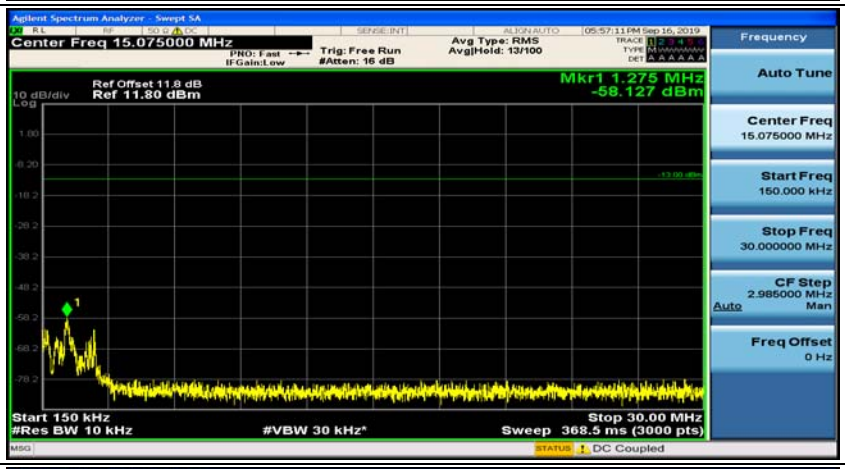
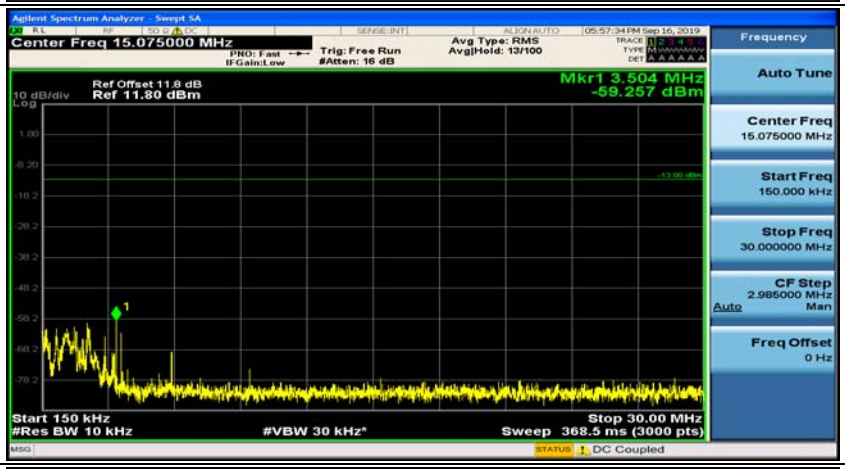
Channel Bandwidth: 10 MHz_MCH_16QAM_50RB#0

Appendix E: Conducted Spurious Emission

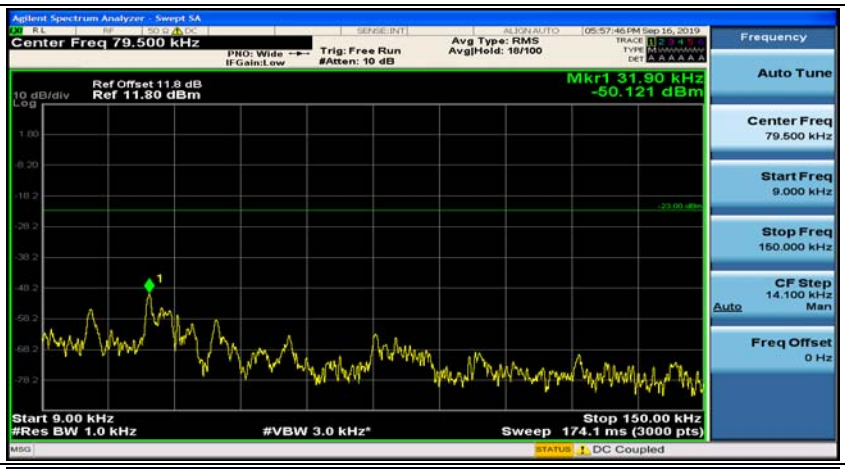
Test Graphs

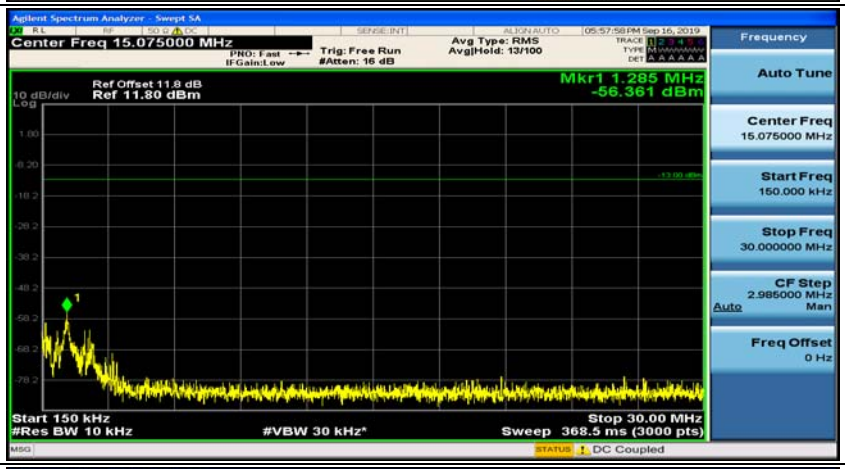
Channel Bandwidth: 5 MHz

(Channel Bandwidth: 5 MHz)_LCH_QPSK_1RB#0

(Channel Bandwidth: 5 MHz)_LCH_QPSK_1RB#12



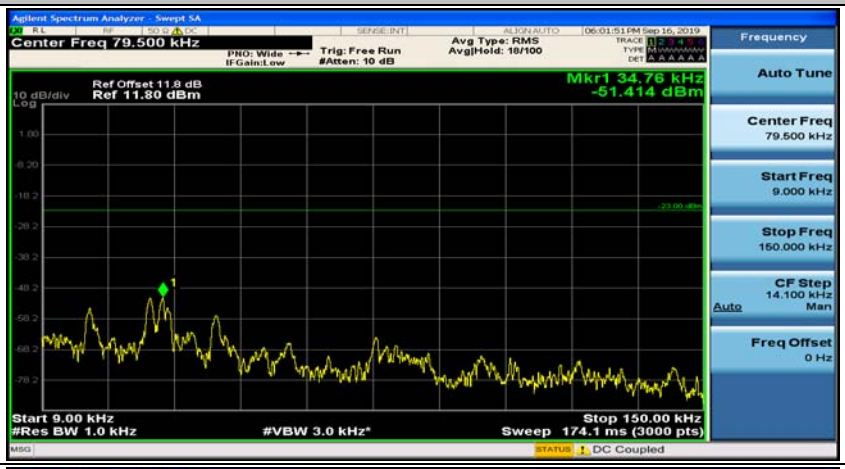
(Channel Bandwidth: 5 MHz)_LCH_QPSK_1RB#24

