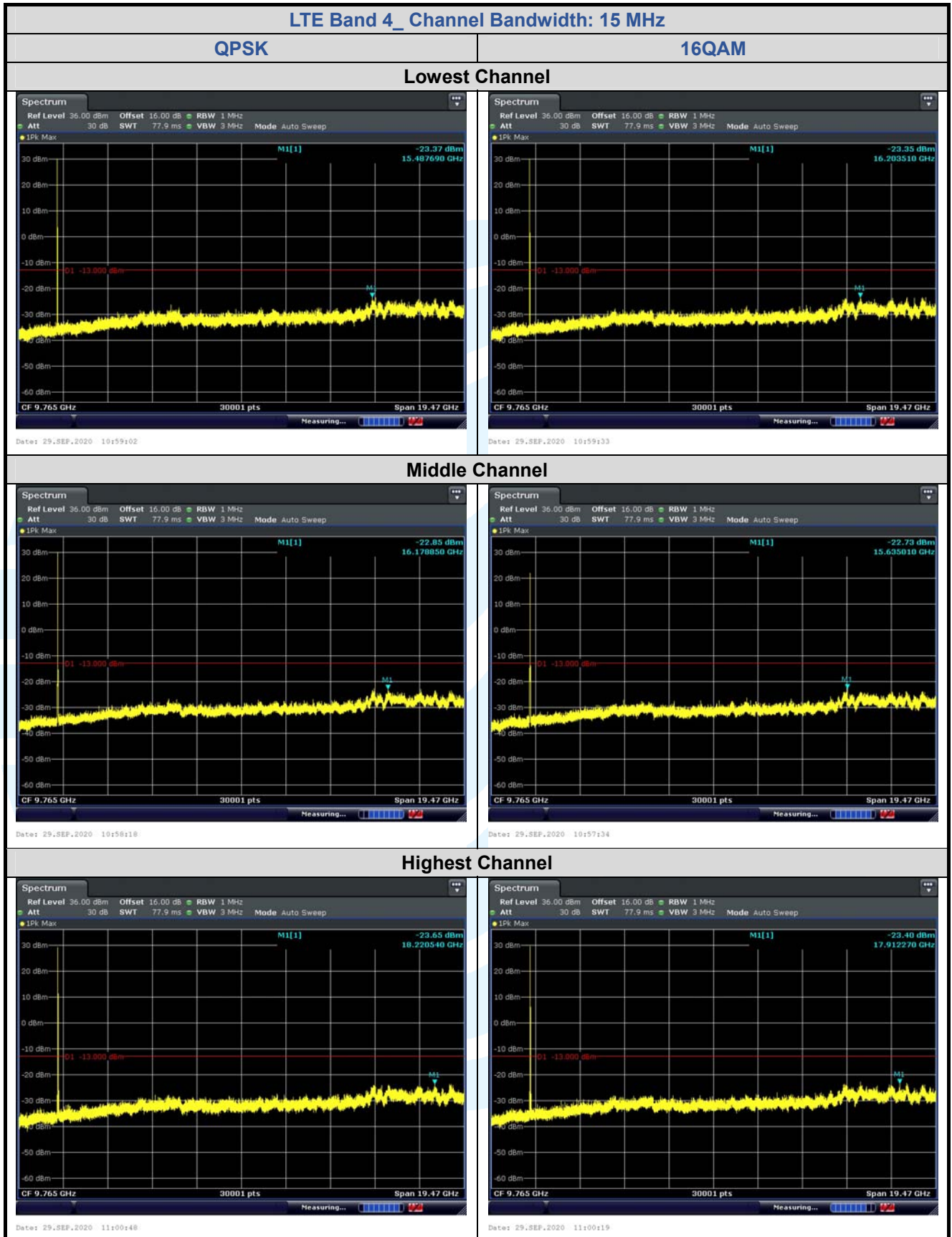
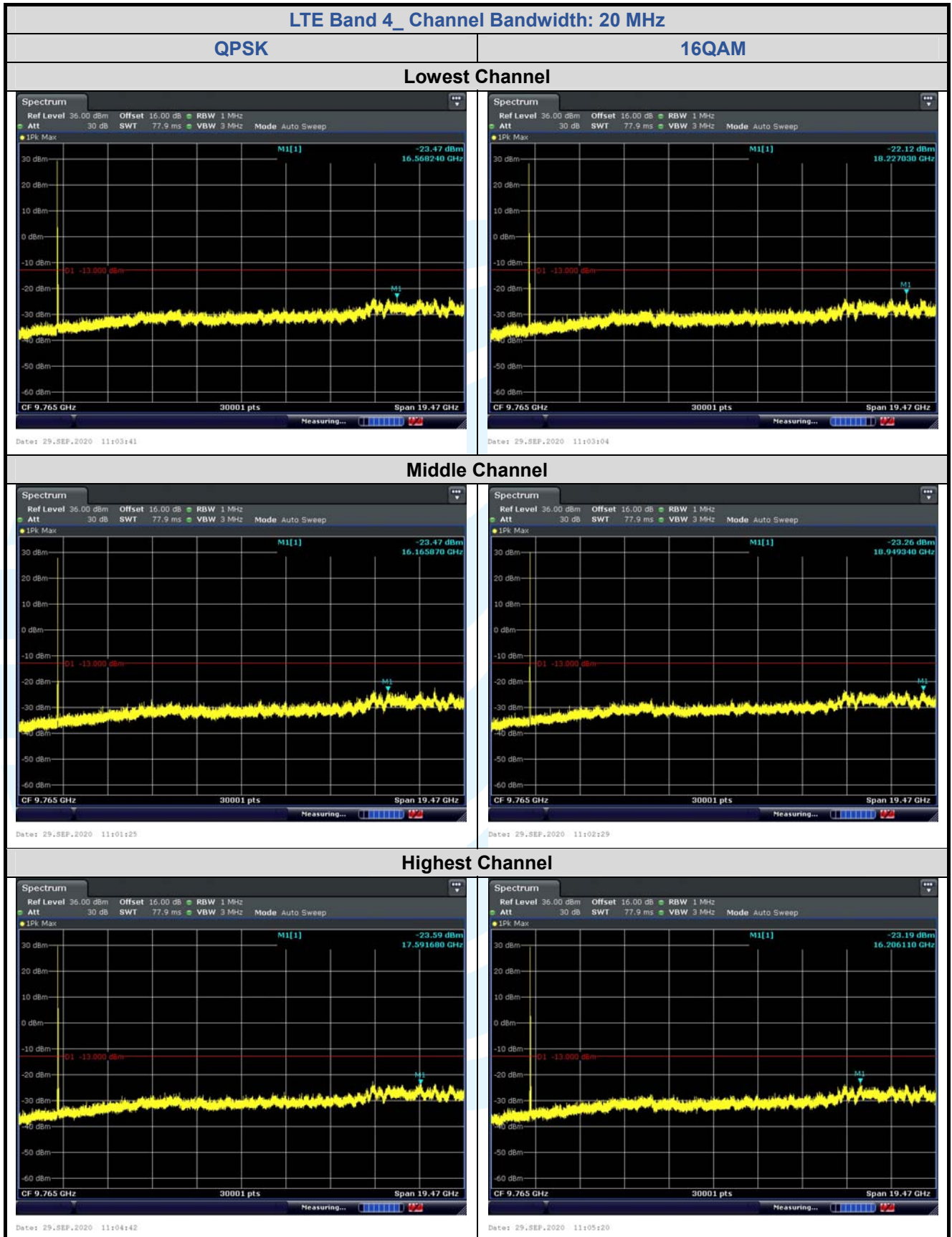
