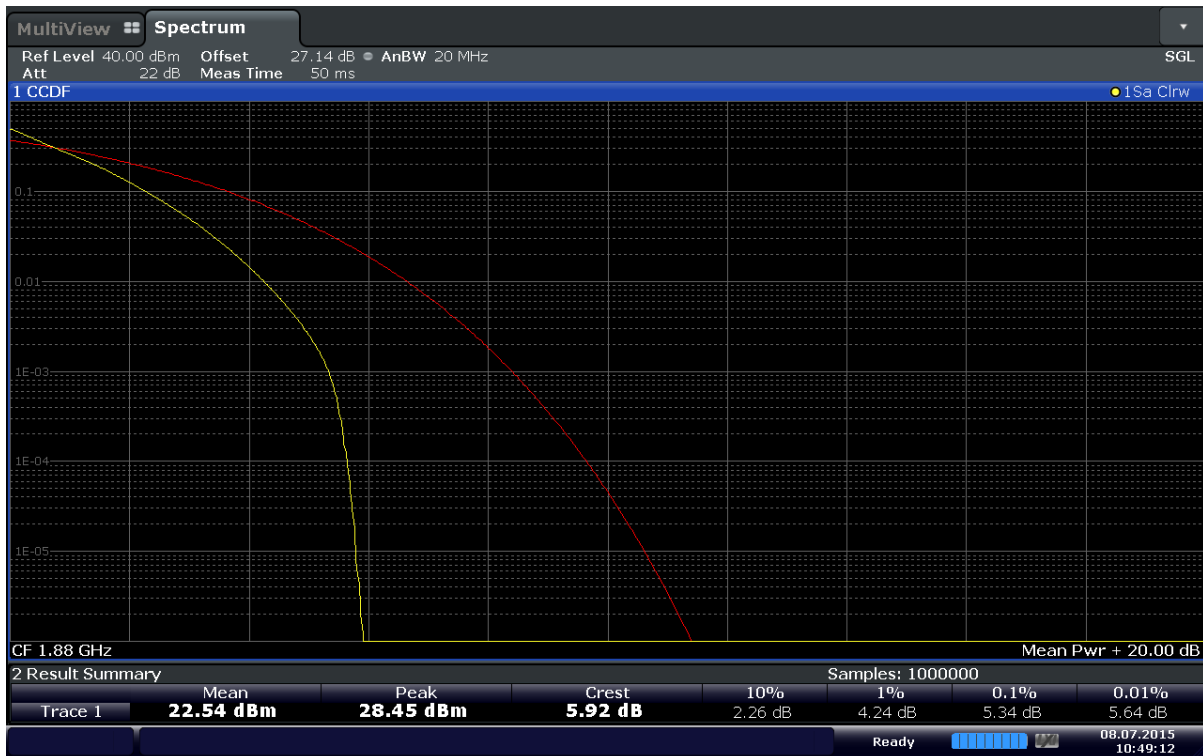
Date: 8 JUL 2015 10:47:51

Plot 6-158. Peak-Average Ratio Plot (Band 2 – 15.0MHz QPSK - RB Size 75)



Date: 8 JUL 2015 10:47:57

Plot 6-159. Peak-Average Ratio Plot (Band 2 – 15.0MHz 16QAM - RB Size 75)



Date: 8 JUL 2015 10:49:12

Plot 6-160. Peak-Average Ratio Plot (Band 2 – 20.0MHz QPSK - RB Size 100)



Date: 8 JUL 2015 10:49:18

Plot 6-161. Peak-Average Ratio Plot (Band 2 – 20.0MHz 16QAM - RB Size 100)

6.6. Frequency Stability / Temperature Variation

§2.1055 §22.355 §24.235

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-C-2004. The frequency stability of the transmitter is measured by:

1. Temperature: The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
2. Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for other than hand carried battery equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point(=Batt.End) 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, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-C-2004

Test Settings

1. 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.
2. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of time sufficient to stabilize EUT at each temperature level shall be allowed prior to frequency measurement.