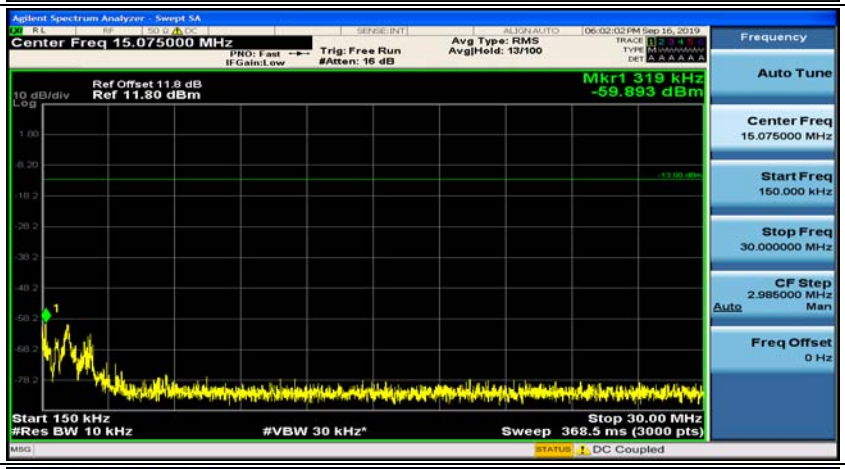

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 18/100
05:57:46 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 31.90 kHz
-50.121 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
79.500 kHz
Start Freq
9.000 kHz
Stop Freq
150.000 kHz
CF Step
14.100 kHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 13/100
05:57:58 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 1.285 MHz
-56.361 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
15.075000 MHz
Start Freq
150.000 kHz
Stop Freq
30.000000 MHz
CF Step
2.985000 MHz
Auto
Man
Freq Offset
0 Hz

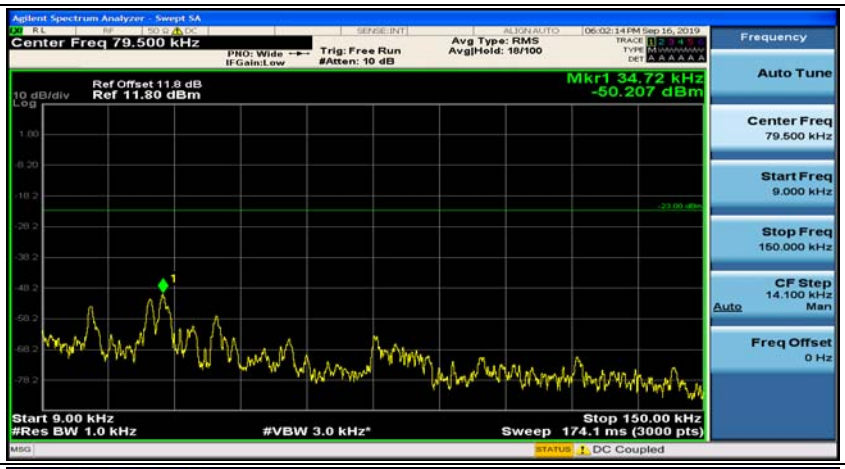
Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 17/100
05:58:03 PM Sep 16, 2019
Ref Offset 11.75 dB
10 dB/div
Ref 30.00 dBm
Mkr2 24.822 GHz
-22.020 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 GHz
Sweep 64.98 ms (3000 pts)
Frequency
Auto Tune
Center Freq
13.015000000 GHz
Start Freq
30.000000 MHz
Stop Freq
26.000000000 GHz
CF Step
2.597000000 GHz
Auto
Man
Freq Offset
0 Hz

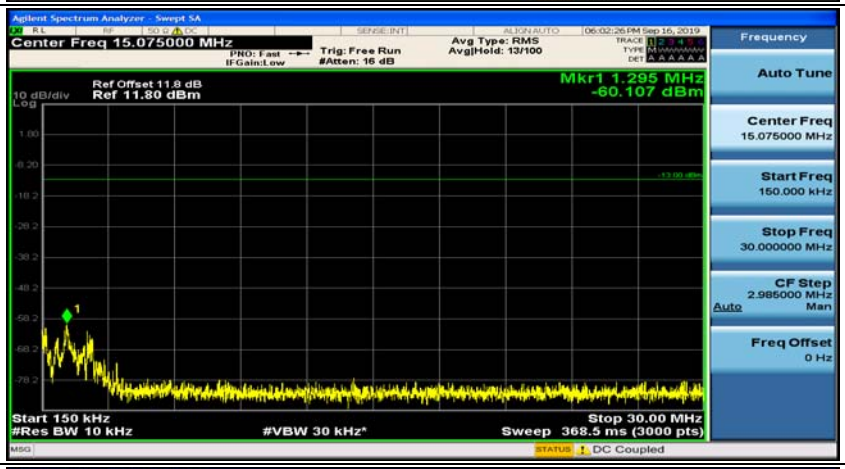
(Channel Bandwidth: 5 MHz)_HCH_QPSK_1RB#0



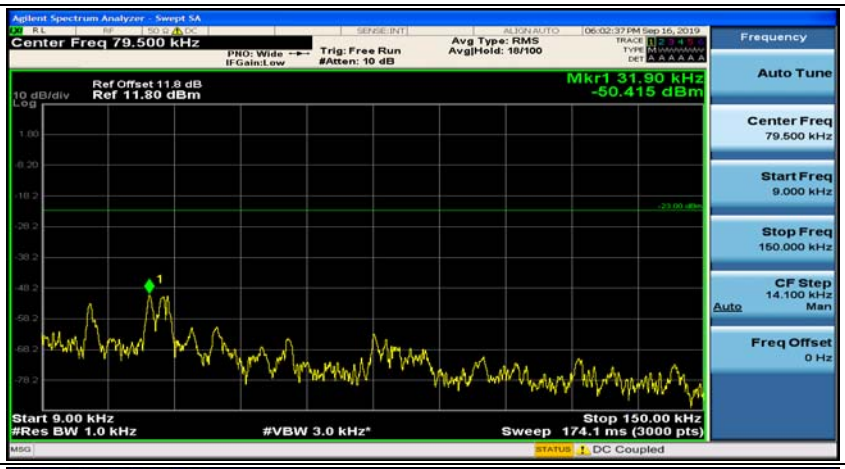


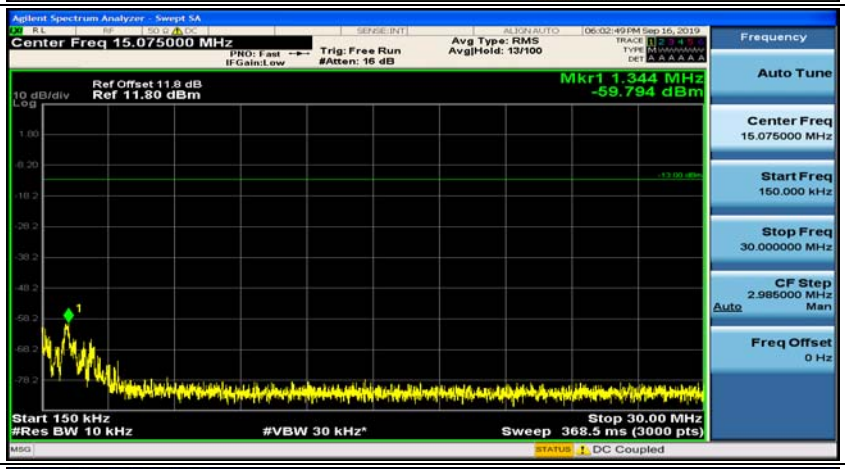
(Channel Bandwidth: 5 MHz)_HCH_QPSK_1RB#12



