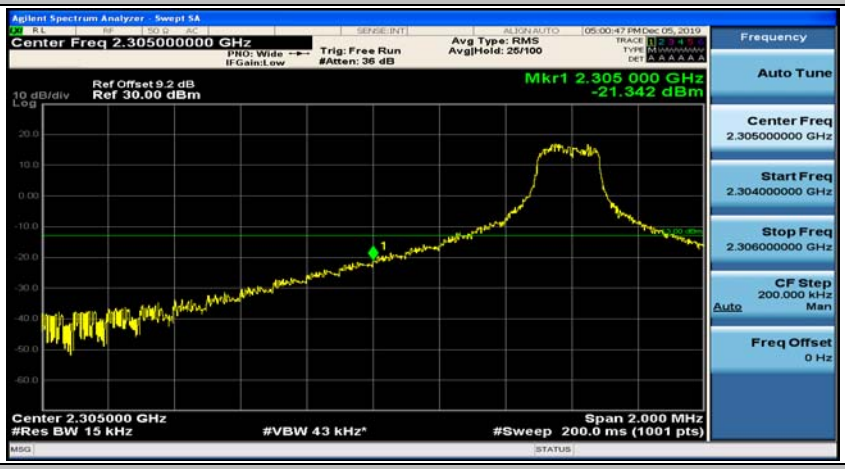
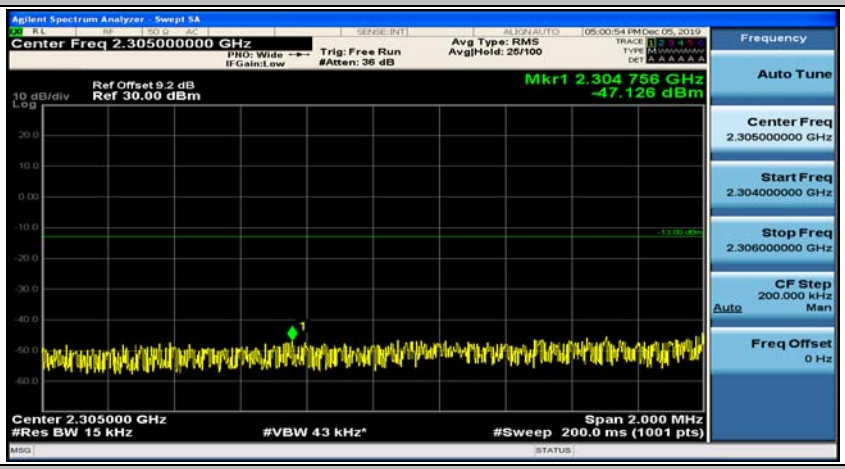
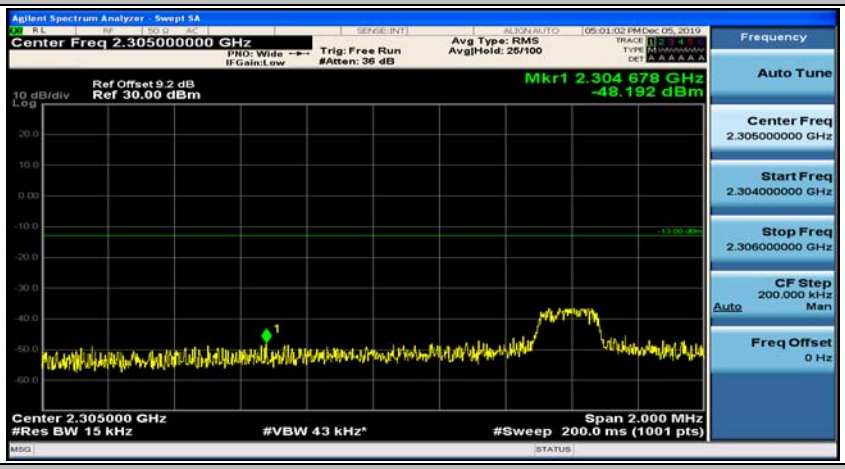
Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#0



Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#24

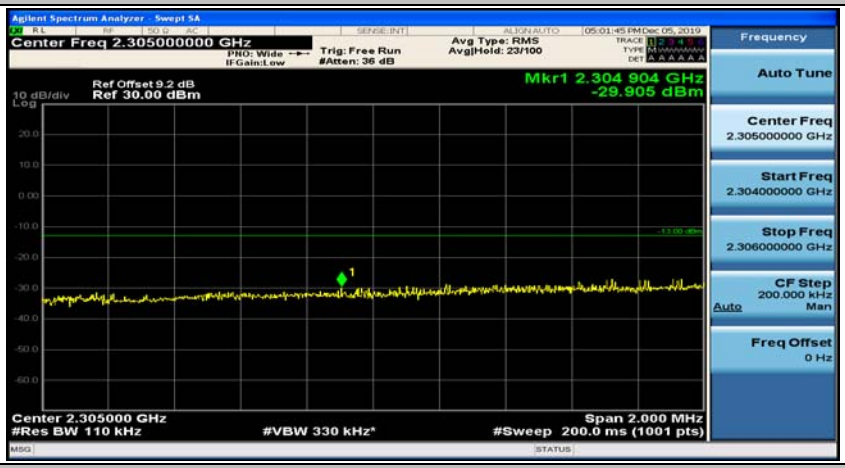


Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#49

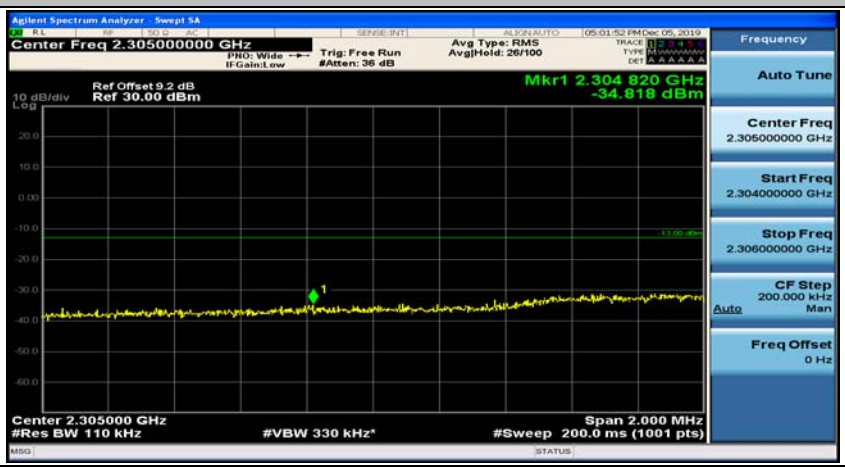


Channel Bandwidth: 10 MHz_MCH_16QAM_25RB#0

Channel Bandwidth: 10 MHz_MCH_16QAM_25RB#12

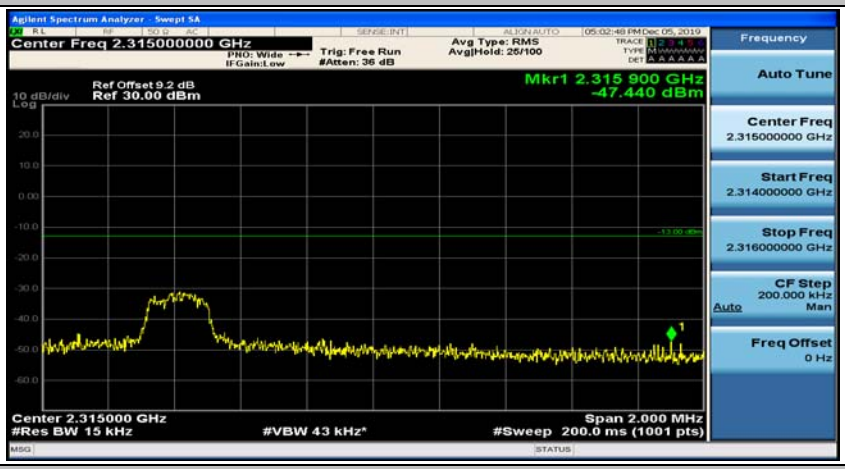


Channel Bandwidth: 10 MHz_MCH_16QAM_25RB#25

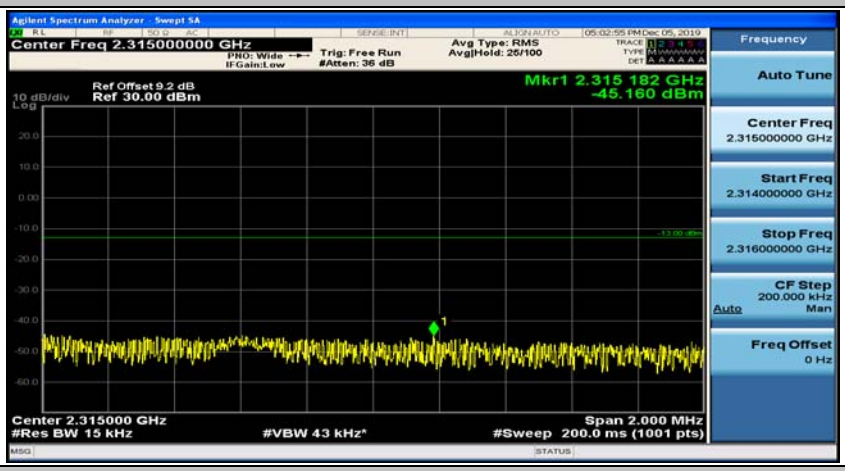


Channel Bandwidth: 10 MHz_MCH_16QAM_50RB#0

Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#0

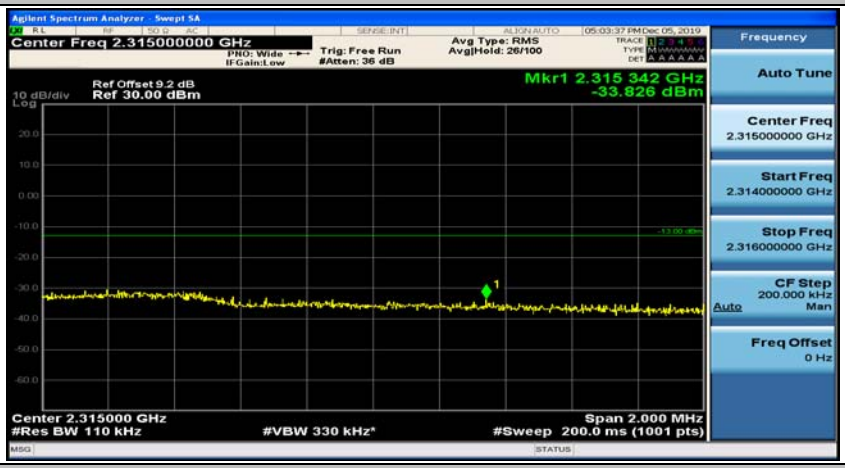


Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#24

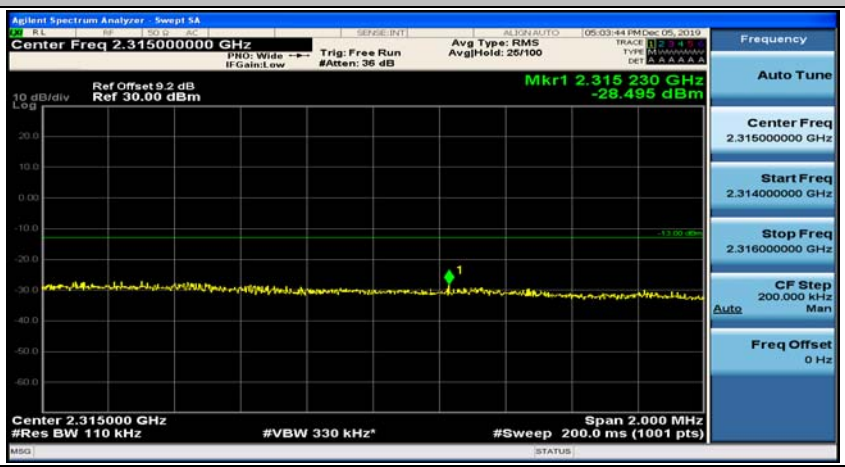


Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#49

Channel Bandwidth: 10 MHz_MCH_16QAM_25RB#0



Channel Bandwidth: 10 MHz_MCH_16QAM_25RB#12



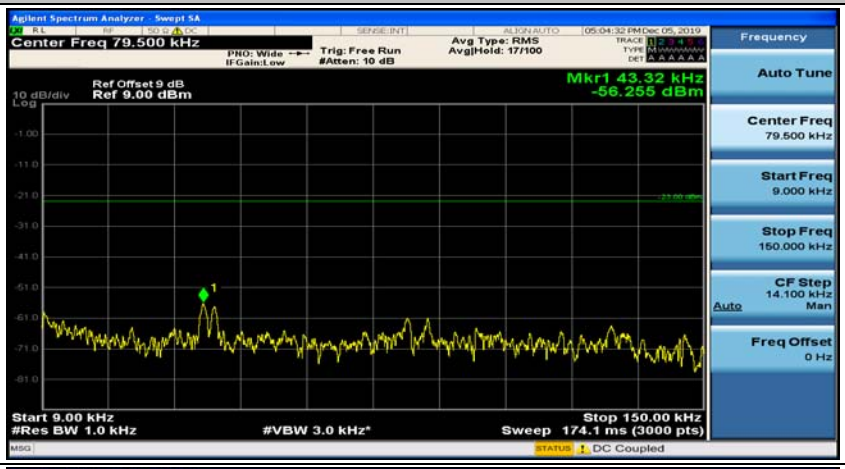
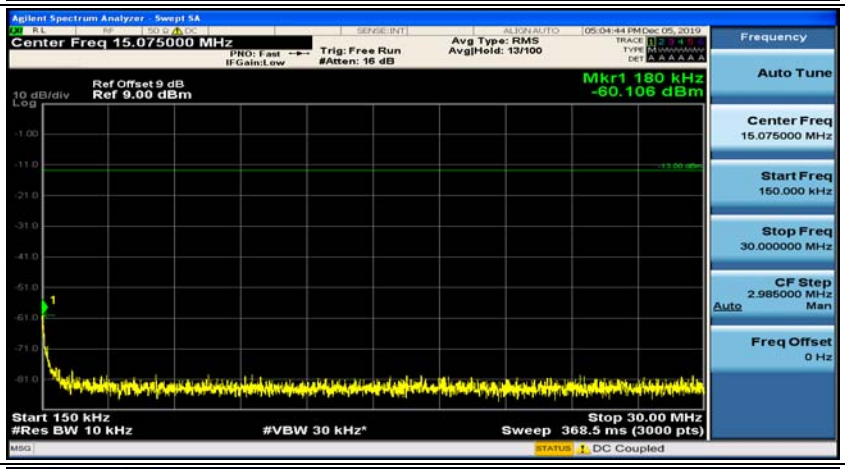
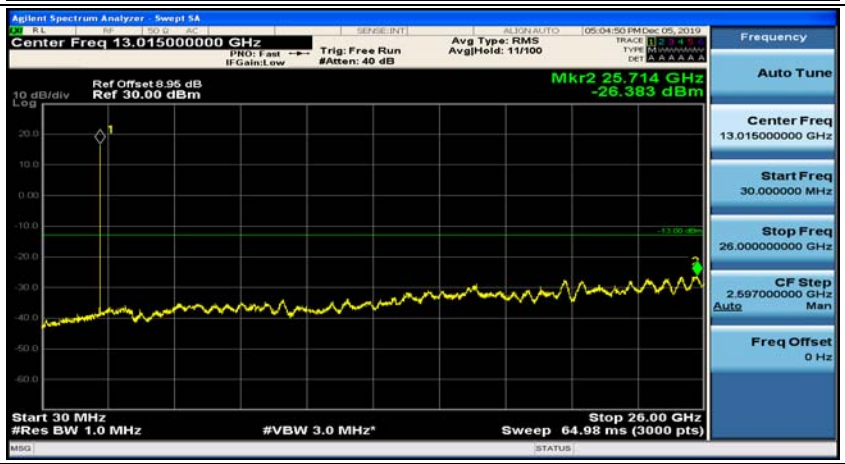
Channel Bandwidth: 10 MHz_MCH_16QAM_25RB#25

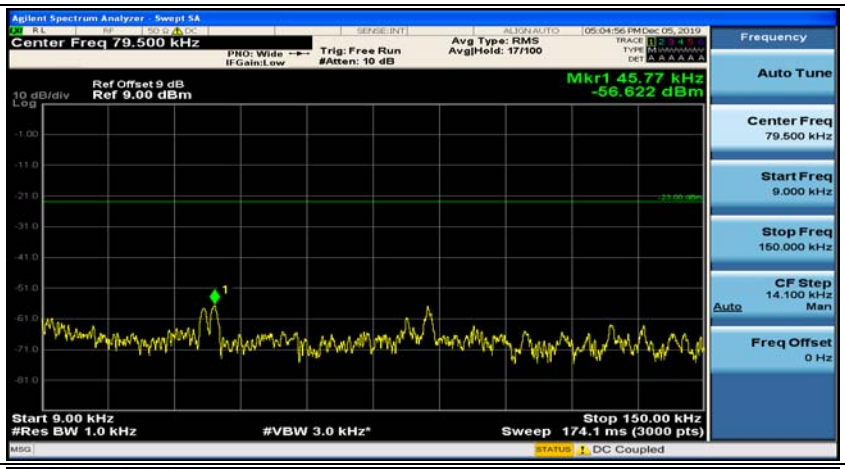
Channel Bandwidth: 10 MHz_MCH_16QAM_50RB#0

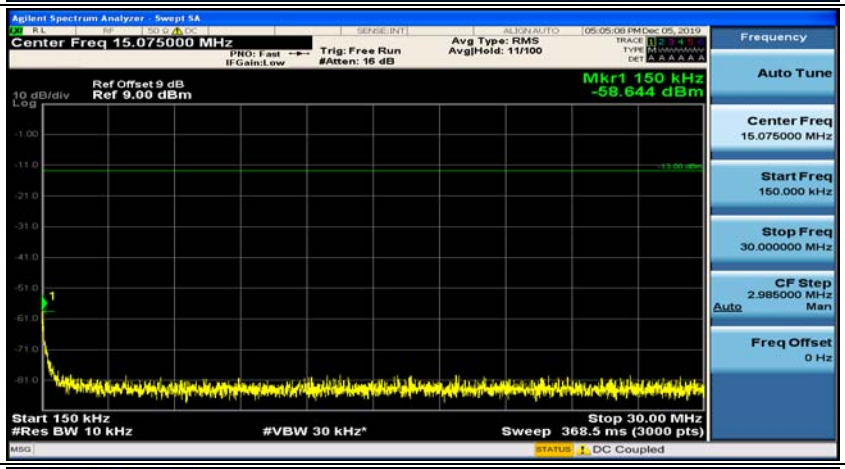
Appendix E: Conducted Spurious Emission

Test Graphs

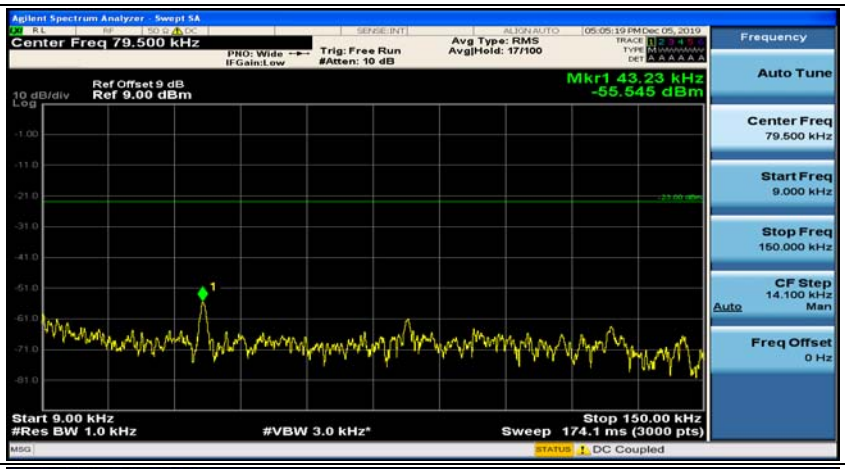
Channel Bandwidth: 5 MHz

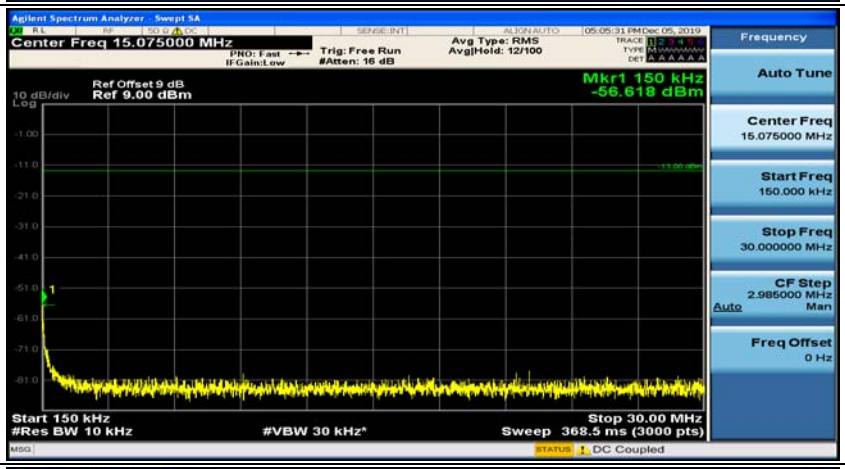
(Channel Bandwidth: 5 MHz)_LCH_QPSK_1RB#0