Test Setup

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

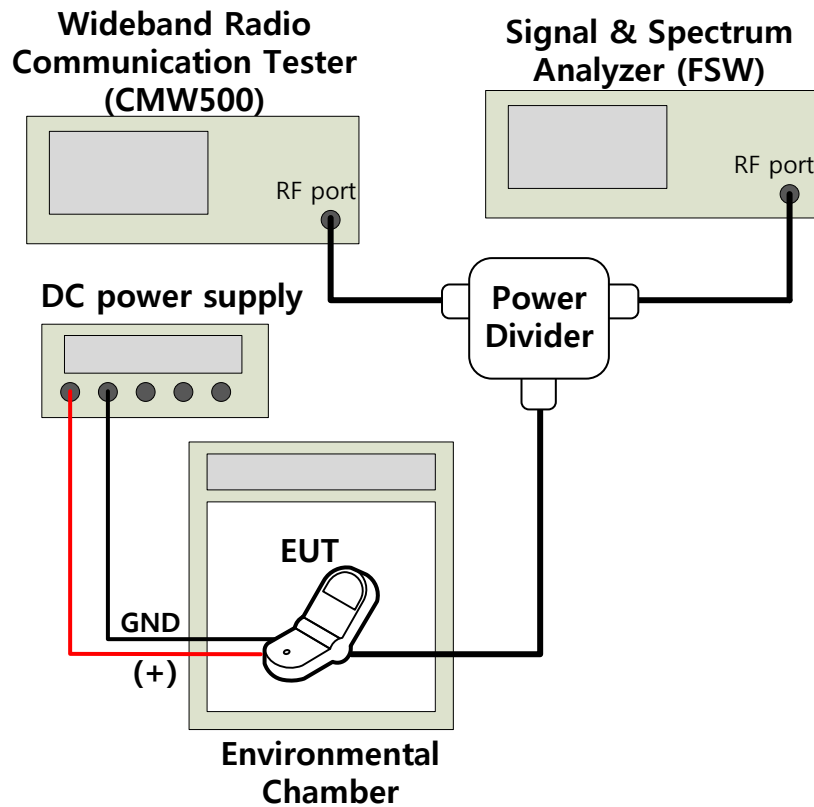


Figure 6-5. Test Instruments & Measurement Setup

Test Notes

1. MCF is the Measured Carrier Frequency
ACF is the Assigned Carrier Frequency
2. Calculate the ppm frequency error by the following:

$$\text{ppm error} = \left(\frac{\text{MCF}_{[\text{MHz}]} }{\text{ACF}_{[\text{MHz}]} } - 1 \right) \times 10^6$$

3. For part 24, the fundamental emission should stay within the authorized frequency block. But, 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.

Mode : LTE Band 2
Channel : 18900
Operating Frequency : 1880 MHz
Reference Voltage : 3.85 VDC

Voltage [%]	Power [VDC]	Temp [°C]	ACF [MHz]	MCF [MHz]	Freq. Dev. [Hz]	ppm error
100 %	3.85	-30	1880.0	1,879.999995	-5.48	-0.003
		-20	1880.0	1,880.000005	5.04	0.003
		-10	1880.0	1,880.000007	6.51	0.003
		0	1880.0	1,880.000004	4.18	0.002
		+10	1880.0	1,880.000007	7.28	0.004
		+20	1880.0	1,880.000004	4.49	0.002
		+30	1880.0	1,880.000007	6.97	0.004
		+40	1880.0	1,879.999997	-3.35	-0.002
		+50	1880.0	1,880.000005	4.55	0.002
Batt.End	3.40	+20	1880.0	1,880.000006	5.95	0.003

Table 6-2. Frequency Stability Data (LTE Band 2)