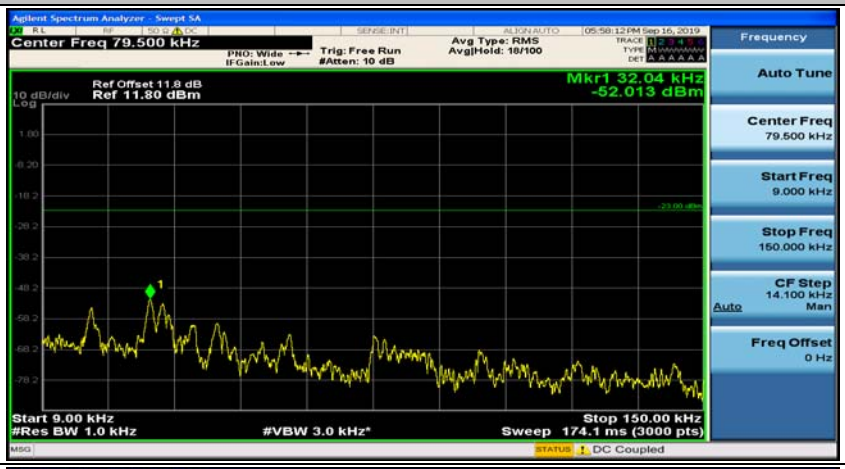
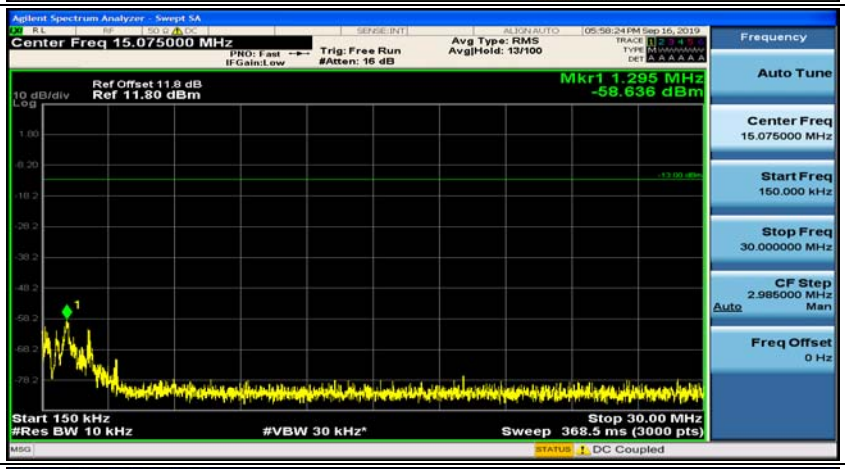


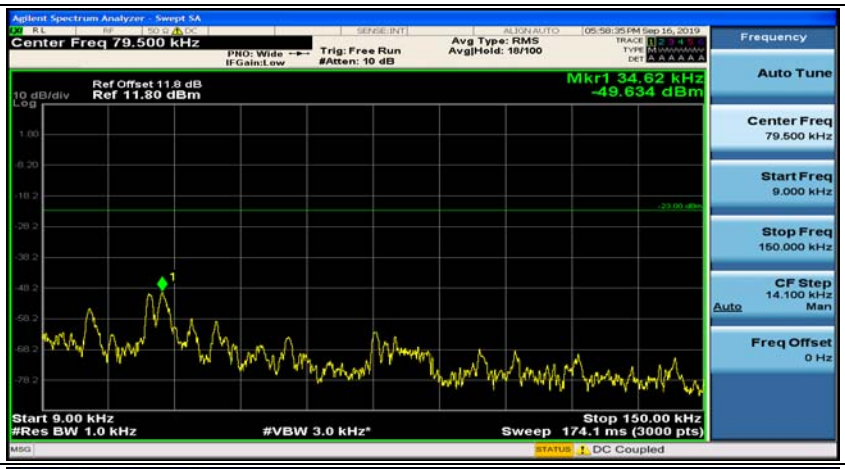
(Channel Bandwidth: 5 MHz)_HCH_QPSK_1RB#24

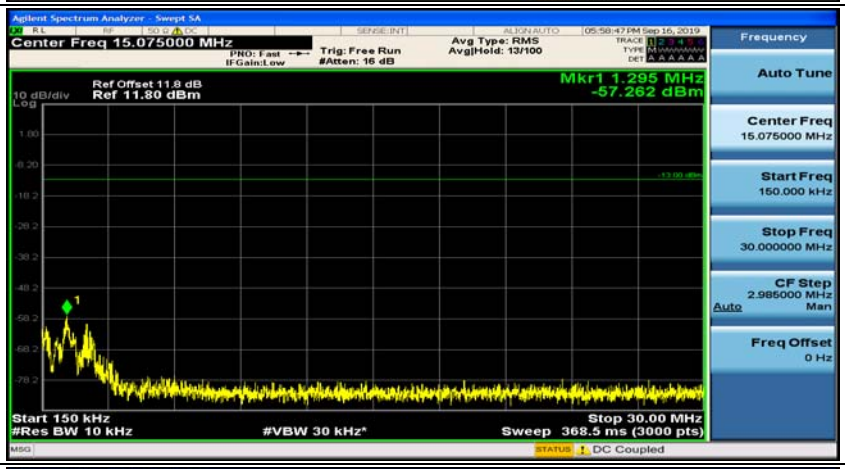

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 18/100
06:02:37 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 31.90 kHz
-50.415 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
79.500 kHz
Start Freq
9.000 kHz
Stop Freq
150.000 kHz
CF Step
14.100 kHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 13/100
06:02:49 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 1.344 MHz
-59.794 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
15.075000 MHz
Start Freq
150.000 kHz
Stop Freq
30.000000 MHz
CF Step
2.985000 MHz
Auto
Man
Freq Offset
0 Hz