(Channel Bandwidth: 5 MHz)_LCH_QPSK_1RB#12

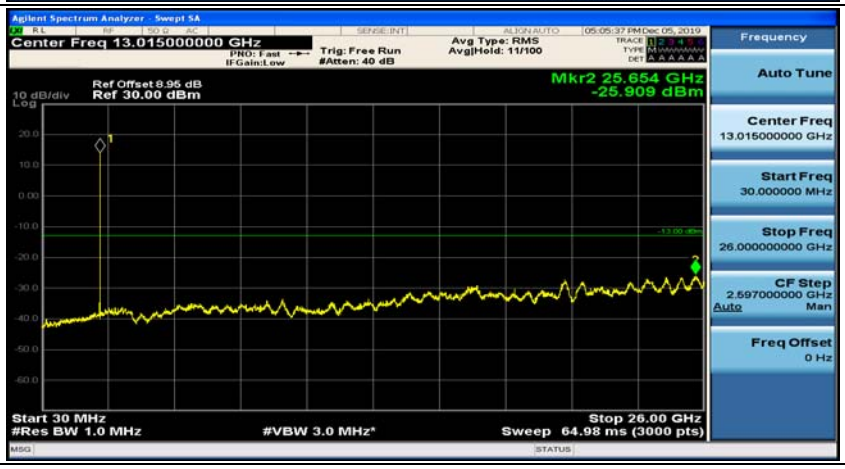




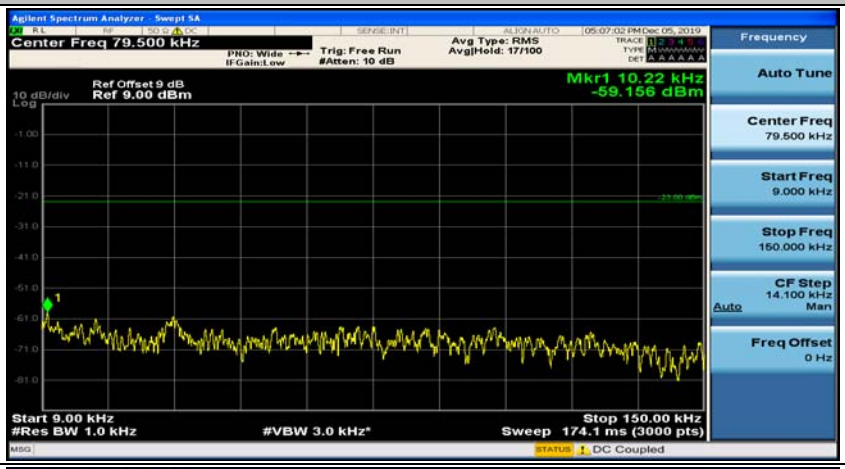
(Channel Bandwidth: 5 MHz)_LCH_QPSK_1RB#24

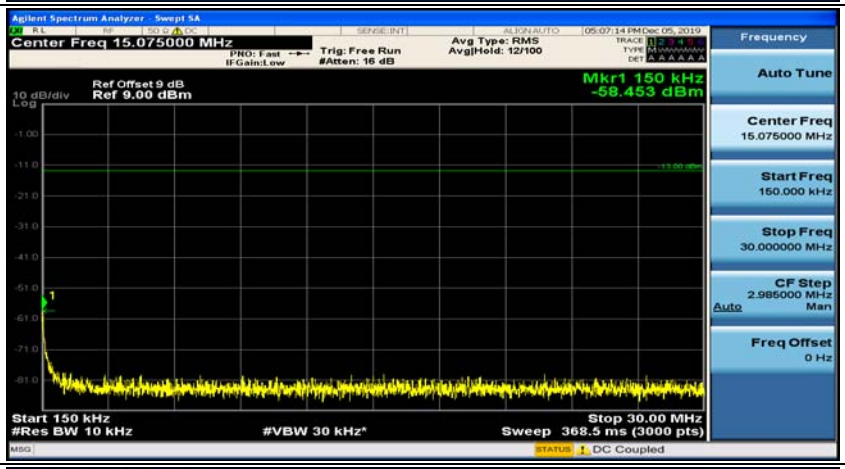

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 17/100
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 43.23 kHz
-55.545 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 ms (3000 pts)
DC Coupled
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

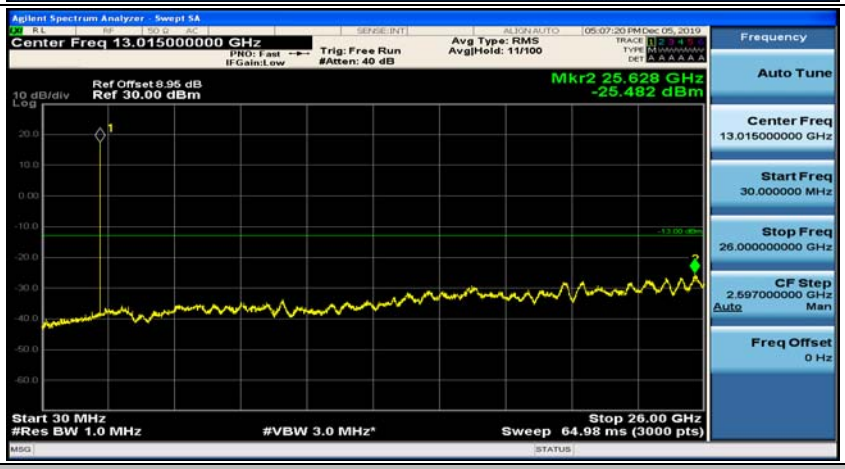

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 12/100
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 150 kHz
-56.618 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 ms (3000 pts)
DC Coupled
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: 11/100
Ref Offset 8.95 dB
10 dB/div
Ref 30.00 dBm
Mkr2 25.654 GHz
-25.909 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

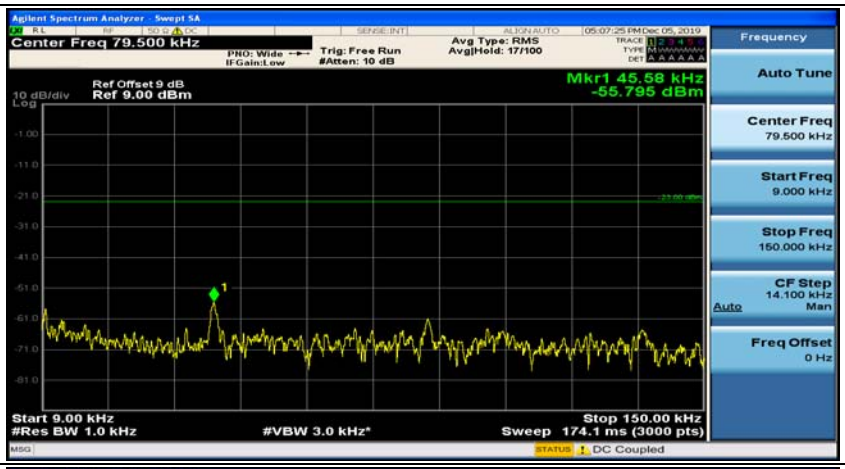
(Channel Bandwidth: 5 MHz)_HCH_QPSK_1RB#0

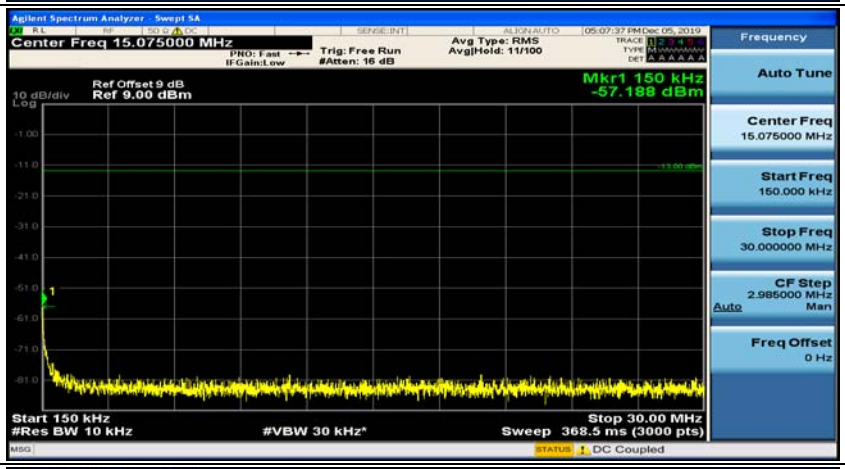


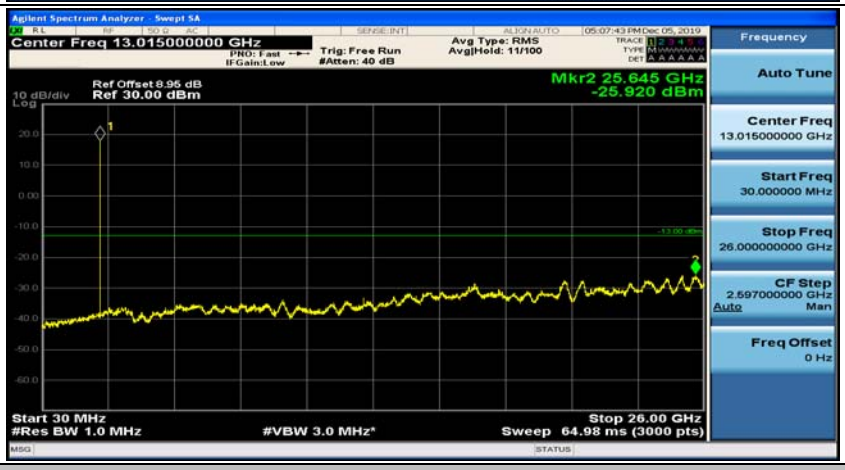




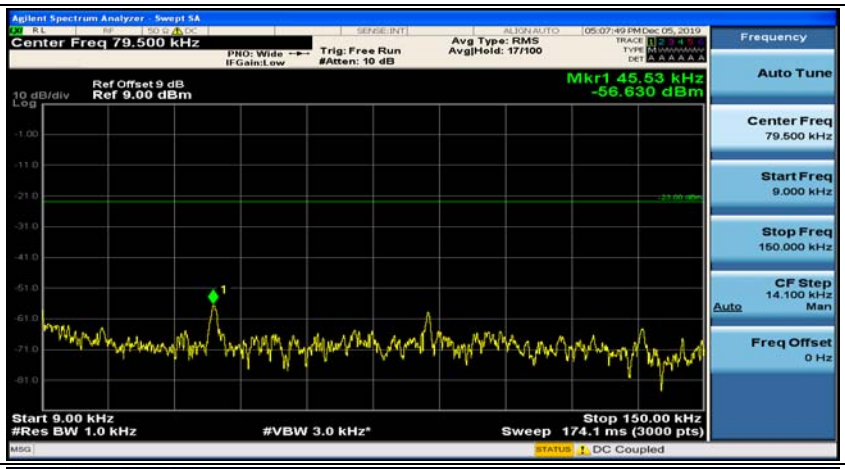
(Channel Bandwidth: 5 MHz)_HCH_QPSK_1RB#12

