16QAM Modulation ANT1						
-40.8	20.0	-6.21	-0,002	129	0.05	compliant
-48.0	20.0	6.71	0,003	129	0.05	compliant
-55.2	20.0	-4.84	-0,002	129	0.05	compliant
16QAM Modulation ANT2						
-40.8	20.0	6.05	0,002	129	0.05	compliant
-48.0	20.0	-8.08	-0,003	129	0.05	compliant
-55.2	20.0	-6.68	-0,003	129	0.05	compliant
16QAM Modulation ANT3						
-40.8	20.0	-8.40	-0,003	129	0.05	compliant
-48.0	20.0	7.46	0,003	129	0.05	compliant
-55.2	20.0	9.15	0,004	129	0.05	compliant
16QAM Modulation ANT4						
-40.8	20.0	6.20	0,002	129	0.05	compliant
-48.0	20.0	-8.51	-0,003	129	0.05	compliant
-55.2	20.0	-4.91	-0,002	129	0.05	compliant
16QAM Modulation ANT5						
-40.8	20	9.190	0.004	129	0.05	compliant
-48	20	7.600	0.003	129	0.05	compliant
-55.2	20	7.410	0.003	129	0.05	compliant
16QAM Modulation ANT6						
-40.8	20	8.240	0.003	129	0.05	compliant
-48	20	10.720	0.004	129	0.05	compliant
-55.2	20	9.560	0.004	129	0.05	compliant
16QAM Modulation ANT7						
-40.8	20	6.960	0.003	129	0.05	compliant
-48	20	7.950	0.003	129	0.05	compliant
-55.2	20	6.380	0.002	129	0.05	compliant
16QAM Modulation ANT8						
-40.8	20	7.380	0.003	129	0.05	compliant
-48	20	8.480	0.003	129	0.05	compliant
-55.2	20	10.530	0.004	129	0.05	compliant
64QAM Modulation ANT1						
-40.8	20.0	9.95	0,004	129	0.05	compliant
-48.0	20.0	10.80	0,004	129	0.05	compliant
-55.2	20.0	8.39	0,003	129	0.05	compliant
64QAM Modulation ANT2						
-40.8	20.0	9.97	0,004	129	0.05	compliant
-48.0	20.0	11.90	0,005	129	0.05	compliant
-55.2	20.0	7.65	0,003	129	0.05	compliant
64QAM Modulation ANT3						
-40.8	20.0	7.82	0,003	129	0.05	compliant

-48.0	20.0	9.29	0,004	129	0.05	compliant
-55.2	20.0	8.80	0,003	129	0.05	compliant
64QAM Modulation ANT4						
-40.8	20.0	-7.72	-0,003	129	0.05	compliant
-48.0	20.0	-8.27	-0,003	129	0.05	compliant
-55.2	20.0	-8.52	-0,003	129	0.05	compliant
64QAM Modulation ANT5						
-40.8	20	8.120	0.003	129	0.05	compliant
-48	20	9.230	0.004	129	0.05	compliant
-55.2	20	12.140	0.005	129	0.05	compliant
64QAM Modulation ANT6						
-40.8	20	11.810	0.005	129	0.05	compliant
-48	20	8.780	0.003	129	0.05	compliant
-55.2	20	8.920	0.003	129	0.05	compliant
64QAM Modulation ANT7						
-40.8	20	8.030	0.003	129	0.05	compliant
-48	20	10.530	0.004	129	0.05	compliant
-55.2	20	7.800	0.003	129	0.05	compliant
64QAM Modulation ANT8						
-40.8	20	11.190	0.004	129	0.05	compliant
-48	20	9.130	0.004	129	0.05	compliant
-55.2	20	11.080	0.004	129	0.05	compliant
Measurement Uncertainty:					±1.0 Hz	

Table 17 Frequency stability with voltage var. (10 MHz Channel BW)

Config B:

Carrier Frequency: 2593.0 MHz						
Supply Voltage (DC) [V]	Ambient Temperature [°C]	Frequency Deviation		Manufacturer's Specification		Result
		[Hz]	[ppm]	[Hz]	[ppm]	
QPSK Modulation ANT1						
-40.8	20.0	-7.08	-0,003	129	0.05	compliant
-48.0	20.0	-5.75	-0,002	129	0.05	compliant
-55.2	20.0	4.97	0,002	129	0.05	compliant
QPSK Modulation ANT2						
-40.8	20.0	-4.53	-0,002	129	0.05	compliant
-48.0	20.0	-5.43	-0,002	129	0.05	compliant
-55.2	20.0	-5.56	-0,002	129	0.05	compliant
QPSK Modulation ANT3						
-40.8	20.0	3.19	0,001	129	0.05	compliant

-48.0	20.0	4.57	0,002	129	0.05	compliant
-55.2	20.0	-4.75	-0,002	129	0.05	compliant
QPSK Modulation ANT4						
-40.8	20.0	-7.65	-0,003	129	0.05	compliant
-48.0	20.0	-6.64	-0,003	129	0.05	compliant
-55.2	20.0	-5.85	-0,002	129	0.05	compliant
QPSK Modulation ANT5						
-40.8	20	6.930	0.003	129	0.05	compliant
-48	20	9.240	0.004	129	0.05	compliant
-55.2	20	5.060	0.002	129	0.05	compliant
QPSK Modulation ANT6						
-40.8	20	5.950	0.002	129	0.05	compliant
-48	20	9.300	0.004	129	0.05	compliant
-55.2	20	6.470	0.002	129	0.05	compliant
QPSK Modulation ANT7						
-40.8	20	6.440	0.002	129	0.05	compliant
-48	20	7.000	0.003	129	0.05	compliant
-55.2	20	4.990	0.002	129	0.05	compliant
QPSK Modulation ANT8						
-40.8	20	9.660	0.004	129	0.05	compliant
-48	20	6.210	0.002	129	0.05	compliant
-55.2	20	8.350	0.003	129	0.05	compliant
16QAM Modulation ANT1						
-40.8	20.0	-7.51	-0,003	129	0.05	compliant
-48.0	20.0	-8.10	-0,003	129	0.05	compliant
-55.2	20.0	-5.43	-0,002	129	0.05	compliant
16QAM Modulation ANT2						
-40.8	20.0	-6.88	-0,003	129	0.05	compliant
-48.0	20.0	-6.18	-0,002	129	0.05	compliant
-55.2	20.0	-5.60	-0,002	129	0.05	compliant
16QAM Modulation ANT3						
-40.8	20.0	-7.77	-0,003	129	0.05	compliant
-48.0	20.0	-6.34	-0,002	129	0.05	compliant
-55.2	20.0	-6.01	-0,002	129	0.05	compliant
16QAM Modulation ANT4						
-40.8	20.0	-6.83	-0,003	129	0.05	compliant
-48.0	20.0	-6.45	-0,002	129	0.05	compliant
-55.2	20.0	-4.11	-0,002	129	0.05	compliant
16QAM Modulation ANT5						
-40.8	20	7.300	0.003	129	0.05	compliant
-48	20	9.390	0.004	129	0.05	compliant
-55.2	20	-6.700	-0.003	129	0.05	compliant

16QAM Modulation ANT6						
-40.8	20	8.380	0.003	129	0.05	compliant
-48	20	6.800	0.003	129	0.05	compliant
-55.2	20	8.490	0.003	129	0.05	compliant
16QAM Modulation ANT7						
-40.8	20	-6.740	-0.003	129	0.05	compliant
-48	20	9.410	0.004	129	0.05	compliant
-55.2	20	7.960	0.003	129	0.05	compliant
16QAM Modulation ANT8						
-40.8	20	8.900	0.003	129	0.05	compliant
-48	20	6.880	0.003	129	0.05	compliant
-55.2	20	-7.070	-0.003	129	0.05	compliant
64QAM Modulation ANT1						
-40.8	20.0	-7.71	-0,003	129	0.05	compliant
-48.0	20.0	-7.05	-0,003	129	0.05	compliant
-55.2	20.0	-6.28	-0,002	129	0.05	compliant
64QAM Modulation ANT2						
-40.8	20.0	-6.30	-0,002	129	0.05	compliant
-48.0	20.0	-5.60	-0,002	129	0.05	compliant
-55.2	20.0	-5.85	-0,002	129	0.05	compliant
64QAM Modulation ANT3						
-40.8	20.0	-5.71	-0,002	129	0.05	compliant
-48.0	20.0	-5.07	-0,002	129	0.05	compliant
-55.2	20.0	-6.45	-0,002	129	0.05	compliant
64QAM Modulation ANT4						
-40.8	20.0	-7.96	-0,003	129	0.05	compliant
-48.0	20.0	-5.15	-0,002	129	0.05	compliant
-55.2	20.0	-4.57	-0,002	129	0.05	compliant
64QAM Modulation ANT5						
-40.8	20	6.460	0.002	129	0.05	compliant
-48	20	-5.610	-0.002	129	0.05	compliant
-55.2	20	6.760	0.003	129	0.05	compliant
64QAM Modulation ANT6						
-40.8	20	5.820	0.002	129	0.05	compliant
-48	20	5.030	0.002	129	0.05	compliant
-55.2	20	7.930	0.003	129	0.05	compliant
64QAM Modulation ANT7						
-40.8	20	9.340	0.004	129	0.05	compliant
-48	20	8.510	0.003	129	0.05	compliant
-55.2	20	7.150	0.003	129	0.05	compliant
64QAM Modulation ANT8						
-40.8	20	10.060	0.004	129	0.05	compliant

-48	20	8.140	0.003	129	0.05	compliant
-55.2	20	7.680	0.003	129	0.05	compliant
Measurement Uncertainty:					±1.0 Hz	

Table 18 Frequency stability with voltage var. (20 MHz Channel BW)

The measured frequency stability was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

5. TEST DATA AND SCREENSHOTS

5.1 Part List of the RF Measurement Test Equipment

No.	Test Equipment	Manufacturer & Type	Serial Number	Calibration date	Calibration due	Test No.
1	Signal Analyzer	Rohde & Schwarz: FSV 30	100781	05/2013	05/2014	1, 2, 3, 4, 6
2	Vector Signal Generator	Rohde & Schwarz: SMU200A	100935	07/2012	07/2014	1, 2, 3, 6
3	Signal Generator	Rohde & Schwarz: SMP02	836402/015	03/2013	03/2015	1, 2, 3, 6
4	Vector Network Analyzer	Rohde & Schwarz: ZVA40	100146	02/2013	02/2014	4
5	Vector Network Analyzer	Rohde & Schwarz: ZVL13	101177	02/2013	02/2014	4
6	Calibration Unit	Rohde & Schwarz: ZV-Z54	100125	03/2013	03/2014	4
7	Calibration Kit	Hewlett-Packard: HP85032B	2919A04843	07/2013	07/2014	4
8	Power Meter	Rohde & Schwarz: NRP-Z21	100354	01/2013	01/2015	1, 2, 3, 6
9	Frequency Standard	Datum 8040	30007339	01/2013	01/2014	6
10	Multimeter	Fluke 83	65870302	12/2012	12/2013	1, 2, 3, 4, 6
11	Humidity and Temperature Indicator	Vaisala: HMI 31	P3730008	01/2013	01/2014	1, 2, 3, 4, 6
12	DC Power Supply	Sorensen: SGI 80/188	1245A00011	cnn	-	1, 2, 3, 4, 6
13	Interface Unit	Orbis: TX SSU Platform 700-2700A	SSU-1113-2155	cnn	-	1, 2, 3, 6
14	Attenuator	Aeroflex/Weinschel: 66-20-33	BV3346	cnn	-	4
15	EMI Test Receiver	R&S ESU40	100262	03/2013	03/2014	5
16	Horn Antenna	Emco 3115	6346	10/2012	10/2013	5
17	Bilog Antenna	Chase CBL6112	2003	04/2013	04/2014	5
18	Log Periodic Antenna	R&S 1-26.5GHz	356749/012	07/2013	07/2014	5
19	Amplifier	Miteq AFSX4	902638	cnn	-	5
20	Antenna Mast	Deisel HD240	2401323194	cnn	-	5
21	Mast Controller	Deisel HD100	1001331	cnn	-	5

Table 19 Part List of the RF Measurement Test Equipment

5.2 Spectral Plots

5.2.1. Test No. 1: RF Power Output

The value 'Power' is the carrier power (RF Power Output) measured by the signal analyzer. 'Offset' is the external attenuation (cable loss of the test set up). The sum of both values is the base station maximum RF output power given on page 8. The external attenuation is frequency dependant. Thus the various 'Offset' values in the screenshots may differ.

Config A ANT1:

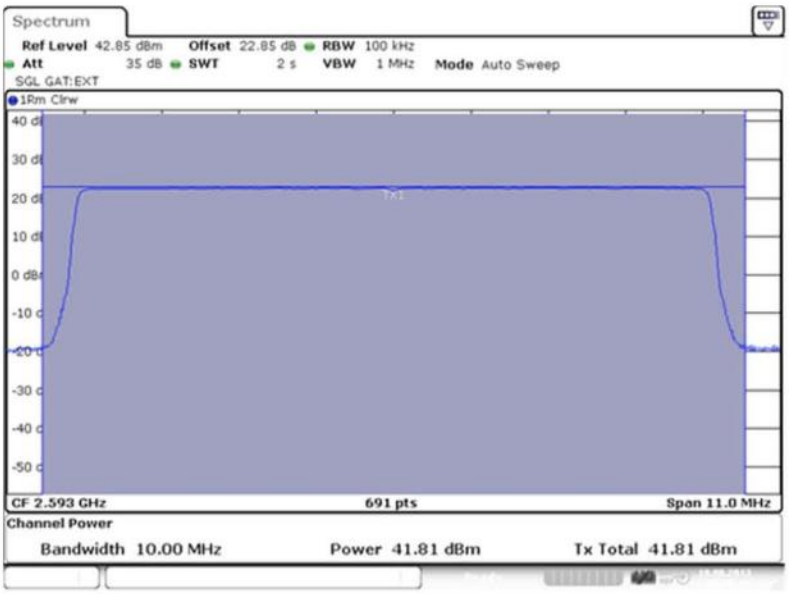

Figure 5 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)

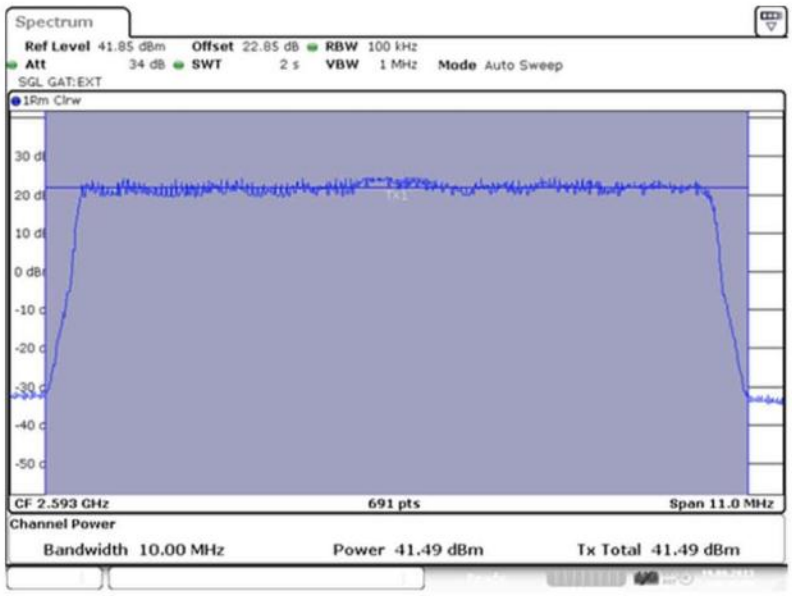

Figure 6 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)

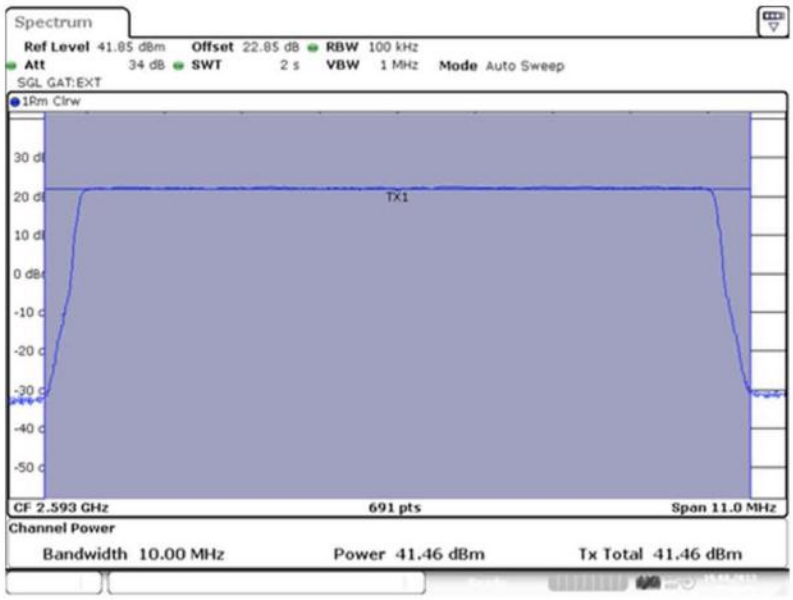

Figure 7 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT2:

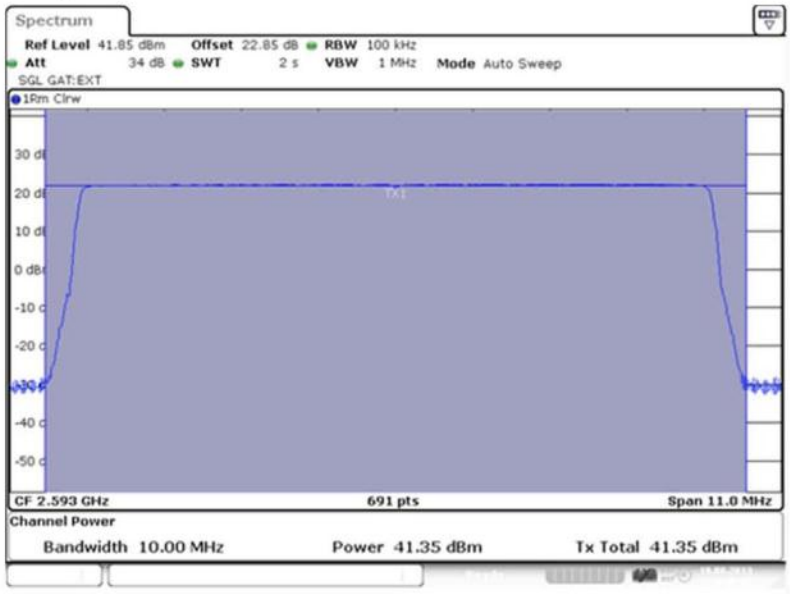

Figure 8 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)

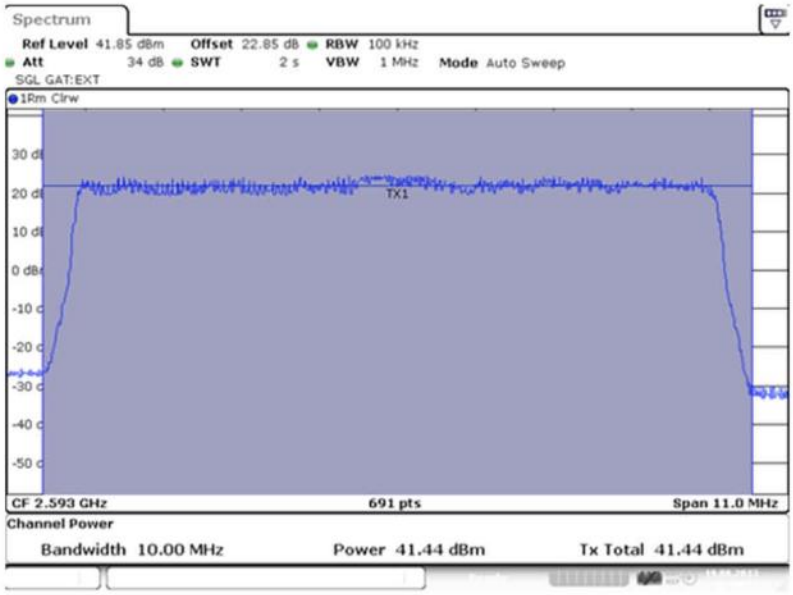

Figure 9 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)