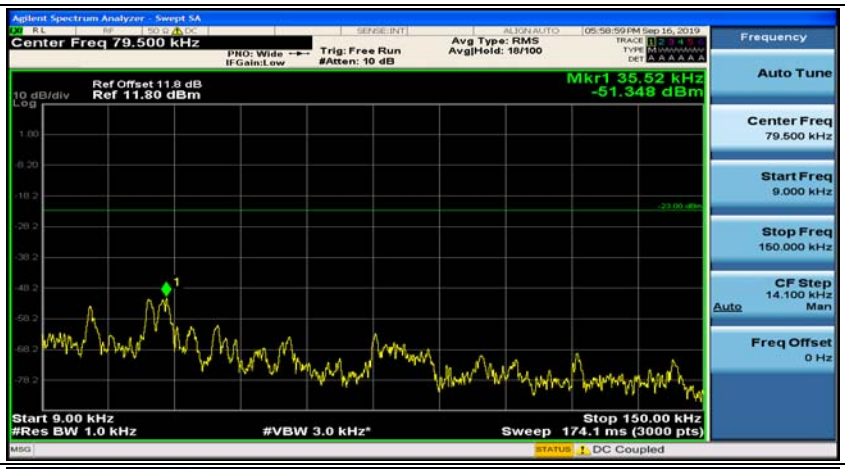
Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 17/100
06:02:55 PM Sep 16, 2019
Ref Offset 11.75 dB
10 dB/div
Ref 30.00 dBm
Mkr2 24.831 GHz
-21.995 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 GHz
Sweep 64.98 ms (3000 pts)
Frequency
Auto Tune
Center Freq
13.015000000 GHz
Start Freq
30.000000 MHz
Stop Freq
26.000000000 GHz
CF Step
2.597000000 GHz
Auto
Man
Freq Offset
0 Hz

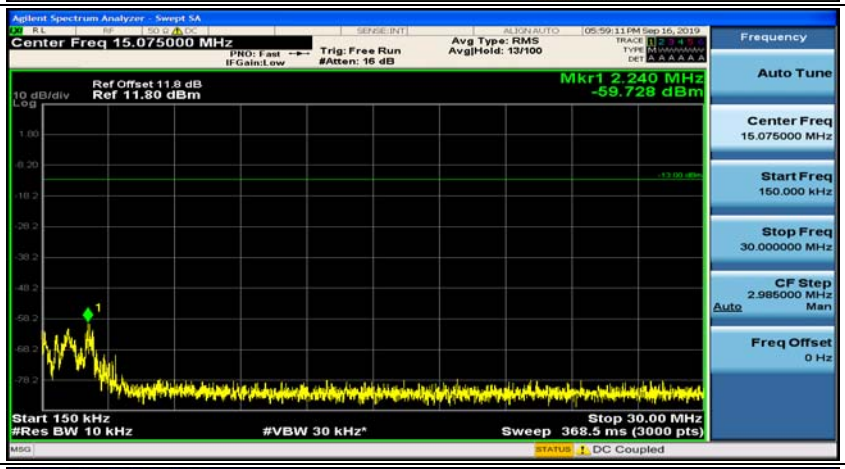
(Channel Bandwidth: 5 MHz)_LCH_16QAM_1RB#0


(Channel Bandwidth: 5 MHz)_LCH_16QAM_1RB#12





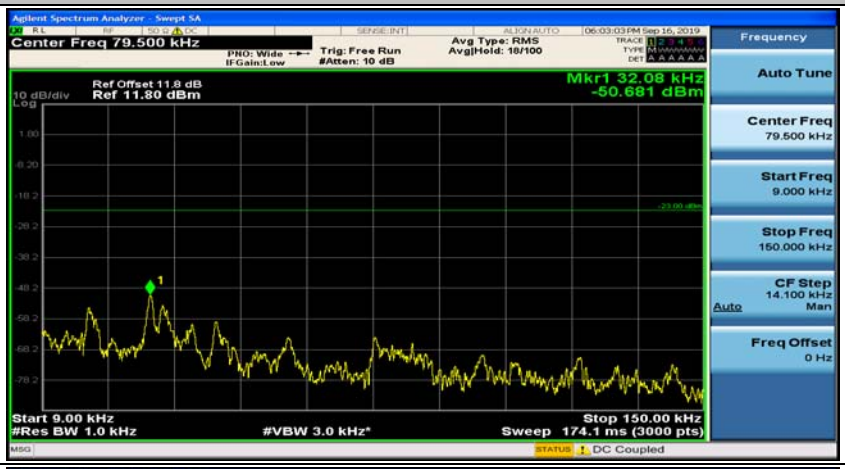
(Channel Bandwidth: 5 MHz)_LCH_16QAM_1RB#24

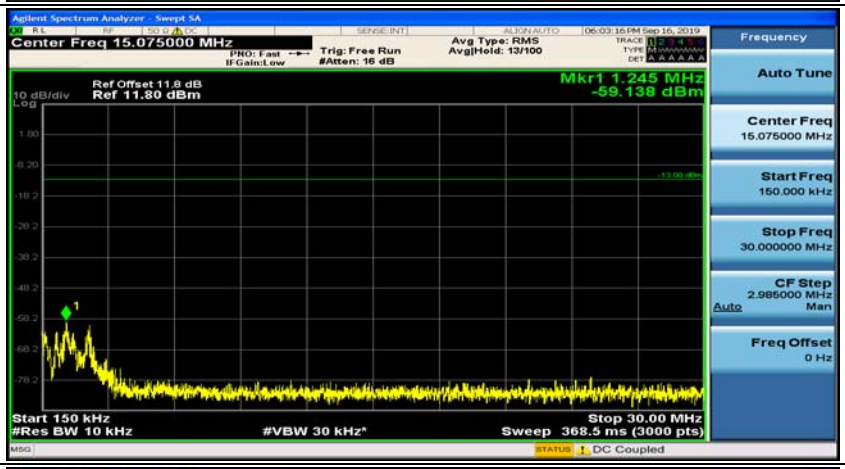

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 18/100
05:58:59 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 35.52 kHz
-51.348 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
79.500 kHz
Start Freq
9.000 kHz
Stop Freq
150.000 kHz
CF Step
14.100 kHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 13/100
05:59:11 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 2.240 MHz
-59.728 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
15.075000 MHz
Start Freq
150.000 kHz
Stop Freq
30.000000 MHz
CF Step
2.985000 MHz
Auto
Man
Freq Offset
0 Hz

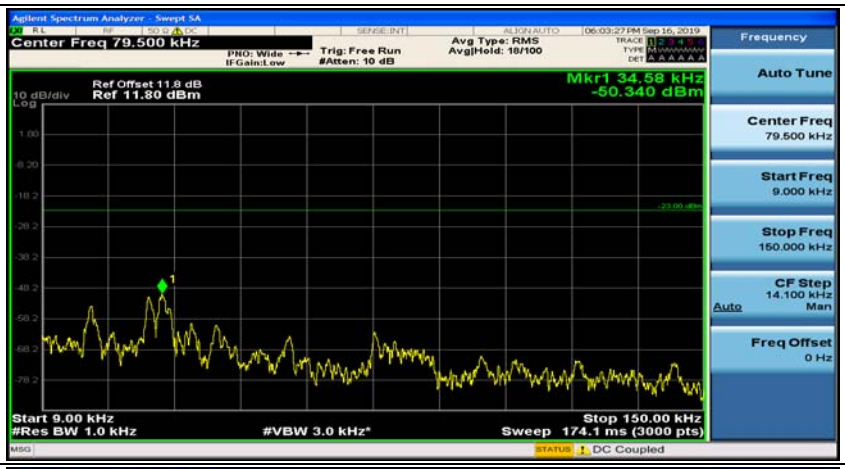
Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 17/100
05:59:16 PM Sep 16, 2019
Ref Offset 11.75 dB
10 dB/div
Ref 30.00 dBm
Mkr2 24.840 GHz
-21.388 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 GHz
Sweep 64.98 ms (3000 pts)
Frequency
Auto Tune
Center Freq
13.015000000 GHz
Start Freq
30.000000 MHz
Stop Freq
26.000000000 GHz
CF Step
2.597000000 GHz
Auto
Man
Freq Offset
0 Hz