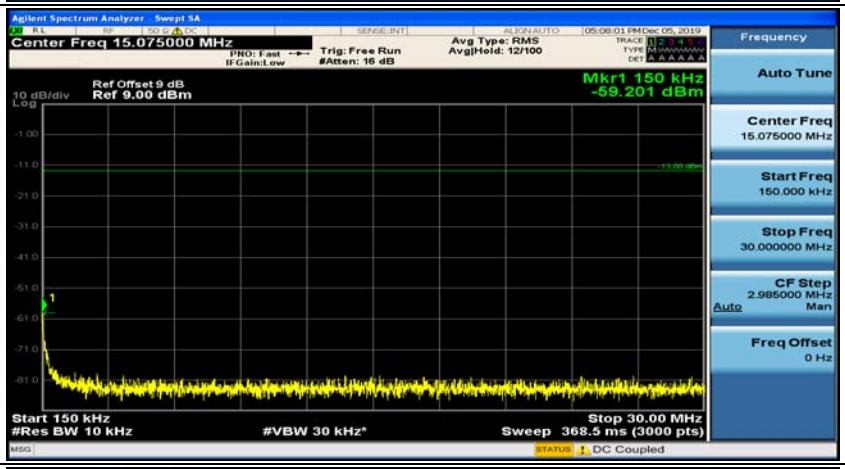


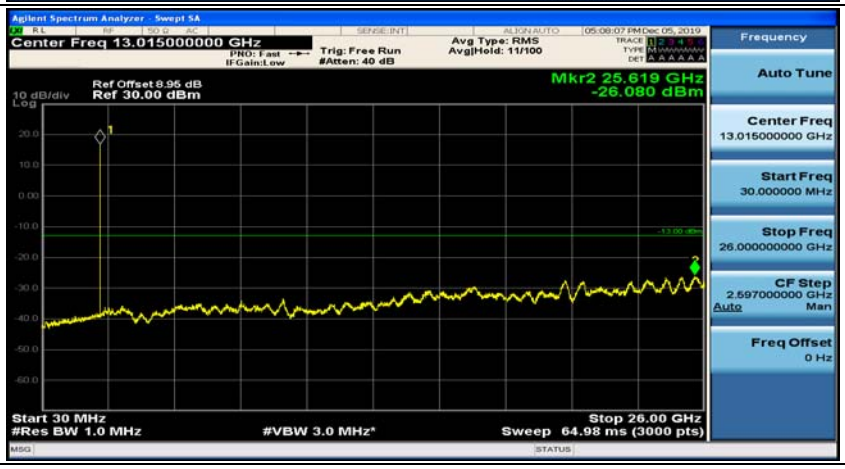




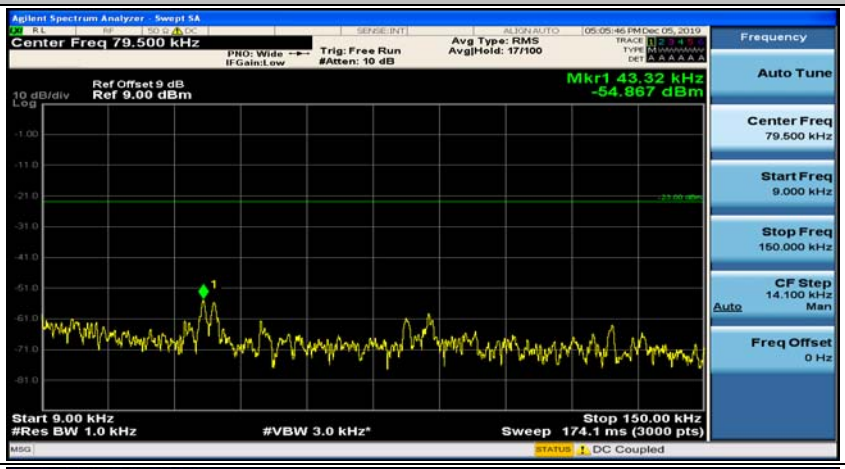
(Channel Bandwidth: 5 MHz)_HCH_QPSK_1RB#24

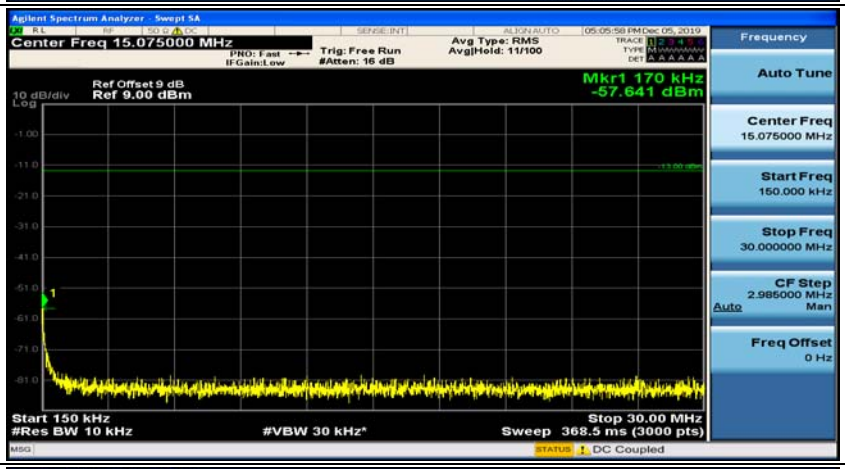

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 17/100
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 45.53 kHz
-56.630 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 ms (3000 pts)
DC Coupled
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

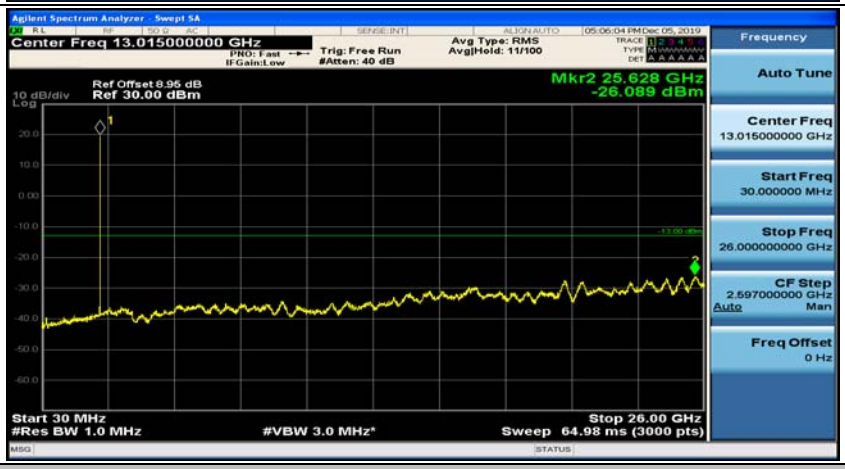

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 12/100
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 150 kHz
-59.201 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 ms (3000 pts)
DC Coupled
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: 11/100
Ref Offset 8.95 dB
10 dB/div
Ref 30.00 dBm
Mkr2 25.619 GHz
-26.080 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

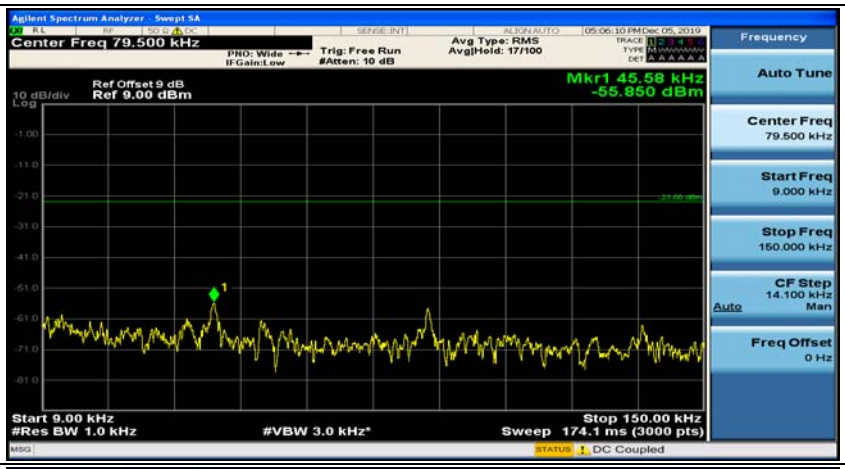
(Channel Bandwidth: 5 MHz)_LCH_16QAM_1RB#0

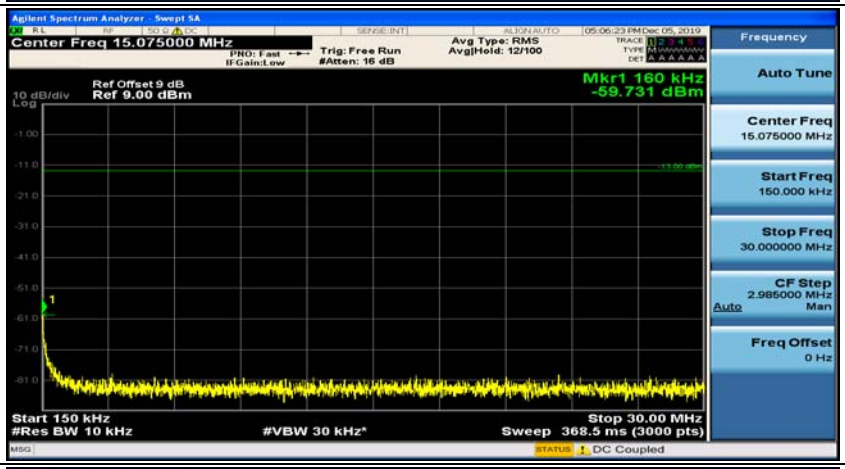


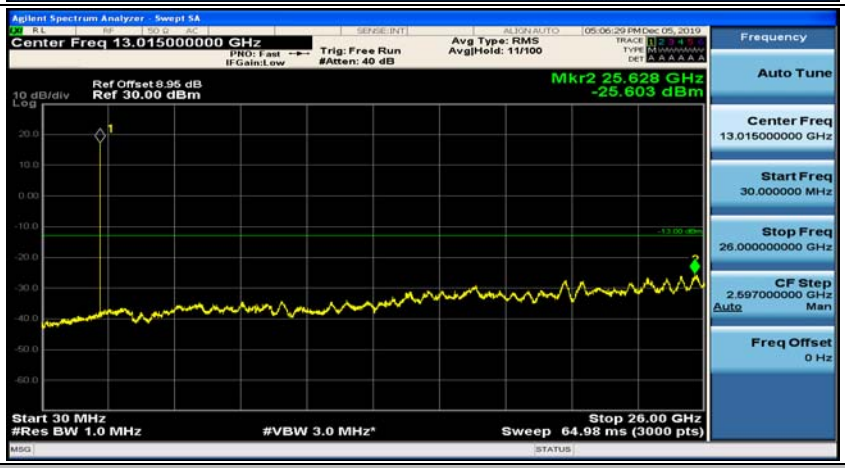




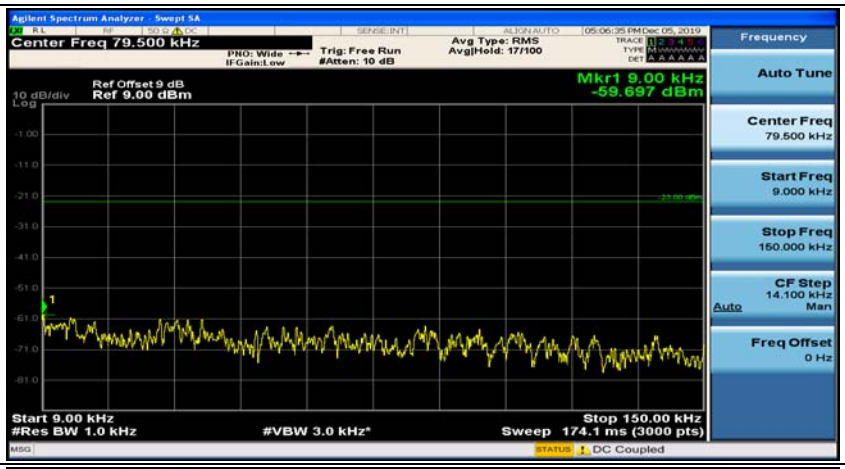
(Channel Bandwidth: 5 MHz)_LCH_16QAM_1RB#12