Mode : LTE Band 26
Channel : 26915
Operating Frequency : 836.5 MHz
Reference Voltage : 3.85 VDC

Voltage [%]	Power [VDC]	Temp [°C]	ACF [MHz]	MCF [MHz]	Freq. Dev. [Hz]	ppm error	Limit [ppm]
100 %	3.85	-30	836.5	836.499994	-6.08	-0.007	±2.5
		-20	836.5	836.499995	-4.88	-0.006	
		-10	836.5	836.499995	-5.14	-0.006	
		0	836.5	836.499993	-7.12	-0.009	
		+10	836.5	836.499995	-5.08	-0.006	
		+20	836.5	836.499995	-4.96	-0.006	
		+30	836.5	836.499994	-6.08	-0.007	
		+40	836.5	836.499994	-5.56	-0.007	
		+50	836.5	836.499995	-5.38	-0.006	
Batt.End	3.40	+20	836.5	836.499995	-5.24	-0.006	

Table 6-3. Frequency Stability Data (LTE Band 26)



6.7. Radiated Power (ERP/EIRP)
§24.232(c) §22.913(a.2)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using dipole antennas. Measurements on signals operating above 1GHz are performed using 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 Procedure Used

KDB 971168 v02r02 – Section 5.2.1

ANSI/TIA-603-C-2004 – 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

Test Setup

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

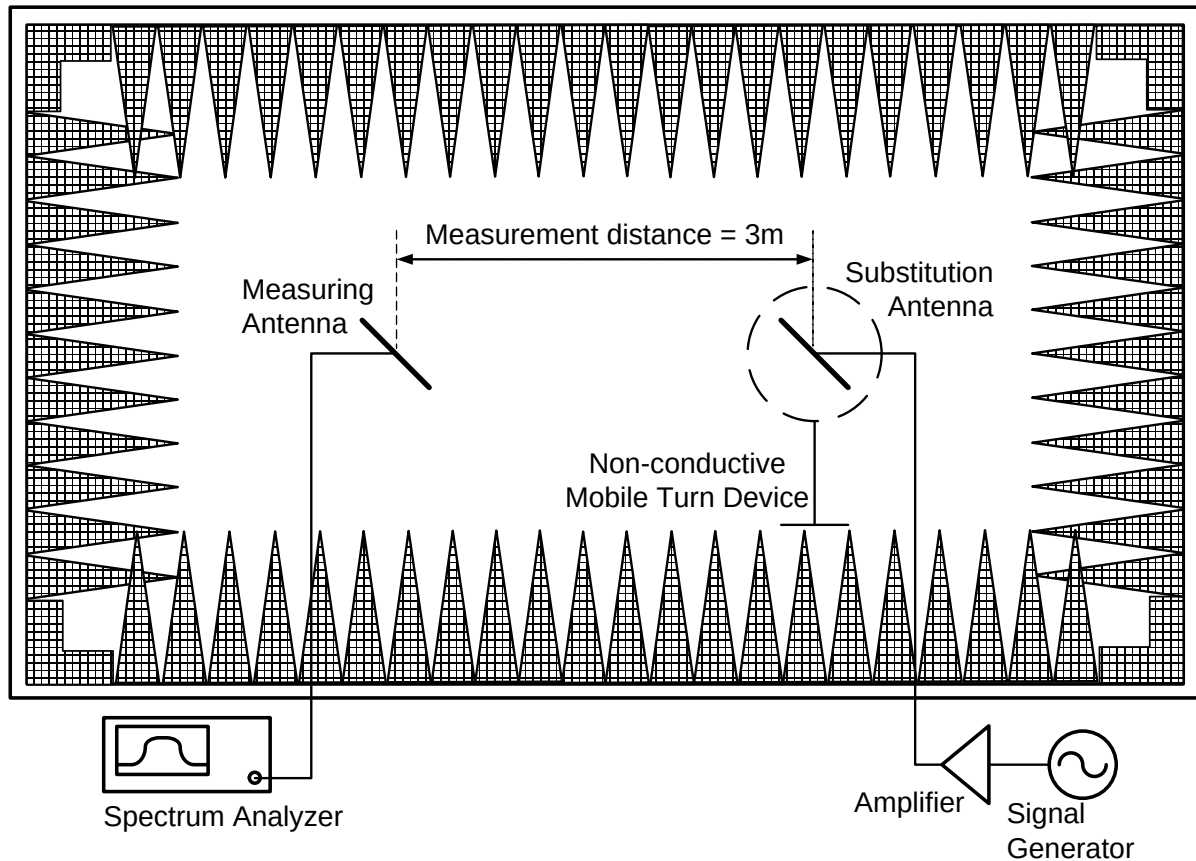


Figure 6-7. Test Instruments & Measurement Setup

Test Notes

1. The EUT was tested with Turn Device and 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 embedded battery.

Test Results

Channel	Channel BW [MHz]	Mod.	RB Size /Offset	Ant Pol (H/V)	EUT POL [degree]		S/A Reading [dBm]	S/G Level [dBm]	Tx C/L [dB]	Ant. Gain [dBi]	EIRP [dBm]	Margin [dB]
					Azimuth	Elevation						
18607	1.4	QPSK	1 / 5	V	135	320	-22.30	16.63	4.75	10.26	22.14	10.87
18607	1.4	16QAM	1 / 5	V	120	279	-22.48	16.45	4.75	10.26	21.96	11.05
18900	1.4	QPSK	1 / 5	V	127	300	-23.28	15.69	4.80	10.33	21.22	11.79
18900	1.4	16QAM	1 / 5	V	120	290	-23.42	15.55	4.80	10.33	21.08	11.93
19193	1.4	QPSK	1 / 5	V	125	295	-21.82	17.29	4.84	10.38	22.83	10.18
19193	1.4	16QAM	1 / 0	V	119	300	-22.06	17.05	4.84	10.38	22.59	10.42
18615	3	QPSK	1 / 0	V	120	299	-22.93	16.00	4.75	10.27	21.52	11.49