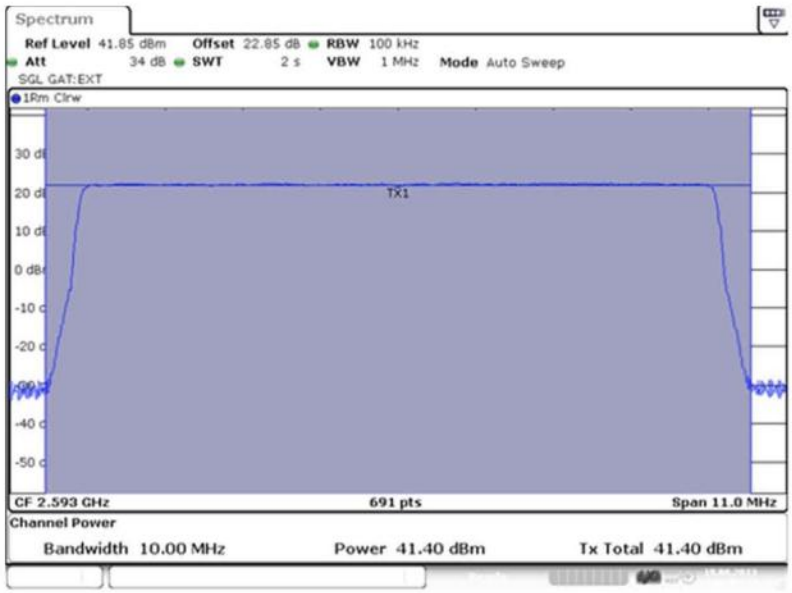

Figure 10 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT3:

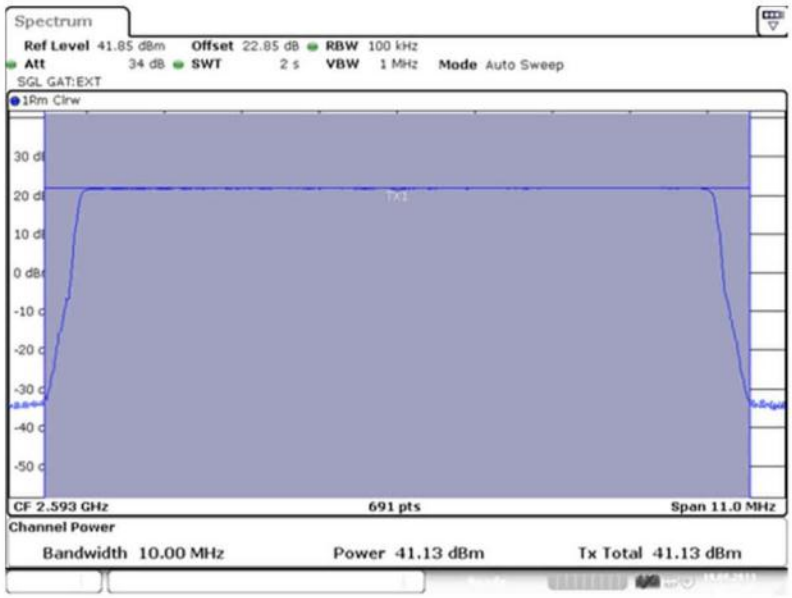

Figure 11 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)

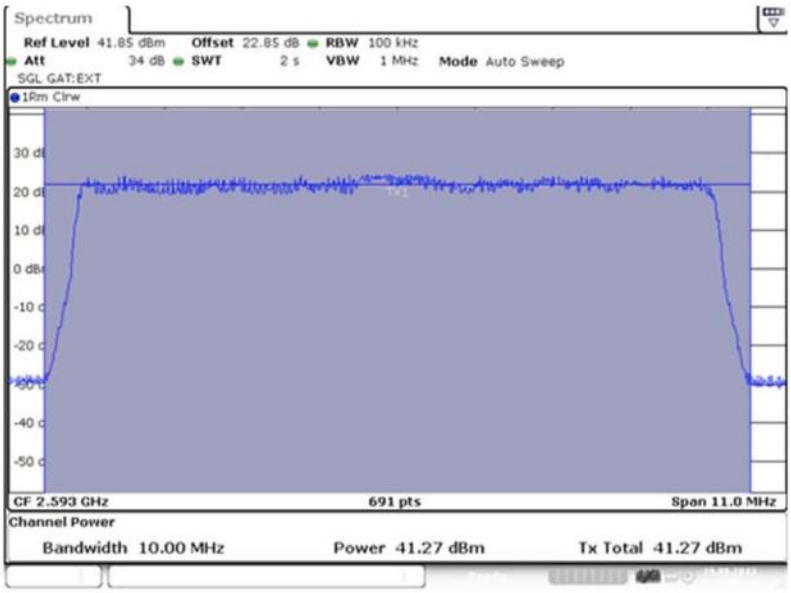

Figure 12 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)

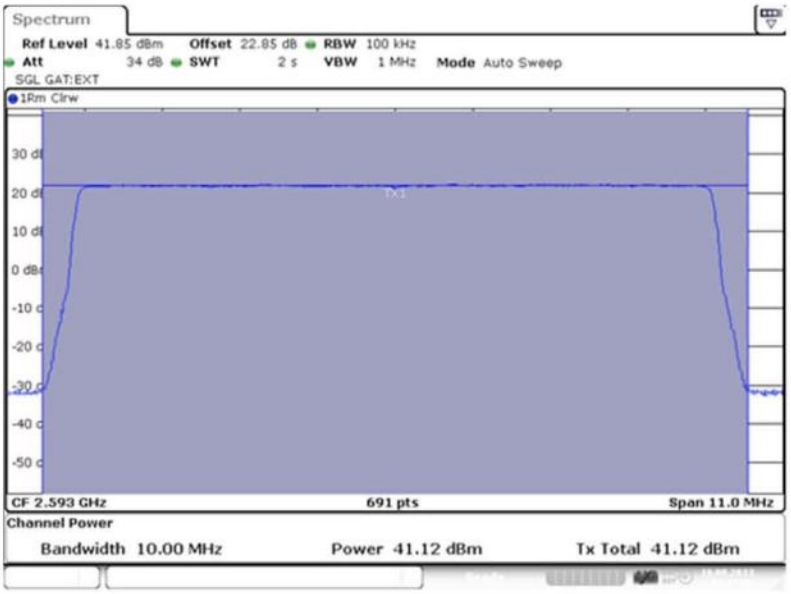

Figure 13 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT4:

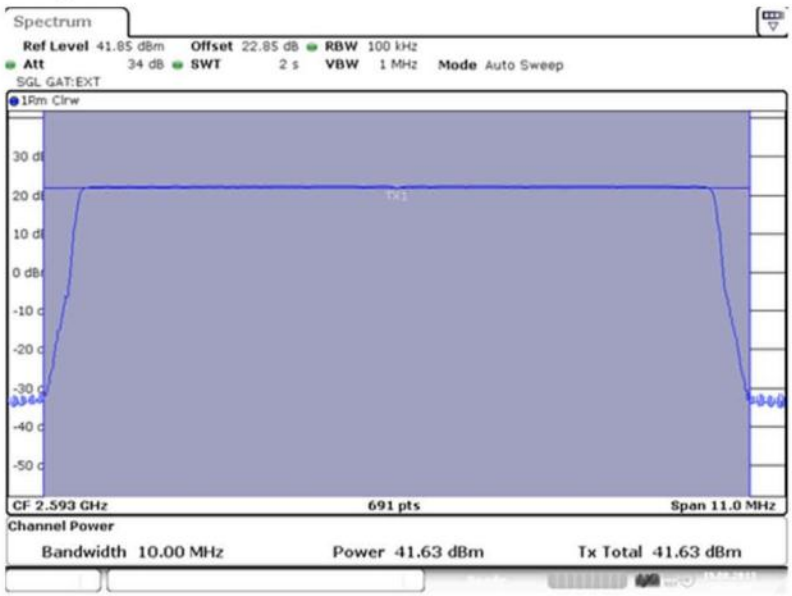

Figure 14 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)

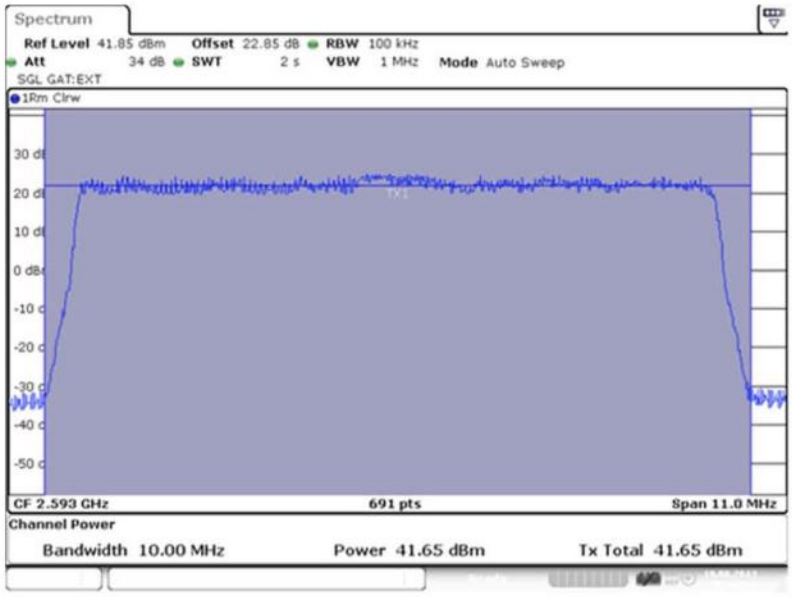

Figure 15 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)

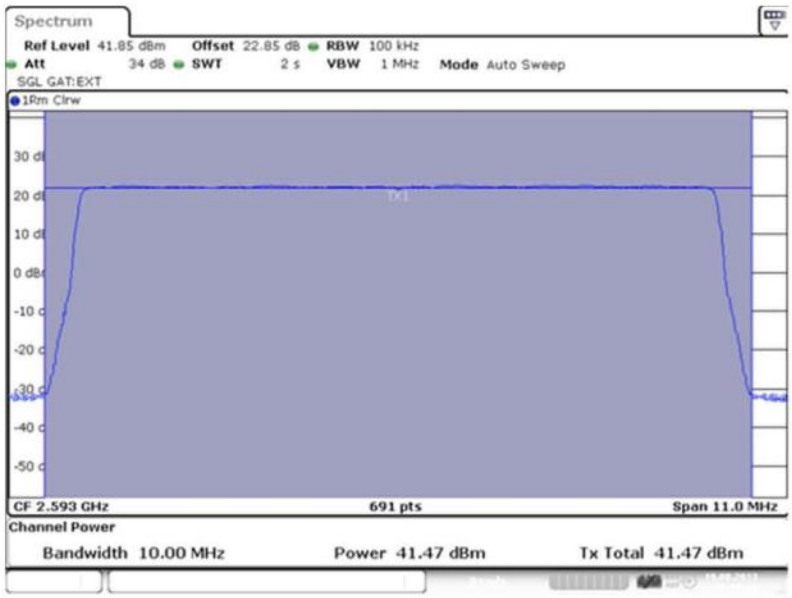

Figure 16 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT5:

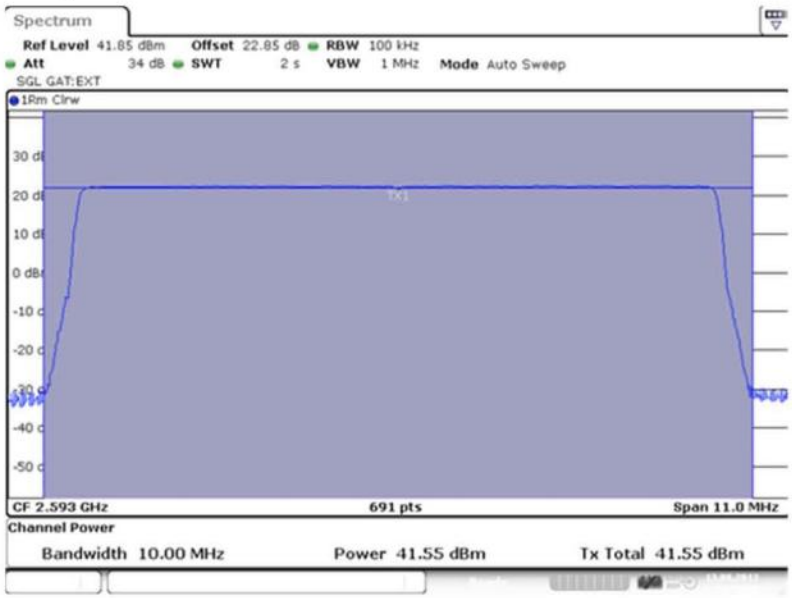

Figure 17 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)

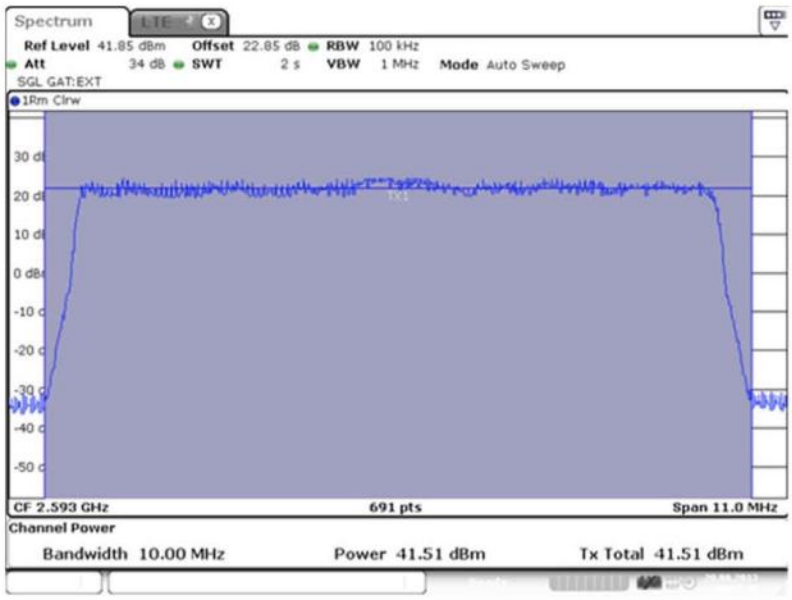

Figure 18 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)

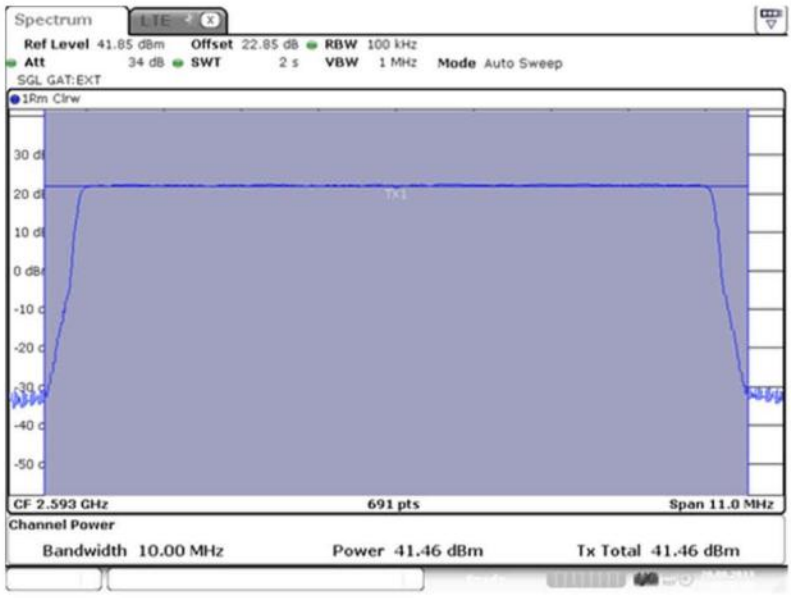

Figure 19 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT6:

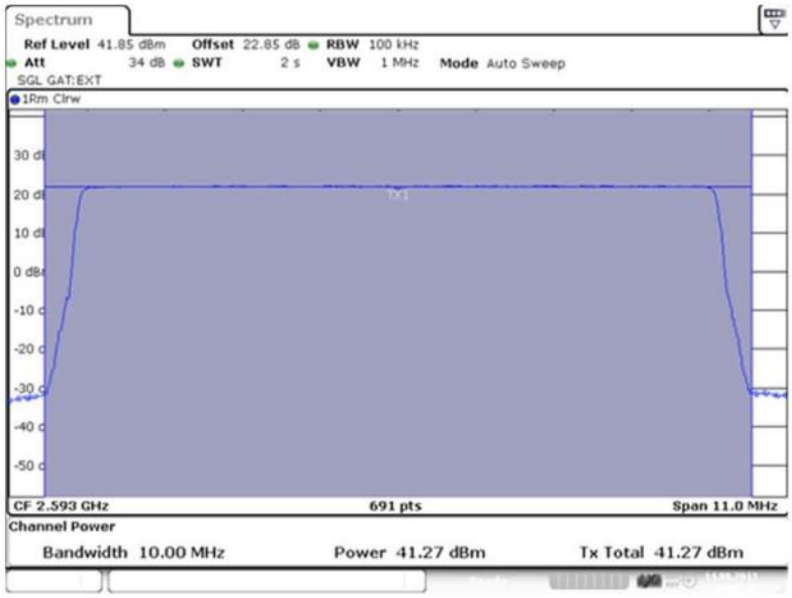

Figure 20 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)

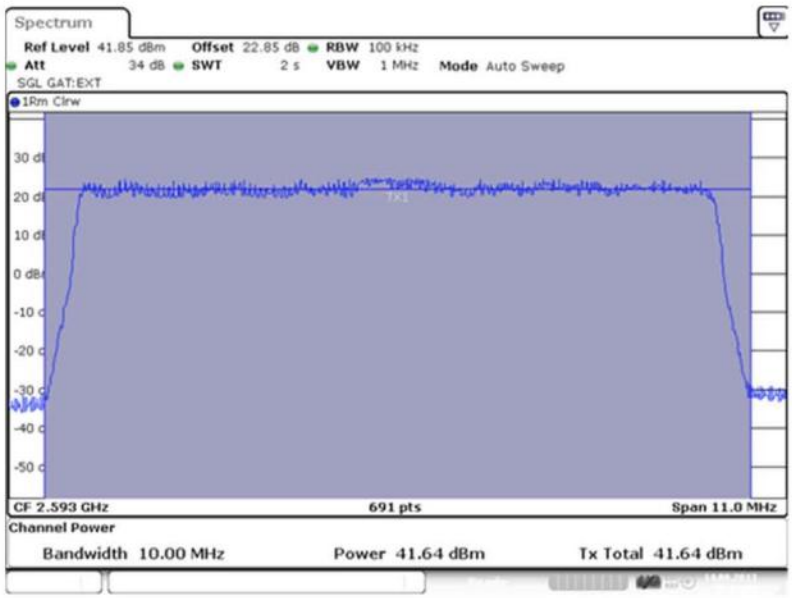

Figure 21 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)

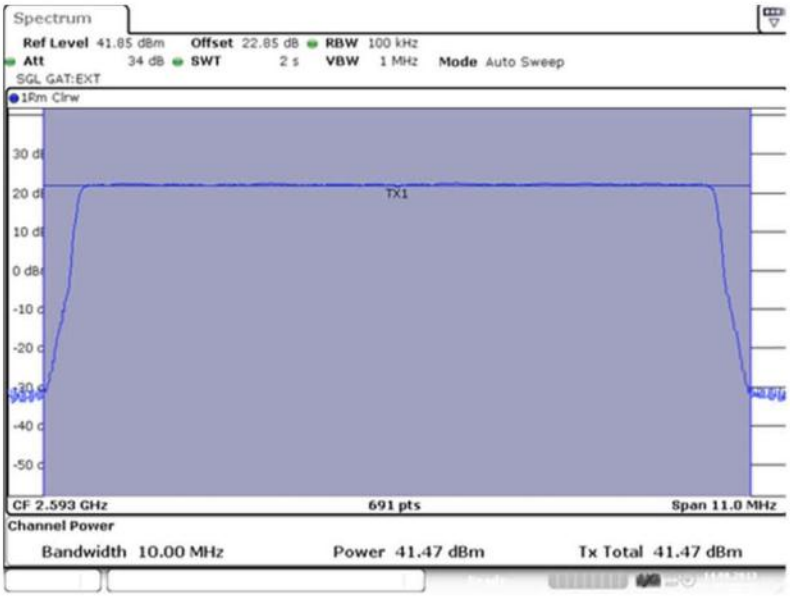

Figure 22 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT7:

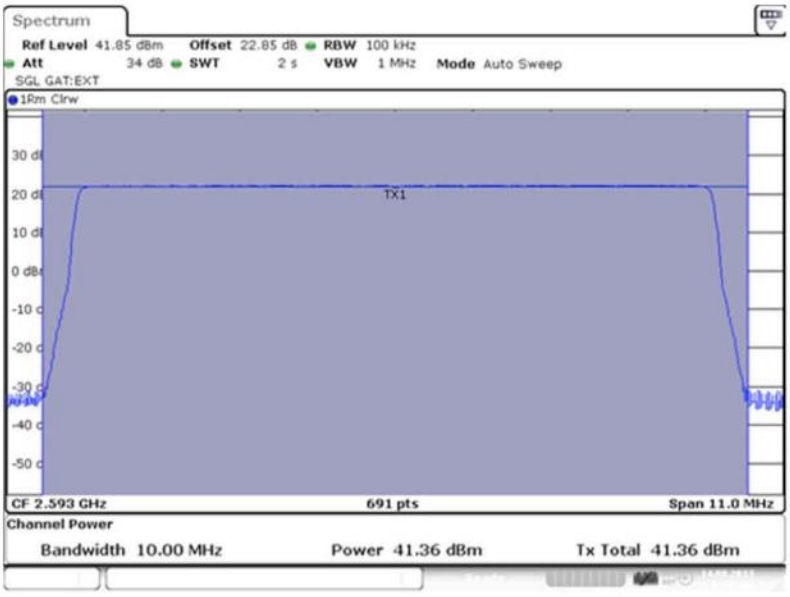

Figure 23 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)

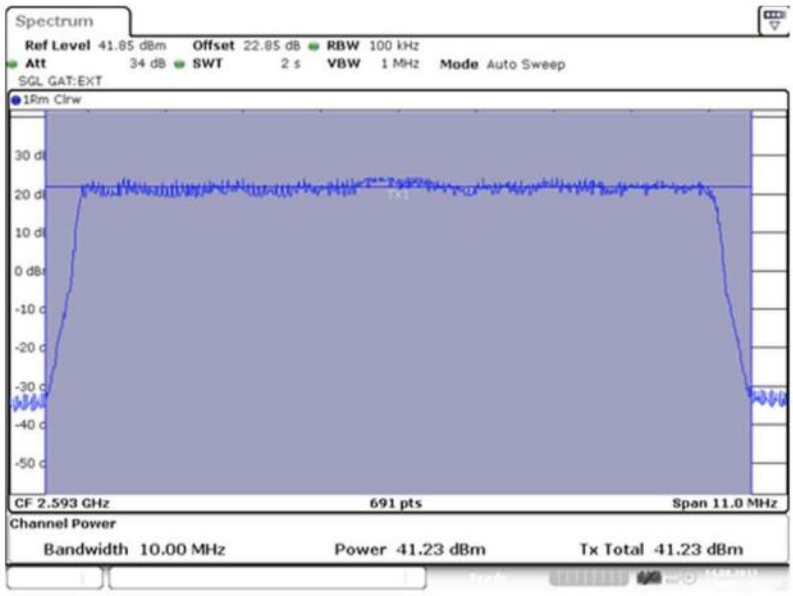

Figure 24 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)

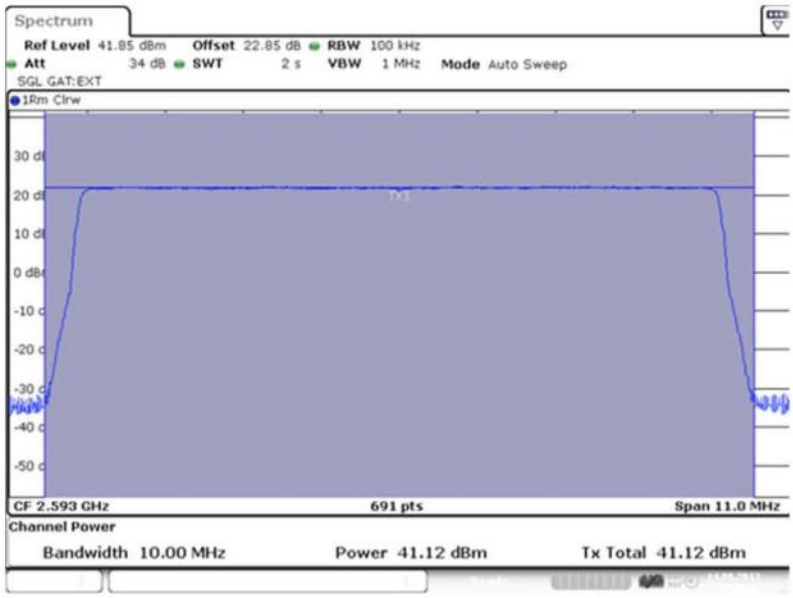

Figure 25 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT8:

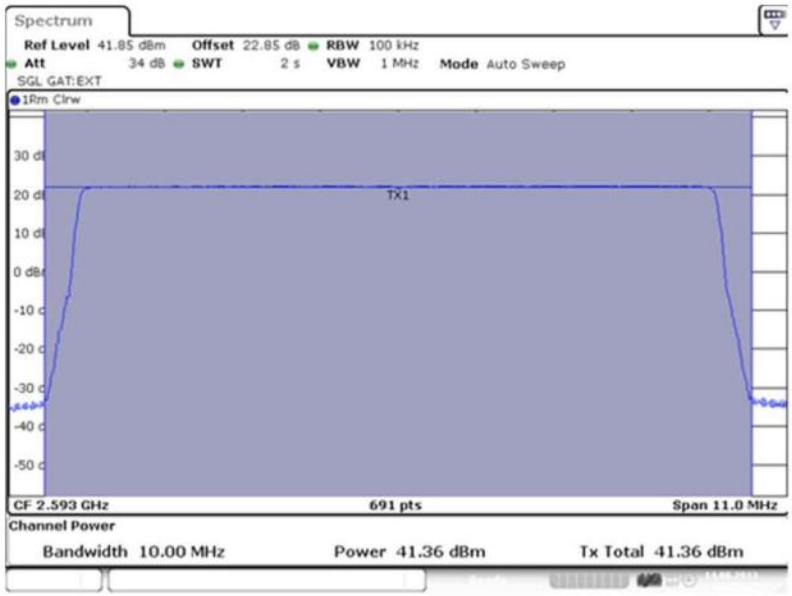

Figure 26 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)

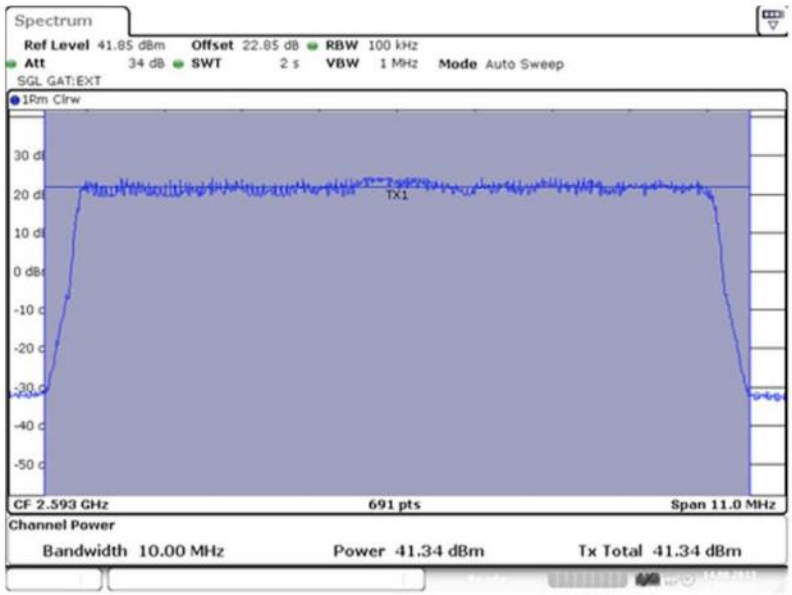

Figure 27 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)

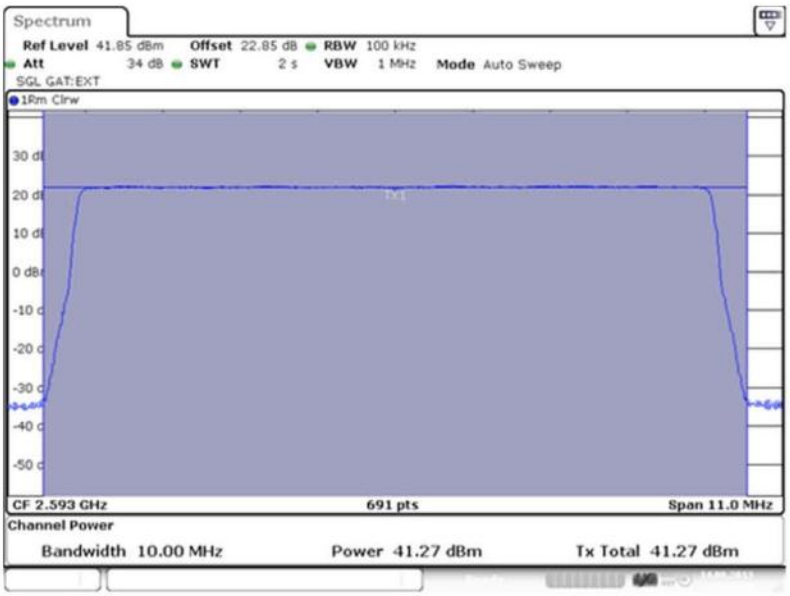

Figure 28 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config B ANT1:

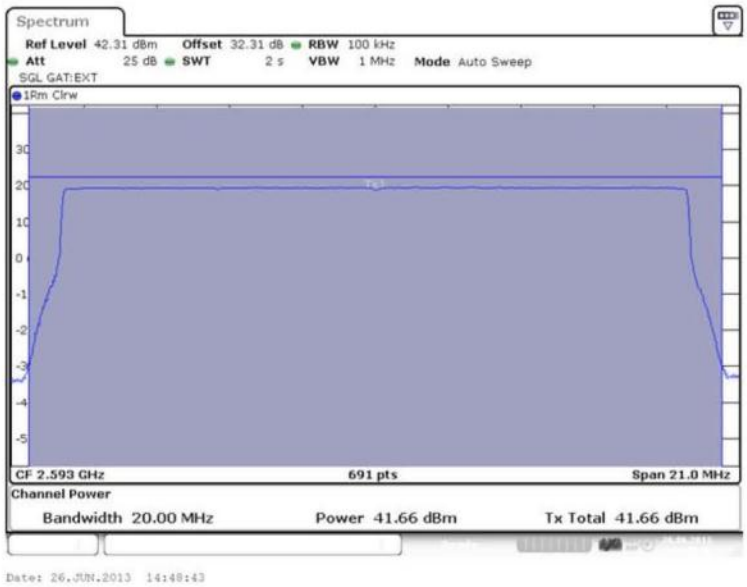

Figure 29 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)

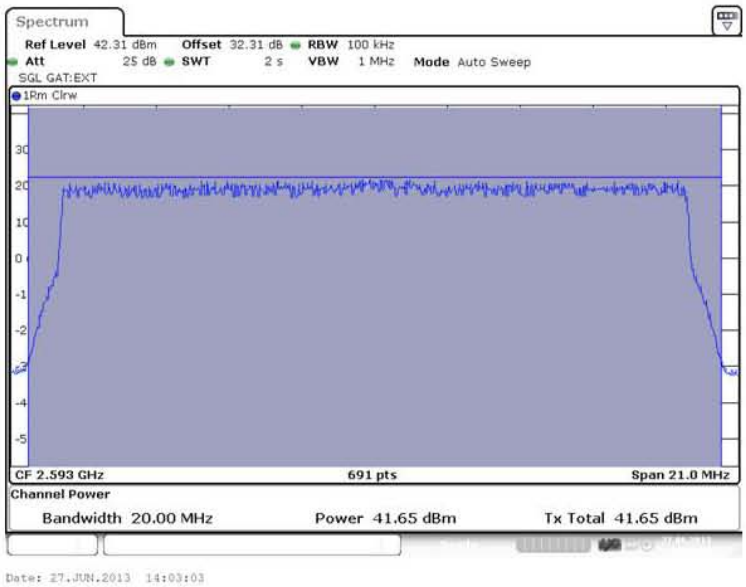

Figure 30 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)

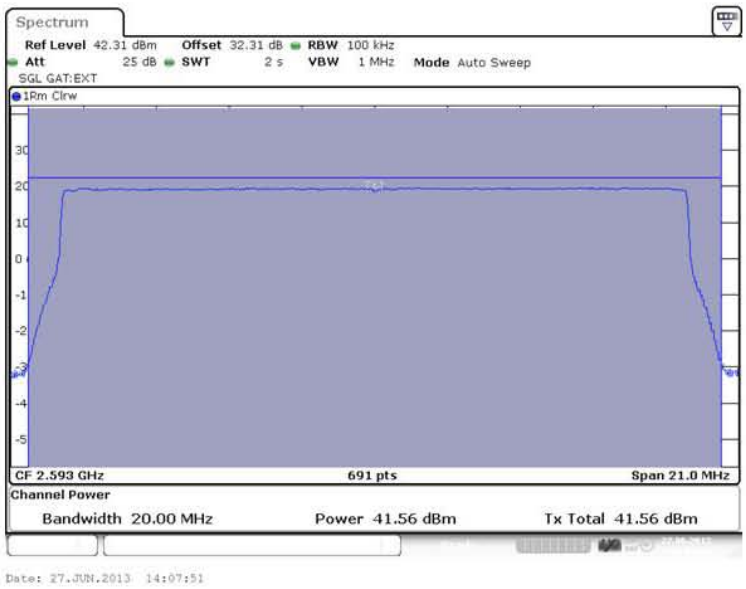

Figure 31 RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT2:

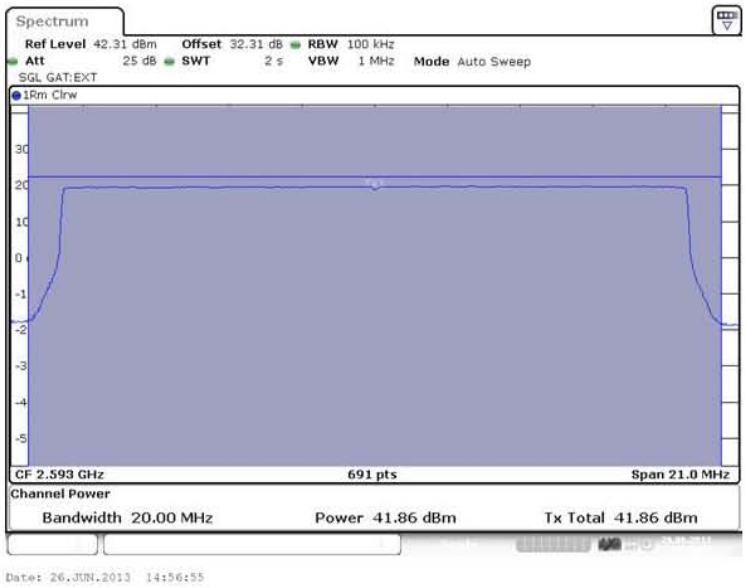

Figure 32 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)

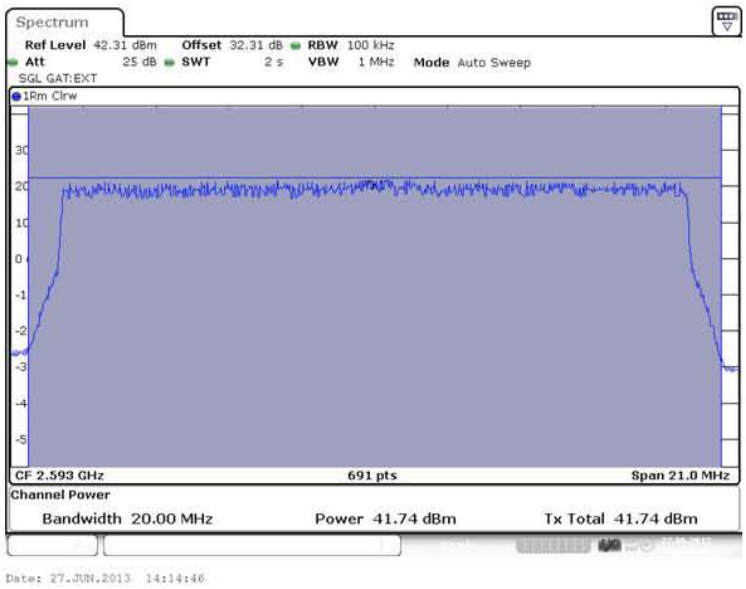

Figure 33 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)

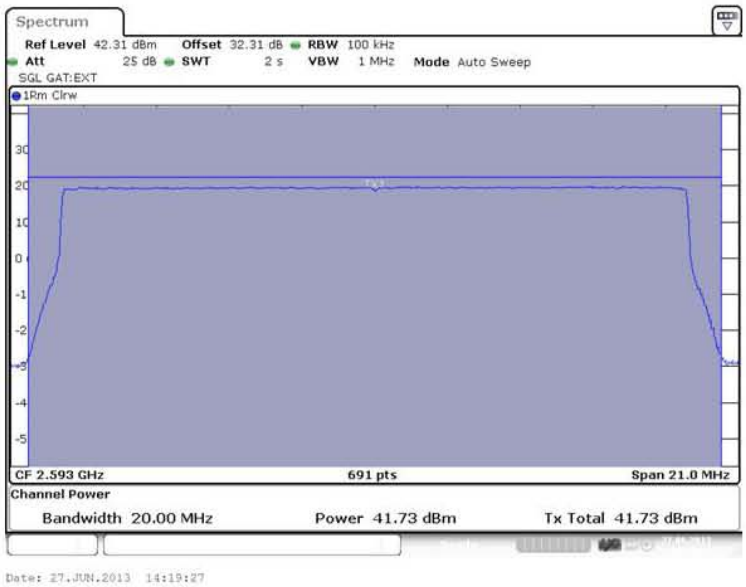

Figure 34RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT3:

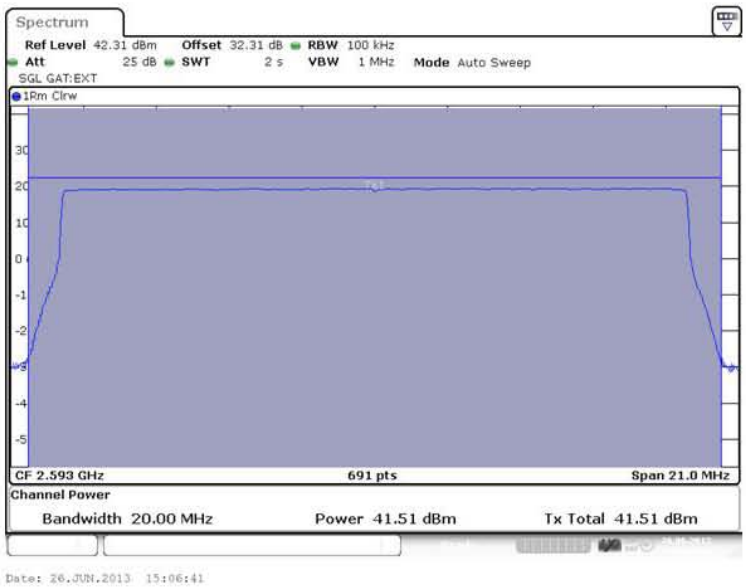

Figure 35 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)

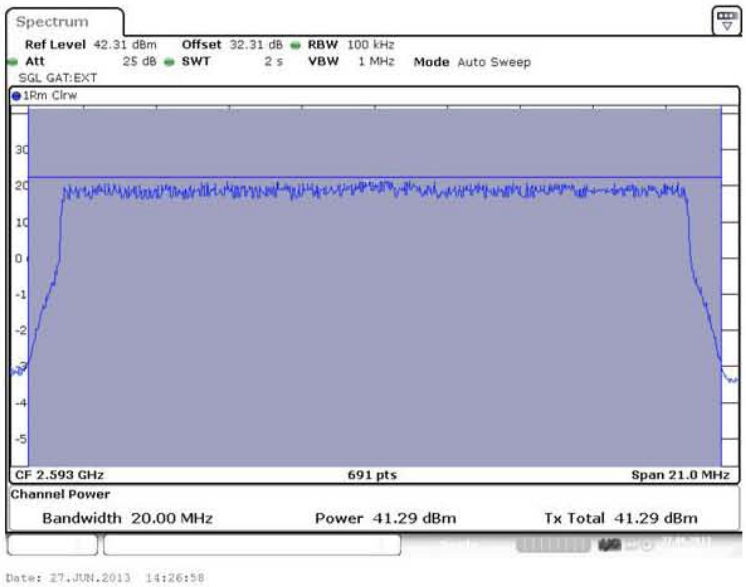

Figure 36 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)