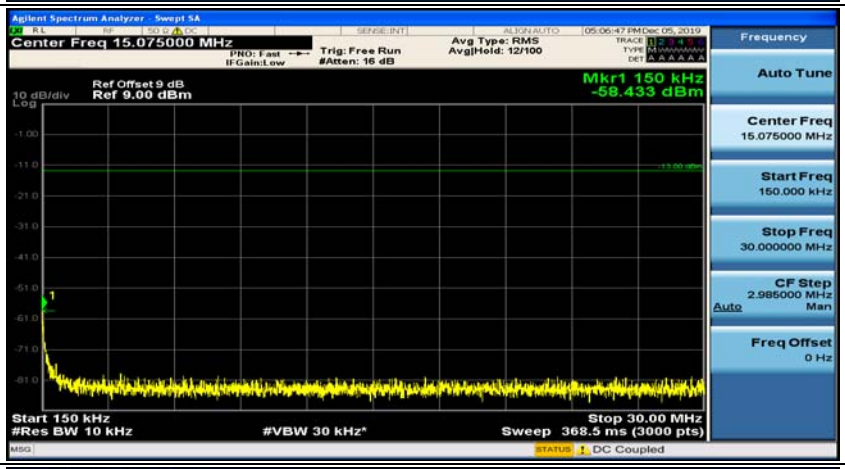


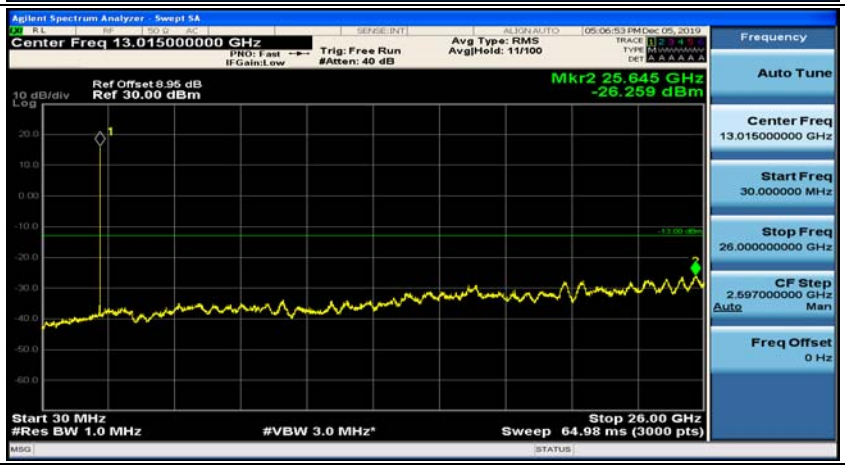




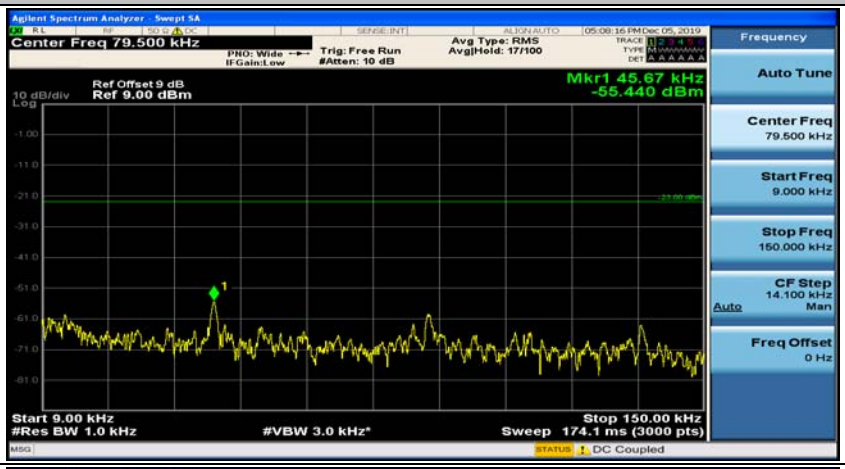
(Channel Bandwidth: 5 MHz)_LCH_16QAM_1RB#24

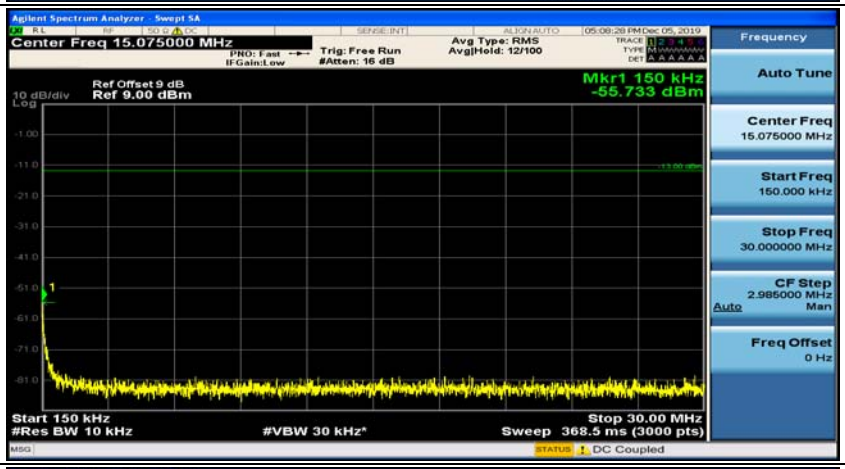

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 17/100
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 9.00 kHz
-59.697 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 ms (3000 pts)
DC Coupled
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

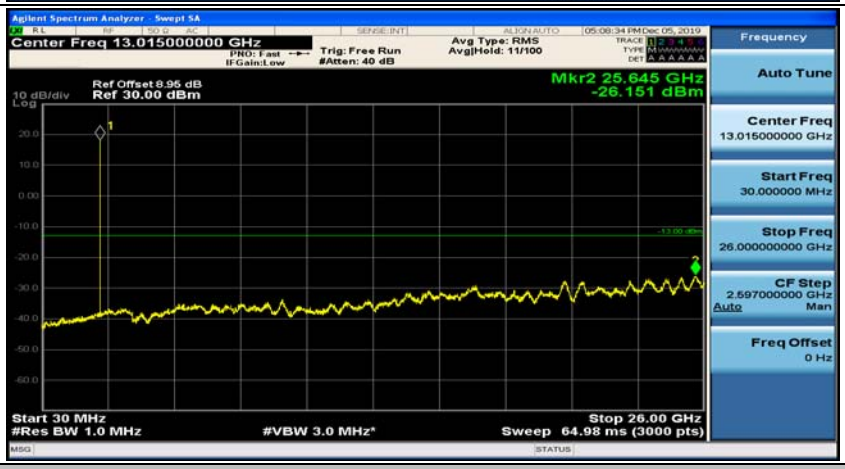

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 12/100
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 150 kHz
-58.433 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 ms (3000 pts)
DC Coupled
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: 11/100
Ref Offset 8.95 dB
10 dB/div
Ref 30.00 dBm
Mkr2 25.645 GHz
-26.259 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

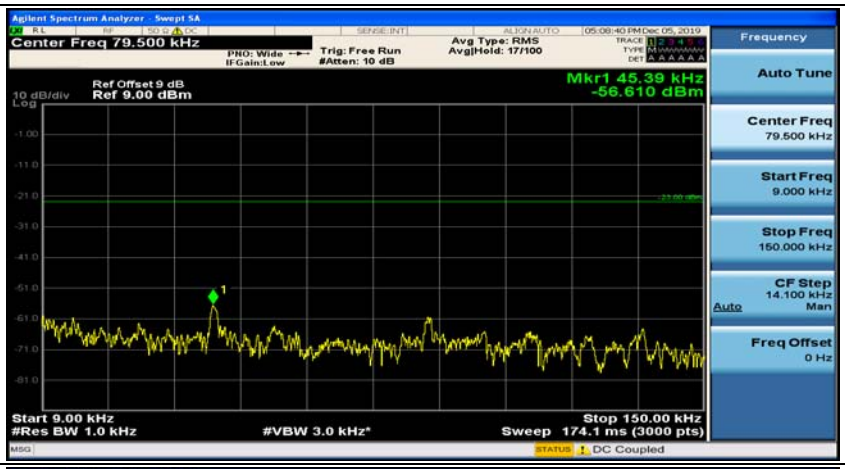
(Channel Bandwidth: 5 MHz)_HCH_16QAM_1RB#0