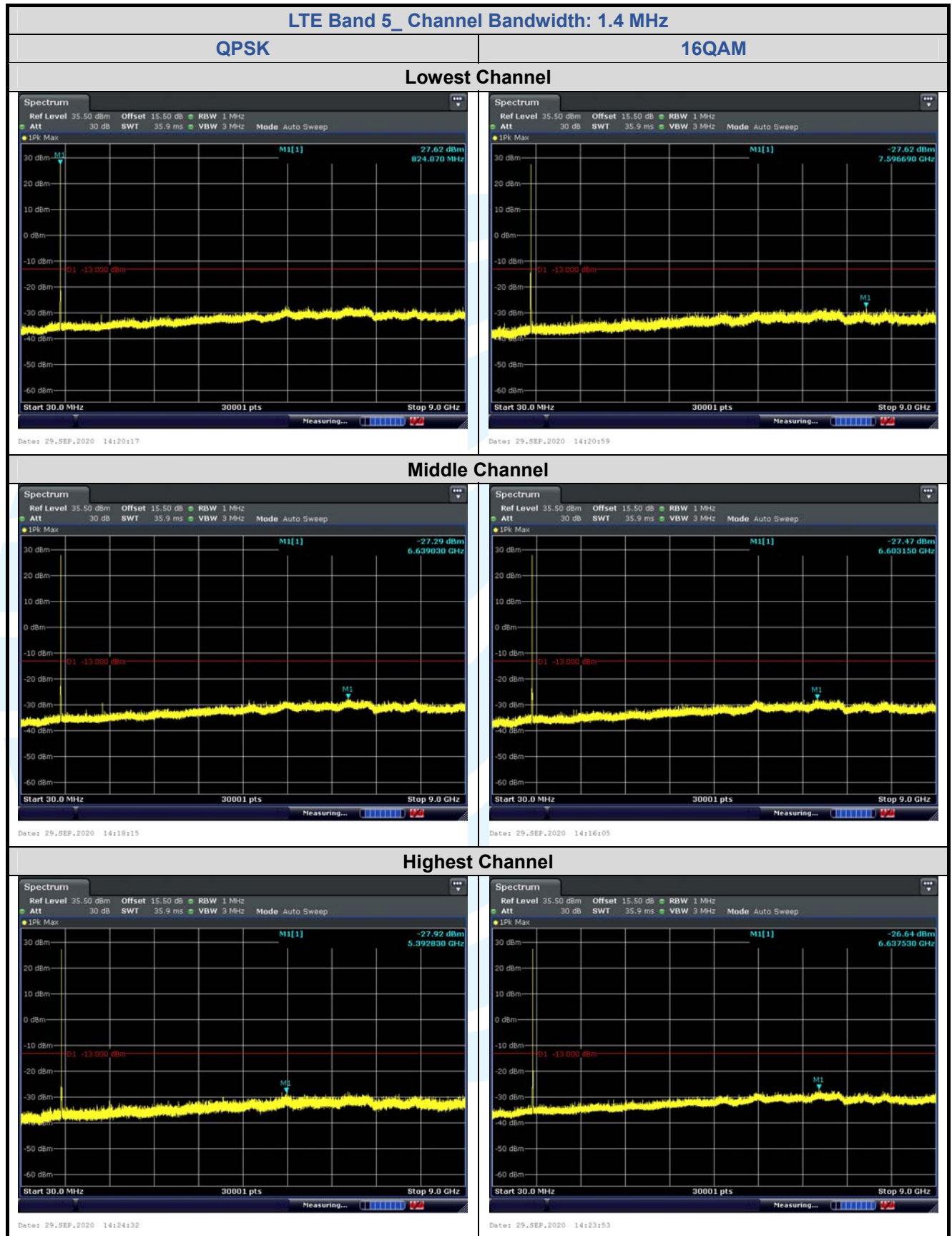
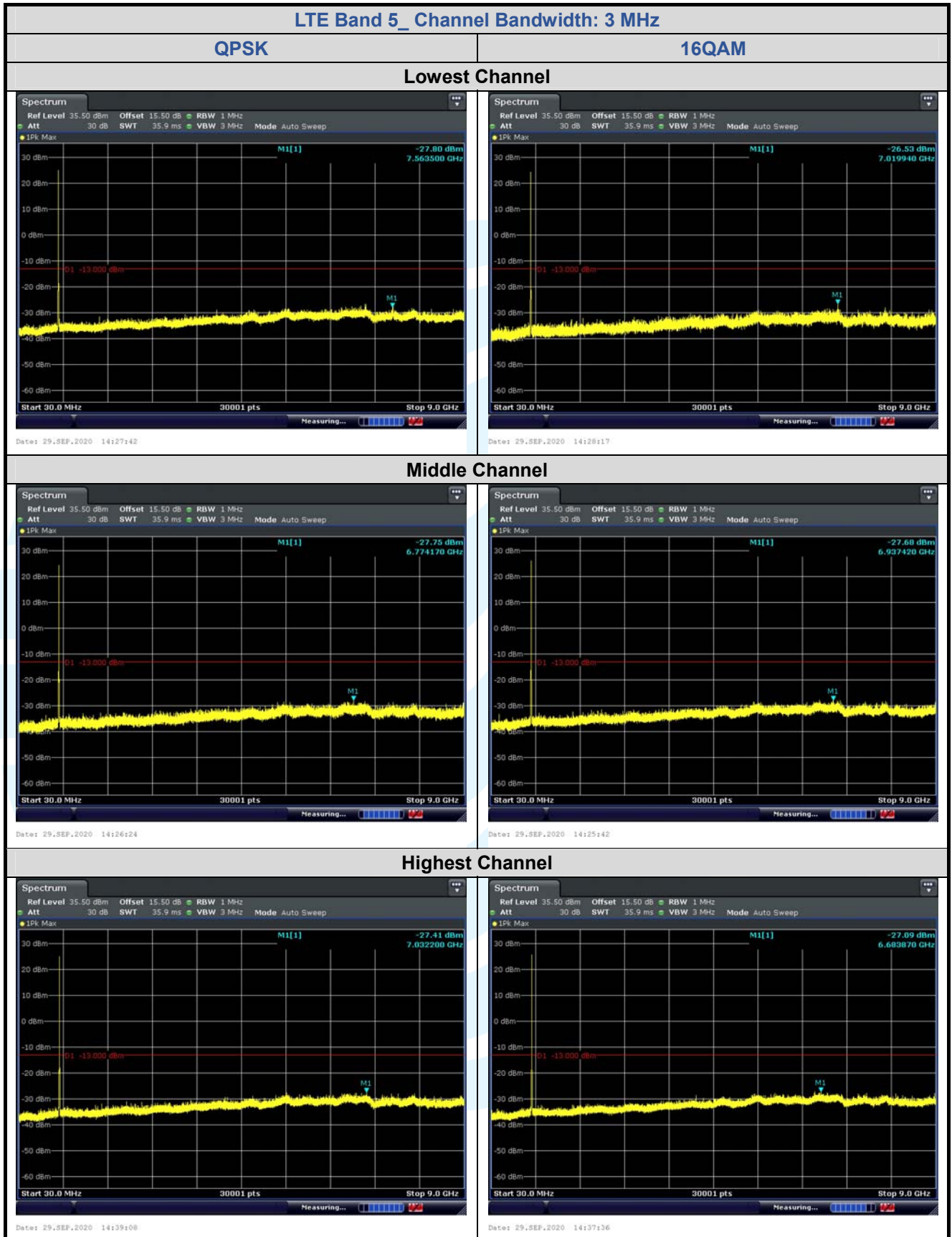