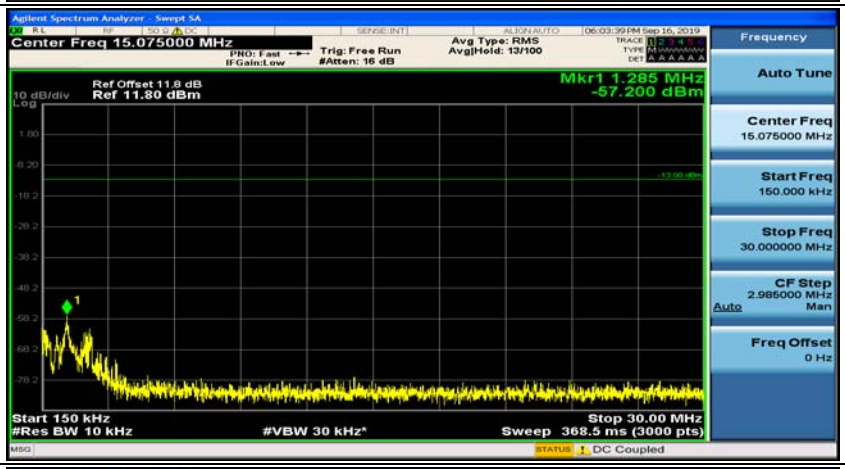
(Channel Bandwidth: 5 MHz)_HCH_16QAM_1RB#0



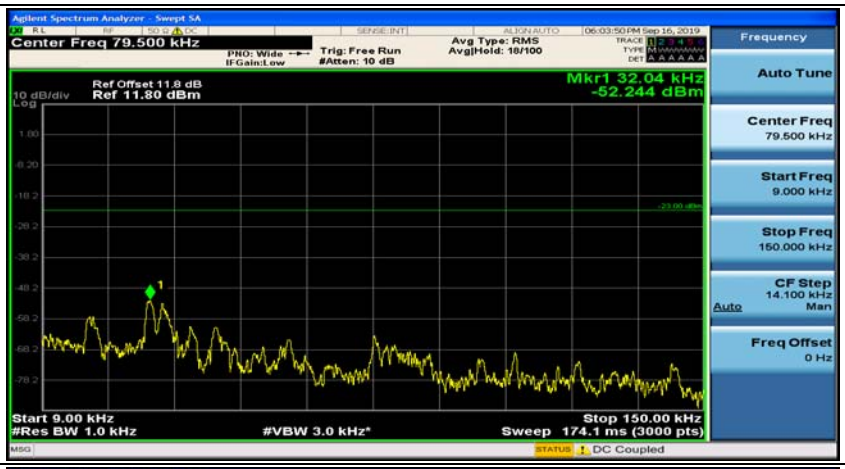


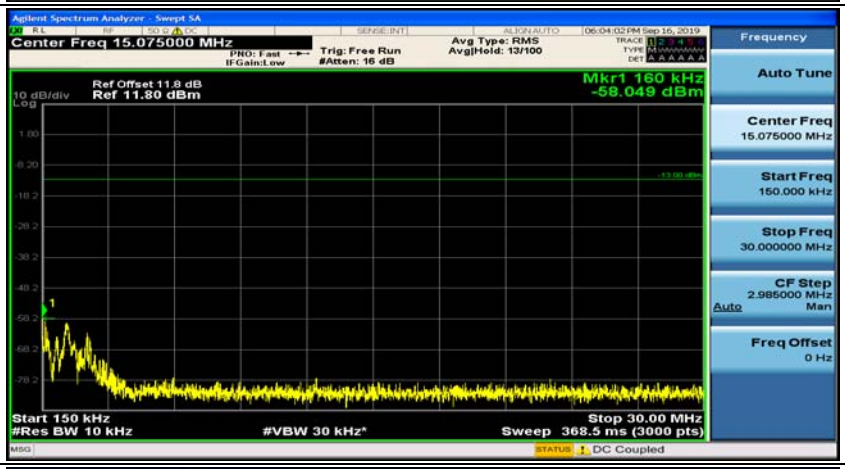
(Channel Bandwidth: 5 MHz)_HCH_16QAM_1RB#12





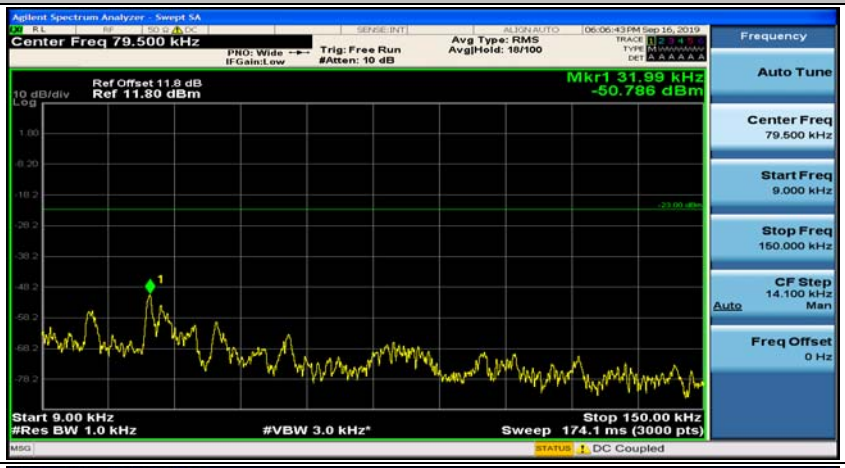
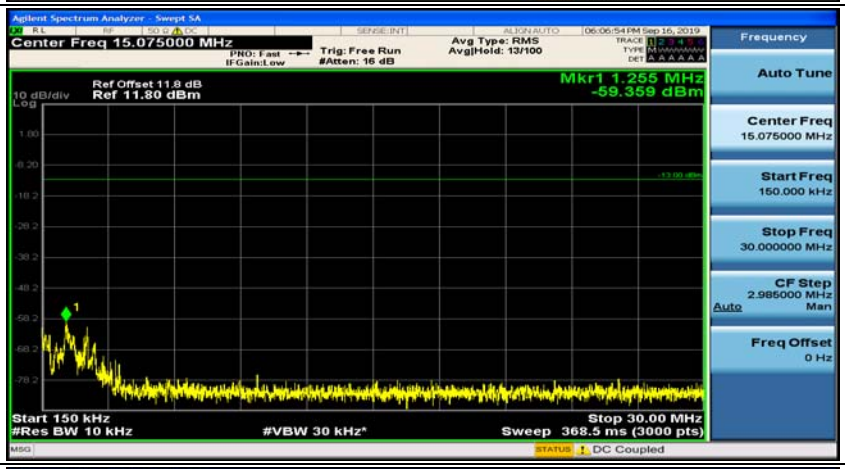
(Channel Bandwidth: 5 MHz)_HCH_16QAM_1RB#24