18615	3	16QAM	1 / 0	V	130	280	-23.03	15.90	4.75	10.27	21.42	11.59
18900	3	QPSK	1 / 7	V	120	290	-22.32	16.65	4.80	10.33	22.18	10.83
18900	3	16QAM	1 / 14	V	118	280	-22.96	16.01	4.80	10.33	21.54	11.47
19185	3	QPSK	1 / 0	V	120	275	-23.03	16.07	4.84	10.38	21.61	11.40
19185	3	16QAM	1 / 0	V	118	270	-23.14	15.96	4.84	10.38	21.50	11.51
18625	5	QPSK	1 / 24	V	124	300	-23.07	15.86	4.75	10.27	21.38	11.63
18625	5	16QAM	1 / 24	V	120	260	-23.73	15.20	4.75	10.27	20.72	12.29
18900	5	QPSK	1 / 0	V	120	274	-22.36	38.97	4.80	10.33	22.14	10.87
18900	5	16QAM	1 / 0	V	115	268	-22.48	38.97	4.80	10.33	22.02	10.99
19175	5	QPSK	1 / 24	V	121	272	-22.82	16.27	4.84	10.38	21.81	11.20
19175	5	16QAM	1 / 0	V	135	269	-22.93	16.16	4.84	10.38	21.70	11.31
18675	10	QPSK	1 / 49	V	133	288	-22.76	16.18	4.76	10.27	21.69	11.32
18675	10	16QAM	1 / 49	V	135	275	-23.91	15.03	4.76	10.27	20.54	12.47
18900	10	QPSK	1 / 24	V	135	310	-22.10	16.87	4.80	10.33	22.40	10.61
18900	10	16QAM	1 / 24	V	130	280	-22.64	16.33	4.80	10.33	21.86	11.15
19150	10	QPSK	1 / 24	V	135	300	-21.79	17.27	4.84	10.37	22.81	10.20
19150	10	16QAM	1 / 24	V	183	288	-21.95	17.11	4.84	10.37	22.65	10.36
18675	15	QPSK	1 / 37	V	130	290	-21.86	17.08	4.76	10.28	22.60	10.41
18675	15	16QAM	1 / 0	V	135	300	-21.98	16.96	4.76	10.28	22.48	10.53
18900	15	QPSK	1 / 0	V	180	350	-22.32	16.66	4.80	10.33	22.18	10.83
18900	15	16QAM	1 / 0	V	177	299	-23.06	15.91	4.80	10.33	21.44	11.57
19125	15	QPSK	1 / 0	V	155	314	-22.86	16.17	4.83	10.37	21.71	11.30
19125	15	16QAM	1 / 37	V	160	300	-23.36	15.67	4.83	10.37	21.21	11.80
18700	20	QPSK	1 / 0	V	160	300	-22.75	16.19	4.77	10.28	21.71	11.30
18700	20	16QAM	1 / 49	V	150	290	-22.98	15.96	4.77	10.28	21.48	11.53
18900	20	QPSK	1 / 24	V	145	288	-22.41	38.97	4.80	10.33	22.09	10.92
18900	20	16QAM	1 / 49	V	150	280	-22.83	38.97	4.80	10.33	21.67	11.34
19100	20	QPSK	1 / 49	V	150	285	-22.34	16.66	4.83	10.37	22.20	10.81
19100	20	16QAM	1 / 49	V	144	280	-22.86	16.14	4.83	10.37	21.68	11.33