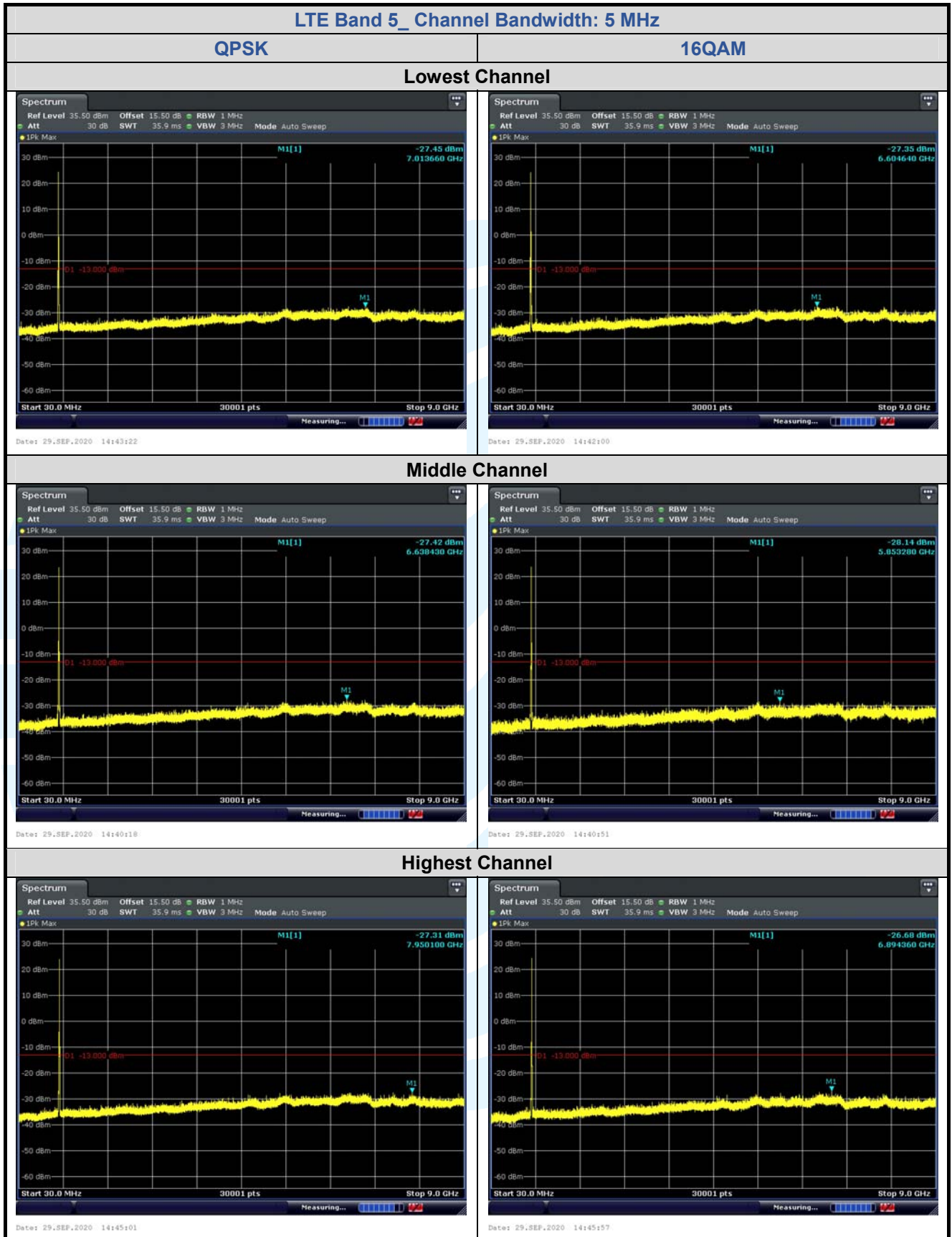




5.7.3 LTE Band 5

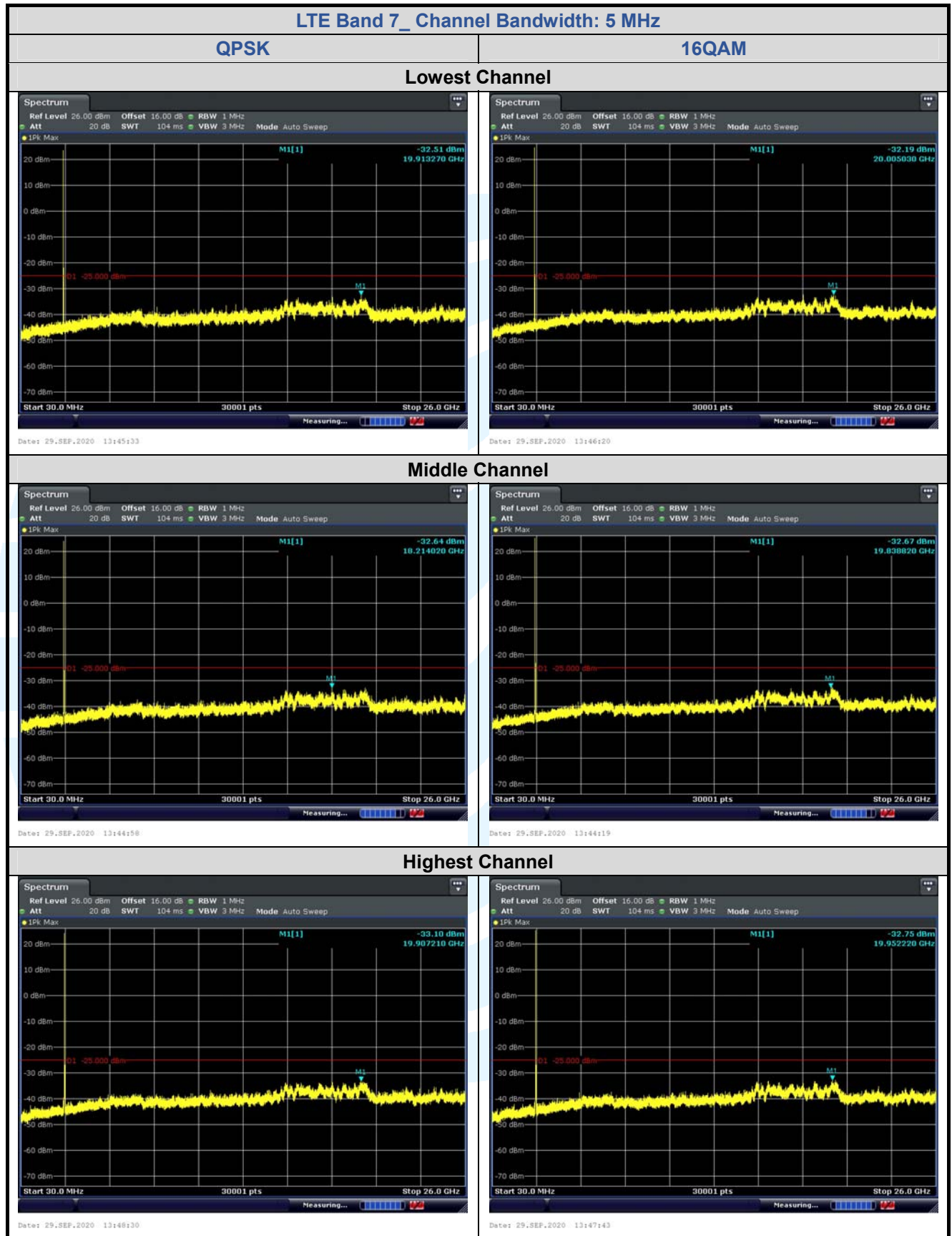


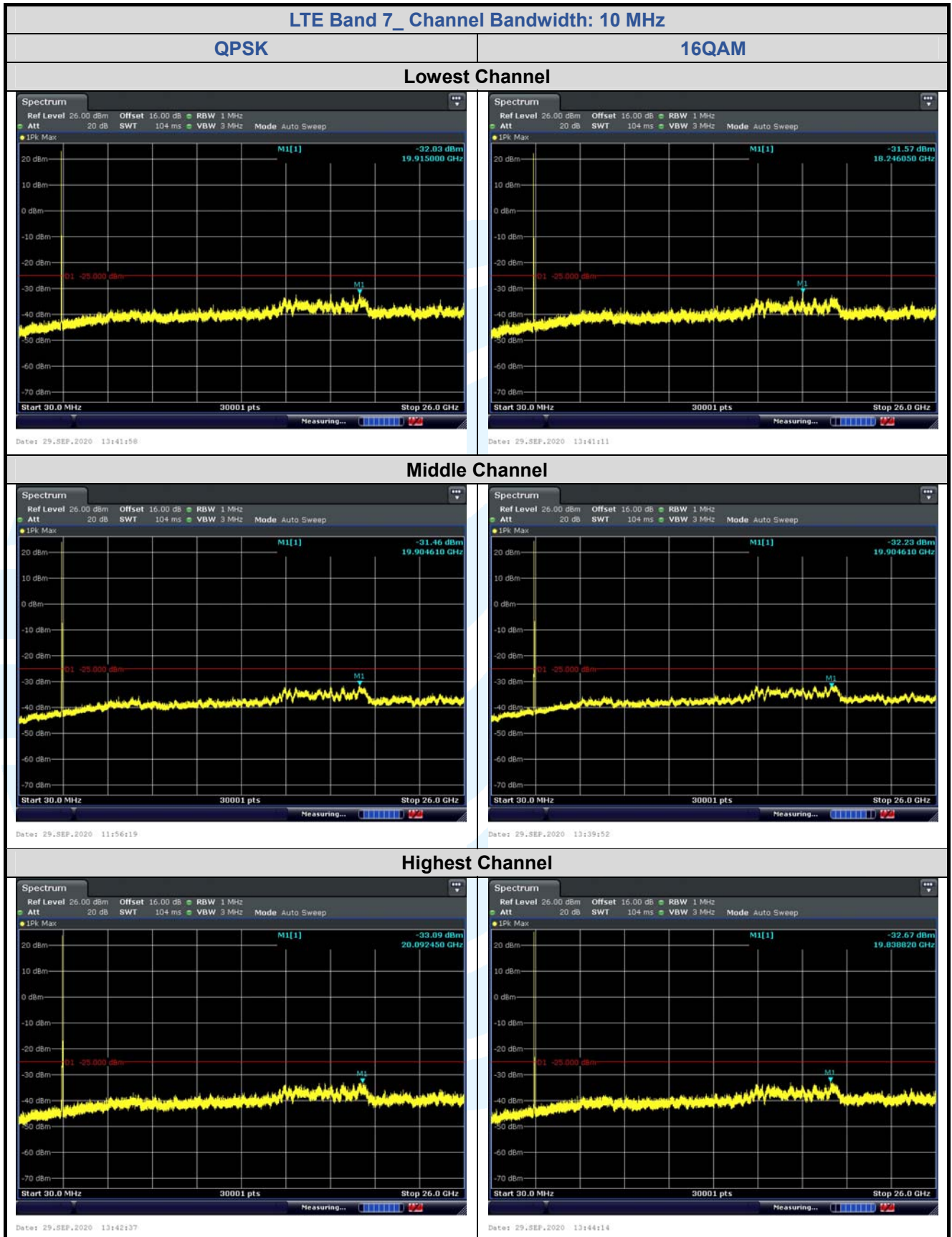


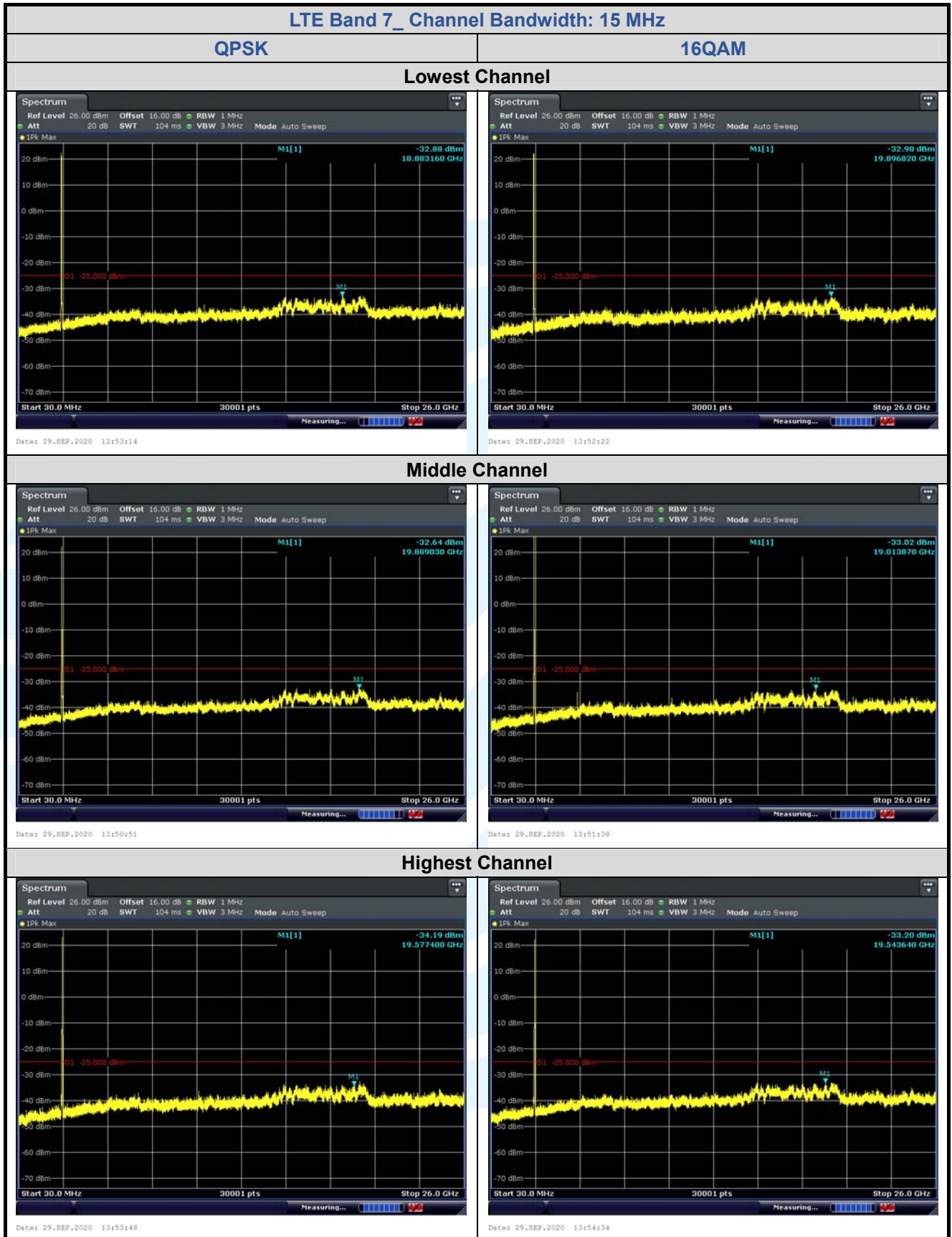


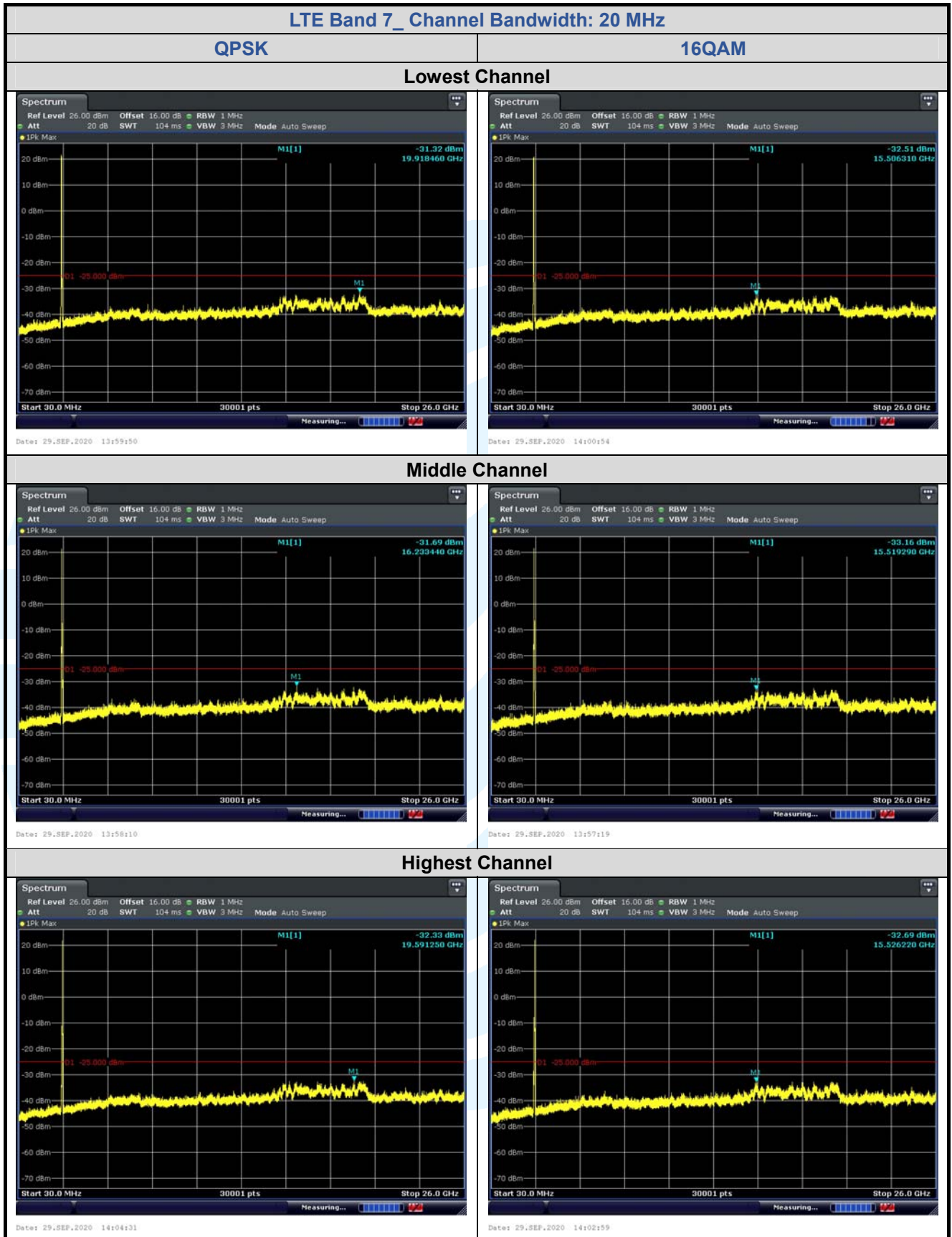


5.7.4 LTE Band 7









5.8 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: LTE Band 2: FCC 47 CFR Part 24.238(a)
LTE Band 4: FCC 47 CFR Part 27.53(h)
LTE Band 5: FCC 47 CFR Part 22.917(a)
LTE Band 7: FCC 47 CFR Part 27.53(m)(4)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009 MHz-30 MHz	Peak	10 kHz	30 KHz	Peak
30 MHz-1 GHz	Quasi-peak	100 kHz	300 KHz	Peak
Above 1 GHz	Peak	1 MHz	3 MHz	Peak

Limits:

FCC 47 CFR Part 24.238(a), 27.53(h)(1), 22.917(a):

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13 dBm.

FCC 47 CFR Part 27.53(m)(4):

