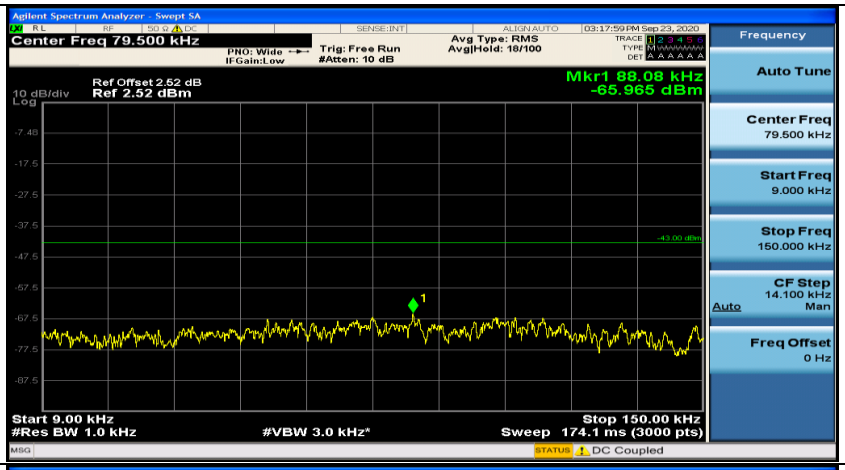
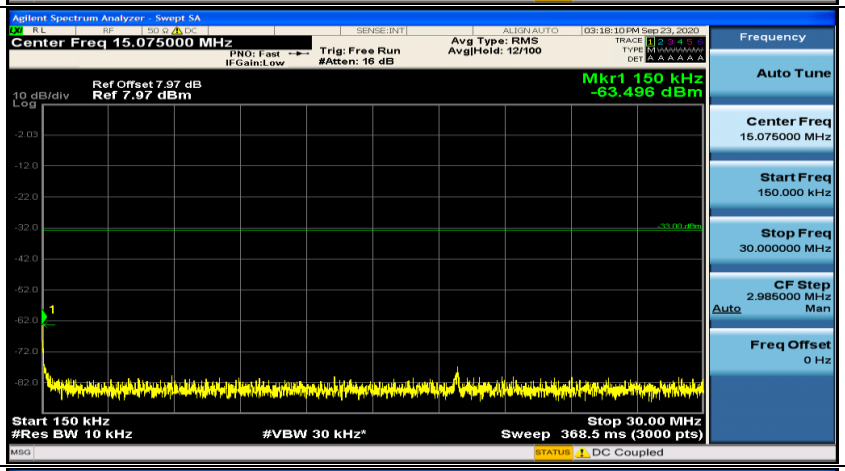
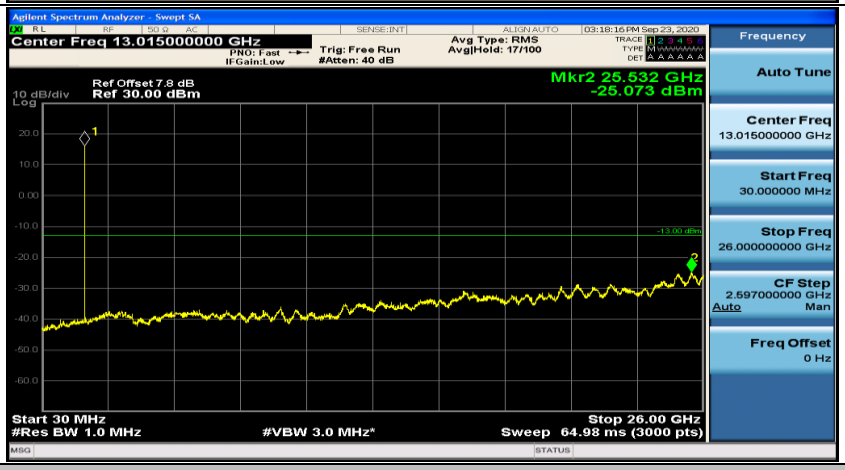
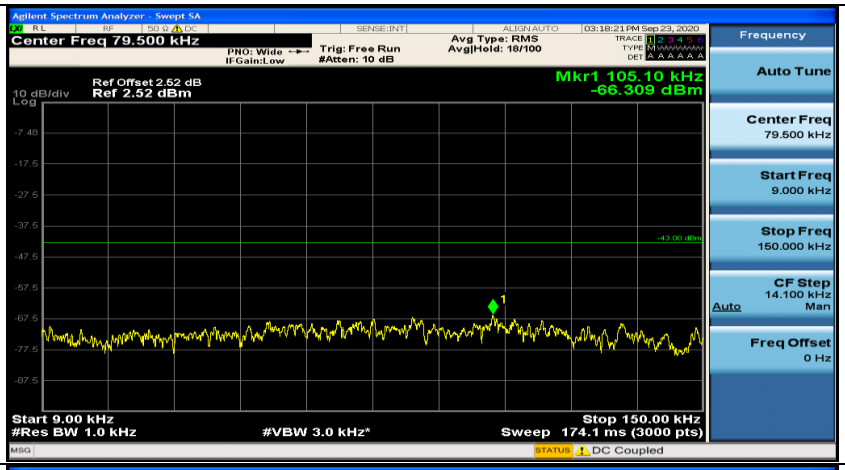
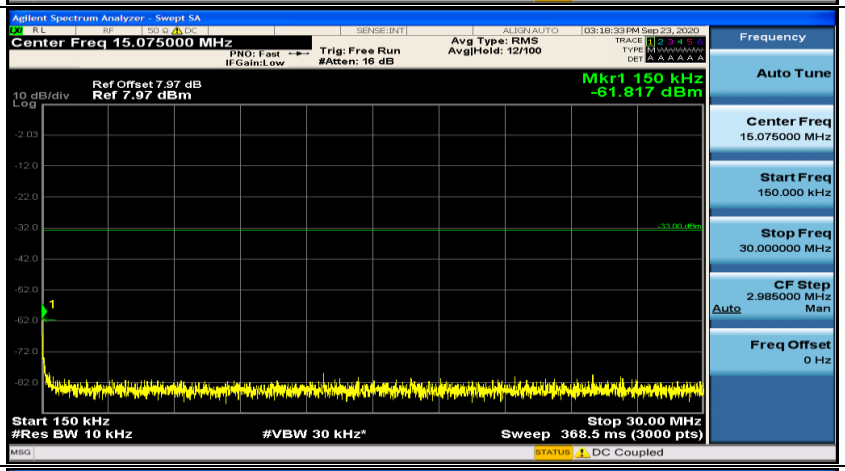