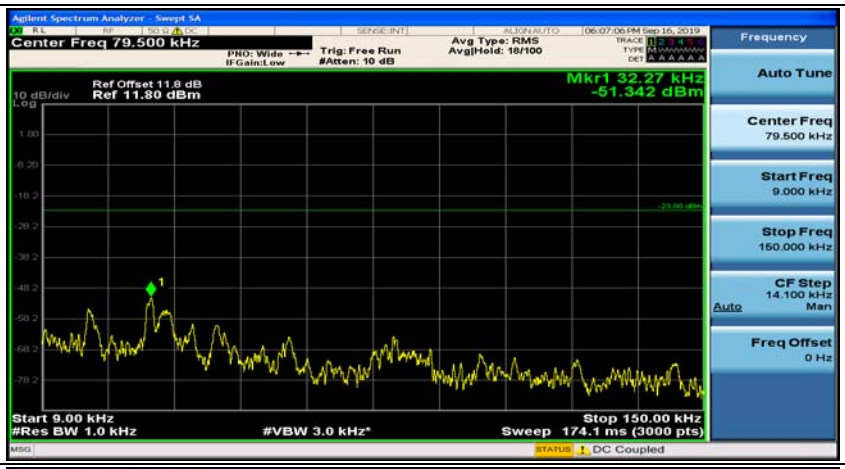

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 18/100
06:03:50 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 32.04 kHz
-52.244 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
79.500 kHz
Start Freq
9.000 kHz
Stop Freq
150.000 kHz
CF Step
14.100 kHz
Auto
Man
Freq Offset
0 Hz

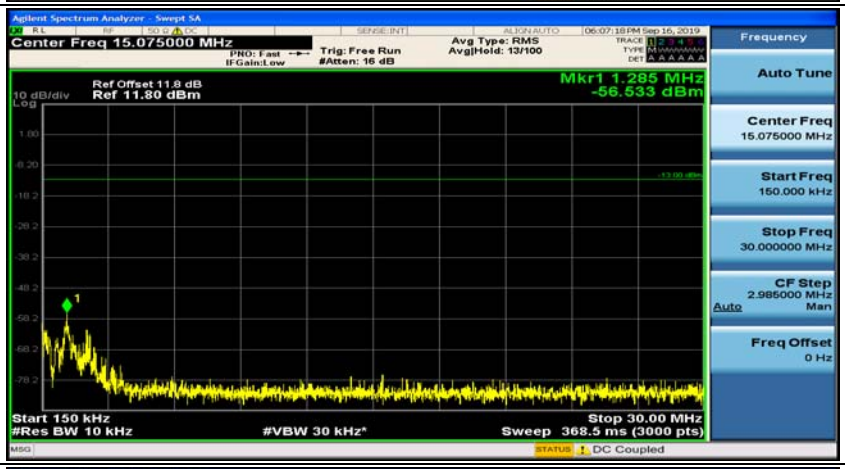

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 13/100
06:04:02 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 160 kHz
-58.049 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
15.075000 MHz
Start Freq
150.000 kHz
Stop Freq
30.000000 MHz
CF Step
2.985000 MHz
Auto
Man
Freq Offset
0 Hz

Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 17/100
06:04:08 PM Sep 16, 2019
Ref Offset 11.75 dB
10 dB/div
Ref 30.00 dBm
Mkr2 24.848 GHz
-21.806 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 GHz
Sweep 64.98 ms (3000 pts)
Frequency
Auto Tune
Center Freq
13.015000000 GHz
Start Freq
30.000000 MHz
Stop Freq
26.000000000 GHz
CF Step
2.597000000 GHz
Auto
Man
Freq Offset
0 Hz

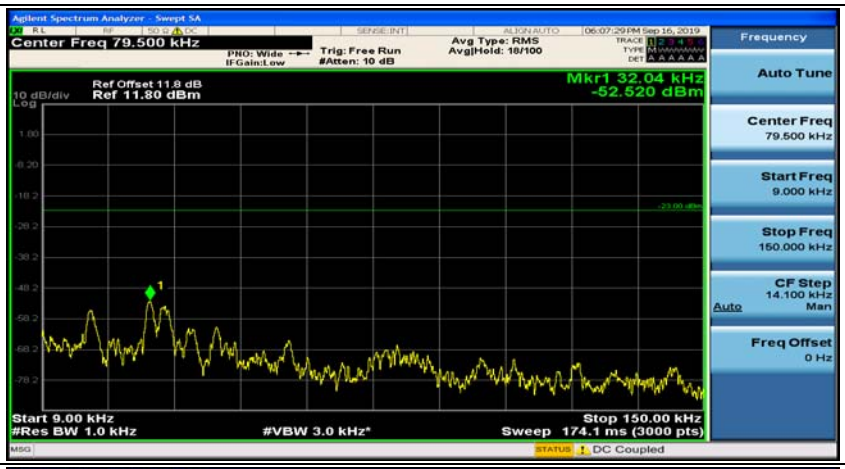
Channel Bandwidth: 10 MHz

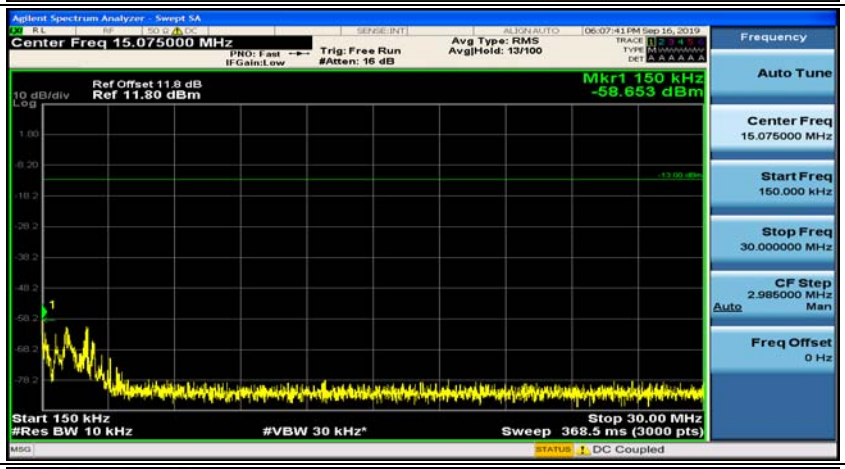
Channel Bandwidth: 10 MHz_MCH_QPSK_1RB#0