Table 6-4. EIRP Data (LTE Band 2)

Channel	Channel BW [MHz]	Mod.	RB Size /Offset	Ant Pol (H/V)	EUT POL [degree]		S/A Reading [dBm]	S/G Level [dBm]	Tx C/L [dB]	Ant. Gain [dBd]	ERP [dBm]	Margin [dB]
					Azimuth	Elevation						
26797	1.4	QPSK	1 / 5	H	295	0	-16.17	21.90	3.10	-0.75	18.05	20.40
26797	1.4	16QAM	1 / 0	H	290	30	-16.92	21.15	3.10	-0.75	17.30	21.15
26915	1.4	QPSK	1 / 24	H	309	360	-15.68	22.43	3.12	-0.77	18.53	19.92
26915	1.4	16QAM	1 / 5	H	318	0	-16.43	21.68	3.12	-0.77	17.78	20.67
27033	1.4	QPSK	1 / 2	H	320	0	-16.90	21.25	3.15	-0.80	17.30	21.15
27033	1.4	16QAM	1 / 0	H	310	360	-17.25	20.90	3.15	-0.80	16.95	21.50
26805	3	QPSK	1 / 7	H	320	10	-15.71	22.36	3.10	-0.75	18.51	19.94
26805	3	16QAM	1 / 0	H	310	0	-16.90	21.17	3.10	-0.75	17.32	21.13
26915	3	QPSK	1 / 0	H	300	0	-15.73	22.38	3.12	-0.77	18.48	19.97
26915	3	16QAM	1 / 0	H	320	0	-16.07	22.04	3.12	-0.77	18.14	20.31
27025	3	QPSK	1 / 0	H	305	10	-17.32	20.83	3.15	-0.80	16.88	21.57
27025	3	16QAM	1 / 0	H	310	0	-17.72	20.43	3.15	-0.80	16.48	21.97
26815	5	QPSK	1 / 24	H	300	0	-15.89	22.19	3.10	-0.75	18.33	20.12
26815	5	16QAM	1 / 12	H	310	10	-16.38	21.70	3.10	-0.75	17.84	20.61
26915	5	QPSK	1 / 0	H	300	0	-16.16	21.95	3.12	-0.77	18.05	20.40
26915	5	16QAM	1 / 0	H	299	10	-16.39	21.72	3.12	-0.77	17.82	20.63
27015	5	QPSK	1 / 0	H	315	0	-17.00	21.14	3.14	-0.80	17.20	21.25
27015	5	16QAM	1 / 0	H	302	360	-17.33	20.81	3.14	-0.80	16.87	21.58
26840	10	QPSK	1 / 0	H	300	0	-15.98	22.11	3.11	-0.76	18.24	20.21
26840	10	16QAM	1 / 24	H	305	5	-16.14	21.95	3.11	-0.76	18.08	20.37
26915	10	QPSK	1 / 0	H	300	10	-16.66	21.45	3.12	-0.77	17.55	20.90
26915	10	16QAM	1 / 0	H	295	10	-16.81	21.30	3.12	-0.77	17.40	21.05
26990	10	QPSK	1 / 0	H	299	10	-16.92	21.22	3.14	-0.79	17.29	21.17
26990	10	16QAM	1 / 0	H	310	360	-17.24	20.90	3.14	-0.79	16.97	21.49
26865	15	QPSK	1 / 37	H	308	0	-15.98	22.11	3.11	-0.76	18.24	20.21
26865	15	16QAM	1 / 0	H	300	355	-16.76	21.33	3.11	-0.76	17.46	20.99
26915	15	QPSK	1 / 0	H	318	0	-15.96	22.15	3.12	-0.77	18.25	20.20
26915	15	16QAM	1 / 0	H	300	360	-16.13	21.98	3.12	-0.77	18.08	20.37
26965	15	QPSK	1 / 0	H	288	360	-16.37	21.76	3.13	-0.79	17.84	20.61
26965	15	16QAM	1 / 0	H	289	0	-16.86	21.27	3.13	-0.79	17.35	21.10