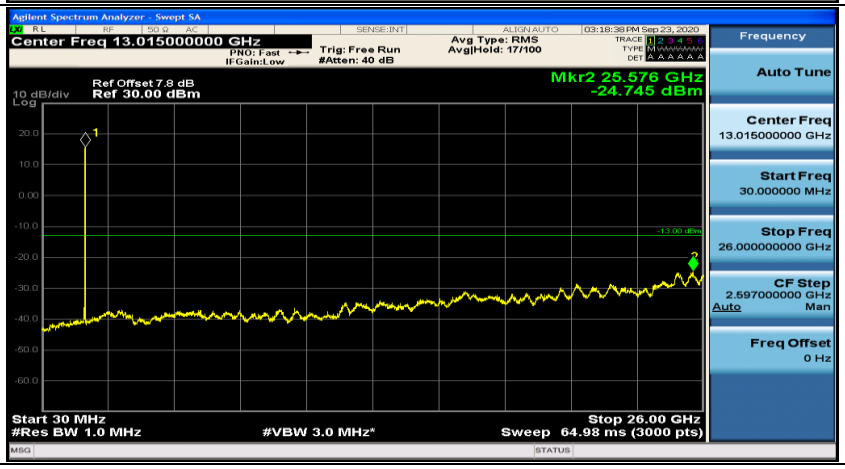




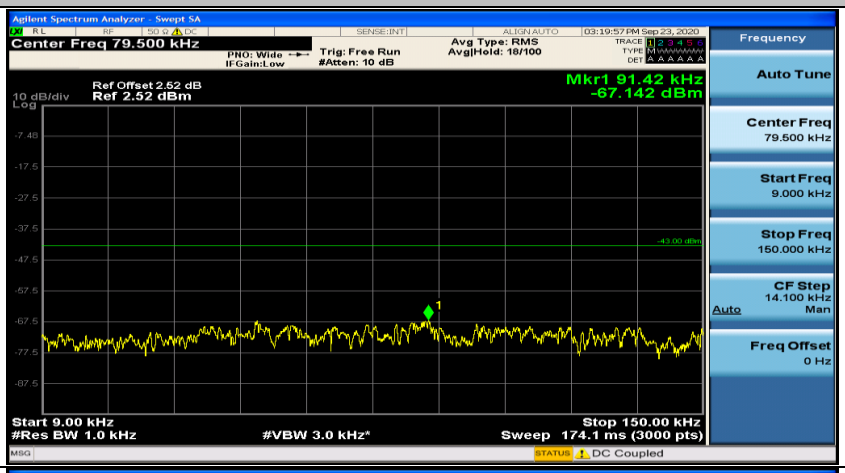
(Channel Bandwidth:20 MHz)_LCH_QPSK_1RB#99

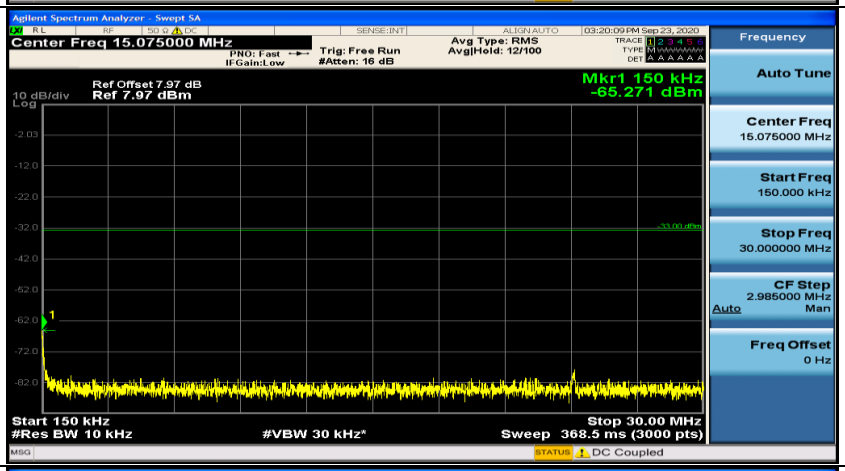

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 16/100
03:18:21 PM Sep 23, 2020
Ref Offset 2.52 dB
10 dB/div
Ref 2.52 dBm
Mkr1 105.10 kHz
-66.309 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 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

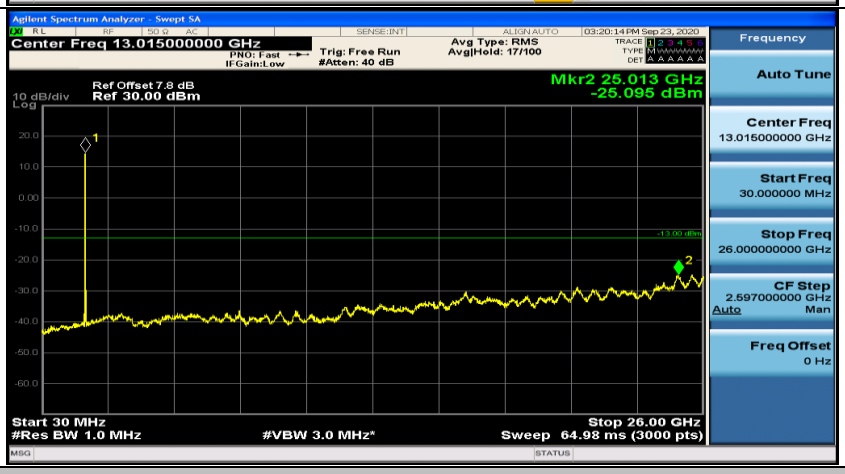

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 12/100
03:18:33 PM Sep 23, 2020
Ref Offset 7.97 dB
10 dB/div
Ref 7.97 dBm
Mkr1 150 kHz
-61.817 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 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
03:18:38 PM Sep 23, 2020
Ref Offset 7.8 dB
10 dB/div
Ref 30.00 dBm
Mkr2 25.576 GHz
-24.745 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

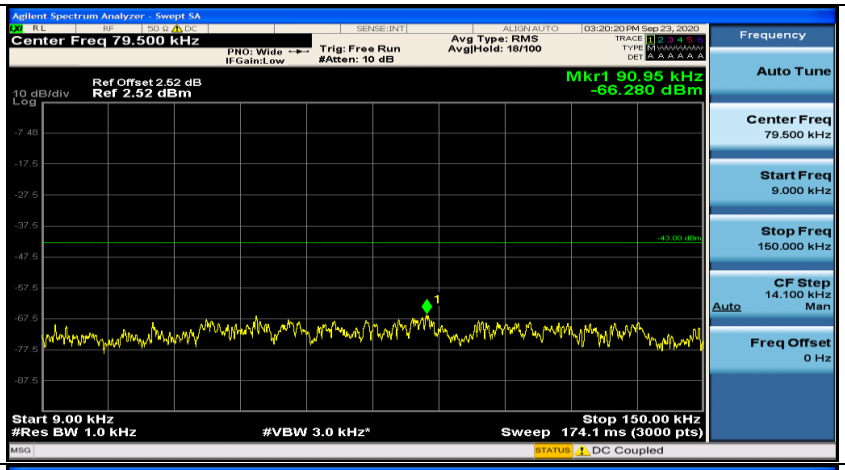
(Channel Bandwidth:20 MHz)_MCH_QPSK_1RB#0