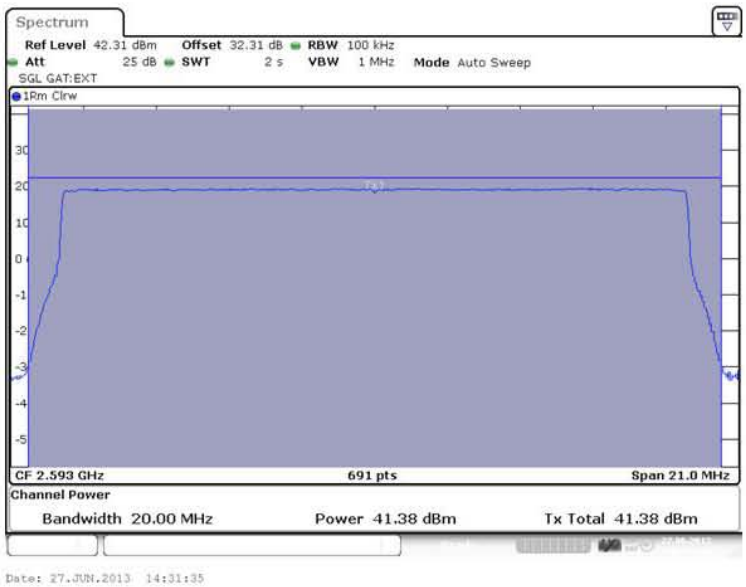

Figure 37RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT4:

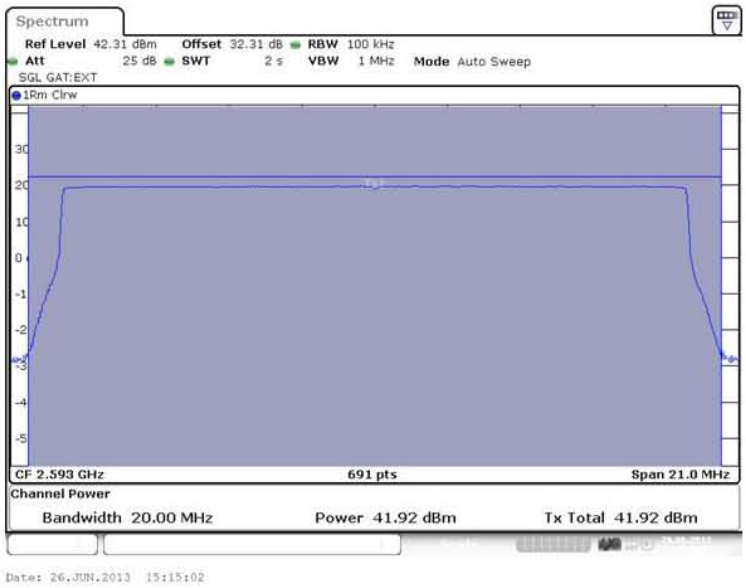

Figure 38 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)

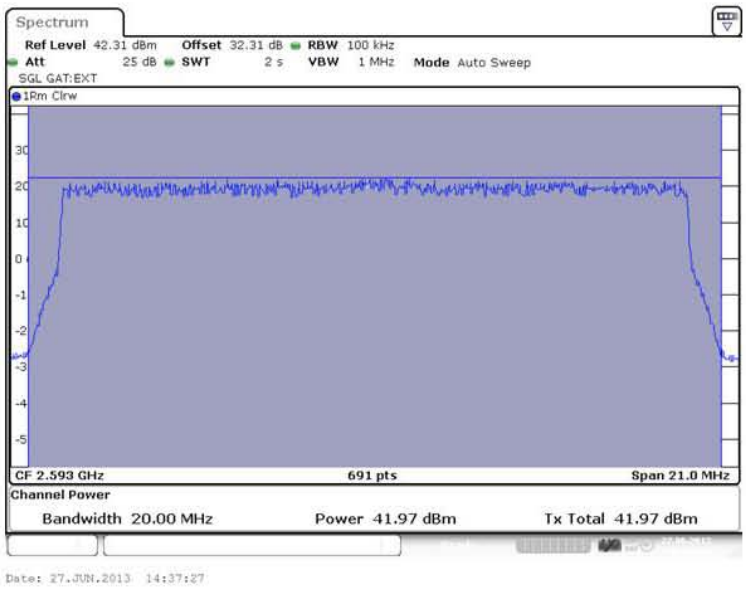

Figure 39 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)

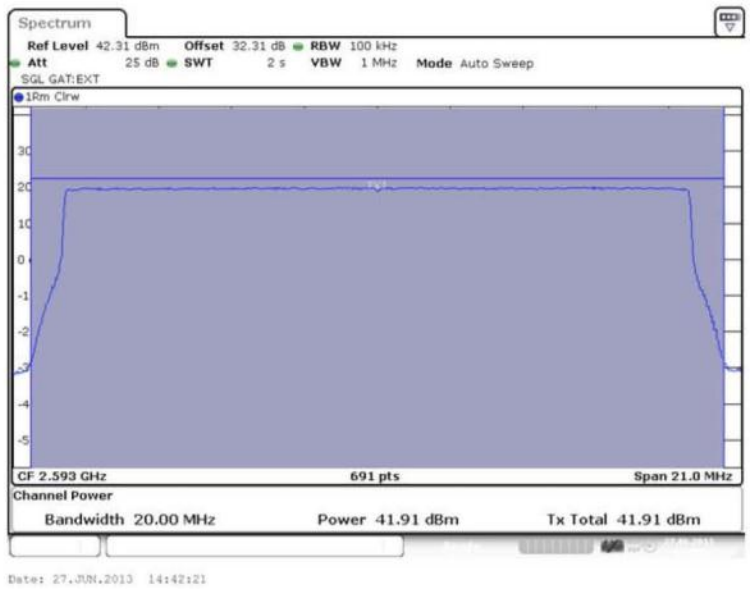

Figure 40RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT5:

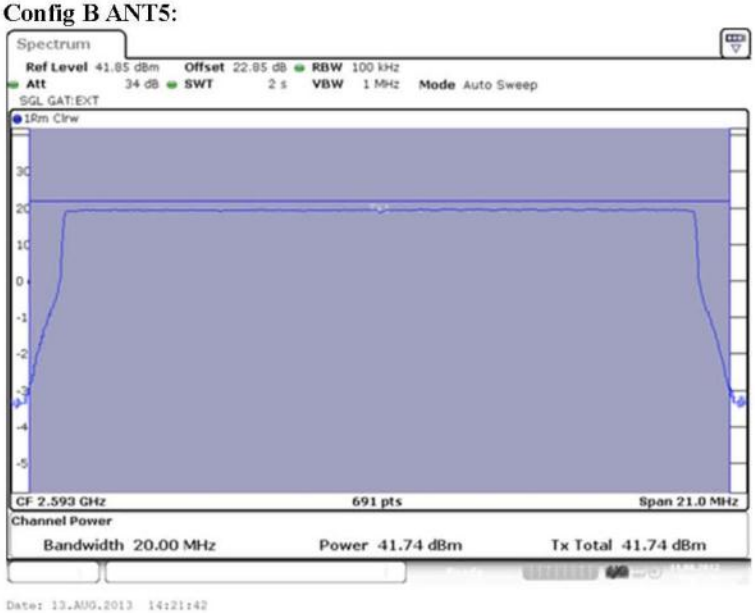

Figure 41 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)

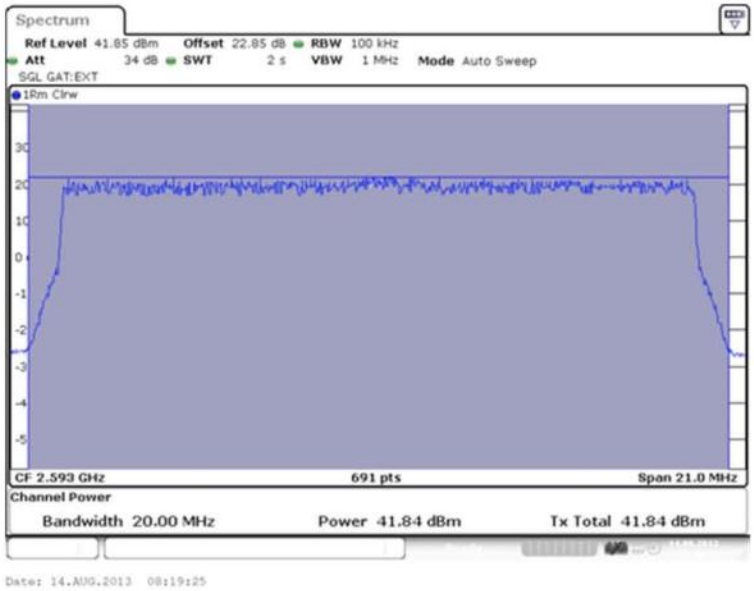

Figure 42 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)

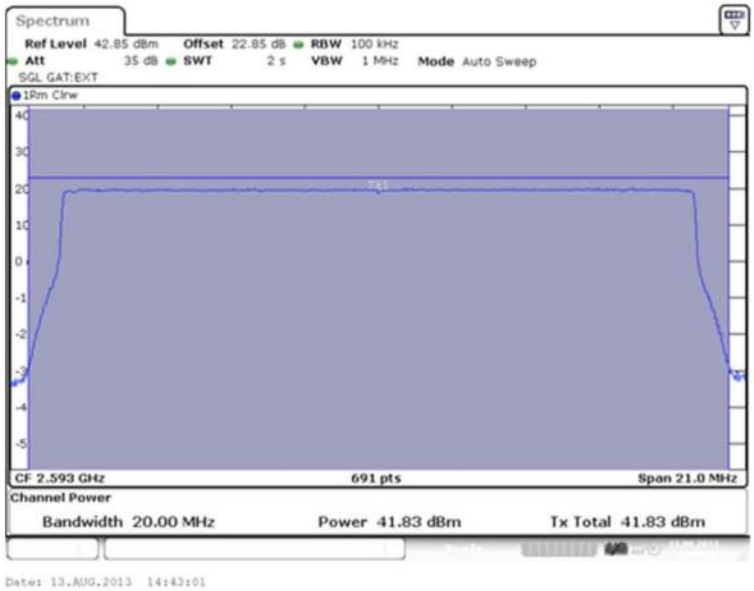

Figure 43RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT6:

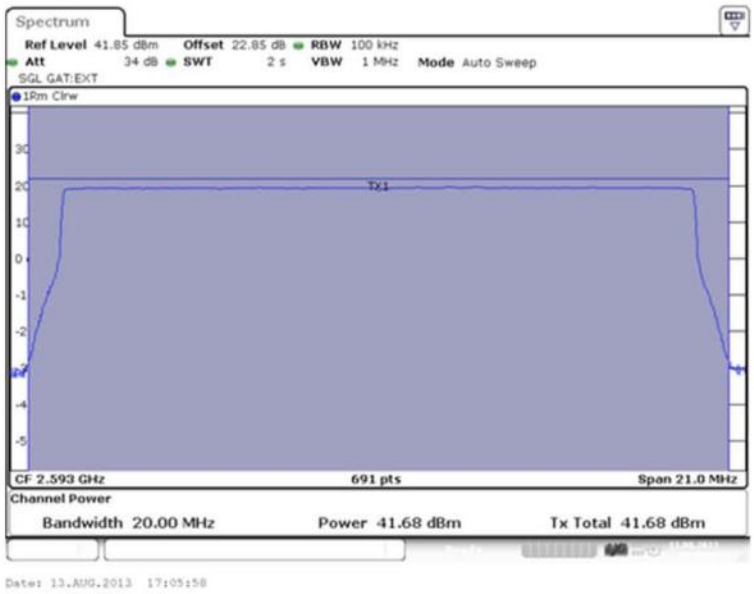

Figure 44 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)

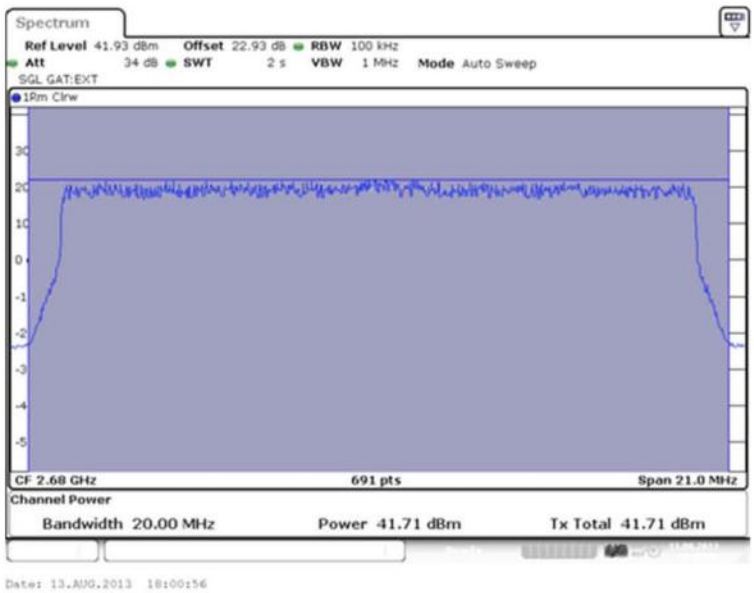

Figure 45 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)

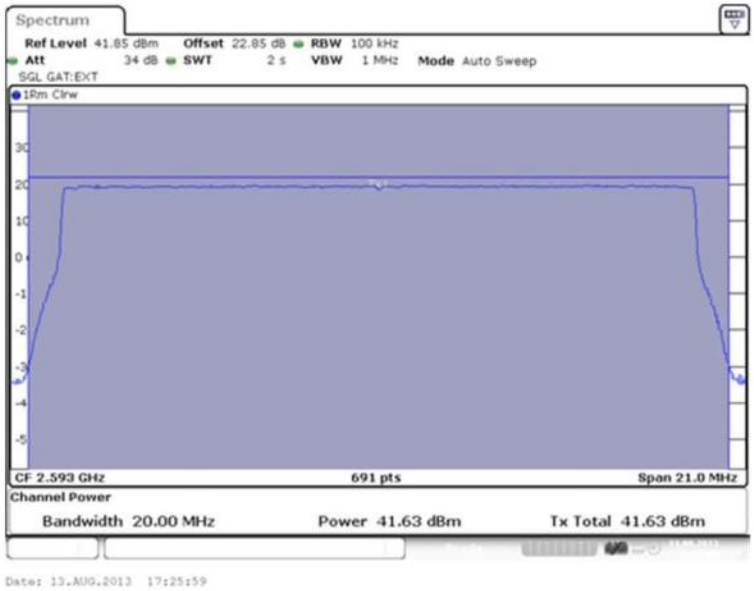

Figure 46RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT7:

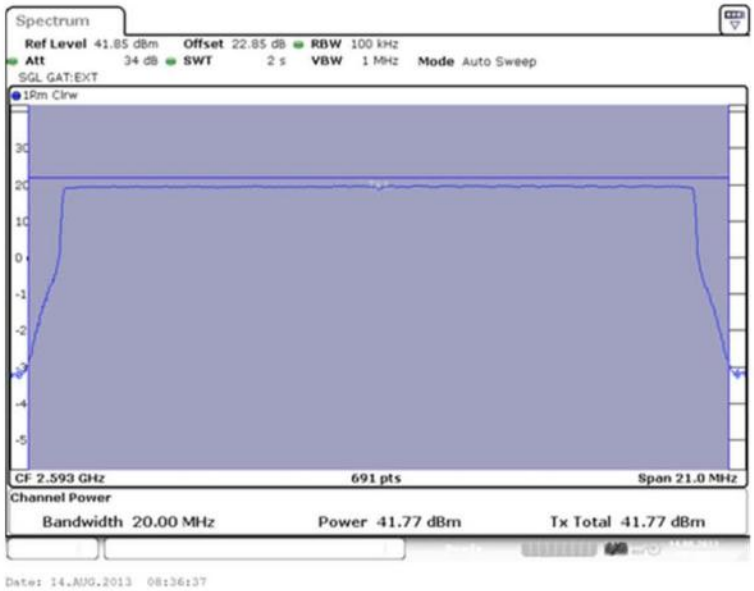

Figure 47 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)

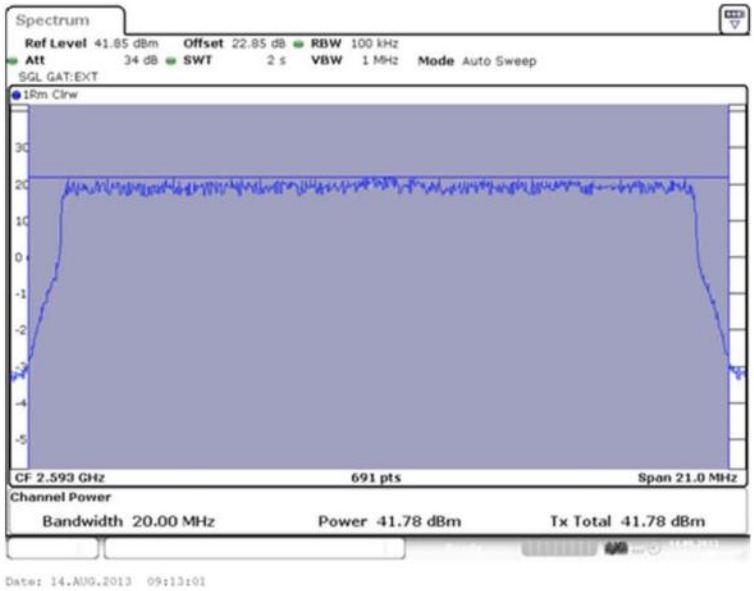

Figure 48 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)

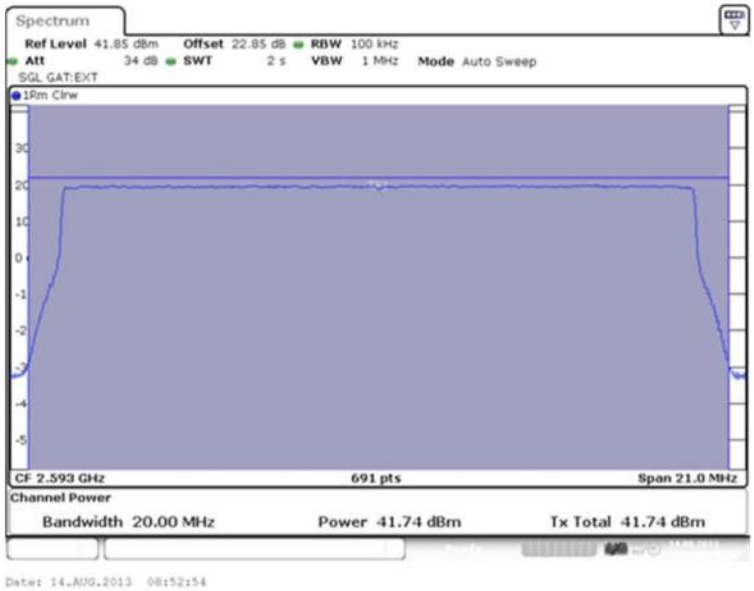

Figure 49RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT8:

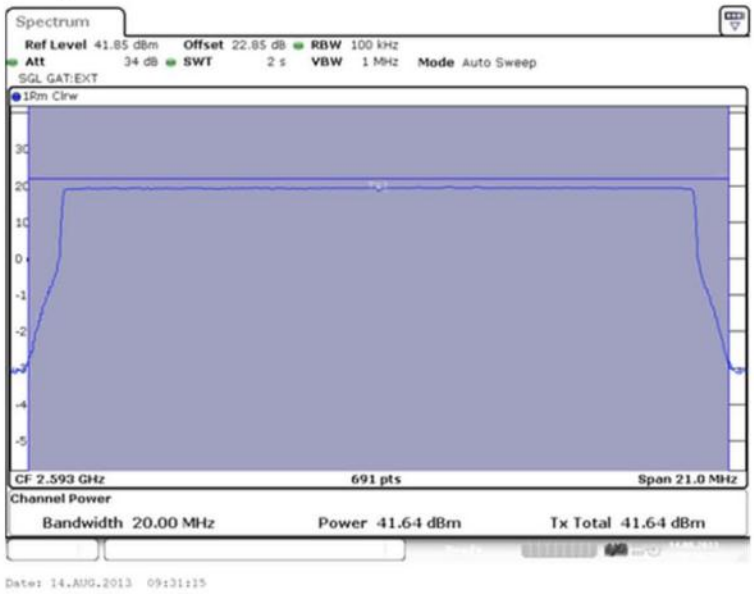

Figure 50 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)

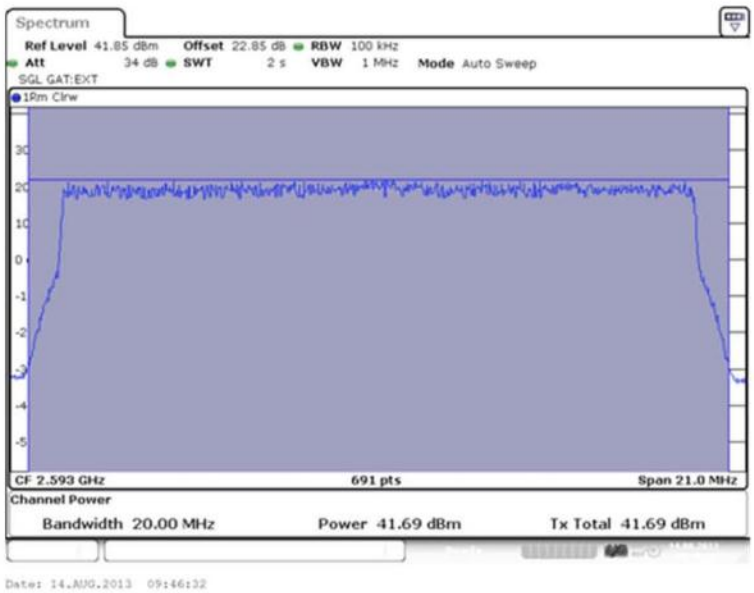

Figure 51 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)

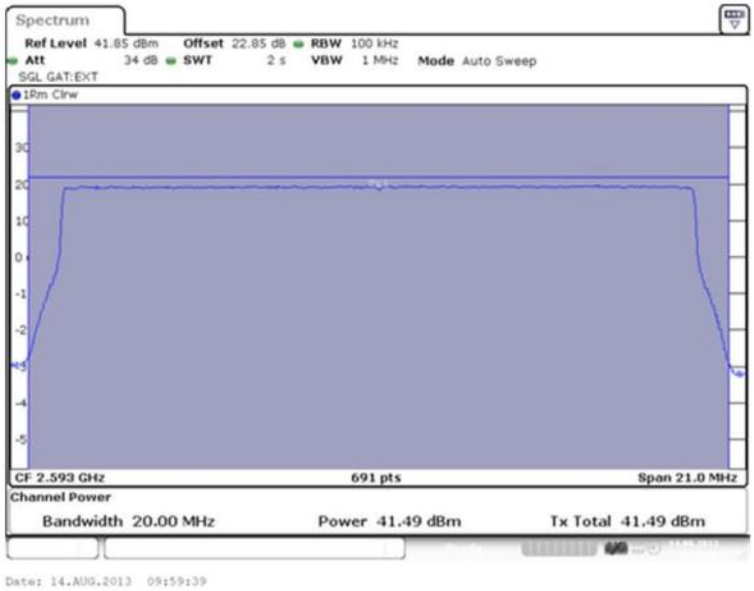

Figure 52 RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

5.2.2. Test No. 2: Modulation Characteristics

No additional measurements are required for the modulation characteristics. Please refer to test no. 3, occupied bandwidth on page 14.