Table 6-5. ERP Data (LTE Band 26)

6.8. Radiated Spurious Emissions Measurements
§2.1051 §22.917(a) §24.238(a)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using dipole antennas. Measurements on signals operating above 1GHz are performed using 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 Procedure Used

KDB 971168 v02r02 – Section 5.8

ANSI/TIA-603-C-2004 – 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 = Max Peak
6. Trace mode = max hold
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.

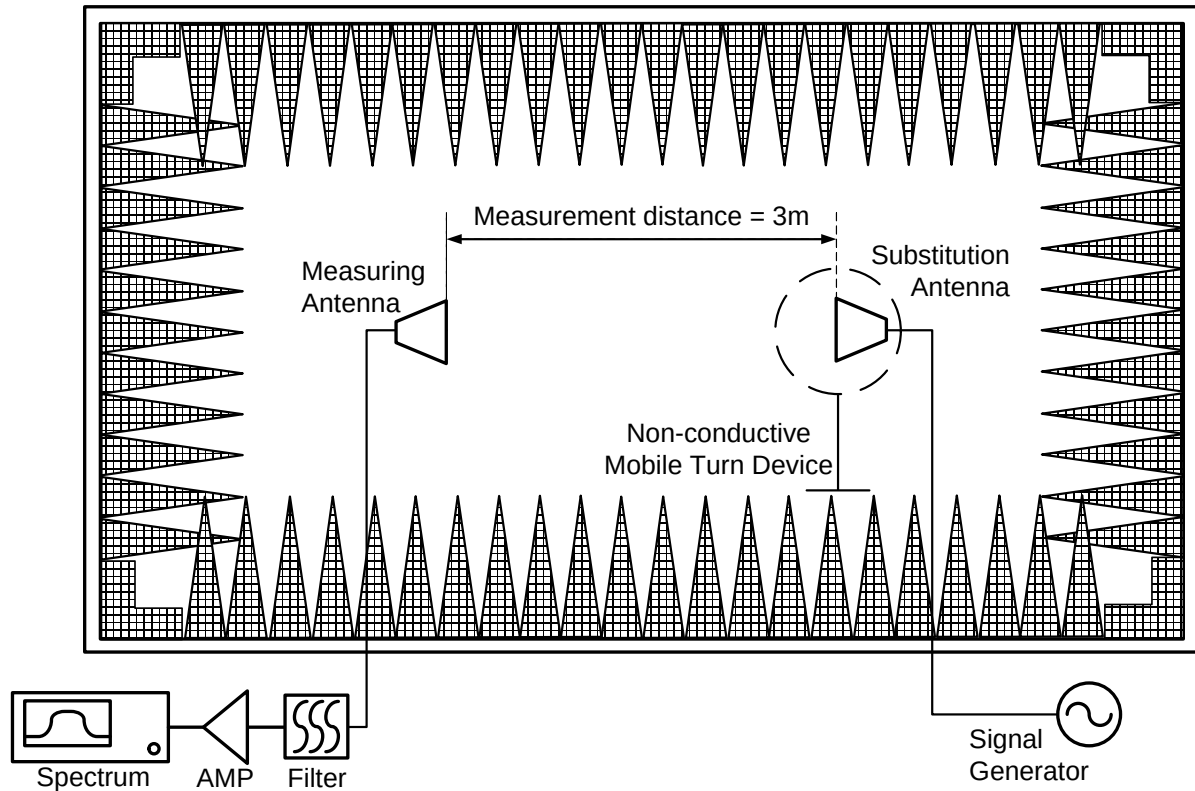


Figure 6-8. Test Instruments & Measurement Setup

Test Notes

1. The EUT was tested with Turn Device and 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 EUT was tested with its embedded 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.

Test Results

Operating Frequency : 1857.5 MHz
Channel : 18675
Modulation Signal : QPSK
Band Width : 15.0 MHz
RB Size / Offset : 1 / 37
Distance : 3 meters
RSE Limit : -13 dBm

Freq. [MHz]	Ant Pol (H/V)	EUT Pol [degree]		S/A reading [dBm]	S/G Level [dBm]	Tx C/L [dB]	Ant. Gain [dBi]	RSE Level [dBm]