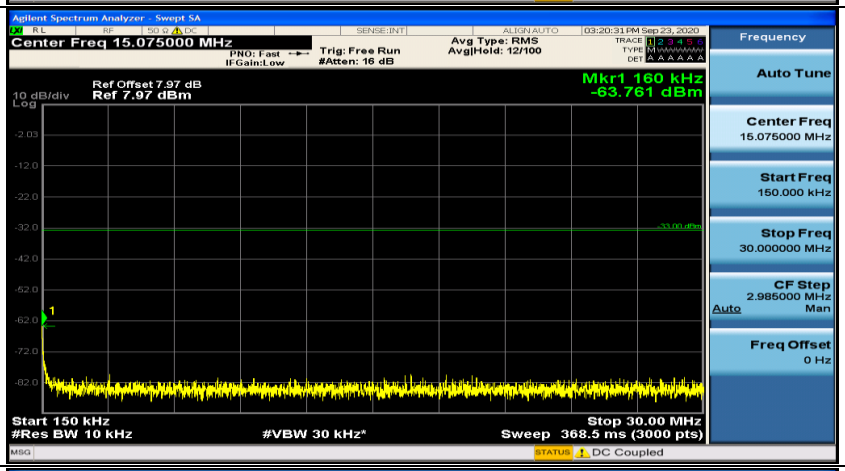


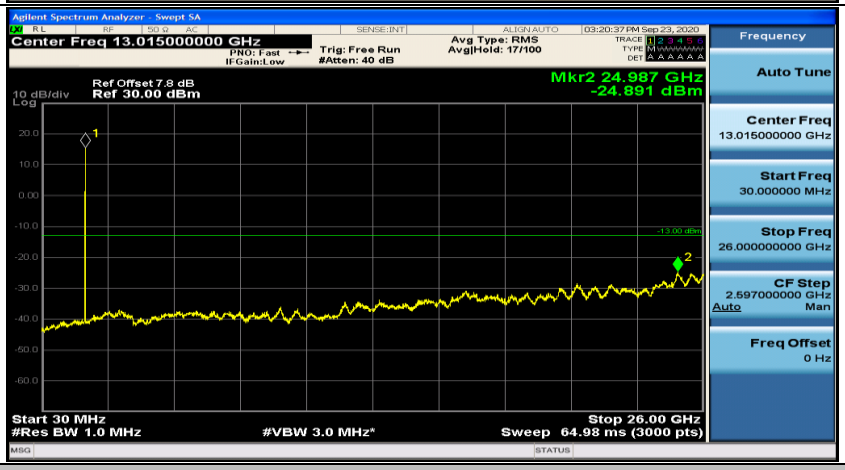




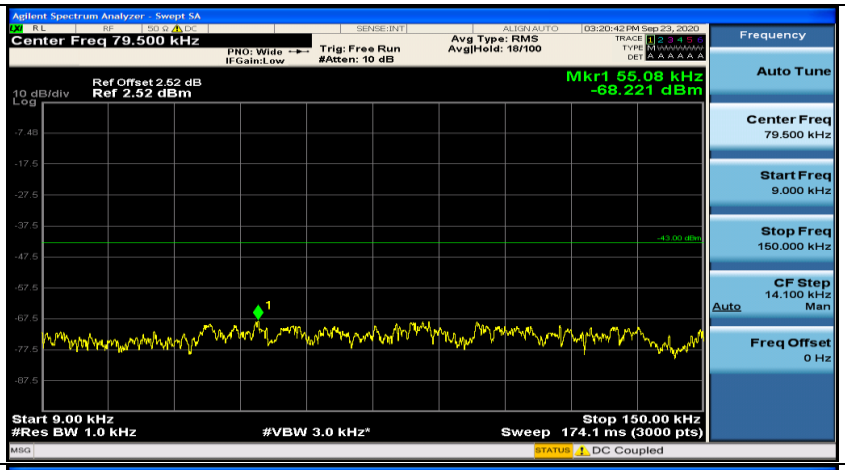
(Channel Bandwidth:20 MHz)_MCH_QPSK_1RB#49

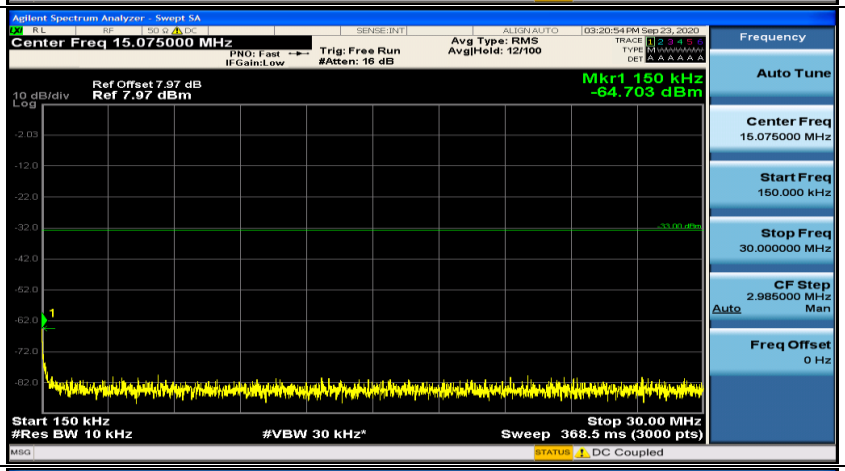


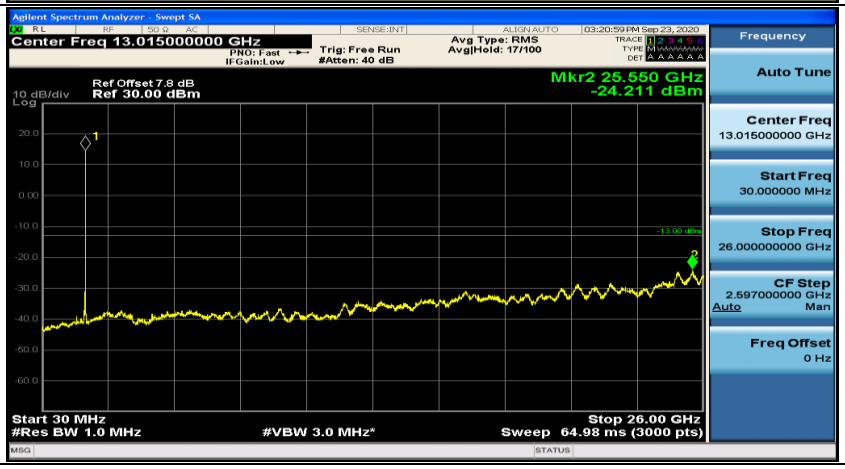




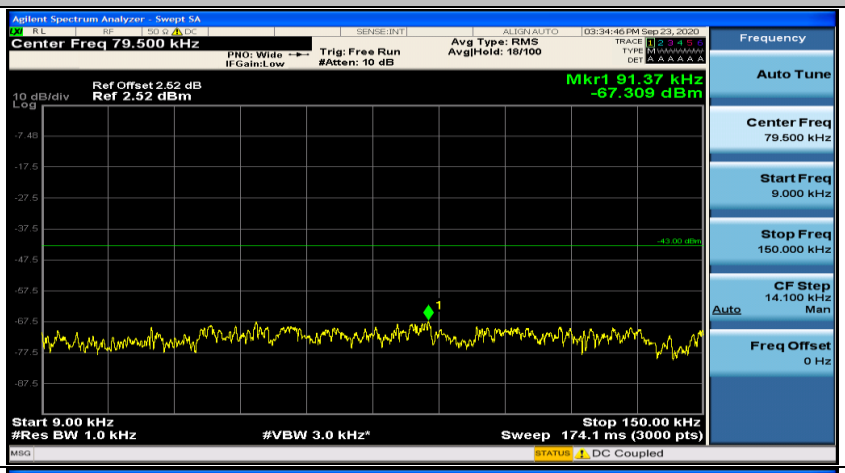
(Channel Bandwidth:20 MHz)_MCH_QPSK_1RB#99

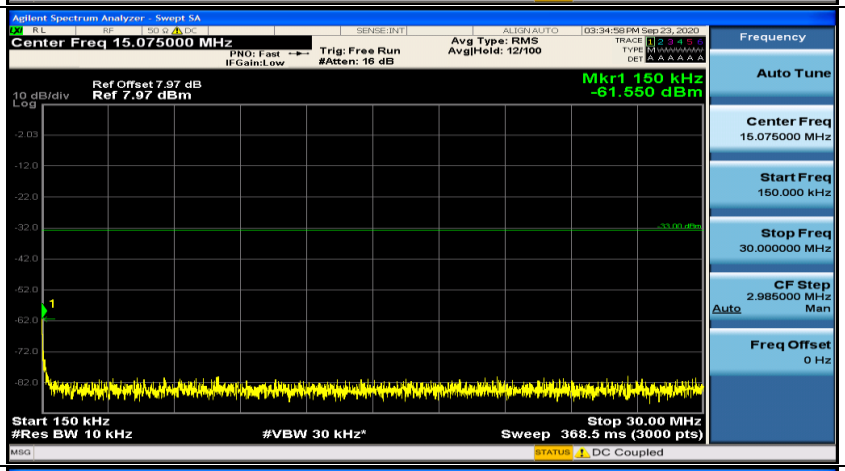

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 16/100
03:20:42 PM Sep 23, 2020
Ref Offset 2.52 dB
10 dB/div
Ref 2.52 dBm
Mkr1 55.08 kHz
-68.221 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 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