Channel Bandwidth: 10 MHz_MCH_QPSK_1RB#24



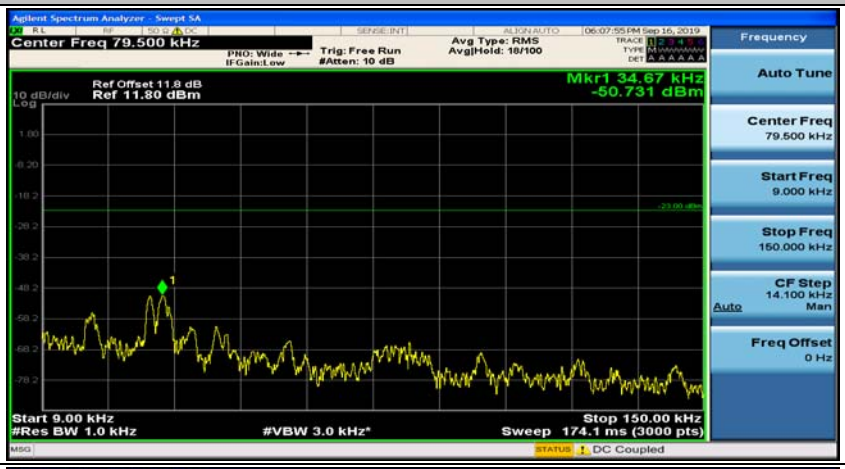
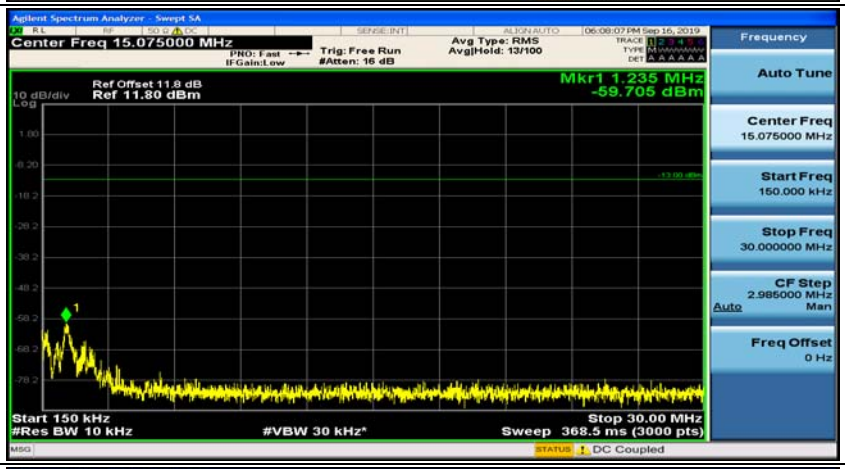


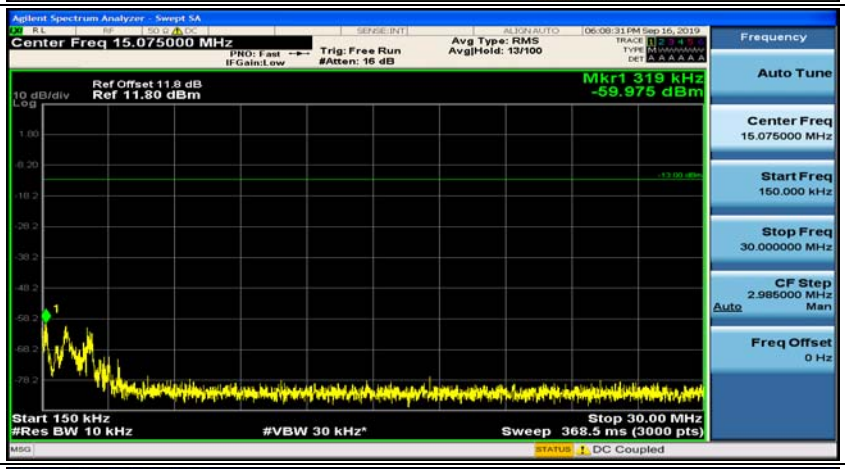
Channel Bandwidth: 10 MHz_MCH_QPSK_1RB#49


Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 18/100
06:07:29 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 32.04 kHz
-52.520 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
79.500 kHz
Start Freq
9.000 kHz
Stop Freq
150.000 kHz
CF Step
14.100 kHz
Auto
Man
Freq Offset
0 Hz

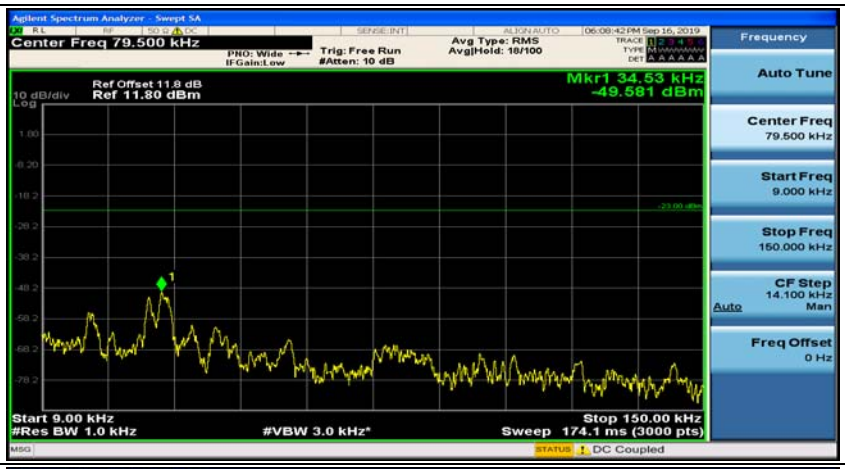

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 13/100
06:07:41 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 150 kHz
-58.653 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
15.075000 MHz
Start Freq
150.000 kHz
Stop Freq
30.000000 MHz
CF Step
2.985000 MHz
Auto
Man
Freq Offset
0 Hz

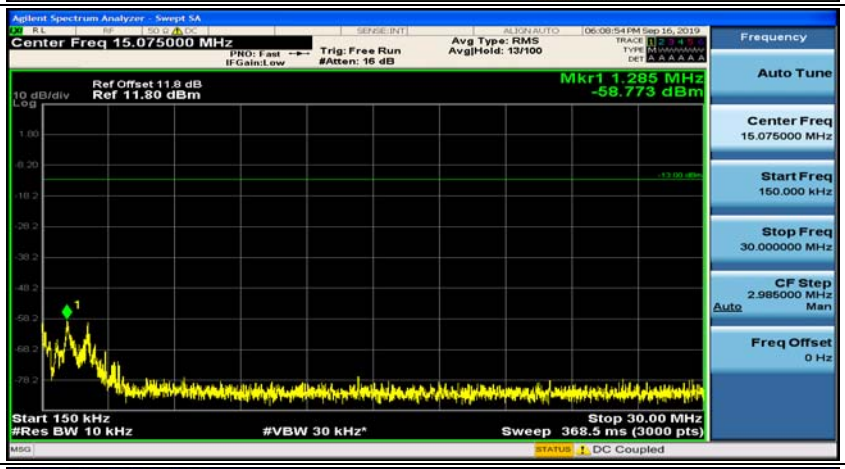
Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 17/100
06:07:46 PM Sep 16, 2019
Ref Offset 11.75 dB
10 dB/div
Ref 30.00 dBm
Mkr2 24.822 GHz
-21.488 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 GHz
Sweep 64.98 ms (3000 pts)
Frequency
Auto Tune
Center Freq
13.015000000 GHz
Start Freq
30.000000 MHz
Stop Freq
26.000000000 GHz
CF Step
2.597000000 GHz
Auto
Man
Freq Offset
0 Hz

Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#0


Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#24



Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#49


Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 18/100
06:08:42 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 34.53 kHz
-49.581 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
79.500 kHz
Start Freq
9.000 kHz
Stop Freq
150.000 kHz
CF Step
14.100 kHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 13/100
06:08:54 PM Sep 16, 2019
Ref Offset 11.8 dB
10 dB/div
Ref 11.80 dBm
Mkr1 1.285 MHz
-58.773 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 ms (3000 pts)
DC Coupled
Frequency
Auto Tune
Center Freq
15.075000 MHz
Start Freq
150.000 kHz
Stop Freq
30.000000 MHz
CF Step
2.985000 MHz
Auto
Man
Freq Offset
0 Hz

Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 17/100
06:08:59 PM Sep 16, 2019
Ref Offset 11.75 dB
10 dB/div
Ref 30.00 dBm
Mkr2 24.857 GHz
-21.853 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 GHz
Sweep 64.98 ms (3000 pts)
Frequency
Auto Tune
Center Freq
13.015000000 GHz
Start Freq
30.000000 MHz
Stop Freq
26.000000000 GHz
CF Step
2.597000000 GHz
Auto
Man
Freq Offset
0 Hz

Appendix F: Frequency Stability

Test Result

Channel Bandwidth: 5 MHz

Channel Bandwidth: 5 MHz							
Voltage							
Modulation	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VL	TN	1.73	0.000750	± 2.5	PASS
		VN	TN	2.62	0.001135	± 2.5	PASS
		VH	TN	-1.83	-0.000793	± 2.5	PASS
	HCH	VL	TN	2.5	0.001081	± 2.5	PASS
		VN	TN	2.98	0.001289	± 2.5	PASS
		VH	TN	3.9	0.001686	± 2.5	PASS
16QAM	LCH	VL	TN	2.91	0.001261	± 2.5	PASS
		VN	TN	0.59	0.000256	± 2.5	PASS
		VH	TN	-1.79	-0.000776	± 2.5	PASS
	HCH	VL	TN	-0.49	-0.000212	± 2.5	PASS
		VN	TN	4.21	0.001821	± 2.5	PASS
		VH	TN	3.68	0.001591	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	-0.81	-0.000351	± 2.5	PASS
		VN	-20	0.96	0.000416	± 2.5	PASS
		VN	-10	-0.88	-0.000381	± 2.5	PASS
		VN	0	-0.96	-0.000416	± 2.5	PASS
		VN	10	2.42	0.001049	± 2.5	PASS
		VN	20	2.29	0.000992	± 2.5	PASS
		VN	30	0.45	0.000195	± 2.5	PASS
		VN	40	-1.25	-0.000542	± 2.5	PASS
		VN	50	3.67	0.001590	± 2.5	PASS
	HCH	VN	-30	2.09	0.000904	± 2.5	PASS
		VN	-20	1.52	0.000657	± 2.5	PASS
		VN	-10	-0.41	-0.000177	± 2.5	PASS
		VN	0	3.89	0.001682	± 2.5	PASS
		VN	10	-0.81	-0.000350	± 2.5	PASS
		VN	20	-1.9	-0.000822	± 2.5	PASS
		VN	30	-0.94	-0.000406	± 2.5	PASS
		VN	40	4.21	0.001821	± 2.5	PASS

		VN	50	3.37	0.001457	± 2.5	PASS
16QAM	LCH	VN	-30	-0.91	-0.000394	± 2.5	PASS
		VN	-20	-1.67	-0.000724	± 2.5	PASS
		VN	-10	-1.67	-0.000724	± 2.5	PASS
		VN	0	-0.33	-0.000143	± 2.5	PASS
		VN	10	3.84	0.001664	± 2.5	PASS
		VN	20	-1.65	-0.000715	± 2.5	PASS
		VN	30	-0.77	-0.000334	± 2.5	PASS
		VN	40	-0.88	-0.000381	± 2.5	PASS
		VN	50	3.11	0.001348	± 2.5	PASS
	HCH	VN	-30	2.14	0.000925	± 2.5	PASS
		VN	-20	4.66	0.002015	± 2.5	PASS
		VN	-10	-0.98	-0.000424	± 2.5	PASS
		VN	0	4.92	0.002128	± 2.5	PASS
		VN	10	-1.72	-0.000744	± 2.5	PASS
		VN	20	4.77	0.002063	± 2.5	PASS
		VN	30	4.64	0.002006	± 2.5	PASS
		VN	40	-0.17	-0.000074	± 2.5	PASS
		VN	50	1.34	0.000579	± 2.5	PASS

Channel Bandwidth: 10 MHz

Channel Bandwidth: 10 MHz							
Voltage							
Modulation	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	MCH	VL	TN	0.000913	0.000913	± 2.5	PASS
		VN	TN	0.000736	0.000736	± 2.5	PASS
		VH	TN	0.001515	0.001515	± 2.5	PASS
16QAM	MCH	VL	TN	-0.07	-0.000030	± 2.5	PASS
		VN	TN	4.63	0.002004	± 2.5	PASS
		VH	TN	4.96	0.002147	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
16QAM	MCH	VN	-30	0.000935	0.000935	± 2.5	PASS
		VN	-20	0.001372	0.001372	± 2.5	PASS
		VN	-10	0.001654	0.001654	± 2.5	PASS
		VN	0	0.000606	0.000606	± 2.5	PASS
		VN	10	0.001697	0.001697	± 2.5	PASS
		VN	20	0.000957	0.000957	± 2.5	PASS
		VN	30	0.000632	0.000632	± 2.5	PASS

		VN	40	0.000892	0.000892	± 2.5	PASS
		VN	50	-0.000208	-0.000208	± 2.5	PASS
QPSK	MCH	VN	-30	0.000987	0.000987	± 2.5	PASS
		VN	-20	0.000065	0.000065	± 2.5	PASS
		VN	-10	-0.000554	-0.000554	± 2.5	PASS
		VN	0	0.000043	0.000043	± 2.5	PASS
		VN	10	0.001931	0.001931	± 2.5	PASS
		VN	20	0.001087	0.001087	± 2.5	PASS
		VN	30	-0.000576	-0.000576	± 2.5	PASS
		VN	40	0.000848	0.000848	± 2.5	PASS
		VN	50	-0.000463	-0.000463	± 2.5	PASS