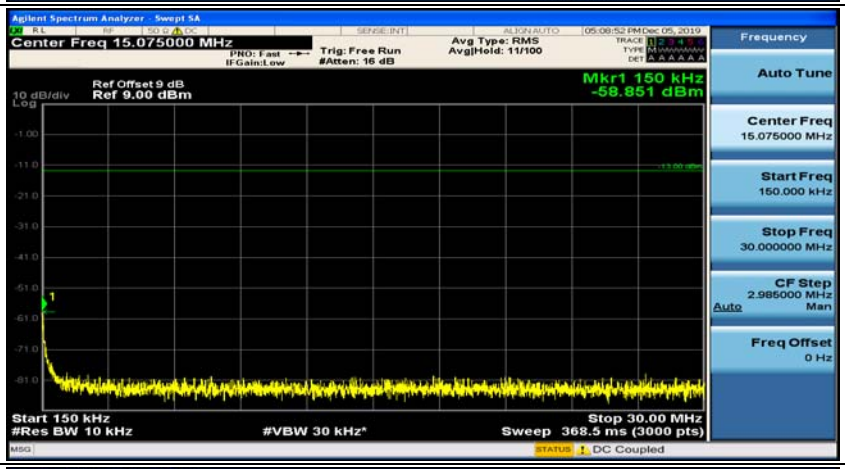




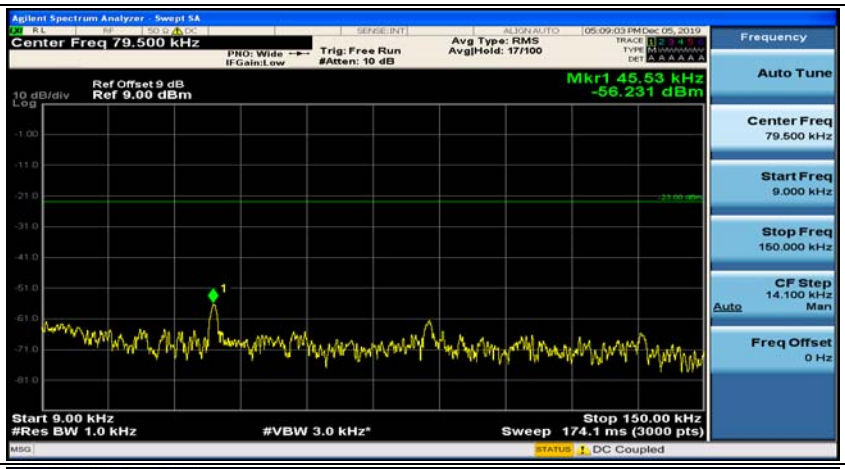


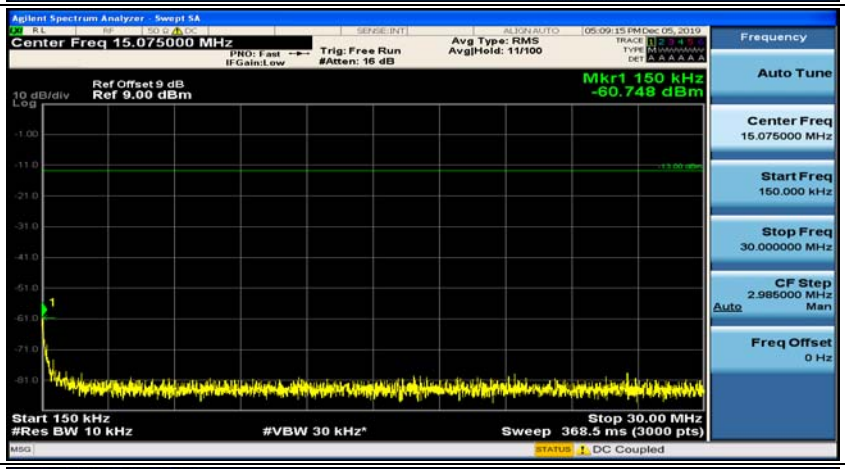
(Channel Bandwidth: 5 MHz)_HCH_16QAM_1RB#12

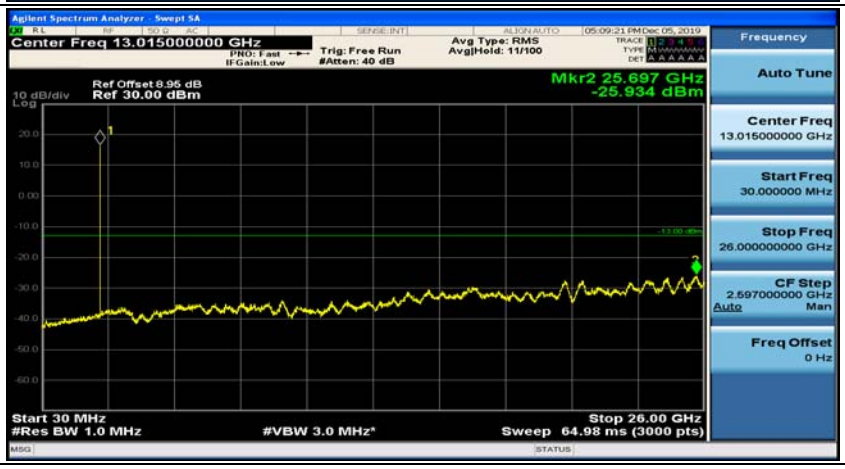




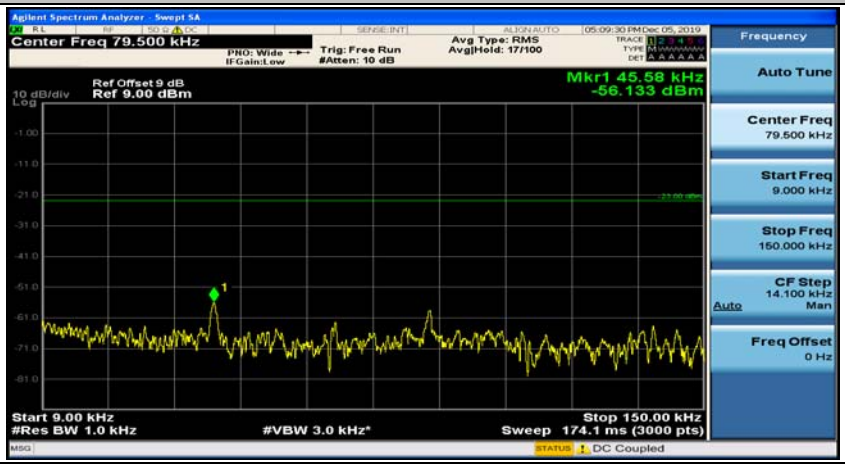
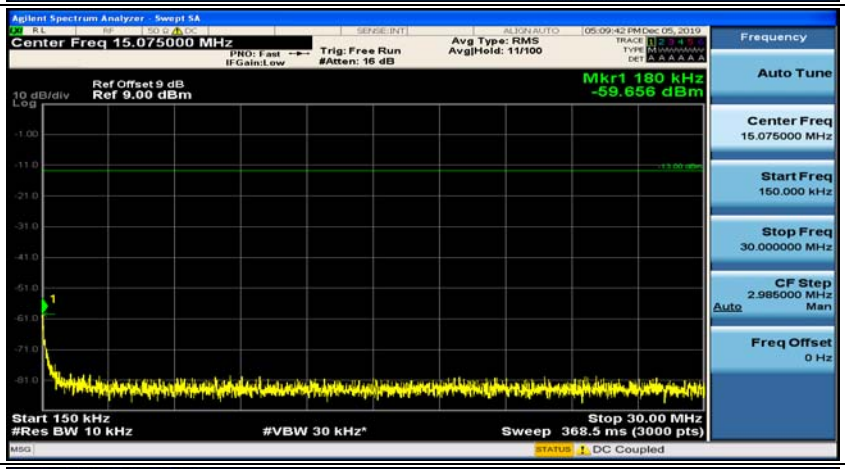
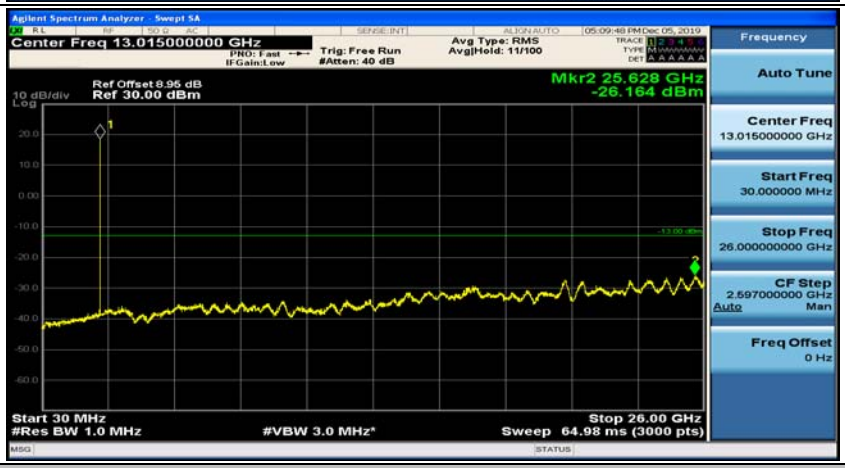
(Channel Bandwidth: 5 MHz)_HCH_16QAM_1RB#24

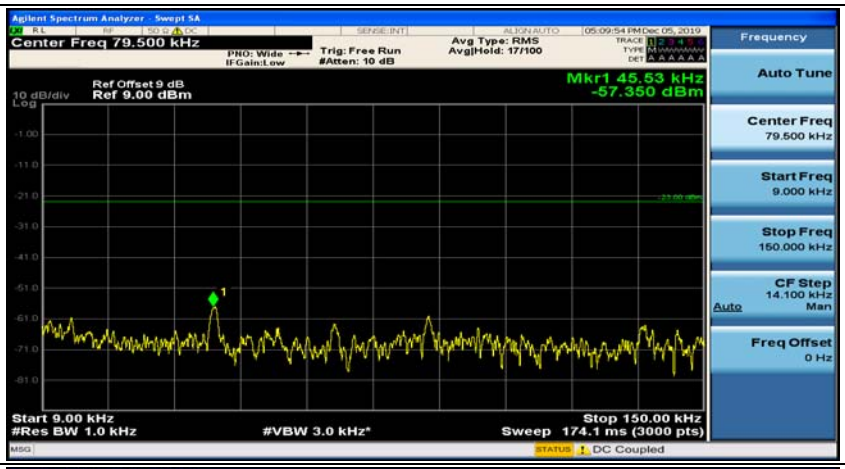

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 17/100
05:09:03 PM Dec 05, 2019
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 45.53 kHz
-56.231 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 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

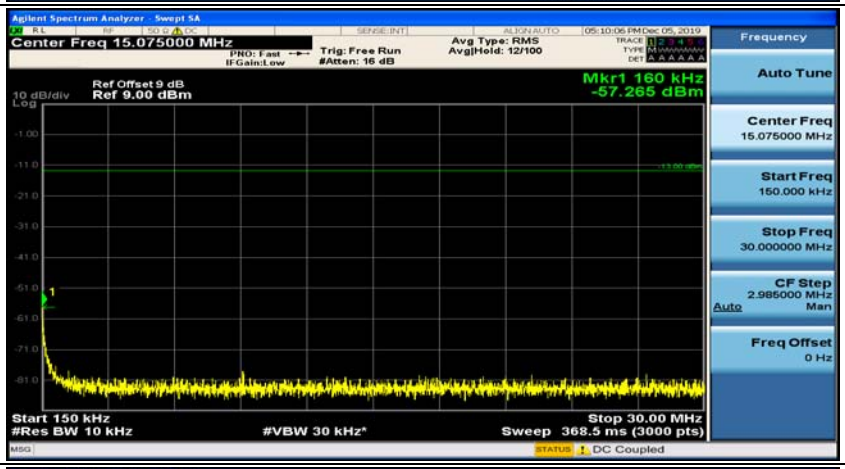

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 11/100
05:09:15 PM Dec 05, 2019
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 150 kHz
-60.748 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 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