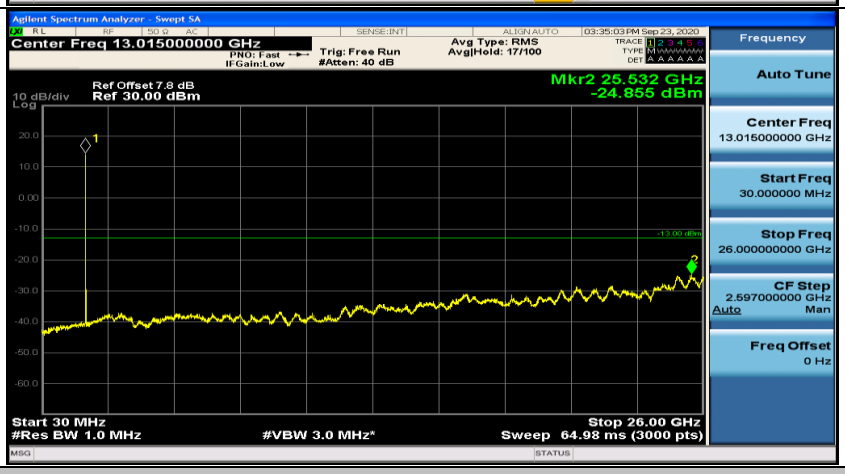

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 12/100
03:20:54 PM Sep 23, 2020
Ref Offset 7.97 dB
10 dB/div
Ref 7.97 dBm
Mkr1 150 kHz
-64.703 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 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
03:20:59 PM Sep 23, 2020
Ref Offset 7.8 dB
10 dB/div
Ref 30.00 dBm
Mkr2 25.550 GHz
-24.211 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

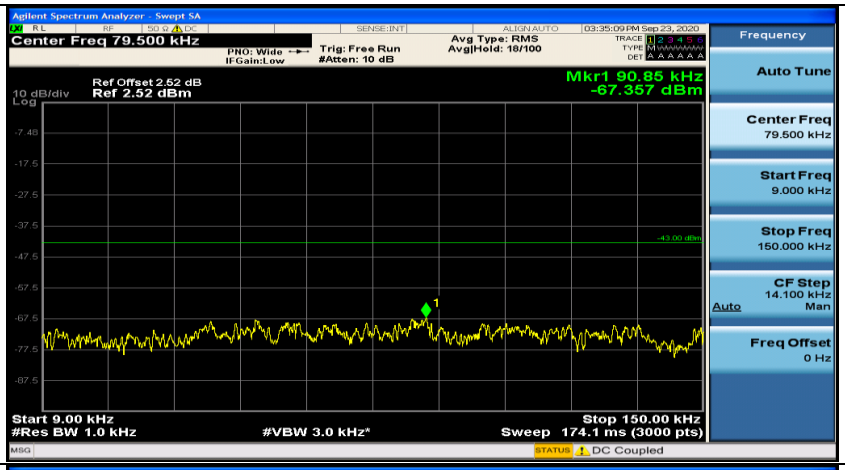
(Channel Bandwidth:20 MHz)_HCH_QPSK_1RB#0

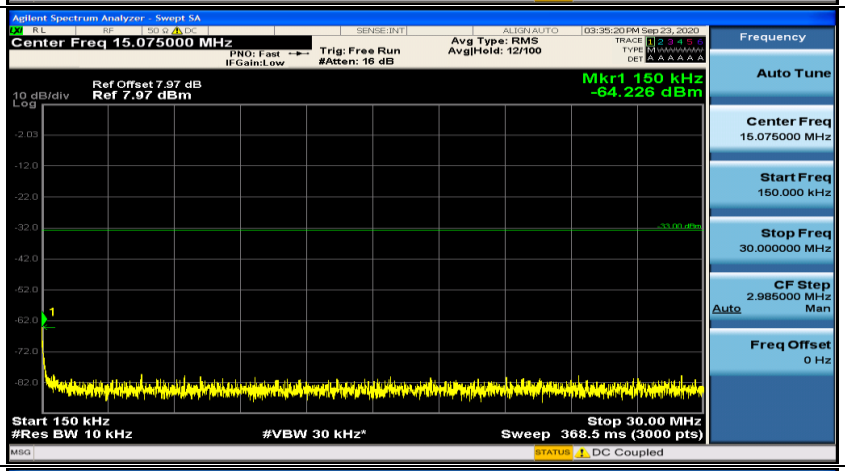


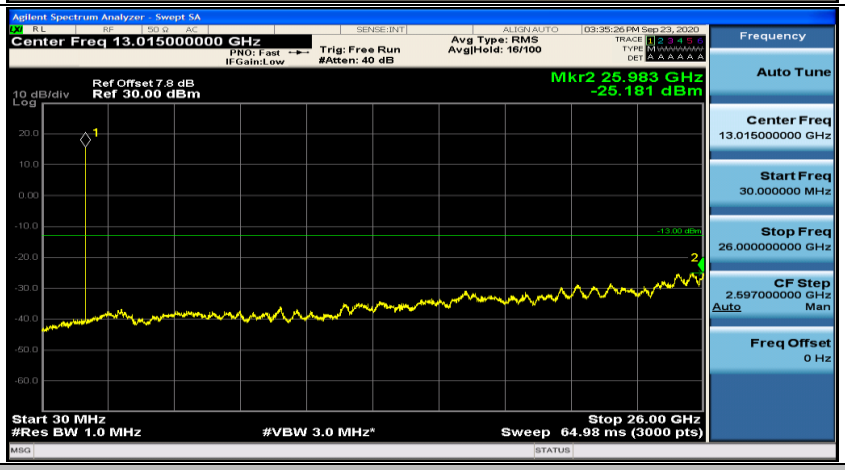




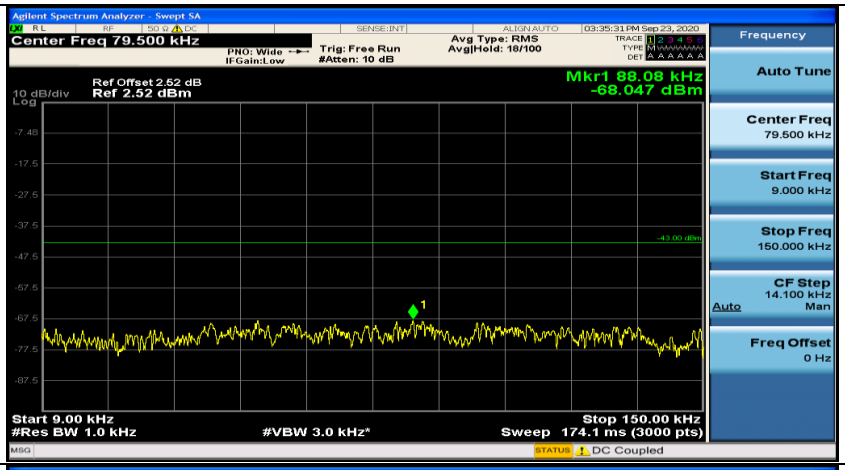
(Channel Bandwidth:20 MHz)_HCH_QPSK_1RB#49