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $55 + 10 \log(P)$ dB. The emission limit equal to -25 dBm.

FCC 47 CFR Part 27.53:

(c) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(f) Emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals. (-70 dBW/MHz = -40dBm/MHz).

Test Setup: Refer to section 4.2.1 for details.

Test Procedures: KDB 971168 D01v03r01 Section 7

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

5.8.1 LTE Band 2

LTE Band 2_ 20 MHz_ QPSK_ (30 MHz-1 GHz)							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	53.379	-70.99	-0.03	-71.02	-13.00	-58.02	Horizontal
2	348.514	-79.66	10.38	-69.28	-13.00	-56.28	Horizontal
3	815.635	-80.81	19.09	-61.72	-13.00	-48.72	Horizontal
4	43.845	-75.03	2.52	-72.51	-13.00	-59.51	Vertical
5	128.486	-78.15	4.03	-74.12	-13.00	-61.12	Vertical
6	979.139	-81.36	23.14	-58.22	-13.00	-45.22	Vertical
Middle Channel							
1	47.703	-71.90	0.89	-71.01	-13.00	-58.01	Horizontal
2	338.855	-80.16	10.39	-69.77	-13.00	-56.77	Horizontal
3	958.714	-80.83	22.62	-58.21	-13.00	-45.21	Horizontal
4	45.095	-75.04	2.25	-72.79	-13.00	-59.79	Vertical
5	128.486	-77.21	4.03	-73.18	-13.00	-60.18	Vertical
6	986.044	-81.87	23.51	-58.36	-13.00	-45.36	Vertical
Highest Channel							
1	54.135	-71.95	-0.06	-72.01	-13.00	-59.01	Horizontal
2	280.294	-81.56	9.23	-72.33	-13.00	-59.33	Horizontal
3	925.613	-81.40	21.15	-60.25	-13.00	-47.25	Horizontal
4	43.845	-75.92	2.52	-73.40	-13.00	-60.40	Vertical
5	127.586	-79.69	4.02	-75.67	-13.00	-62.67	Vertical
6	972.283	-80.33	22.87	-57.46	-13.00	-44.46	Vertical

LTE Band 2_ 20 MHz_ QPSK_ Above 1G							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	3720.000	-58.85	6.82	-52.03	-13.00	-39.03	Horizontal
2	5580.000	-62.17	10.86	-51.31	-13.00	-38.31	Horizontal
3	3720.000	-54.70	6.81	-47.89	-13.00	-34.89	Vertical
4	5580.000	-60.03	11.34	-48.69	-13.00	-35.69	Vertical
Middle Channel							
1	3760.000	-61.33	6.93	-54.40	-13.00	-41.40	Horizontal
2	5640.000	-62.72	10.84	-51.88	-13.00	-38.88	Horizontal
3	3760.000	-57.46	6.93	-50.53	-13.00	-37.53	Vertical
4	5640.000	-61.28	11.32	-49.96	-13.00	-36.96	Vertical
Highest Channel							
1	3800.000	-58.68	7.03	-51.65	-13.00	-38.65	Horizontal
2	5700.000	-61.24	10.83	-50.41	-13.00	-37.41	Horizontal
3	3800.000	-52.06	7.05	-45.01	-13.00	-32.01	Vertical
4	5700.000	-60.56	11.29	-49.27	-13.00	-36.27	Vertical