Screenshots below shows information about the modulations I/Q constellation form and modulation information table, displaying error to ideal modulation symbols.

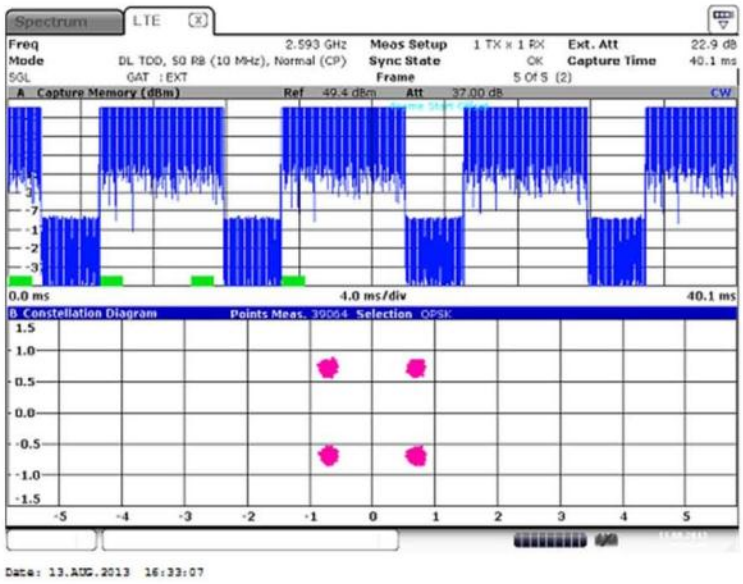

Figure 53 I/Q constellation diagram with capture buffer – QPSK (2593.0 MHz) (10MHz Channel BW)

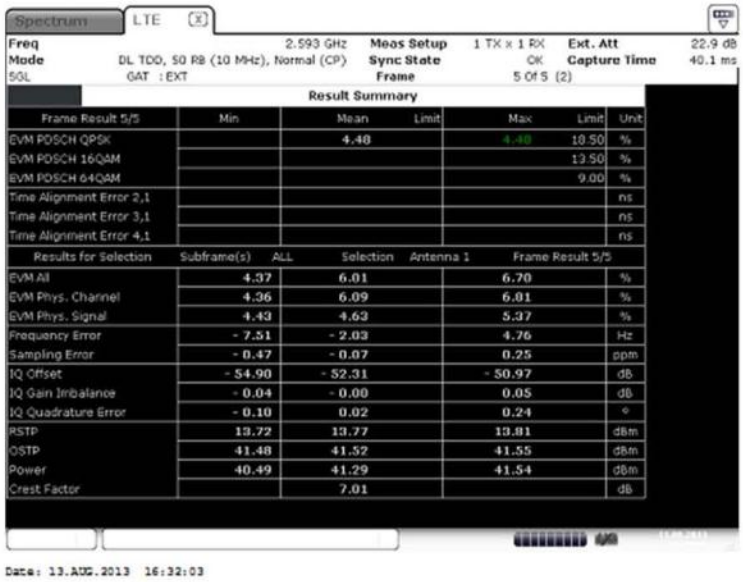

Figure 54 I/Q constellation table with I/Q error – QPSK (2593.0 MHz) (10MHz Channel BW)

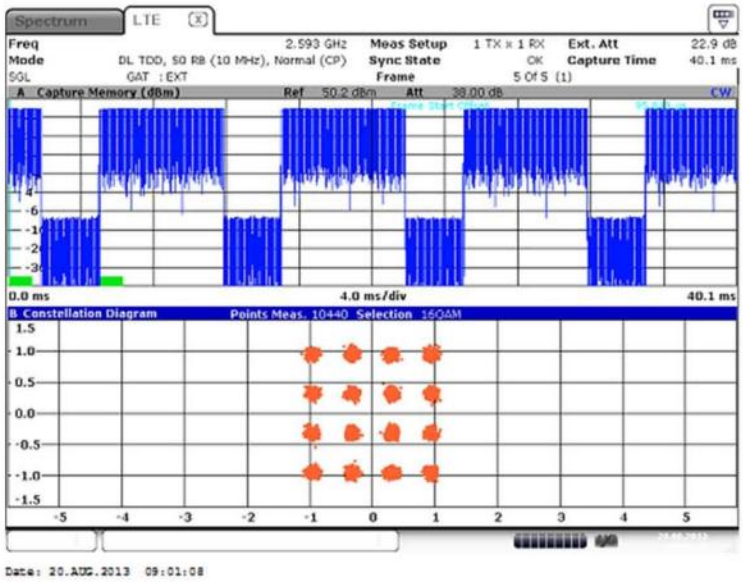

Figure 55 I/Q constellation diagram with capture buffer – 16QAM (2593.0 MHz) (10MHz Channel BW)

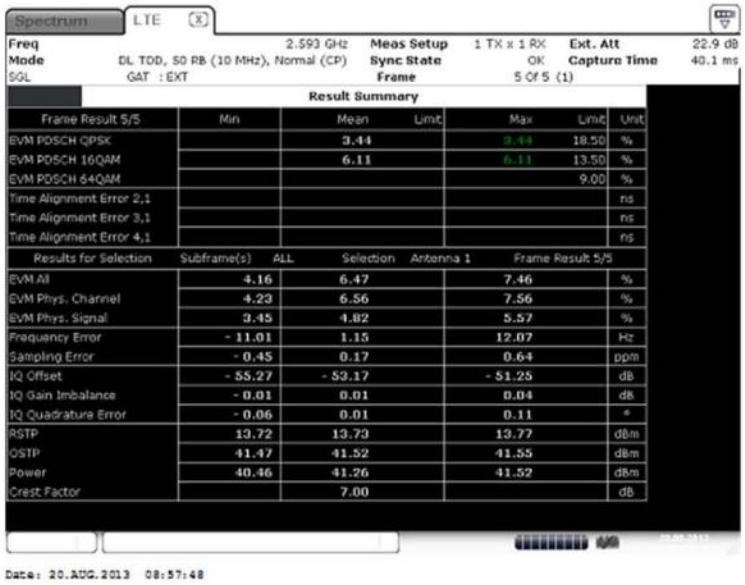

Figure 56 I/Q constellation table with I/Q error – 16QAM (2593.0 MHz) (10MHz Channel BW)

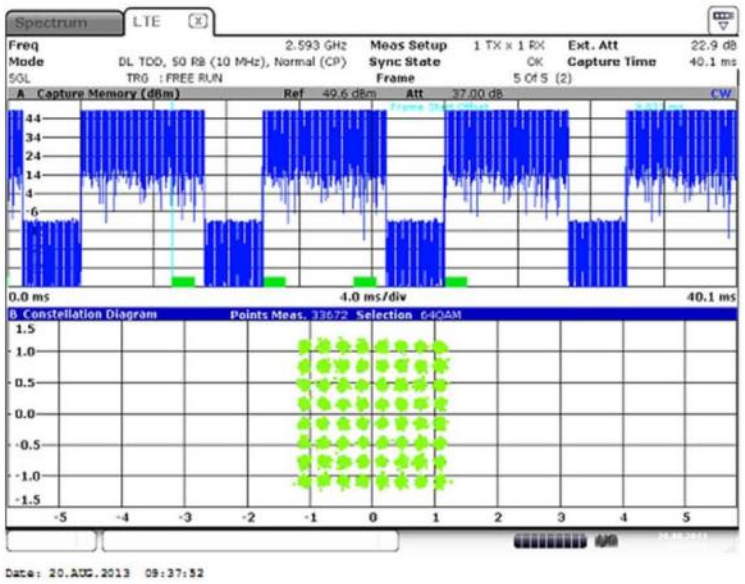

Figure 57 I/Q constellation diagram with capture buffer – 64QAM (2593.0 MHz) (10MHz Channel BW)

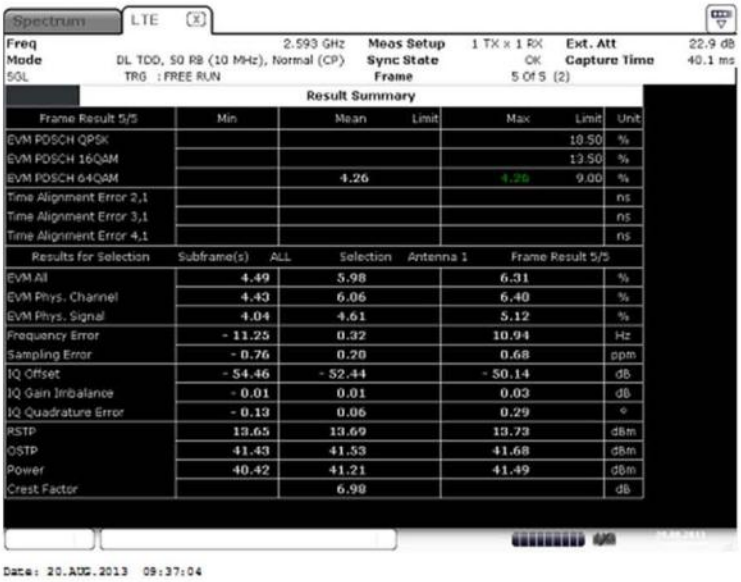

Figure 58 I/Q constellation table with I/Q error – 64QAM (2593.0 MHz) (10MHz Channel BW)

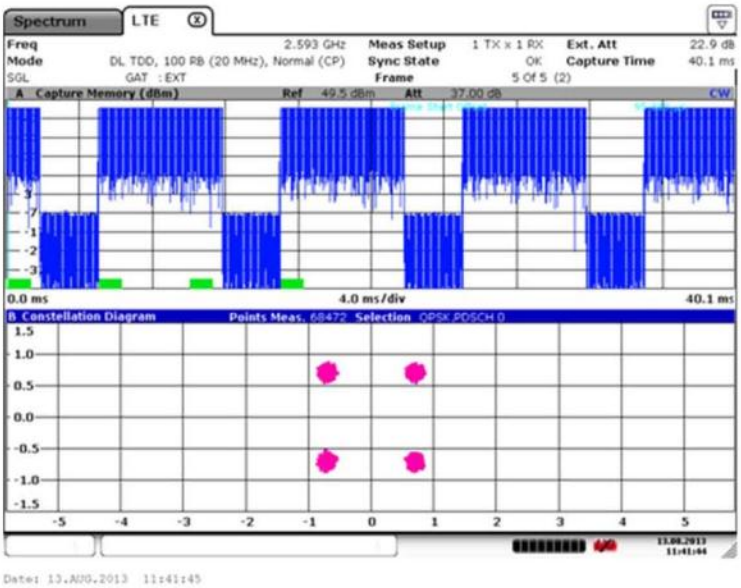

Figure 59 I/Q constellation diagram with capture buffer – QPSK (2593.0 MHz) (20MHz Channel BW)

Figure 60 I/Q constellation table with I/Q error – QPSK (2593.0 MHz) (20MHz Channel BW)

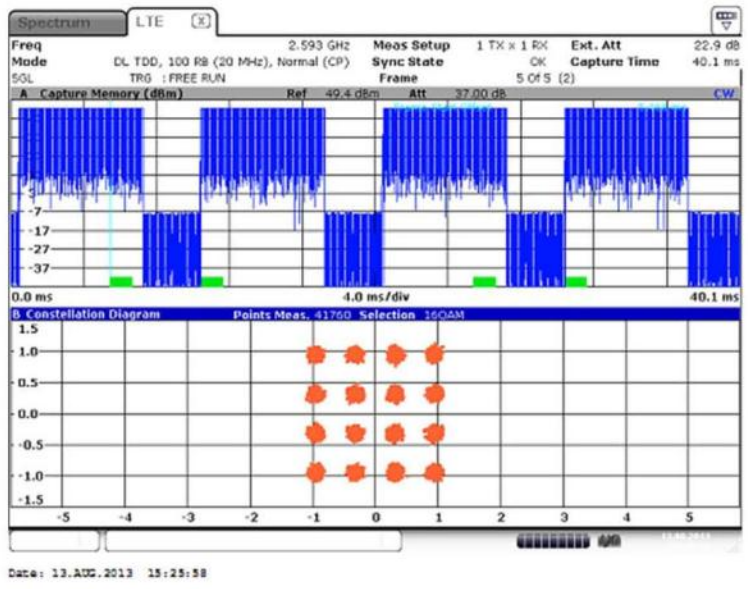

Figure 61 I/Q constellation diagram with capture buffer – 16QAM (2593.0 MHz) (20MHz Channel BW)

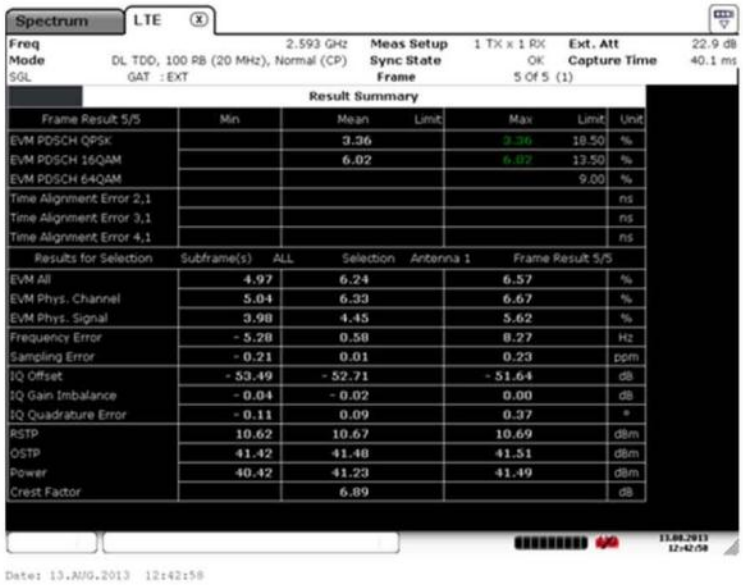

Figure 62 I/Q constellation table with I/Q error – 16QAM (2593.0 MHz) (20MHz Channel BW)

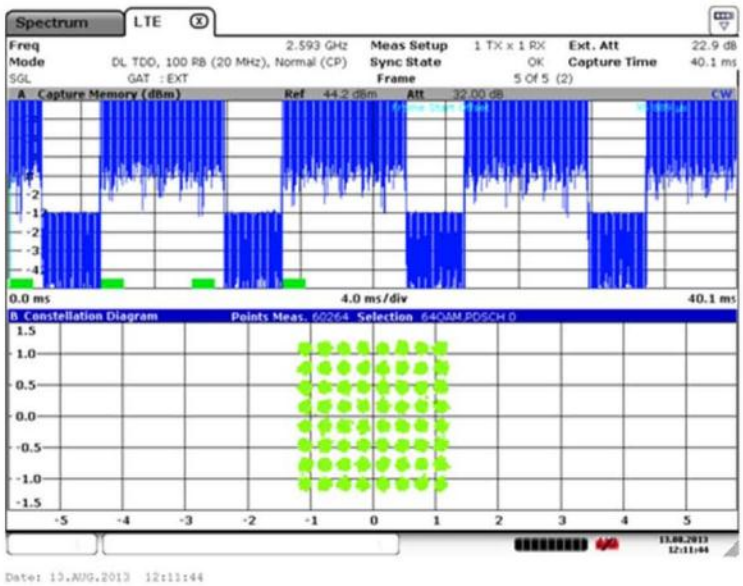

Figure 63 I/Q constellation diagram with capture buffer – 64QAM (2593.0 MHz) (20MHz Channel BW)

Figure 64 I/Q constellation table with I/Q error – 64QAM (2593.0 MHz) (20MHz Channel BW)

Test No. 3: Occupied Bandwidth

The value 'Occ Bw' is the measured occupied bandwidth.