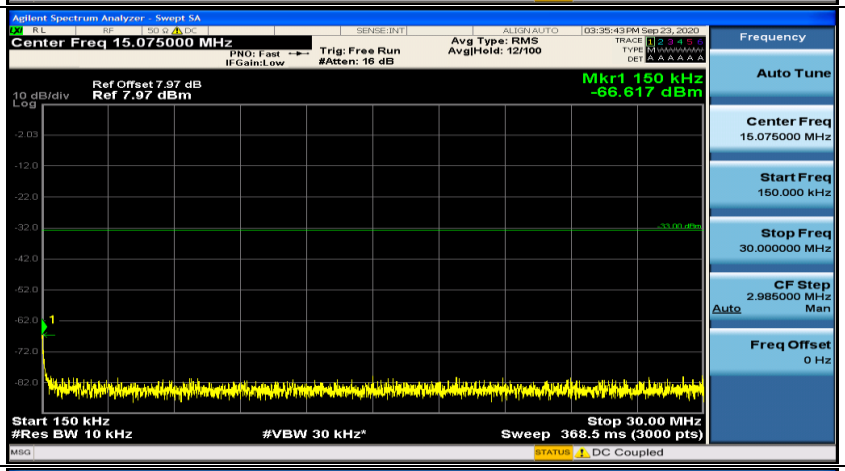


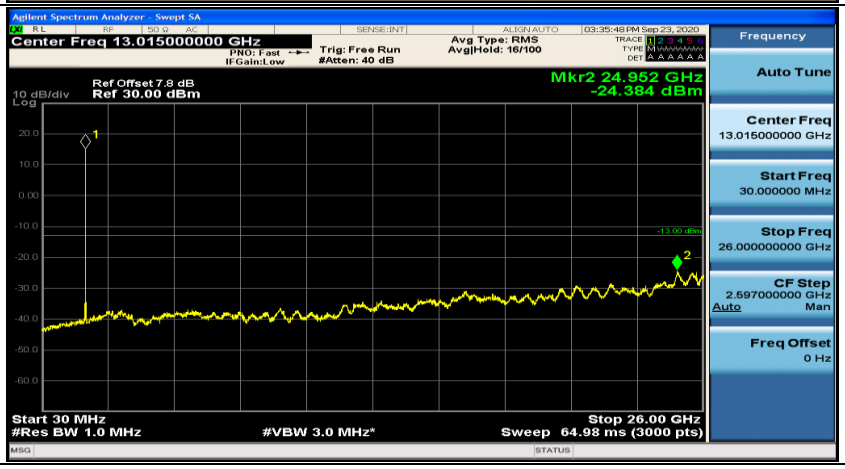




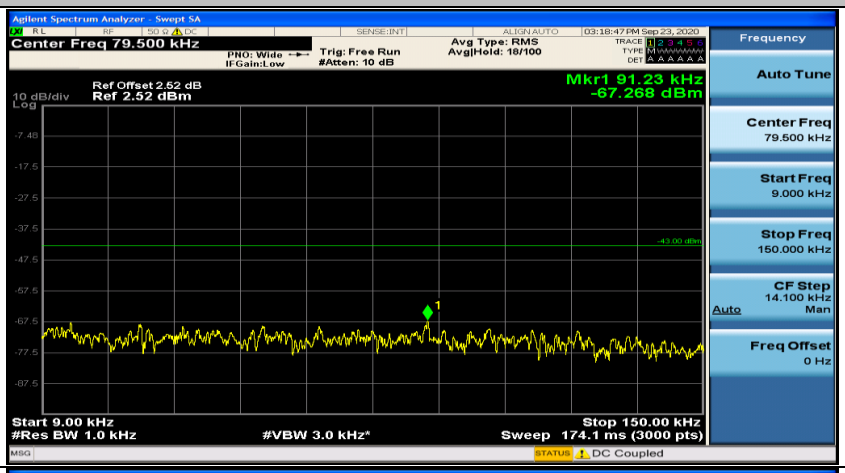
(Channel Bandwidth:20 MHz)_HCH_QPSK_1RB#99

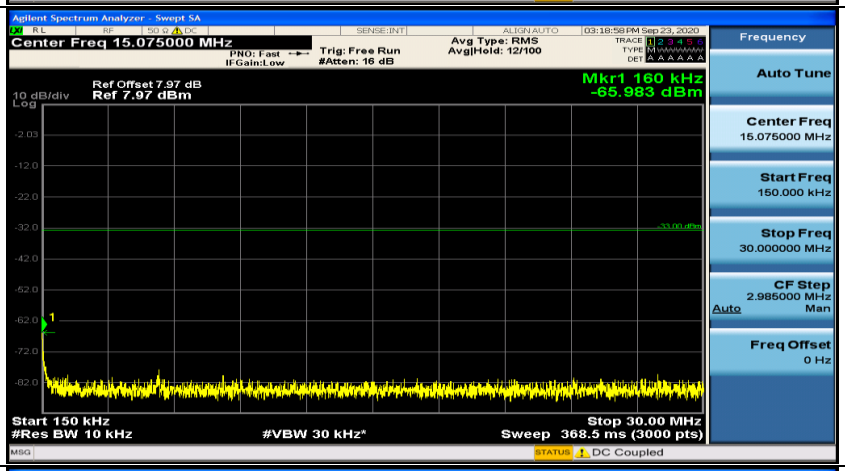

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 16/100
03:35:31 PM Sep 23, 2020
Ref Offset 2.52 dB
10 dB/div
Ref 2.52 dBm
Mkr1 88.08 kHz
-68.047 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 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

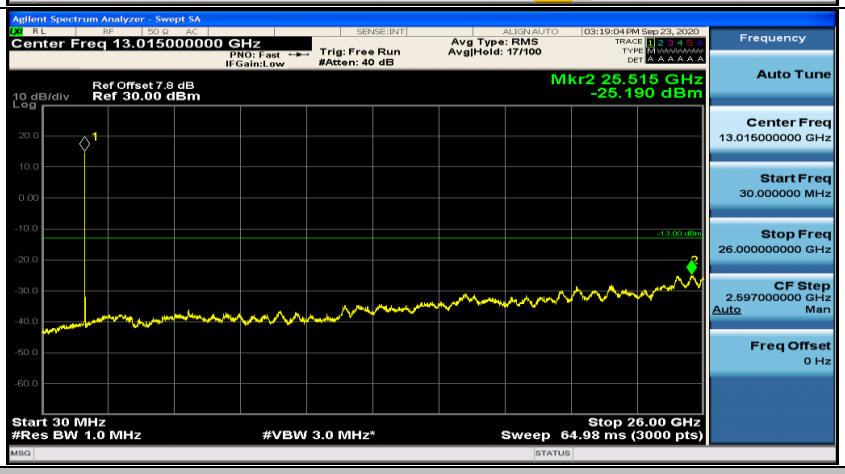

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 12/100
03:35:43 PM Sep 23, 2020
Ref Offset 7.97 dB
10 dB/div
Ref 7.97 dBm
Mkr1 150 kHz
-66.617 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 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: 16/100
03:35:48 PM Sep 23, 2020
Ref Offset 7.8 dB
10 dB/div
Ref 30.00 dBm
Mkr2 24.952 GHz
-24.384 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

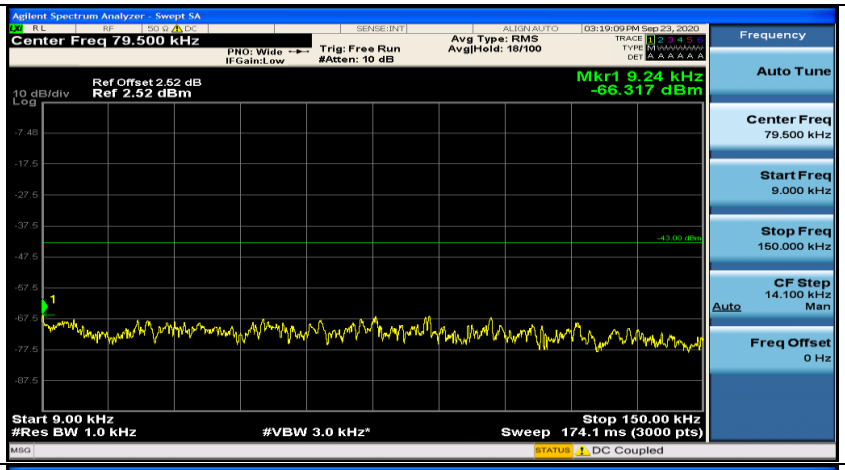
(Channel Bandwidth:20 MHz)_LCH_16QAM_1RB#0