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5.8.2 LTE Band 4

LTE Band 4_ 20 MHz_ QPSK_ (30 MHz-1 GHz)							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	50.461	-71.31	0.09	-71.22	-13.00	-58.22	Horizontal
2	403.934	-81.34	12.27	-69.07	-13.00	-56.07	Horizontal
3	827.179	-79.82	19.07	-60.75	-13.00	-47.75	Horizontal
4	32.870	-79.59	8.31	-71.28	-13.00	-58.28	Vertical
5	128.486	-78.37	4.03	-74.34	-13.00	-61.34	Vertical
6	793.028	-80.36	19.02	-61.34	-13.00	-48.34	Vertical
Middle Channel							
1	47.703	-72.27	0.89	-71.38	-13.00	-58.38	Horizontal
2	288.284	-81.05	9.37	-71.68	-13.00	-58.68	Horizontal
3	821.387	-81.17	19.08	-62.09	-13.00	-49.09	Horizontal
4	32.411	-78.57	8.64	-69.93	-13.00	-56.93	Vertical
5	128.486	-79.58	4.03	-75.55	-13.00	-62.55	Vertical
6	979.139	-81.39	23.14	-58.25	-13.00	-45.25	Vertical
Highest Channel							
1	47.703	-72.06	0.89	-71.17	-13.00	-58.17	Horizontal
2	69.230	-74.26	-0.16	-74.42	-13.00	-61.42	Horizontal
3	979.139	-81.66	23.31	-58.35	-13.00	-45.35	Horizontal
4	50.461	-72.87	1.04	-71.83	-13.00	-58.83	Vertical
5	204.305	-80.32	6.06	-74.26	-13.00	-61.26	Vertical
6	815.635	-80.59	19.10	-61.49	-13.00	-48.49	Vertical

LTE Band 4_ 20 MHz_ QPSK _ Above 1G							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	3440.000	-59.35	5.94	-53.41	-13.00	-40.41	Horizontal
2	5160.000	-60.90	9.17	-51.73	-13.00	-38.73	Horizontal
3	3440.000	-53.01	5.75	-47.26	-13.00	-34.26	Vertical
4	5160.000	-60.22	9.53	-50.69	-13.00	-37.69	Vertical
Middle Channel							
1	3465.000	-60.77	6.02	-54.75	-13.00	-41.75	Horizontal
2	5197.500	-61.49	9.31	-52.18	-13.00	-39.18	Horizontal
3	3465.000	-54.53	5.87	-48.66	-13.00	-35.66	Vertical
4	5197.500	-60.80	9.69	-51.11	-13.00	-38.11	Vertical
Highest Channel							
1	3490.000	-59.48	6.11	-53.37	-13.00	-40.37	Horizontal
2	5235.000	-61.56	9.50	-52.06	-13.00	-39.06	Horizontal
3	3490.000	-53.65	5.99	-47.66	-13.00	-34.66	Vertical
4	5235.000	-59.91	9.89	-50.02	-13.00	-37.02	Vertical

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5.8.3 LTE Band 5

LTE Band 5_ 10 MHz_ QPSK_ (30 MHz-1 GHz)							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	50.461	-71.79	23.07	-48.72	-13.00	-35.72	Horizontal
2	254.031	-79.71	30.97	-48.74	-13.00	-35.74	Horizontal
3	992.997	-81.32	46.93	-34.39	-13.00	-21.39	Horizontal
4	43.845	-75.54	25.56	-49.98	-13.00	-36.98	Vertical
5	703.731	-80.57	41.96	-38.61	-13.00	-25.61	Vertical
6	992.997	-82.76	46.87	-35.89	-13.00	-22.89	Vertical
Middle Channel							
1	47.703	-72.02	23.89	-48.13	-13.00	-35.13	Horizontal
2	624.490	-79.84	40.32	-39.52	-13.00	-26.52	Horizontal
3	992.997	-81.32	46.93	-34.39	-13.00	-21.39	Horizontal
4	43.845	-75.36	25.56	-49.80	-13.00	-36.80	Vertical
5	128.486	-77.30	26.82	-50.48	-13.00	-37.48	Vertical
6	958.714	-81.91	45.77	-36.14	-13.00	-23.14	Vertical
Highest Channel							
1	47.703	-71.89	23.89	-48.00	-13.00	-35.00	Horizontal
2	124.925	-78.27	26.35	-51.92	-13.00	-38.92	Horizontal
3	992.997	-82.18	46.93	-35.25	-13.00	-22.25	Horizontal
4	45.733	-74.29	25.11	-49.18	-13.00	-36.18	Vertical
5	128.486	-76.25	26.82	-49.43	-13.00	-36.43	Vertical
6	952.000	-81.36	45.70	-35.66	-13.00	-22.66	Vertical

LTE Band 5_ 10 MHz_ QPSK_ Above 1G							
No.	Frequency	SA Reading	Correction factor	EIRP Result	Limit	Margin	Ant. Pol.
	(MHz)	(dBm)	(dB/m)	(dBm)	(dBm)	(dB)	
Lowest Channel							
1	1658.000	-59.45	0.11	-59.34	-13.00	-46.34	Horizontal
2	2487.000	-62.04	2.76	-59.28	-13.00	-46.28	Horizontal
3	1658.000	-59.48	-0.66	-60.14	-13.00	-47.14	Vertical
4	2487.000	-62.48	2.36	-60.12	-13.00	-47.12	Vertical
Middle Channel							
1	1673.000	-60.93	0.19	-60.74	-13.00	-47.74	Horizontal
2	2509.500	-61.87	2.82	-59.05	-13.00	-46.05	Horizontal
3	1673.000	-60.75	-0.57	-61.32	-13.00	-48.32	Vertical
4	2509.500	-62.58	2.41	-60.17	-13.00	-47.17	Vertical
Highest Channel							
1	1688.000	-61.26	0.28	-60.98	-13.00	-47.98	Horizontal
2	2532.000	-62.42	2.89	-59.53	-13.00	-46.53	Horizontal
3	1688.000	-59.87	-0.47	-60.34	-13.00	-47.34	Vertical
4	2532.000	-62.57	2.47	-60.10	-13.00	-47.10	Vertical