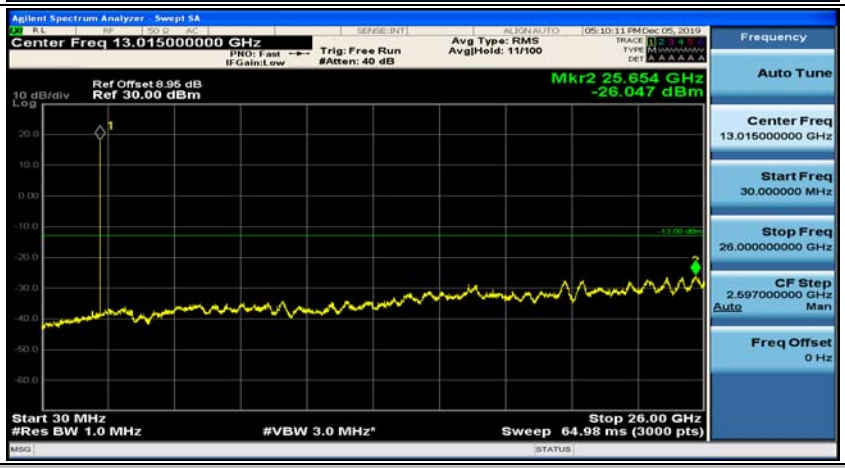

Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 11/100
05:09:21 PM Dec 05, 2019
Ref Offset 8.95 dB
10 dB/div
Ref 30.00 dBm
Mkr2 25.697 GHz
-25.934 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 GHz
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

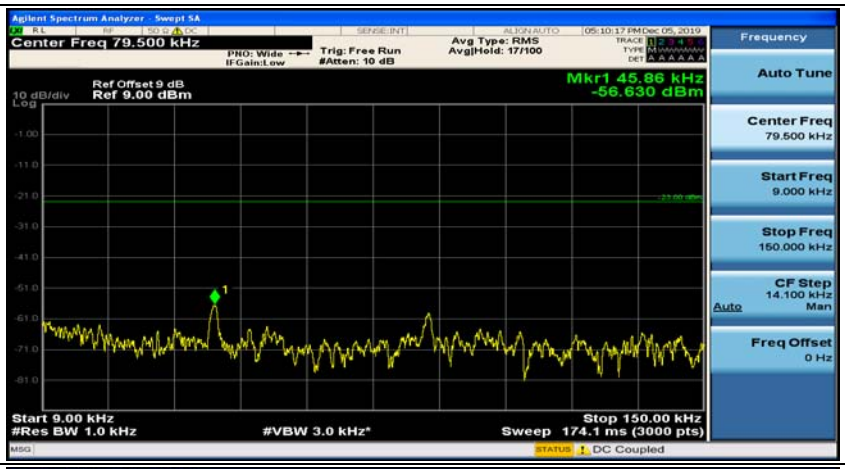
Channel Bandwidth: 10 MHz_MCH_QPSK_1RB#0



Channel Bandwidth: 10 MHz_MCH_QPSK_1RB#24

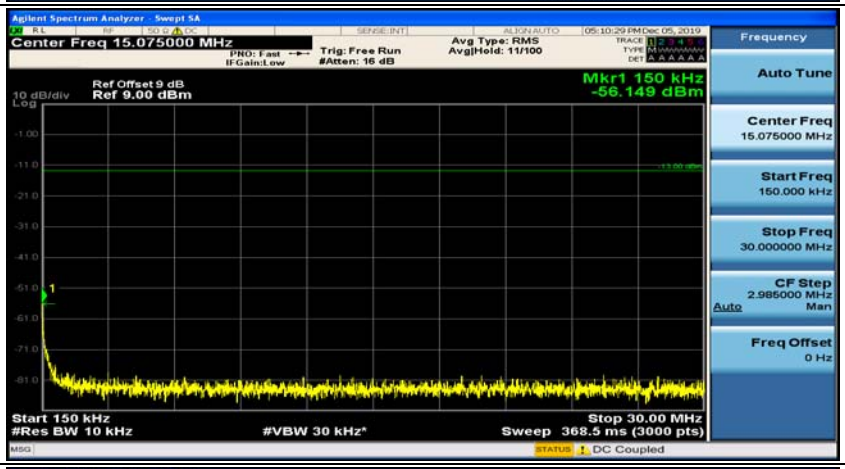


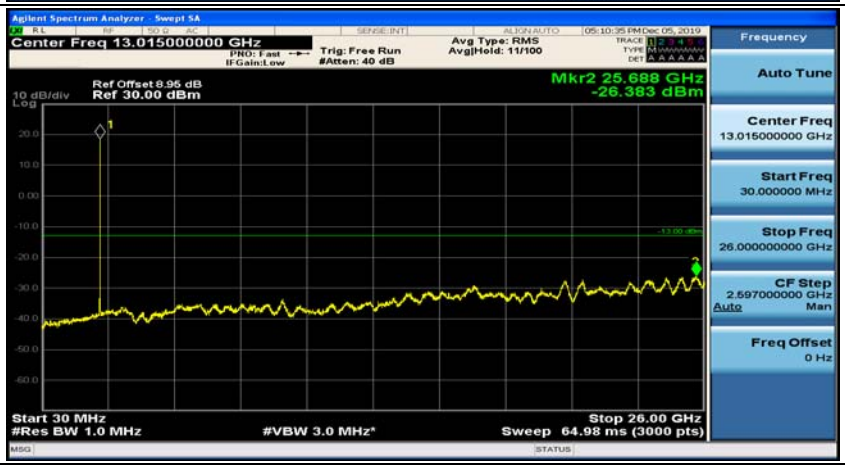


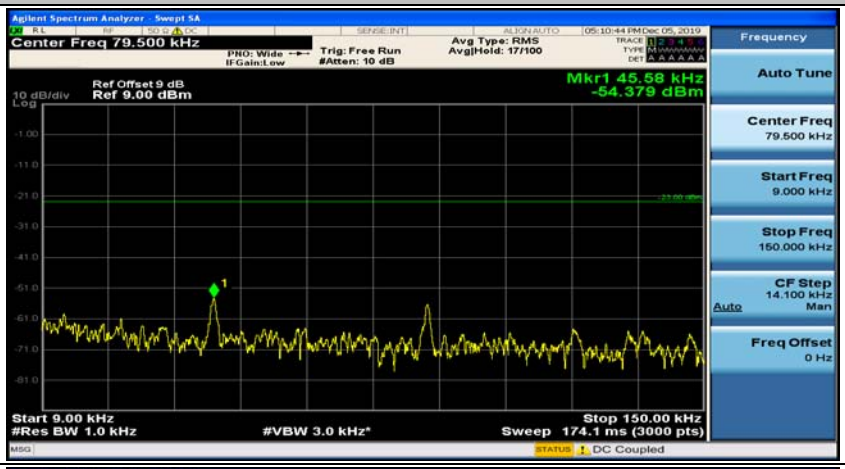
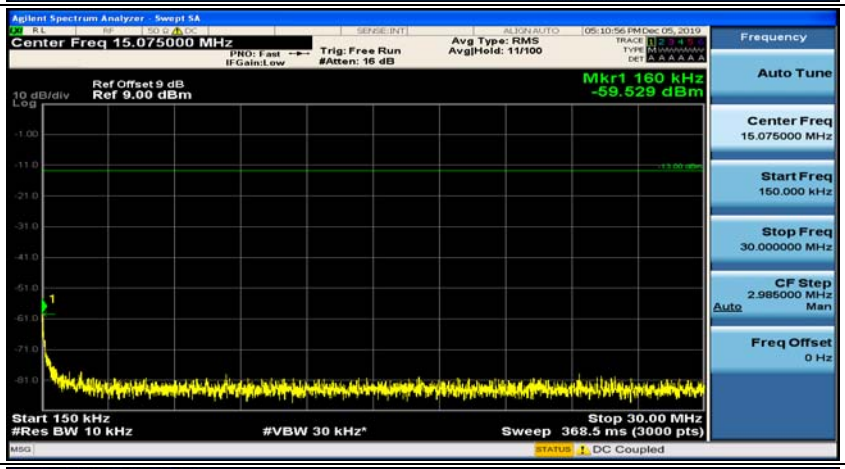
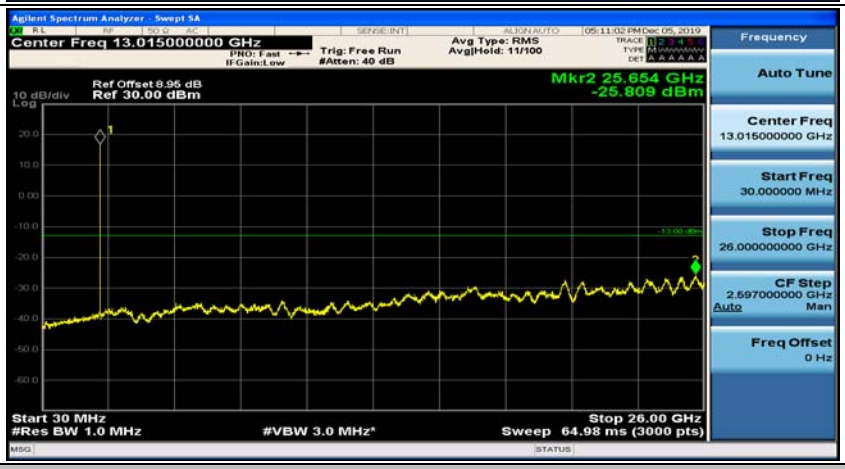


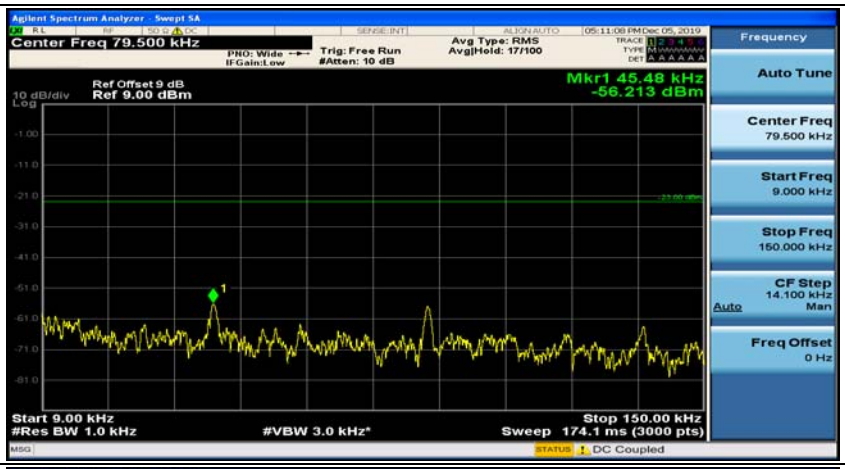
Channel Bandwidth: 10 MHz_MCH_QPSK_1RB#49