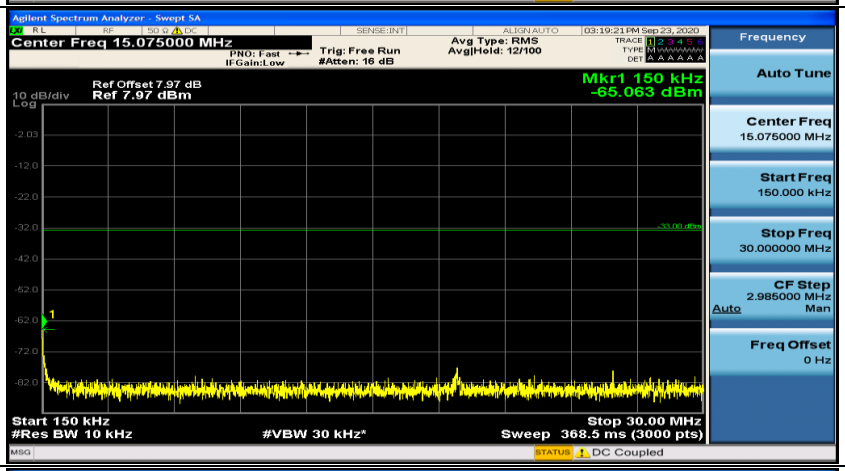


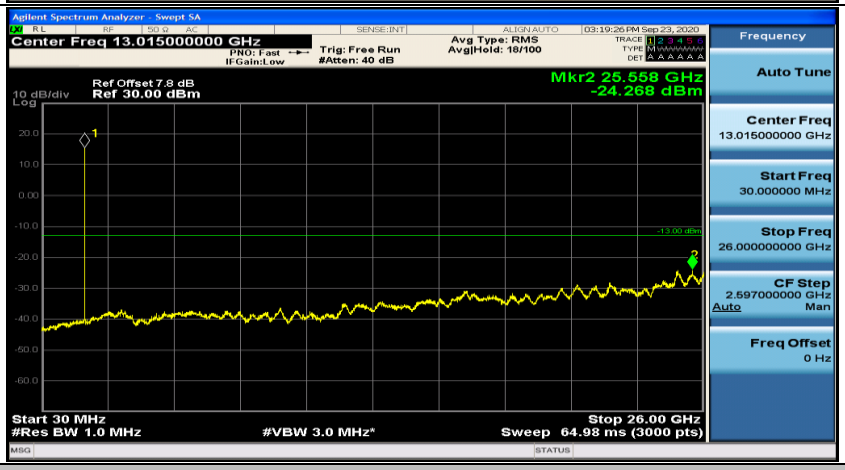




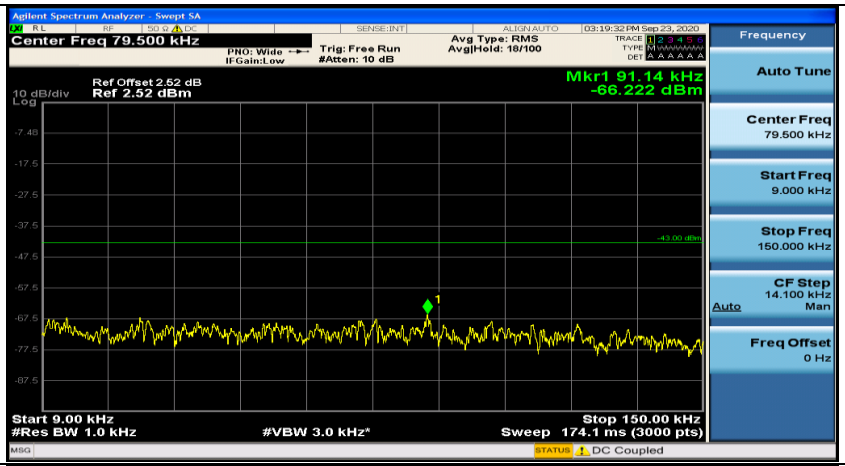
(Channel Bandwidth:20 MHz)_LCH_16QAM_1RB#49

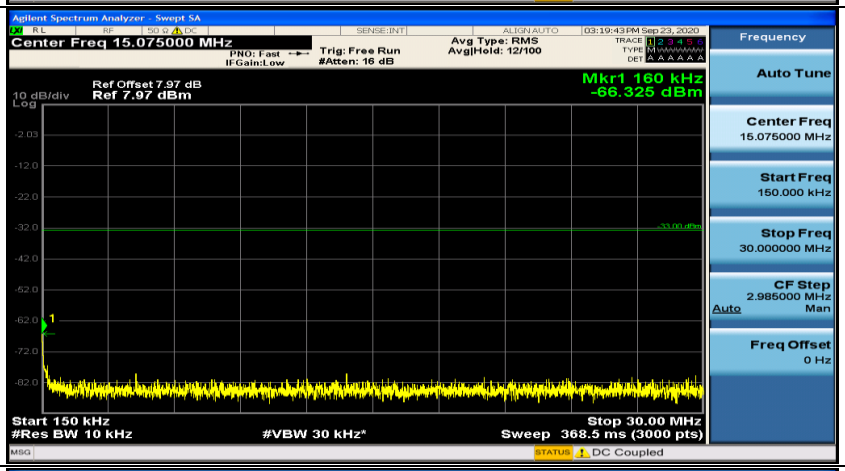


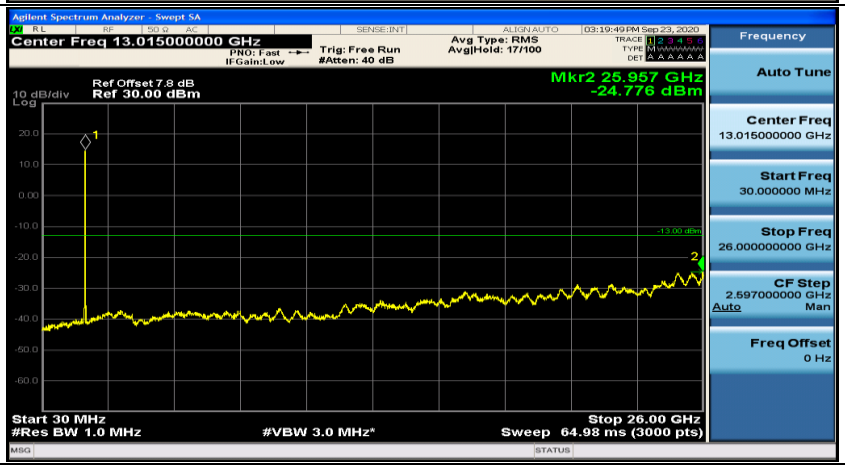




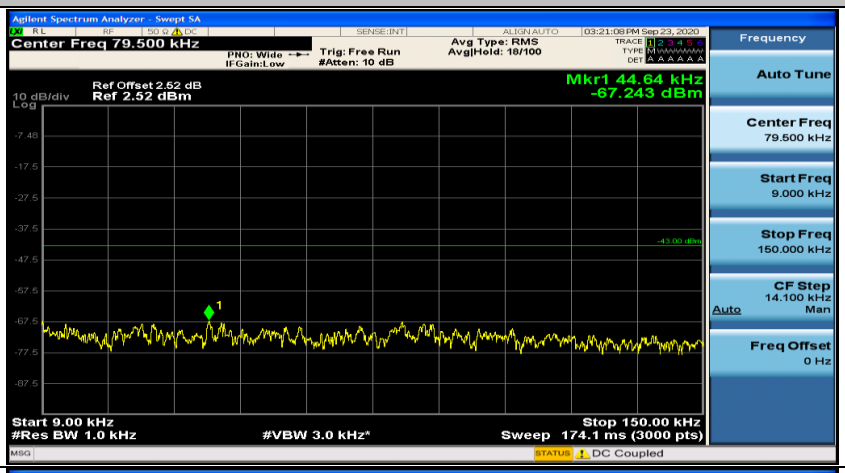
(Channel Bandwidth:20 MHz)_LCH_16QAM_1RB#99

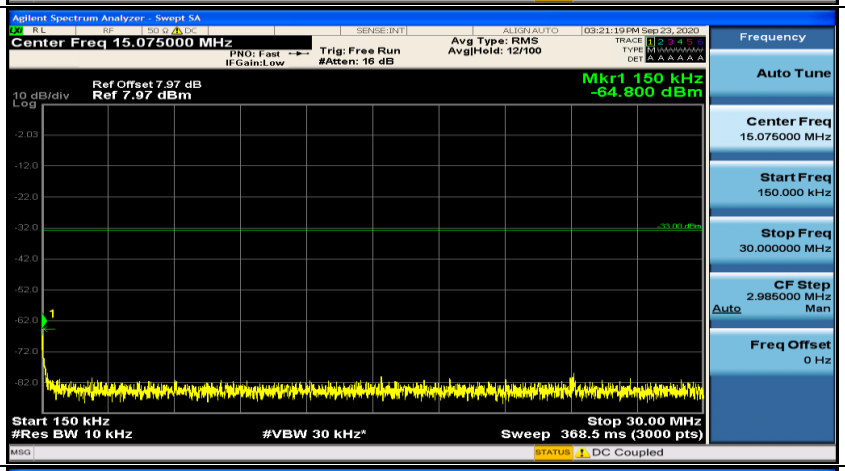

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 16/100
03:19:32 PM Sep 23, 2020
Ref Offset 2.52 dB
10 dB/div
Ref 2.52 dBm
Mkr1 91.14 kHz
-66.222 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 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