Config A ANT1:

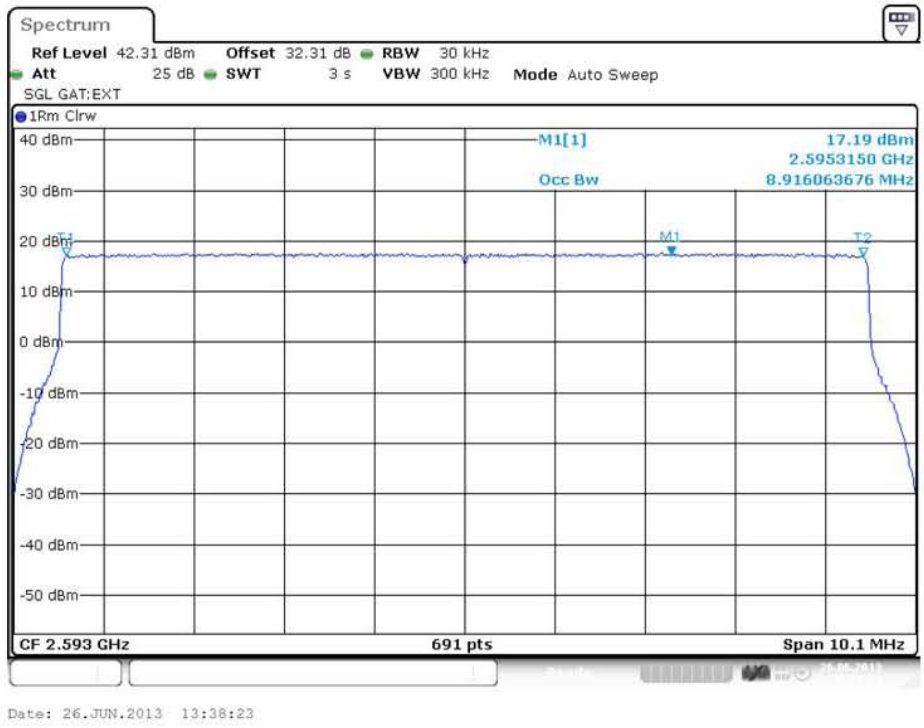

Figure 65 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

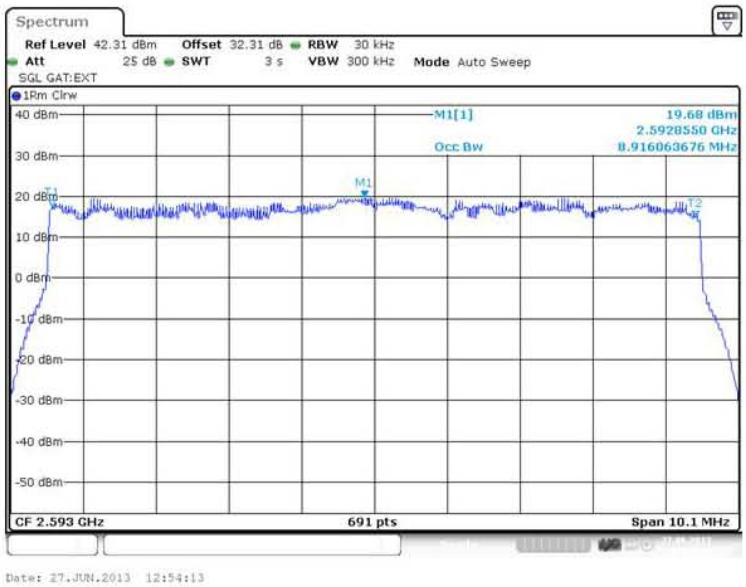

Figure 66 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)

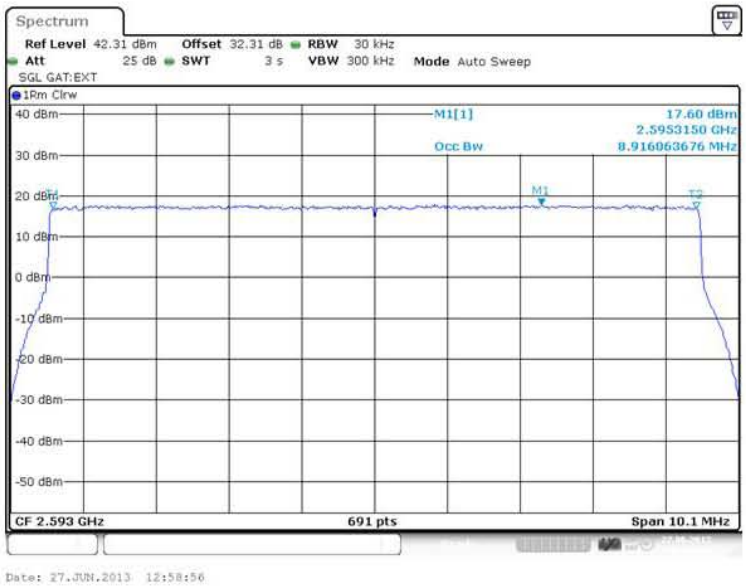

Figure 67 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT2:

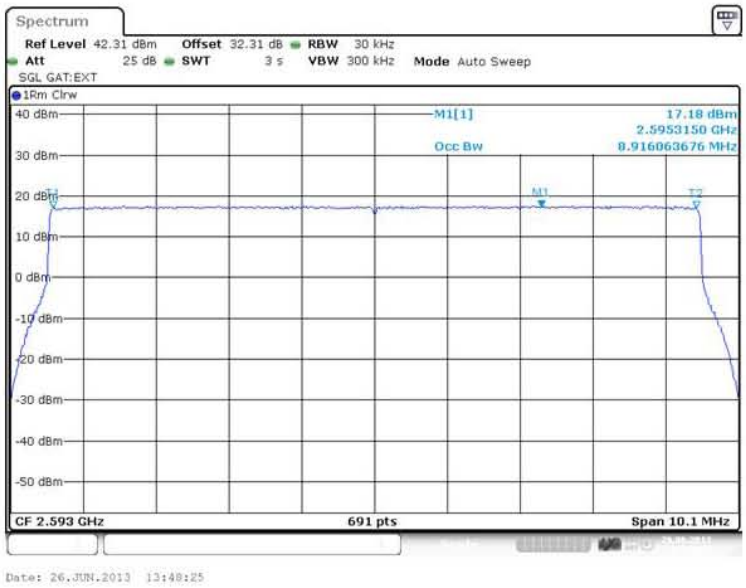

Figure 68 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

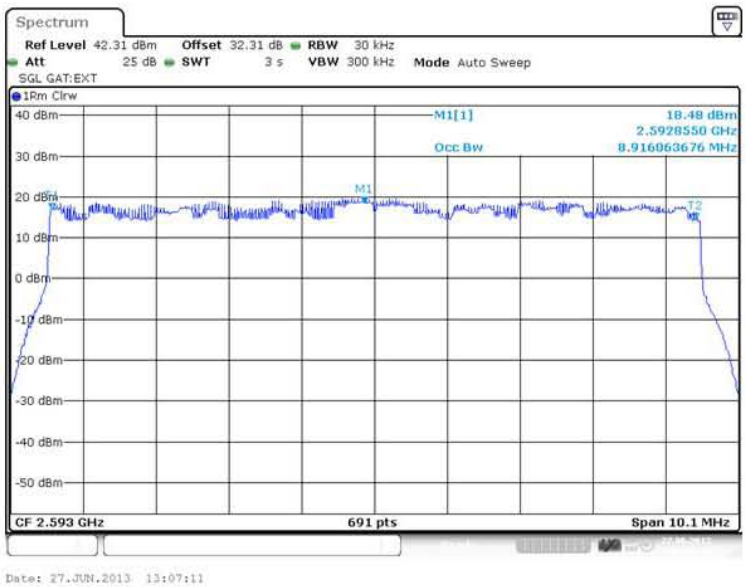

Figure 69 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)

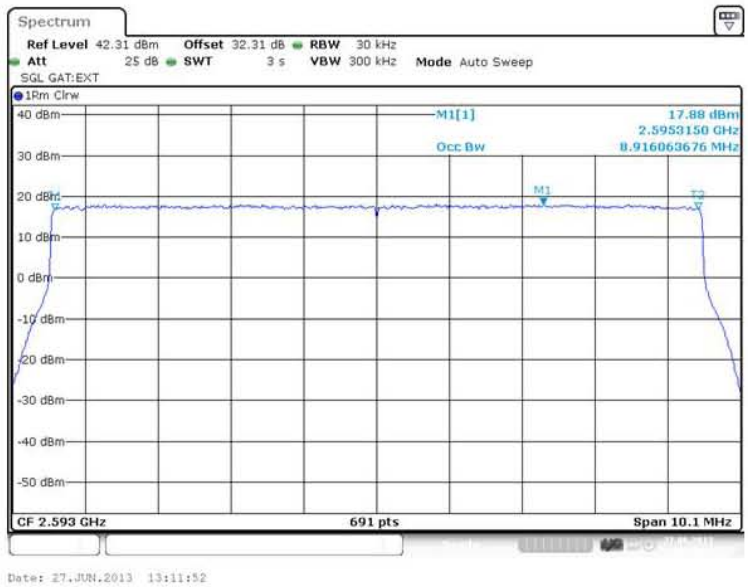

Figure 70 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT3:

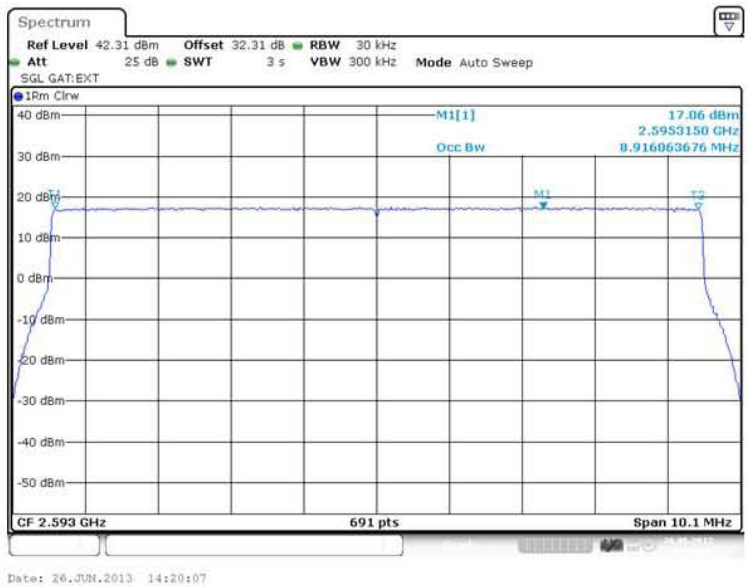

Figure 71 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

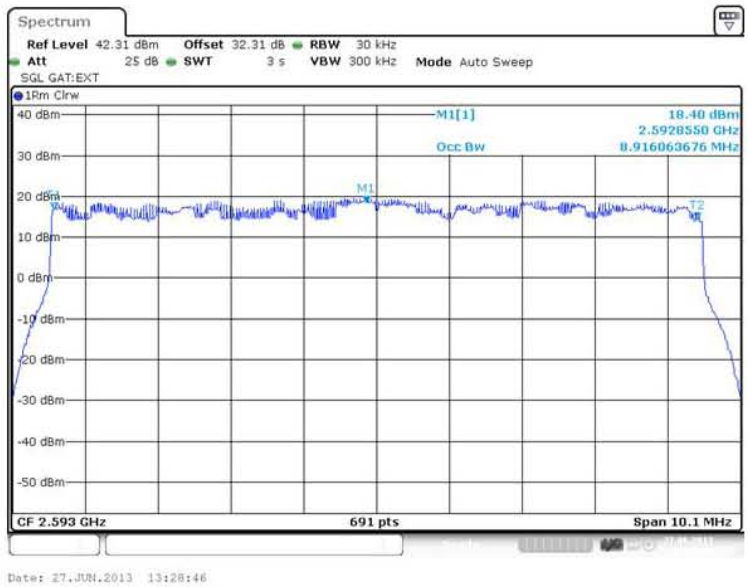

Figure 72 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)

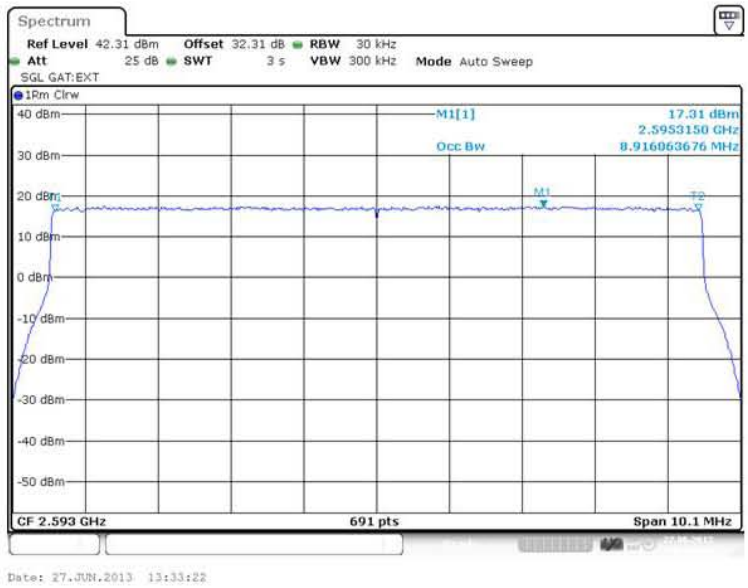

Figure 73 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT4:

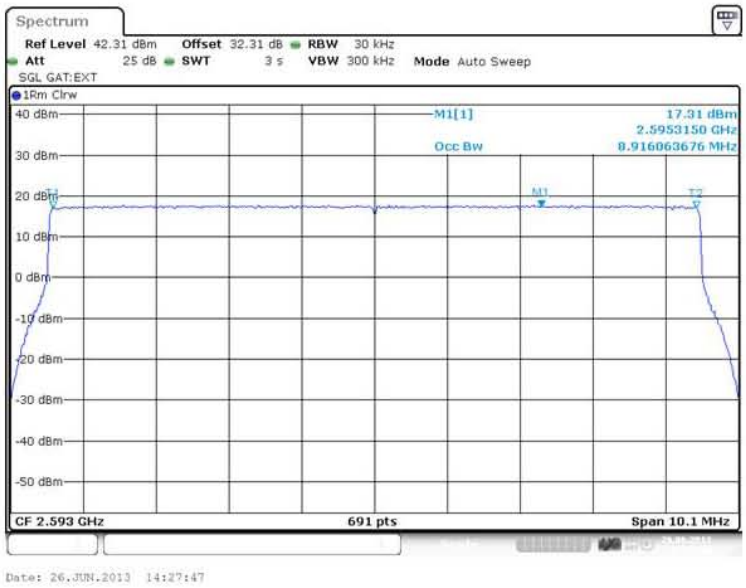

Figure 74 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

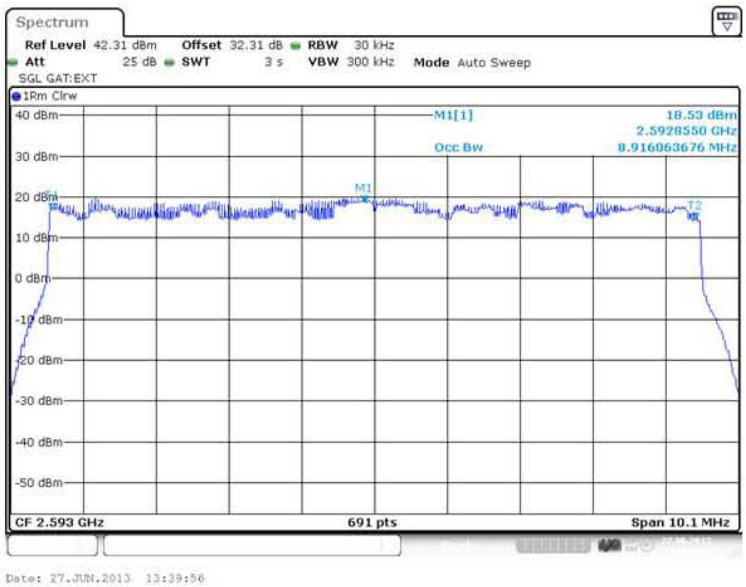

Figure 75 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)

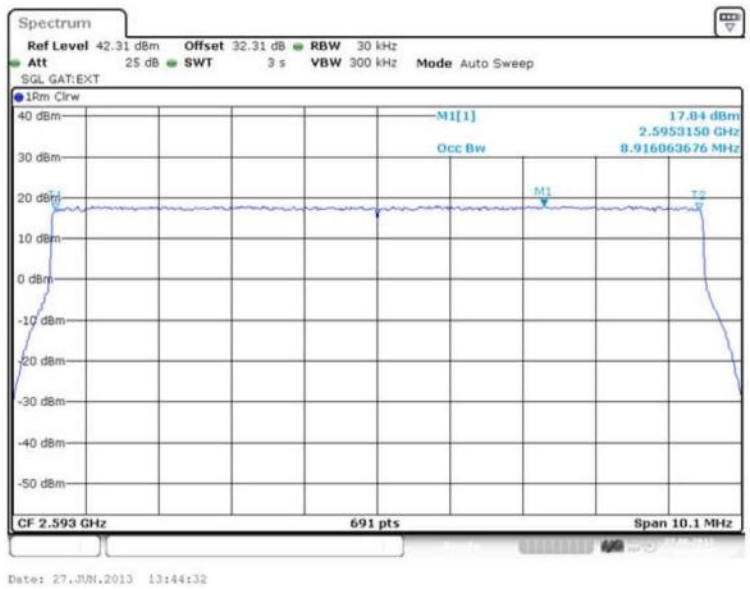

Figure 76 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT5:

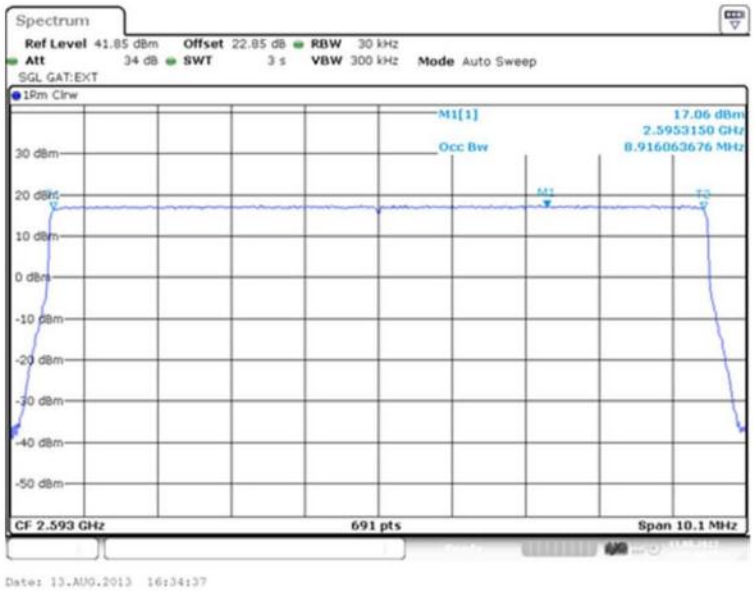

Figure 77 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

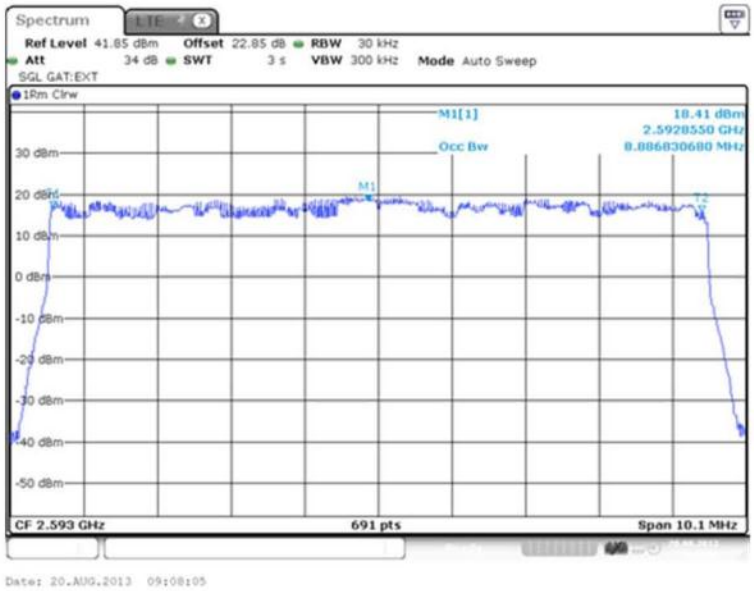

Figure 78 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)

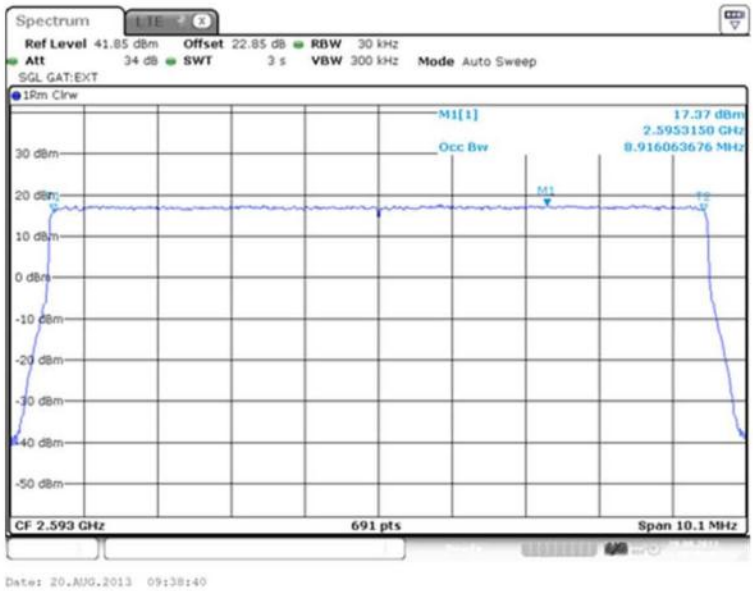

Figure 79 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT6:

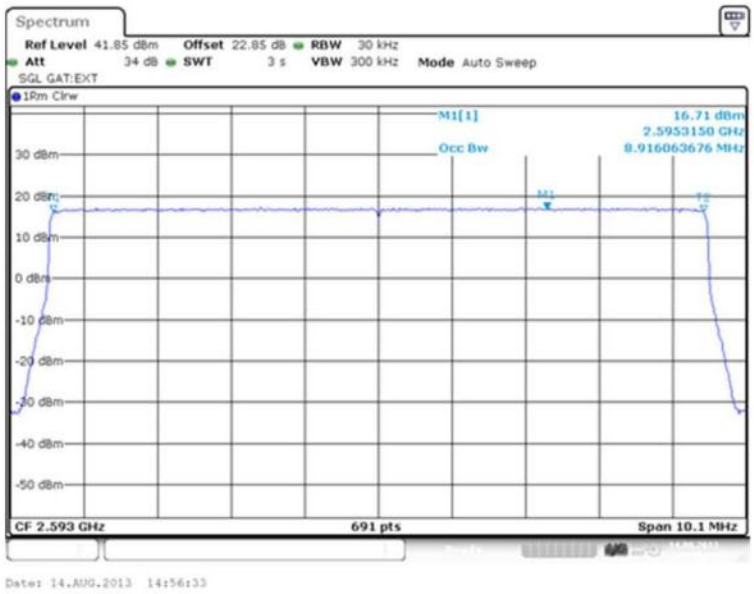

Figure 80 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

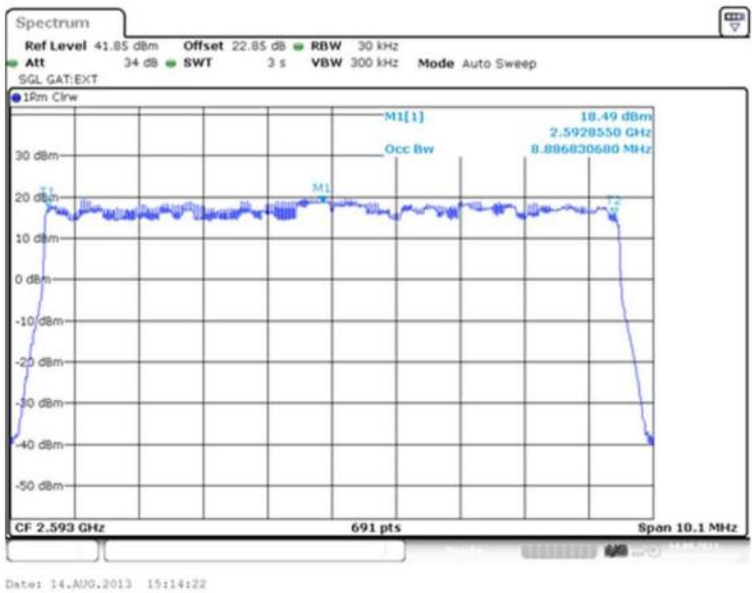

Figure 81 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)

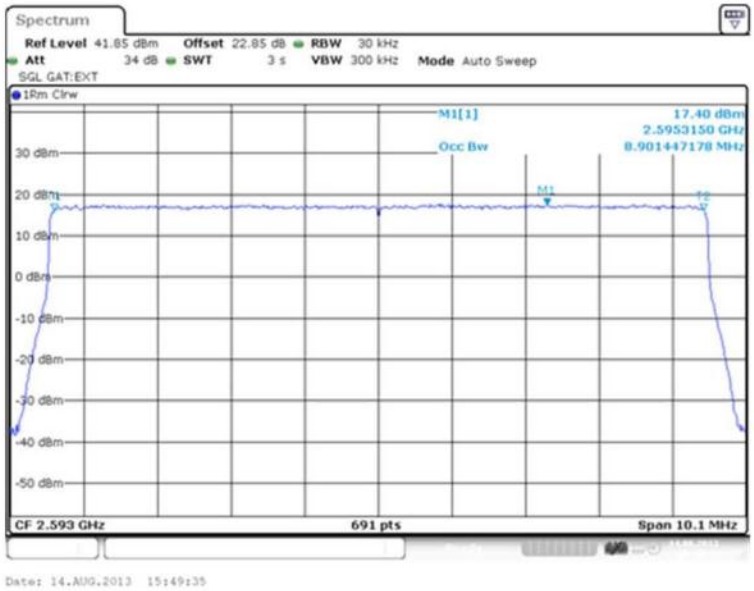

Figure 82 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT7:

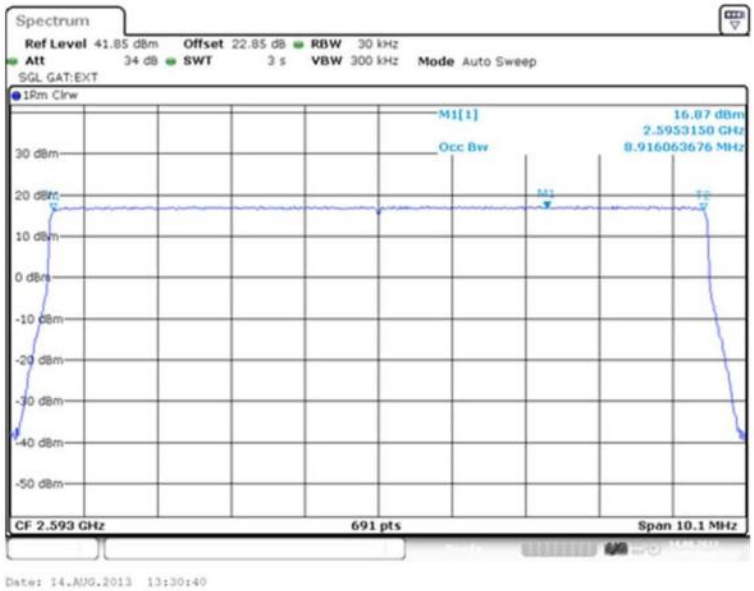

Figure 83 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

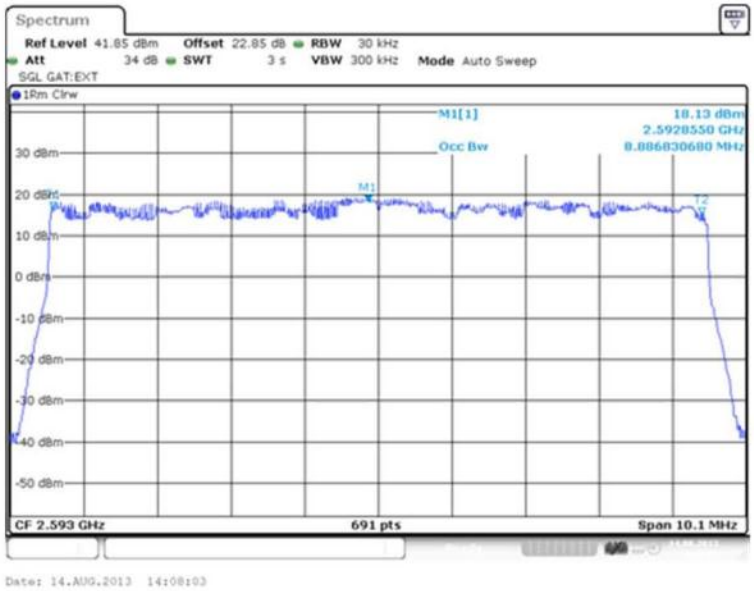

Figure 84 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)

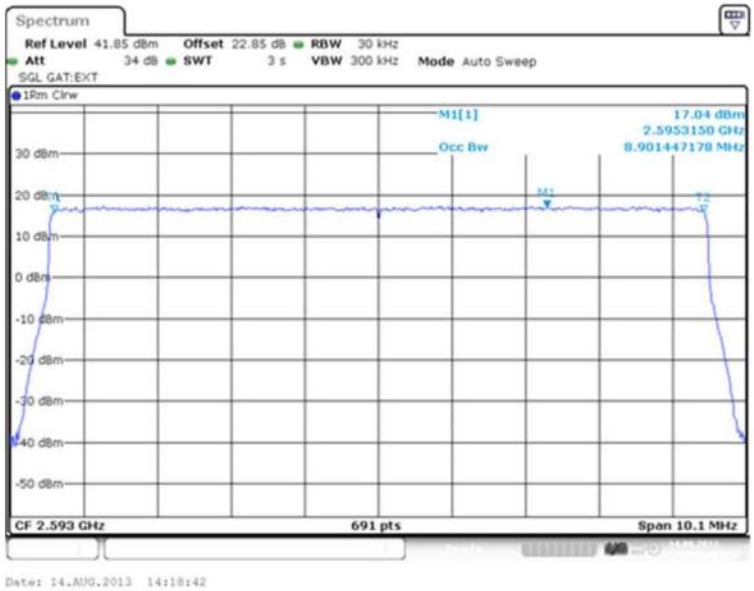

Figure 85 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT8:

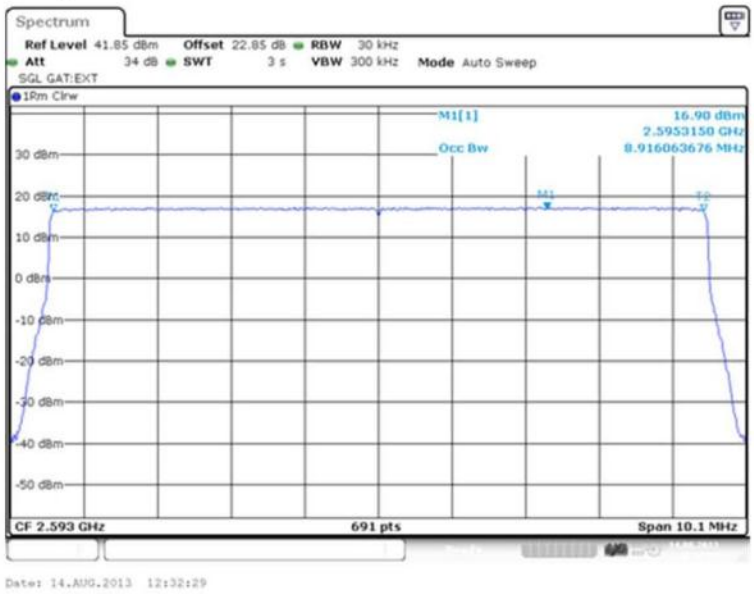

Figure 86 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

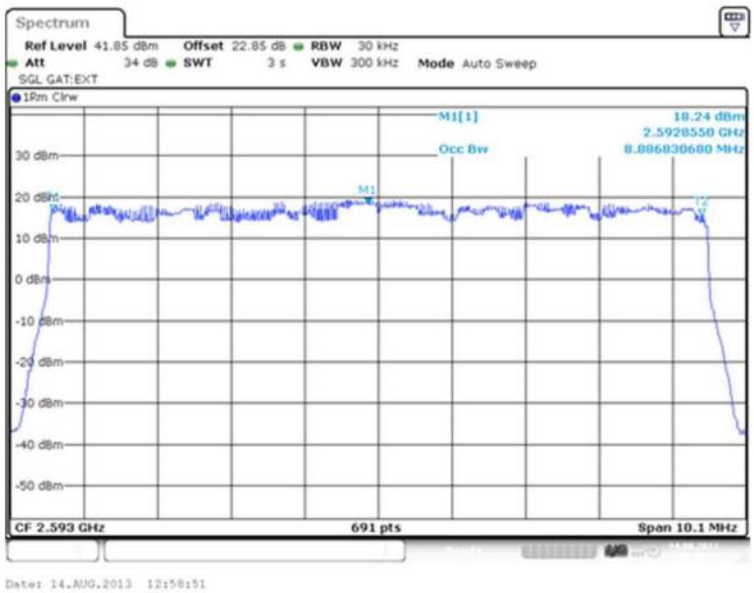

Figure 87 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)

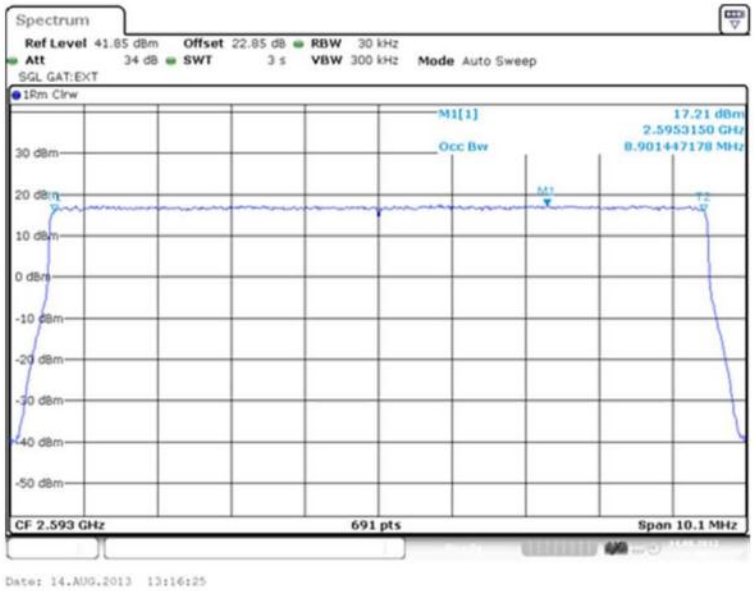

Figure 88 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config B ANT1:

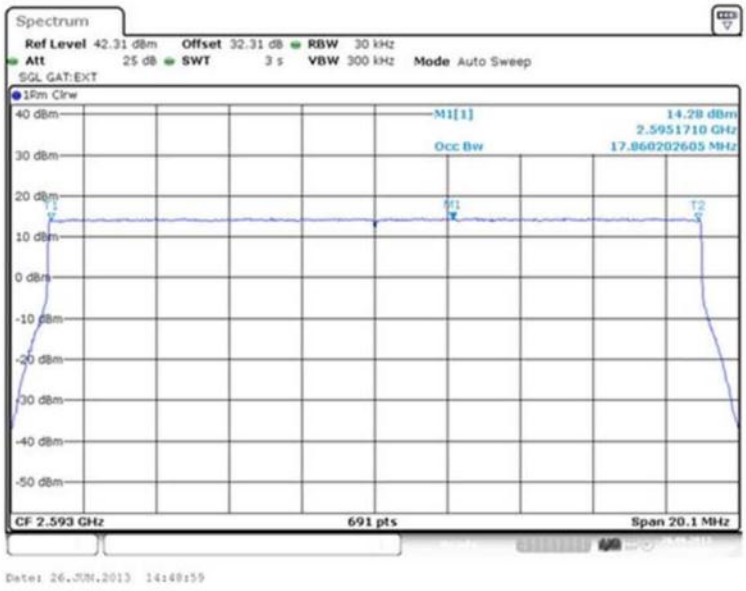

Figure 89 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)

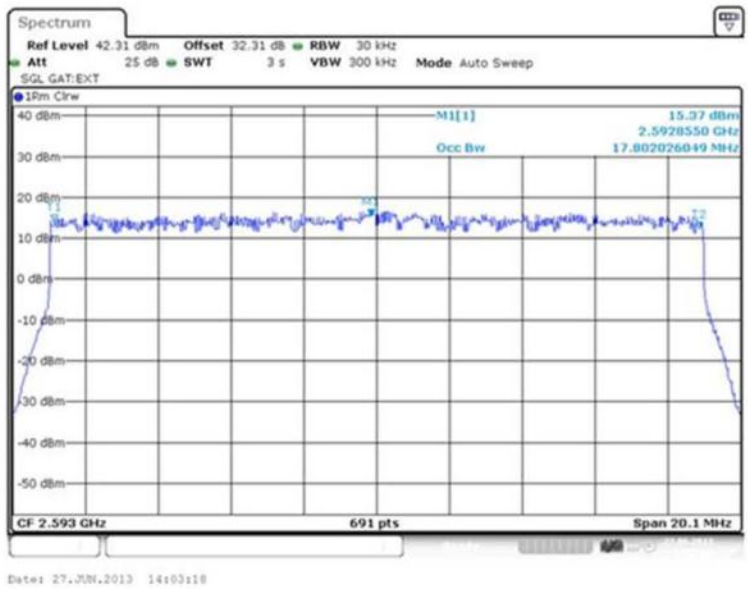

Figure 90 Occupied Bandwidth – 16QAM (2593.0 MHz) (20MHz Channel BW)

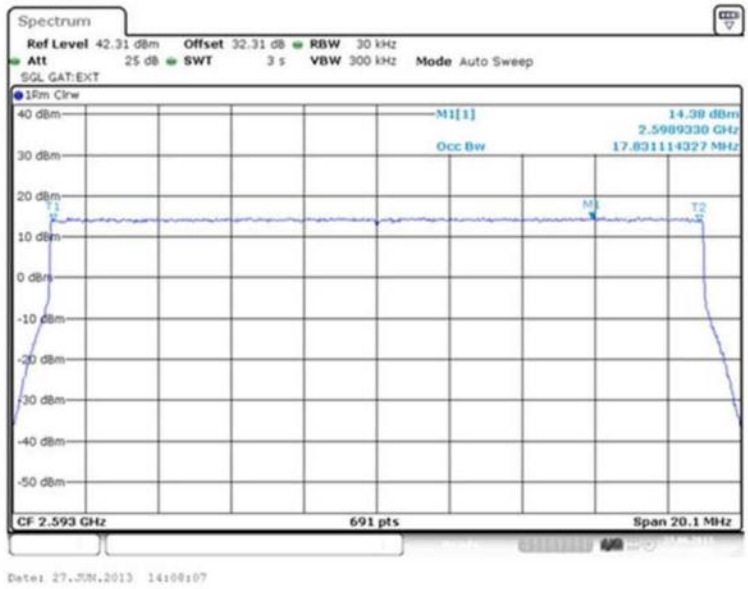

Figure 91 Occupied Bandwidth – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT2:

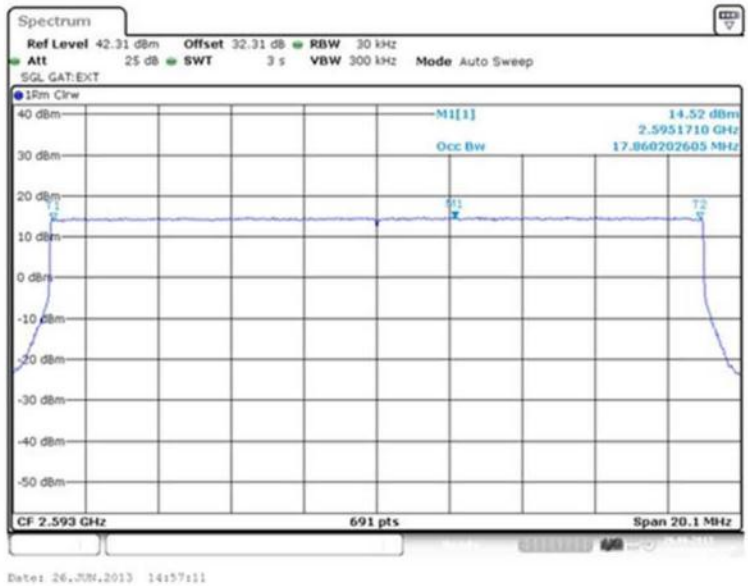

Figure 92 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)

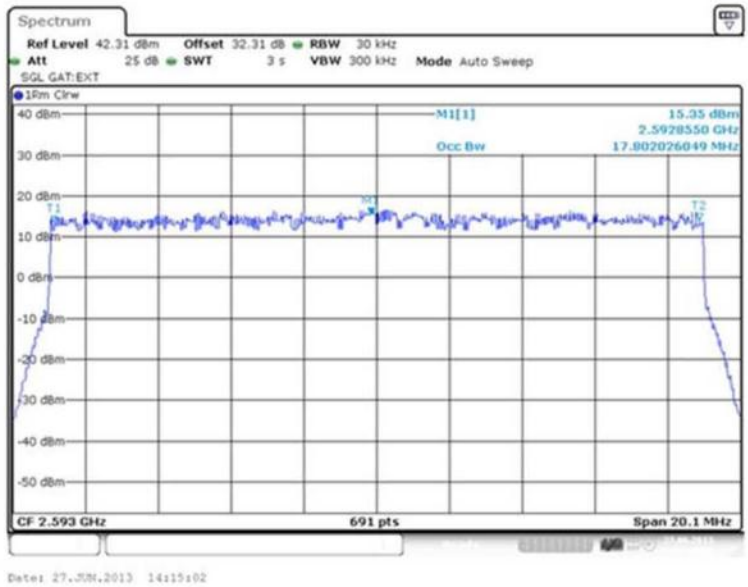

Figure 93 Occupied Bandwidth – 16QAM (2593.0 MHz) (20MHz Channel BW)