		Azimuth	Elevation					
3715.3	H	145	0	-67.20	-55.48	6.93	12.46	-49.94
5573.0	V	266	164	-68.13	-49.19	8.55	12.99	-44.75
7430.6	H	145	277	-69.33	-41.92	9.97	10.39	-41.49
9288.3	H	140	360	-69.66	-38.03	11.37	11.06	-38.34
11145.9	H	Noise floor		-69.57	-37.29	12.45	11.24	-38.50

Table 6-6. Radiated Spurious Data (LTE Band 2 – Low Channel)

Operating Frequency : 1880.0 MHz
Channel : 18900
Modulation Signal : QPSK
Band Width : 10.0 MHz
RB Size / Offset : 1 / 24
Distance : 3 meters
RSE Limit : -13 dBm

Freq. [MHz]	Ant Pol (H/V)	EUT Pol [degree]		S/A reading [dBm]	S/G Level [dBm]	Tx C/L [dB]	Ant. Gain [dBi]	RSE Level [dBm]
		Azimuth	Elevation					
3760.0	H	0	258	-68.81	-56.76	6.93	12.44	-51.25
5640.0	V	43	58	-68.17	-48.89	8.61	13.14	-44.36
7520.0	H	307	130	-69.23	-41.56	10.02	10.67	-40.91
9400.0	V	330	264	-70.36	-39.11	11.43	11.09	-39.45

Table 6-7. Radiated Spurious Data (LTE Band 2 – Mid Channel)

Operating Frequency : 1909.3 MHz
 Channel : 19193
 Modulation Signal : QPSK
 Band Width : 1.4 MHz
 RB Size / Offset : 1 / 5
 Distance : 3 meters
 RSE Limit : -13 dBm