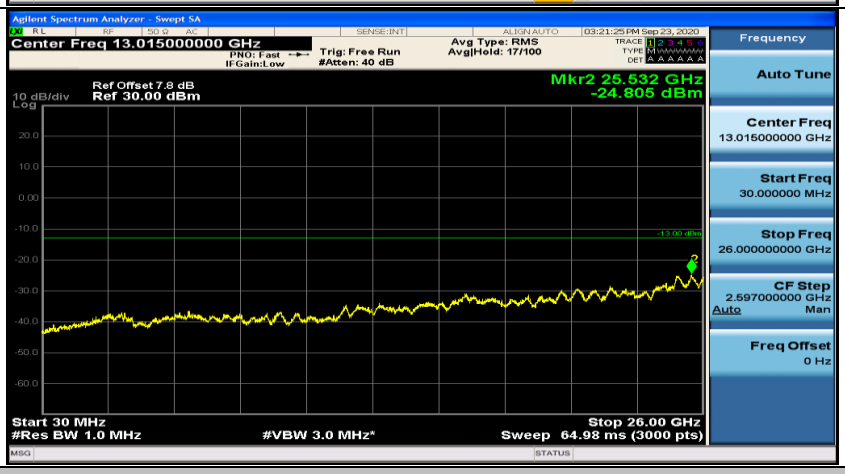

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 12/100
03:19:43 PM Sep 23, 2020
Ref Offset 7.97 dB
10 dB/div
Ref 7.97 dBm
Mkr1 160 kHz
-66.325 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 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
03:19:49 PM Sep 23, 2020
Ref Offset 7.8 dB
10 dB/div
Ref 30.00 dBm
Mkr2 25.957 GHz
-24.776 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

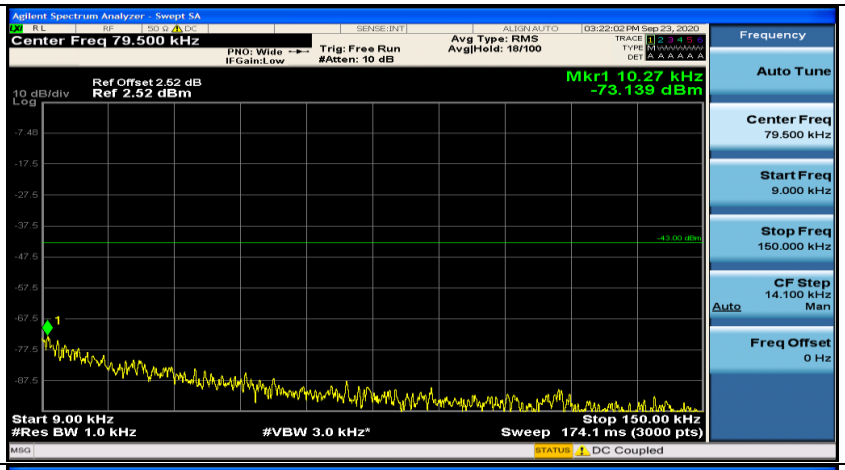
(Channel Bandwidth:20 MHz)_MCH_16QAM_1RB#0

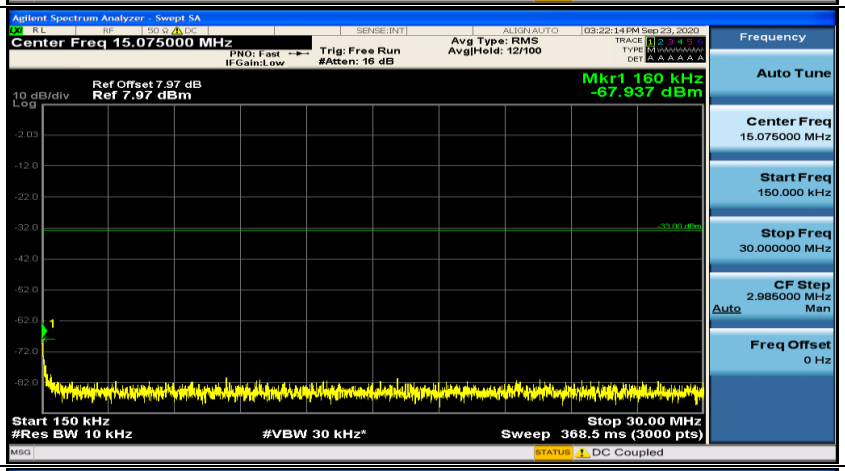


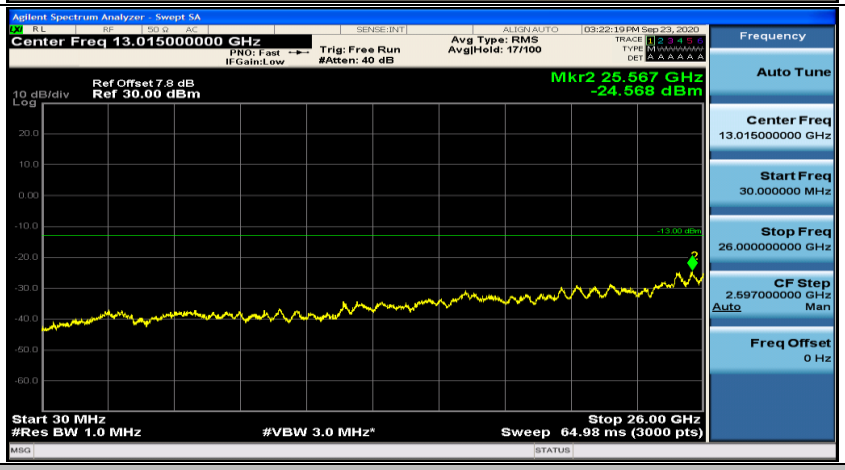




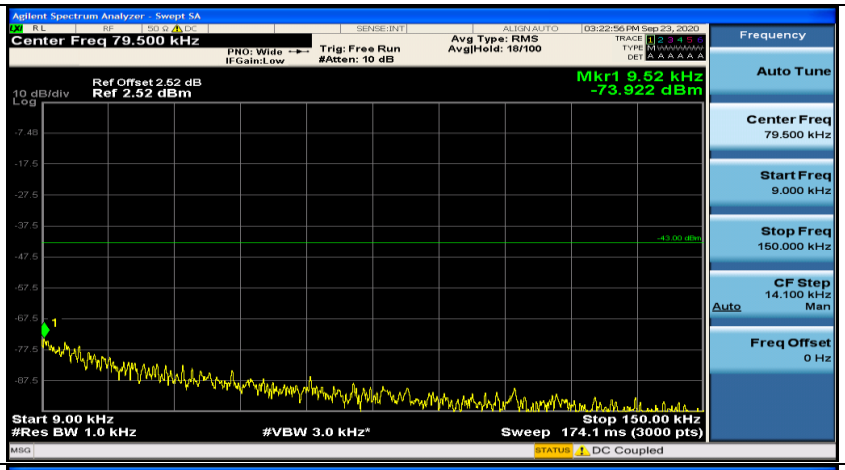
(Channel Bandwidth:20 MHz)_MCH_16QAM_1RB#49