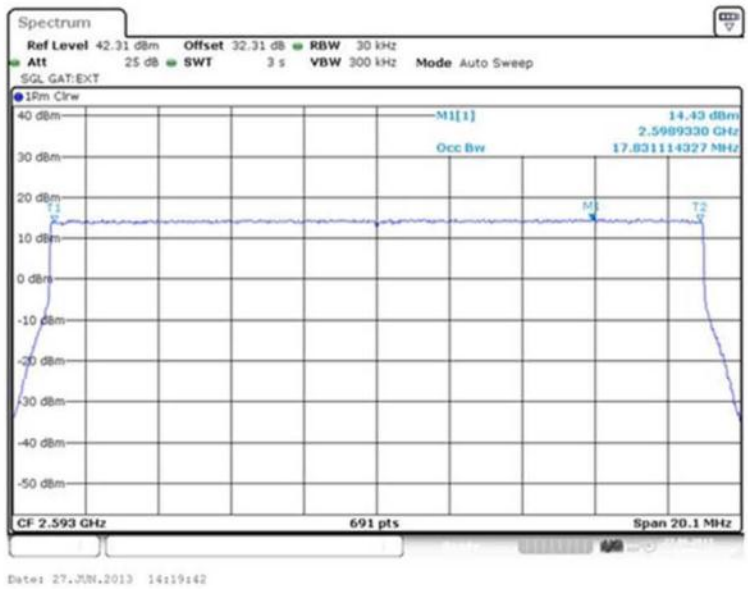

Figure 94 Occupied Bandwidth – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT3:

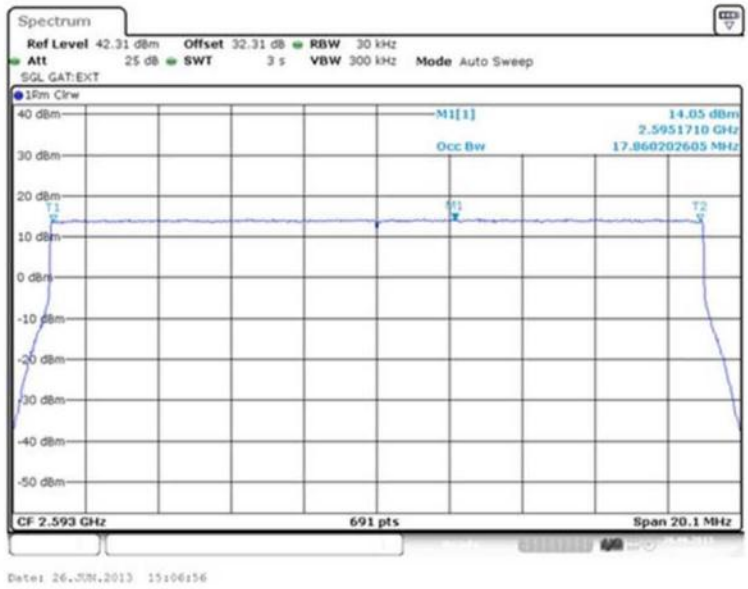

Figure 95 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)

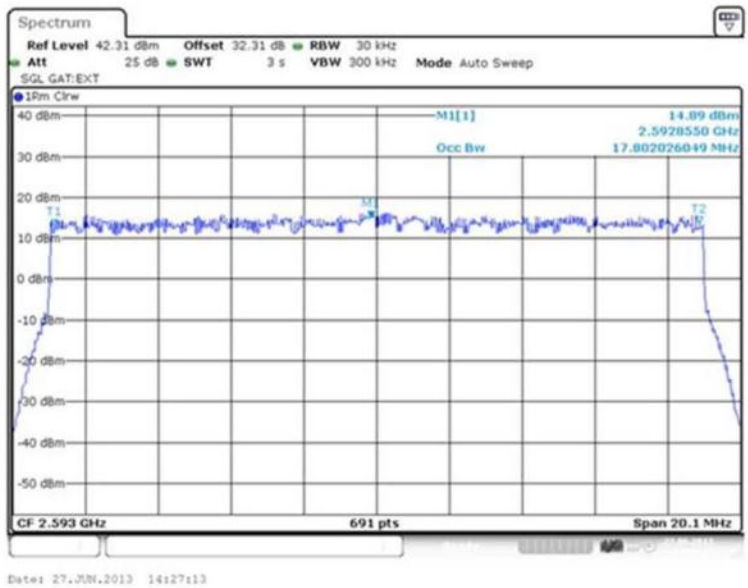

Figure 96 Occupied Bandwidth – 16QAM (2593.0 MHz) (20MHz Channel BW)

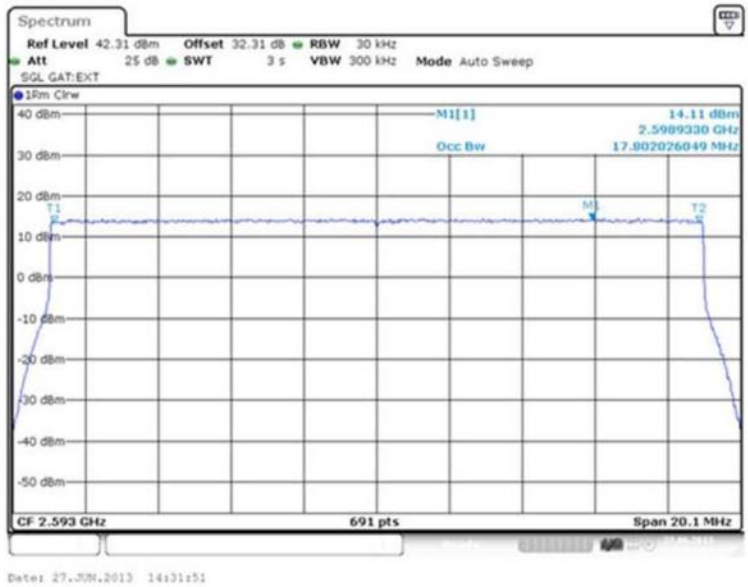

Figure 97 Occupied Bandwidth – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT4:

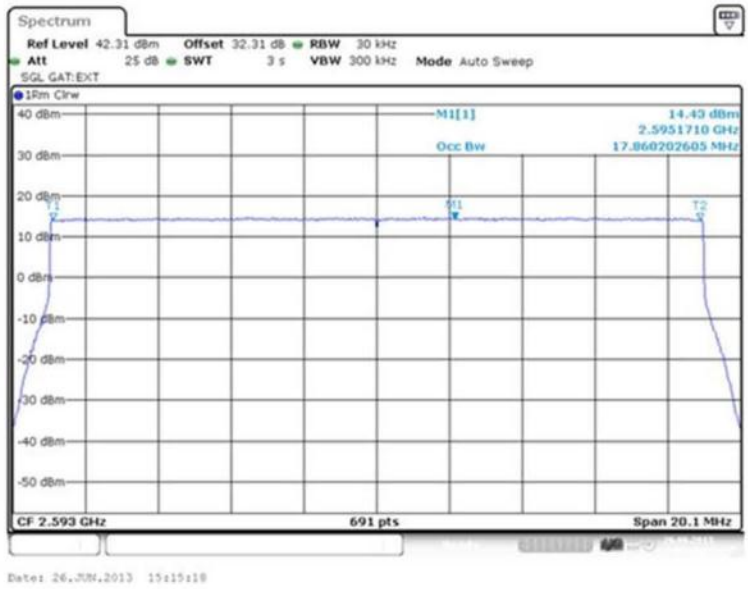

Figure 98 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)

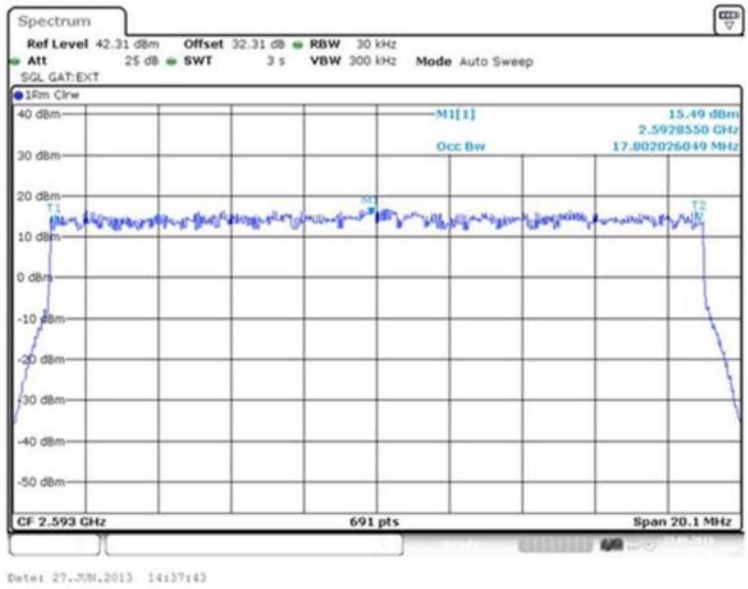

Figure 99 Occupied Bandwidth – 16QAM (2593.0 MHz) (20MHz Channel BW)

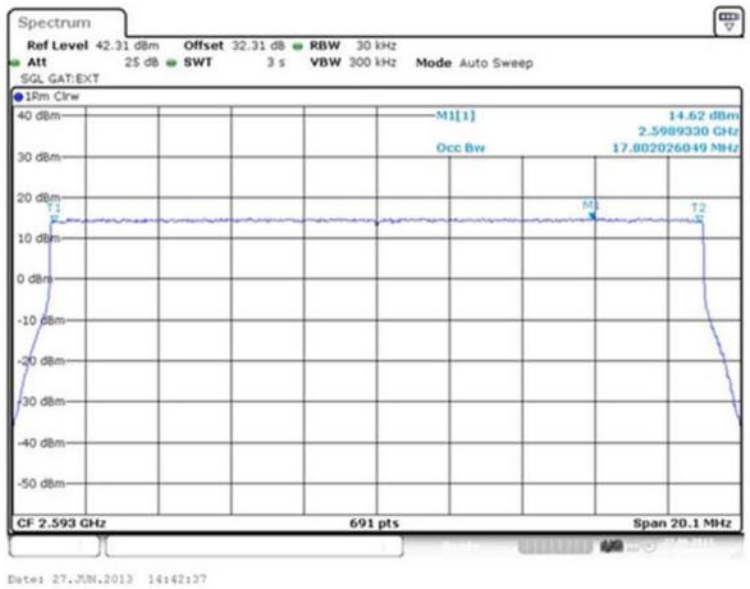

Figure 100 Occupied Bandwidth – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT5:

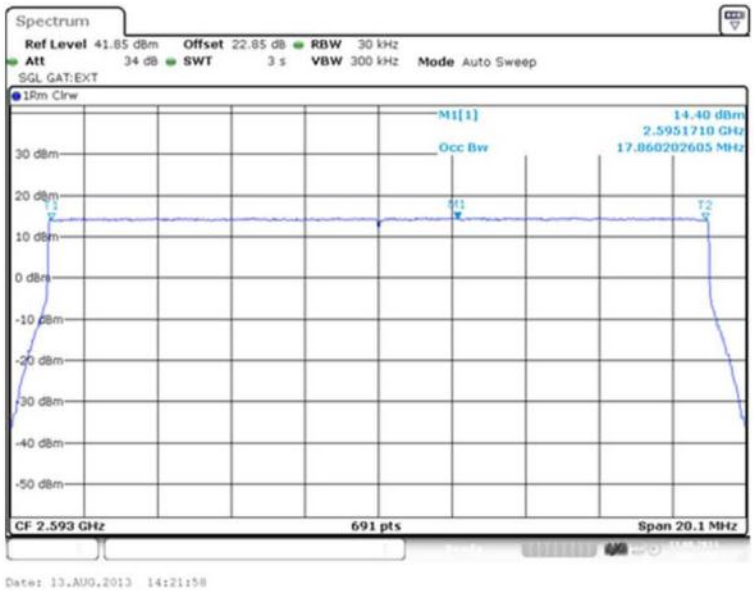

Figure 101 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)

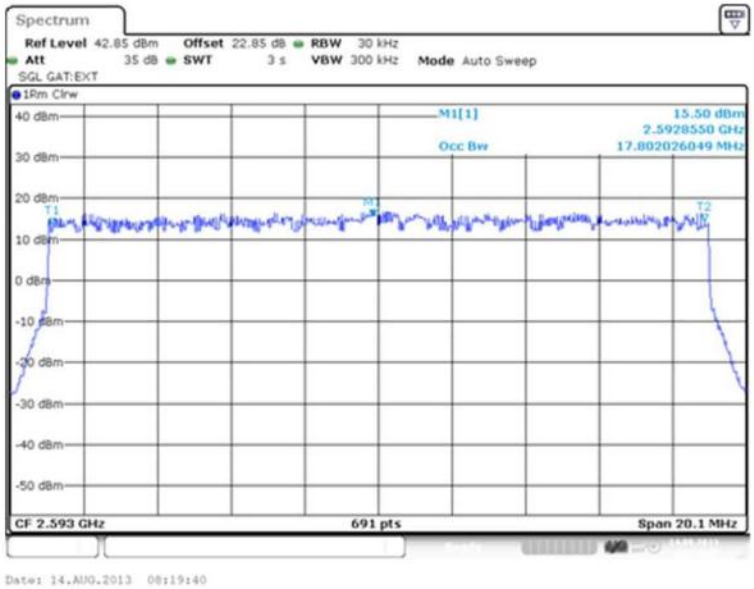

Figure 102 Occupied Bandwidth – 16QAM (2593.0 MHz) (20MHz Channel BW)

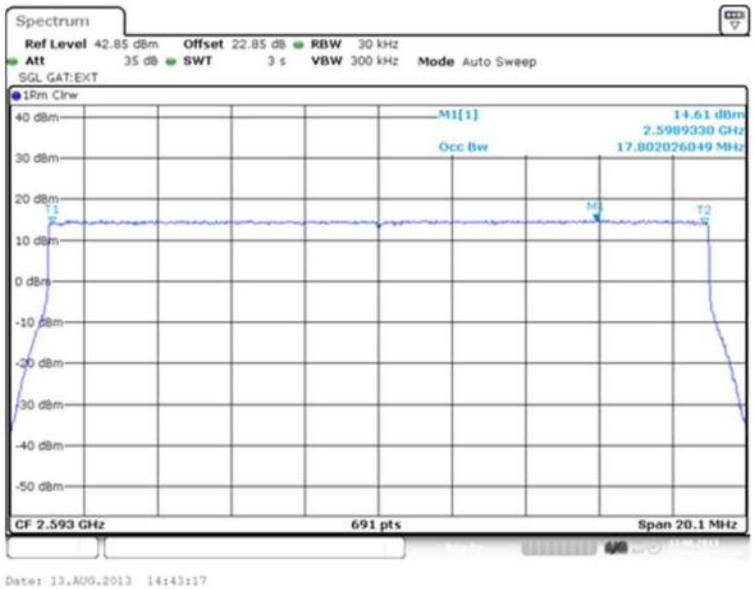

Figure 103 Occupied Bandwidth – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT6:

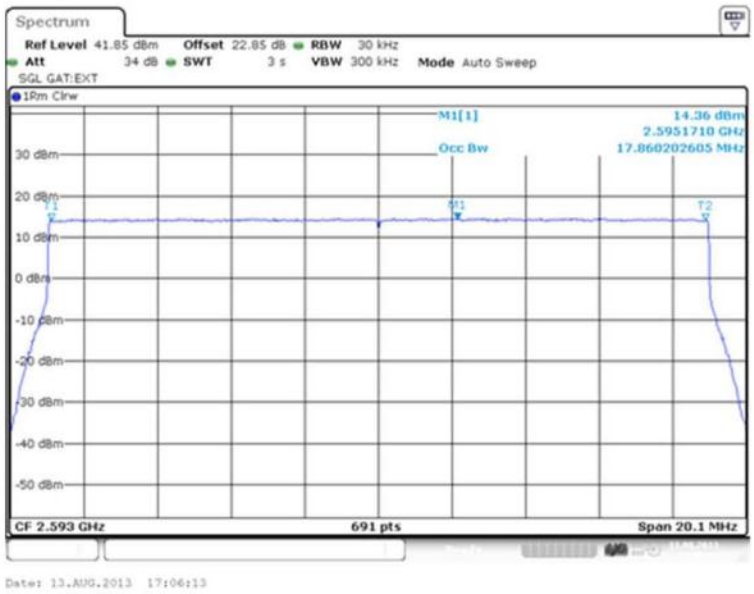

Figure 104 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)

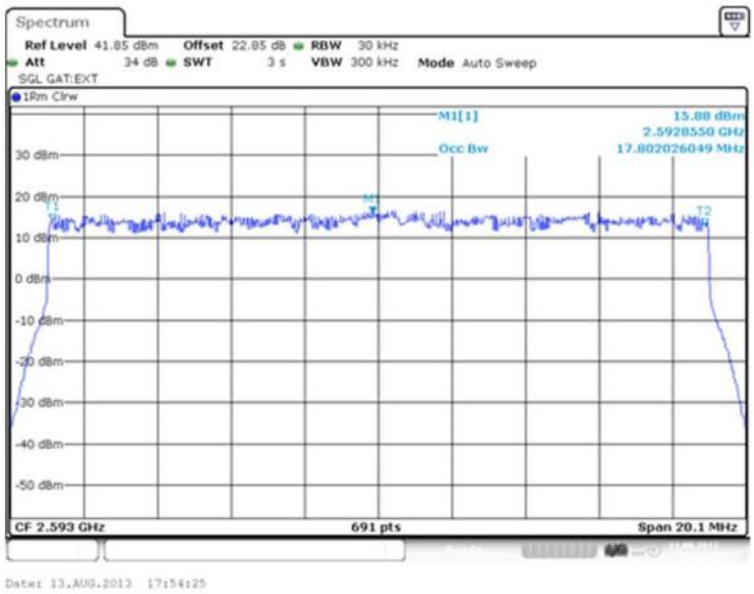

Figure 105 Occupied Bandwidth – 16QAM (2593.0 MHz) (20MHz Channel BW)

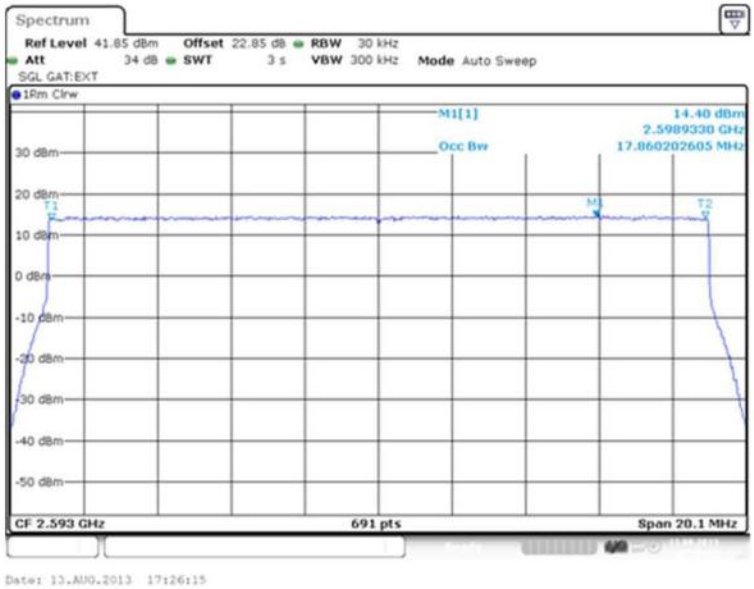

Figure 106 Occupied Bandwidth – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT7:

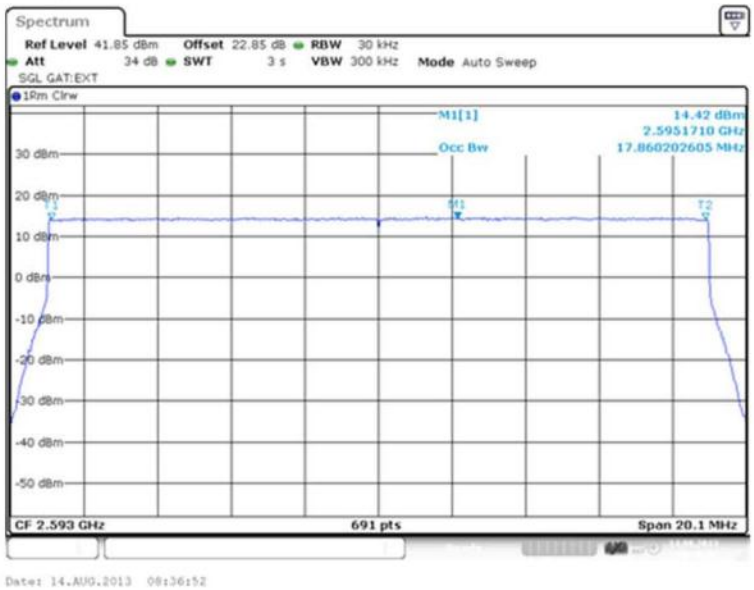

Figure 107 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)