Freq. [MHz]	Ant Pol (H/V)	EUT Pol [degree]		S/A reading [dBm]	S/G Level [dBm]	Tx C/L [dB]	Ant. Gain [dBi]	RSE Level [dBm]
		Azimuth	Elevation					
3818.6	H	125	357	-69.16	-56.89	6.99	12.34	-51.53
5727.9	V	264	323	-67.93	-48.19	8.69	13.05	-43.83
7637.2	V	0	324	-69.13	38.97	10.16	11.20	-40.77
9546.5	H	360	177	-70.08	39.04	11.51	11.84	-39.84

Table 6-8. Radiated Spurious Data (LTE Band 2 – High Channel)

Operating Frequency : 825.5 MHz
 Channel : 26805
 Modulation Signal : QPSK
 Band Width : 3.0 MHz
 RB Size / Offset : 1 / 7
 Distance : 3 Meters
 RSE Limit : -13 dBm

Freq. [MHz]	Ant Pol (H/V)	EUT Pol [degree]		S/A reading [dBm]	S/G Level [dBm]	Tx C/L [dB]	Ant. Gain [dBd]	RSE Level [dBm]
		Azimuth	Elevation					
1651.4	V	360	79	-42.65	-41.30	4.48	7.48	-38.30
2477.1	H	152	189	-66.28	-59.95	5.56	8.35	-57.16
3302.8	H	135	0	-66.33	-56.90	6.50	10.24	-53.16
4128.5	H	360	130	-69.37	-55.16	7.31	10.53	-51.94
4954.2	H	Noise floor		-70.35	-53.44	8.10	10.74	-50.80

Table 6-9. Radiated Spurious Data (LTE Band 26 – Low Channel)

Operating Frequency : 835.5 MHz
 Channel : 26915
 Modulation Signal : QPSK
 Band Width : 1.4 MHz
 RB Size / Offset : 1 / 24
 Distance : 3 Meters
 RSE Limit : -13 dBm

Freq. [MHz]	Ant Pol (H/V)	EUT Pol [degree]		S/A reading [dBm]	S/G Level [dBm]	Tx C/L [dB]	Ant. Gain [dBd]	RSE Level [dBm]
		Azimuth	Elevation					
1673.2	V	97	79	-39.44	-38.13	4.51	7.58	-35.06
2509.8	H	270	275	-66.84	-60.47	5.61	8.37	-57.72
3346.4	H	360	277	-66.96	-57.42	6.56	10.50	-53.48
4183.0	H	360	195	-68.46	-54.15	7.43	10.63	-50.95

Table 6-10. Radiated Spurious Data (LTE Band 26 – Mid Channel)

Operating Frequency : 841.5 MHz
 Channel : 26965
 Modulation Signal : QPSK
 Band Width : 15.0 MHz
 RB Size / Offset : 1 / 0
 Distance : 3 meters
 RSE Limit : -13 dBm

Freq. [MHz]	Ant Pol (H/V)	EUT Pol [degree]		S/A reading [dBm]	S/G Level [dBm]	Tx C/L [dB]	Ant. Gain [dBd]	RSE Level [dBm]
		Azimuth	Elevation					
1683.4	H	202	360	-41.69	-40.21	4.53	7.63	-37.11
2525.1	H	217	209	-69.66	-63.33	5.62	8.37	-60.58
3366.8	H	165	172	-68.84	-59.24	6.57	10.53	-55.28
4208.5	H	80	325	-76.00	-61.74	7.48	10.69	-58.53

Table 6-11. Radiated Spurious Data (LTE Band 26 – High Channel)



7. CONCLUSION

The data collected relate only the item(s) tested and show that the Samsung Portable Handset FCC ID: A3LSMG9287 compliance with all the requirements of Parts 2, 22 and 24 of the FCC rules.

– End of this report –