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5.8.4 LTE Band 7

LTE Band 7_ 20 MHz_ QPSK_ (30 MHz-1 GHz)							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
Lowest Channel							
1	54.135	-71.62	-0.06	-71.68	-25.00	-46.68	Horizontal
2	101.893	-76.92	2.43	-74.49	-25.00	-49.49	Horizontal
3	821.387	-80.46	19.08	-61.38	-25.00	-36.38	Horizontal
4	53.756	-73.72	0.54	-73.18	-25.00	-48.18	Vertical
5	128.486	-78.49	4.03	-74.46	-25.00	-49.46	Vertical
6	815.635	-80.57	19.10	-61.47	-25.00	-36.47	Vertical
Middle Channel							
1	54.901	-71.83	-0.10	-71.93	-25.00	-46.93	Horizontal
2	102.612	-76.92	2.43	-74.49	-25.00	-49.49	Horizontal
3	804.252	-80.64	19.07	-61.57	-25.00	-36.57	Horizontal
4	51.900	-74.29	0.83	-73.46	-25.00	-48.46	Vertical
5	395.507	-80.11	12.29	-67.82	-25.00	-42.82	Vertical
6	919.132	-81.77	21.08	-60.69	-25.00	-35.69	Vertical
Highest Channel							
1	47.703	-71.54	0.89	-70.65	-25.00	-45.65	Horizontal
2	97.002	-77.07	2.22	-74.85	-25.00	-49.85	Horizontal
3	986.044	-81.26	23.62	-57.64	-25.00	-32.64	Horizontal
4	43.845	-75.75	2.52	-73.23	-25.00	-48.23	Vertical
5	455.189	-79.87	12.62	-67.25	-25.00	-42.25	Vertical
6	723.793	-79.82	18.59	-61.23	-25.00	-36.23	Vertical

LTE Band 7_ 20 MHz_ QPSK_ Above 1G							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
Lowest Channel							
1	5020.000	-60.77	8.68	-52.09	-25.00	-27.09	Horizontal
2	12550.000	-64.11	20.88	-43.23	-25.00	-18.23	Horizontal
3	5020.000	-56.34	8.98	-47.36	-25.00	-22.36	Vertical
4	12550.000	-52.47	21.16	-31.31	-25.00	-6.31	Vertical
Middle Channel							
1	5070.000	-60.55	8.86	-51.69	-25.00	-26.69	Horizontal
2	7605.000	-62.12	13.16	-48.96	-25.00	-23.96	Horizontal
3	5070.000	-59.20	9.18	-50.02	-25.00	-25.02	Vertical
4	7605.000	-61.78	13.26	-48.52	-25.00	-23.52	Vertical
Highest Channel							
1	5120.000	-59.07	9.03	-50.04	-25.00	-25.04	Horizontal
2	10240.000	-62.65	17.19	-45.46	-25.00	-20.46	Horizontal
3	5121.445	-56.77	9.39	-47.38	-25.00	-22.38	Vertical
4	10240.000	-58.78	17.39	-41.39	-25.00	-16.39	Vertical

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Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit
4. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test. Subsequently, only the worst case emissions are reported.



5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 &
FCC 47 CFR Part 22.355 &
FCC 47 CFR Part 24.235 &
FCC 47 CFR Part 27.54,

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limits:

FCC 47 CFR Part 24.235, FCC 47 CFR Part 27.54

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Setup: Refer to section 4.2.2 for details.

Test Procedures:

- 1) Use CMW 500 or CMU 200 with Frequency Error measurement capability.
 - a) Temp. = -30° to + 50°C
 - b) Voltage =low voltage, 3.4 Vdc, Normal, 3.8Vdc and High voltage, 4.2 Vdc.

- 2) Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50°C is reached.

- 3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

Equipment Used: Refer to section 3 for details.

Test Result: Pass

5.9.1 LTE Band 2

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
LTE Band 2 / 20MHz / Full RB							
QPSK	18900 / 1880.0	VL	TN	34	0.0181	N/A	Pass
		VN		32	0.0170		Pass
		VH		35	0.0186		Pass
		VN	50	30	0.0160		Pass
			40	29	0.0154		Pass
			30	27	0.0144		Pass
			20	26	0.0138		Pass
			10	32	0.0170		Pass
			0	34	0.0181		Pass
			-10	32	0.0170		Pass
			-20	28	0.0149		Pass
			-30	30	0.0160		Pass

5.9.2 LTE Band 4

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
LTE Band 4 / 20MHz / Full RB							
QPSK	20175 / 1732.5	VL	TN	31	0.0179	N/A	Pass
		VN		27	0.0156		Pass
		VH		26	0.0150		Pass
		VN	50	33	0.0190		Pass
			40	32	0.0185		Pass
			30	34	0.0196		Pass
			20	30	0.0173		Pass
			10	32	0.0185		Pass
			0	33	0.0190		Pass
			-10	29	0.0167		Pass
			-20	27	0.0156		Pass
			-30	35	0.0202		Pass

5.9.3 LTE Band 5

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 5 / 10MHz / Full RB							
QPSK	20525 / 836.5	VL	TN	30	0.0359	± 2.5	Pass
		VN		29	0.0347	± 2.5	Pass
		VH		27	0.0323	± 2.5	Pass
		VN	50	26	0.0311	± 2.5	Pass
			40	30	0.0359	± 2.5	Pass
			30	28	0.0335	± 2.5	Pass
			20	29	0.0347	± 2.5	Pass
			10	25	0.0299	± 2.5	Pass
			0	27	0.0323	± 2.5	Pass
			-10	28	0.0335	± 2.5	Pass
			-20	27	0.0323	± 2.5	Pass
			-30	26	0.0311	± 2.5	Pass

5.9.4 LTE Band 7

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 7 / 20MHz / Full RB							
QPSK	21100 / 2535	VL	TN	-33	-0.0130	N/A	Pass
		VN		-32	-0.0126		Pass
		VH		-34	-0.0134		Pass
		VN	50	-32	-0.0126		Pass
			40	-38	-0.0150		Pass
			30	-30	-0.0118		Pass
			20	-38	-0.0150		Pass
			10	-36	-0.0142		Pass
			0	-37	-0.0146		Pass
			-10	-32	-0.0126		Pass
			-20	-34	-0.0134		Pass
			-30	-36	-0.0142		Pass

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