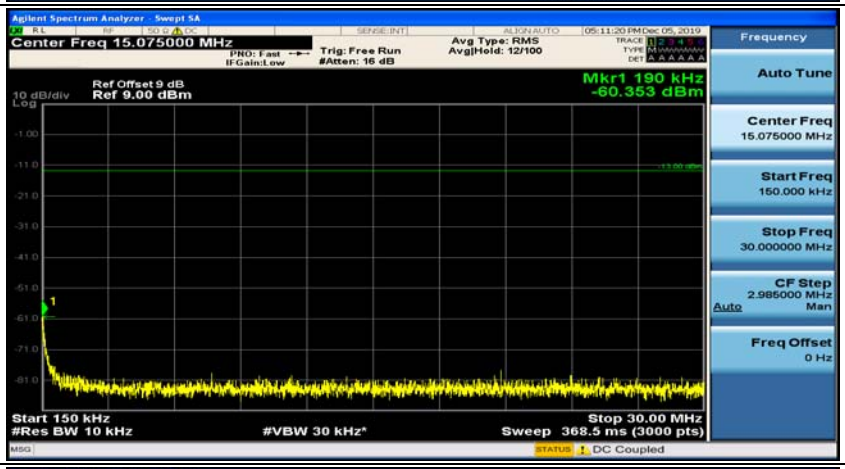

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 17/100
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 45.86 kHz
-56.630 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 174.1 ms (3000 pts)
DC Coupled
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: 11/100
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 150 kHz
-56.149 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

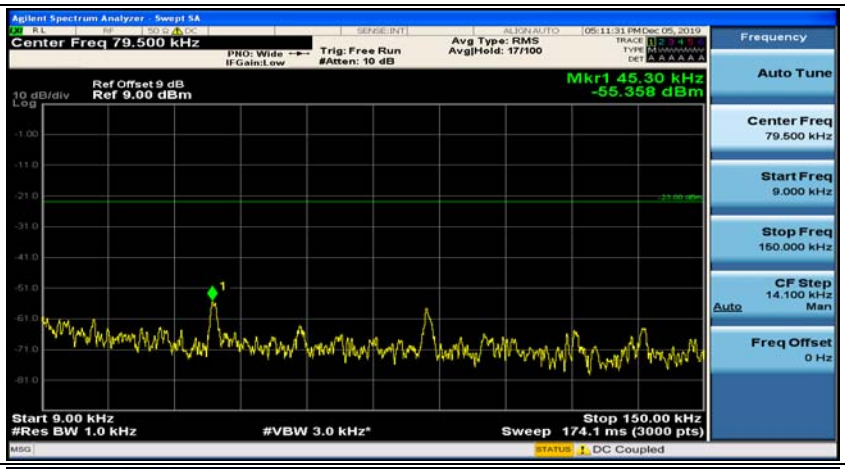

Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 11/100
Ref Offset 8.95 dB
10 dB/div
Ref 30.00 dBm
Mkr2 25.688 GHz
-26.383 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 GHz
Sweep 64.98 ms (3000 pts)
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

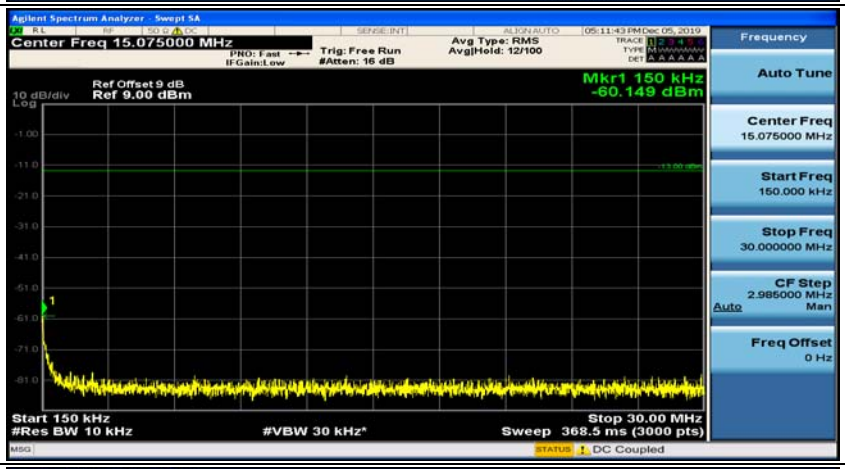
Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#0



Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#24

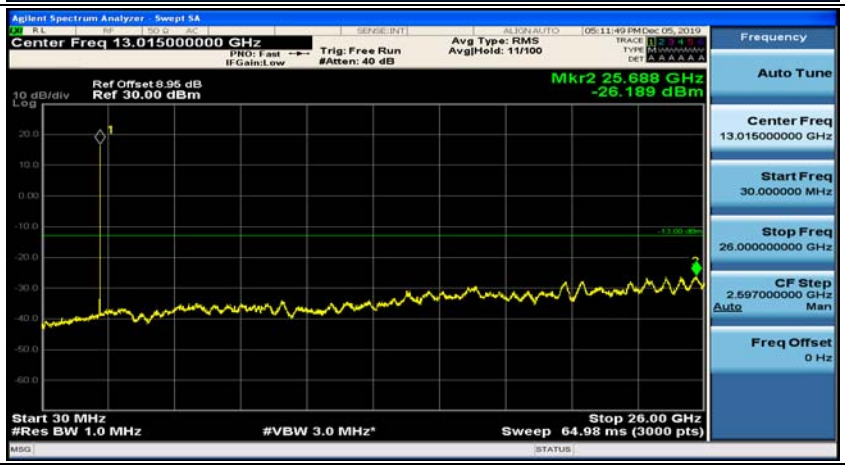




Channel Bandwidth: 10 MHz_MCH_16QAM_1RB#49


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: 17/100
05:11:31 PM Dec 05, 2019
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 45.30 kHz
-55.358 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: 12/100
05:11:43 PM Dec 05, 2019
Ref Offset 9 dB
10 dB/div
Ref 9.00 dBm
Mkr1 150 kHz
-60.149 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: 11/100
05:11:49 PM Dec 05, 2019
Ref Offset 8.95 dB
10 dB/div
Ref 30.00 dBm
Mkr2 25.688 GHz
-26.189 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	0.16	0.000069	± 2.5	PASS
		VN	TN	0.15	0.000065	± 2.5	PASS
		VH	TN	2.5	0.001083	± 2.5	PASS
	HCH	VL	TN	3.07	0.001328	± 2.5	PASS
		VN	TN	1.49	0.000644	± 2.5	PASS
		VH	TN	-0.47	-0.000203	± 2.5	PASS
16QAM	LCH	VL	TN	-0.97	-0.000420	± 2.5	PASS
		VN	TN	1.44	0.000624	± 2.5	PASS
		VH	TN	3.48	0.001508	± 2.5	PASS
	HCH	VL	TN	-0.35	-0.000151	± 2.5	PASS
		VN	TN	-1.47	-0.000636	± 2.5	PASS
		VH	TN	4.63	0.002002	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	2.45	0.001062	± 2.5	PASS
		VN	-20	2.68	0.001161	± 2.5	PASS
		VN	-10	-0.68	-0.000295	± 2.5	PASS
		VN	0	-1.58	-0.000685	± 2.5	PASS
		VN	10	4.39	0.001902	± 2.5	PASS
		VN	20	1.17	0.000507	± 2.5	PASS
		VN	30	1.86	0.000806	± 2.5	PASS
		VN	40	-0.86	-0.000373	± 2.5	PASS
		VN	50	4.15	0.001798	± 2.5	PASS
	HCH	VN	-30	4.99	0.002158	± 2.5	PASS
		VN	-20	-0.7	-0.000303	± 2.5	PASS
		VN	-10	0.3	0.000130	± 2.5	PASS
		VN	0	2.9	0.001254	± 2.5	PASS
		VN	10	-1.71	-0.000739	± 2.5	PASS
		VN	20	-0.98	-0.000424	± 2.5	PASS
		VN	30	1.5	0.000649	± 2.5	PASS
		VN	40	4.12	0.001782	± 2.5	PASS

		VN	50	4.68	0.002024	± 2.5	PASS
16QAM	LCH	VN	-30	-1.3	-0.000563	± 2.5	PASS
		VN	-20	-0.23	-0.000100	± 2.5	PASS
		VN	-10	0.04	0.000017	± 2.5	PASS
		VN	0	3.72	0.001612	± 2.5	PASS
		VN	10	2.27	0.000984	± 2.5	PASS
		VN	20	0.05	0.000022	± 2.5	PASS
		VN	30	4.88	0.002115	± 2.5	PASS
		VN	40	-0.47	-0.000204	± 2.5	PASS
		VN	50	2.59	0.001122	± 2.5	PASS
	HCH	VN	-30	-0.35	-0.000151	± 2.5	PASS
		VN	-20	4.29	0.001855	± 2.5	PASS
		VN	-10	2.66	0.001150	± 2.5	PASS
		VN	0	3.24	0.001401	± 2.5	PASS
		VN	10	4.6	0.001989	± 2.5	PASS
		VN	20	-0.41	-0.000177	± 2.5	PASS
		VN	30	1.49	0.000644	± 2.5	PASS
		VN	40	0.36	0.000156	± 2.5	PASS
		VN	50	0.87	0.000376	± 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	1.09	0.000472	± 2.5	PASS
		VN	TN	1.93	0.000835	± 2.5	PASS
		VH	TN	-0.95	-0.000411	± 2.5	PASS
16QAM	MCH	VL	TN	0.8	0.000346	± 2.5	PASS
		VN	TN	3.43	0.001485	± 2.5	PASS
		VH	TN	2.15	0.000931	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	MCH	VN	-30	1.09	0.000472	± 2.5	PASS
		VN	-20	1.93	0.000835	± 2.5	PASS
		VN	-10	-0.95	-0.000411	± 2.5	PASS
		VN	0	-0.25	-0.000108	± 2.5	PASS
		VN	10	0.74	0.000320	± 2.5	PASS
		VN	20	3.87	0.001675	± 2.5	PASS
		VN	30	2.49	0.001078	± 2.5	PASS
		VN	40	2.01	0.000870	± 2.5	PASS
		VN	50	0.79	0.000342	± 2.5	PASS
16QAM	MCH	VN	-30	2.72	0.001177	± 2.5	PASS
		VN	-20	0.75	0.000325	± 2.5	PASS
		VN	-10	2.93	0.001268	± 2.5	PASS
		VN	0	-1.02	-0.000442	± 2.5	PASS
		VN	10	2.45	0.001061	± 2.5	PASS
		VN	20	-0.53	-0.000229	± 2.5	PASS
		VN	30	3.78	0.001636	± 2.5	PASS
		VN	40	4.5	0.001948	± 2.5	PASS
		VN	50	4.85	0.002100	± 2.5	PASS