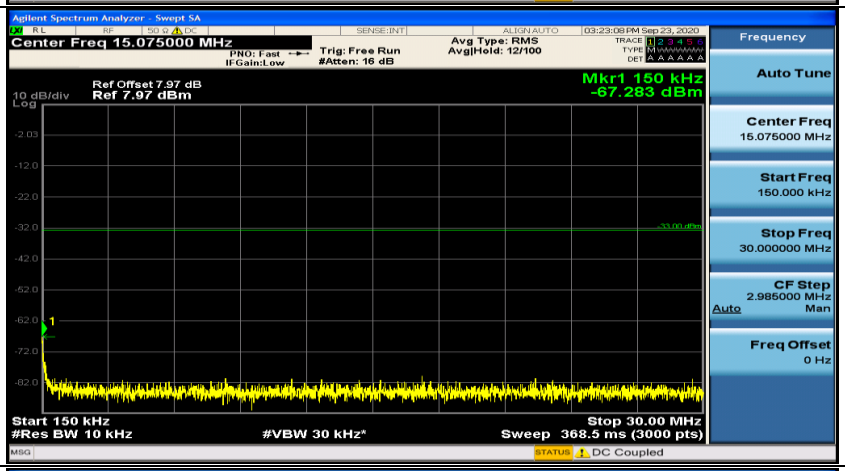


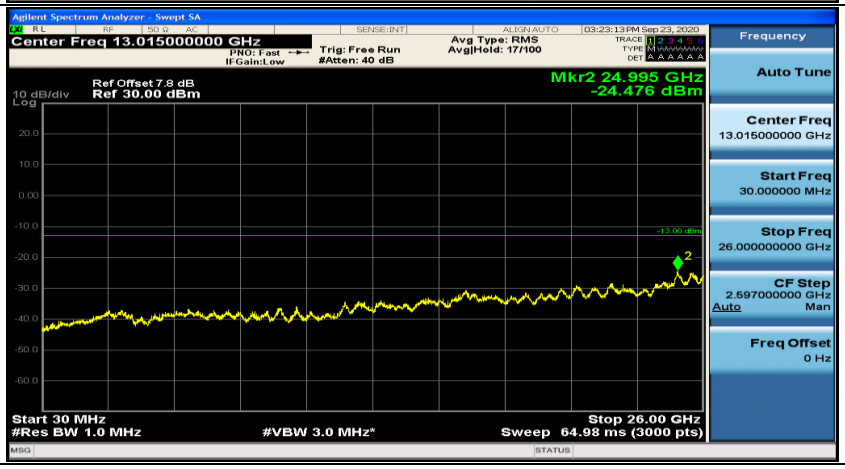




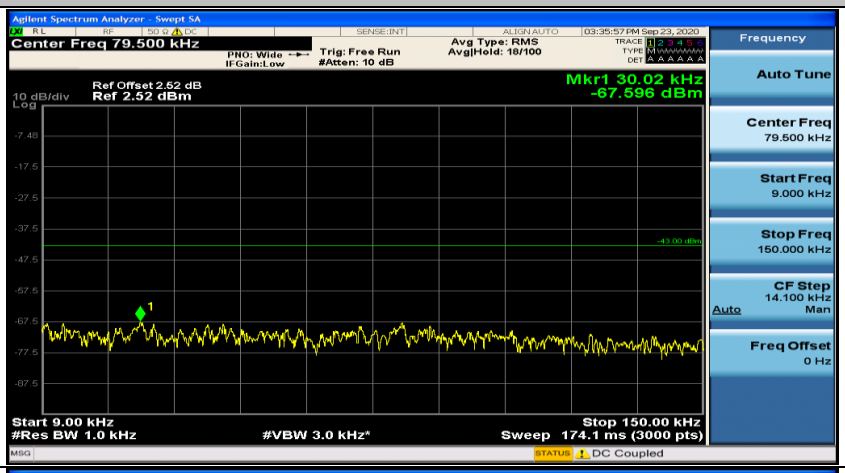
(Channel Bandwidth:20 MHz)_MCH_16QAM_1RB#99

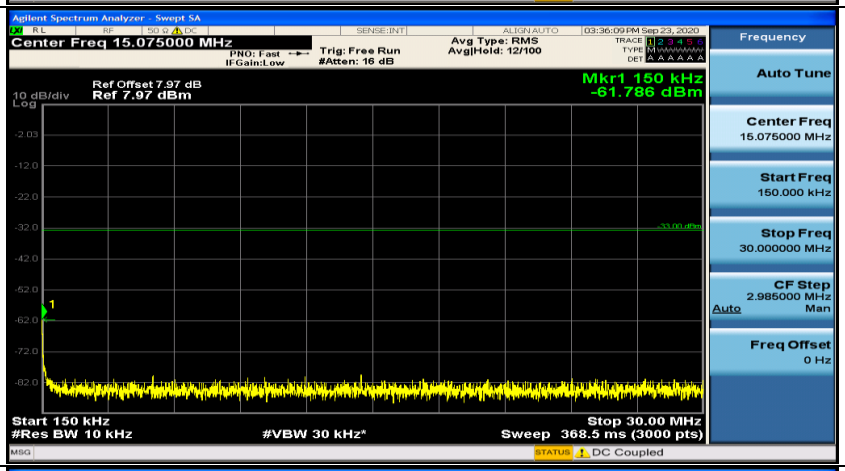

Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 16/100
03:22:56 PM Sep 23, 2020
Ref Offset 2.52 dB
10 dB/div
Ref 2.52 dBm
Mkr1 9.52 kHz
-73.922 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 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

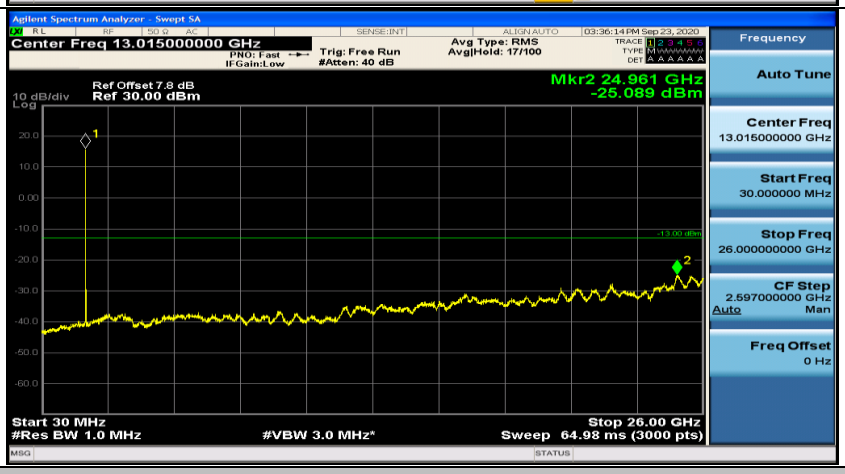

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 12/100
03:23:08 PM Sep 23, 2020
Ref Offset 7.97 dB
10 dB/div
Ref 7.97 dBm
Mkr1 150 kHz
-67.283 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 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
03:23:13 PM Sep 23, 2020
Ref Offset 7.8 dB
10 dB/div
Ref 30.00 dBm
Mkr2 24.995 GHz
-24.476 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

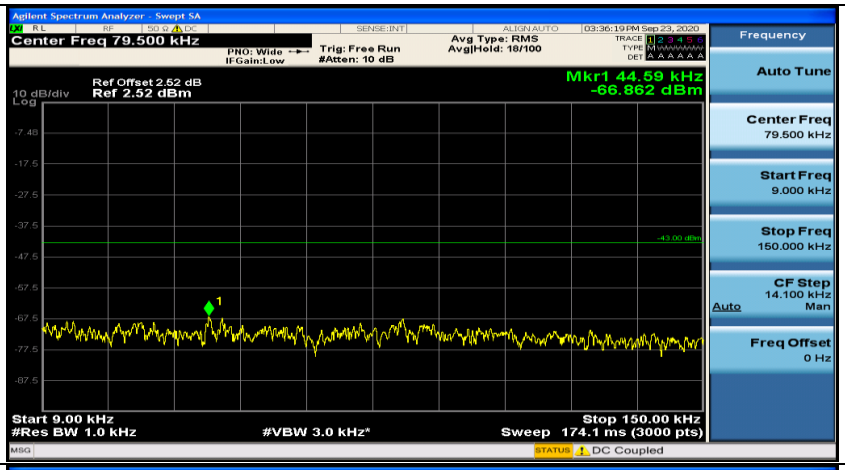
(Channel Bandwidth:20 MHz)_HCH_16QAM_1RB#0

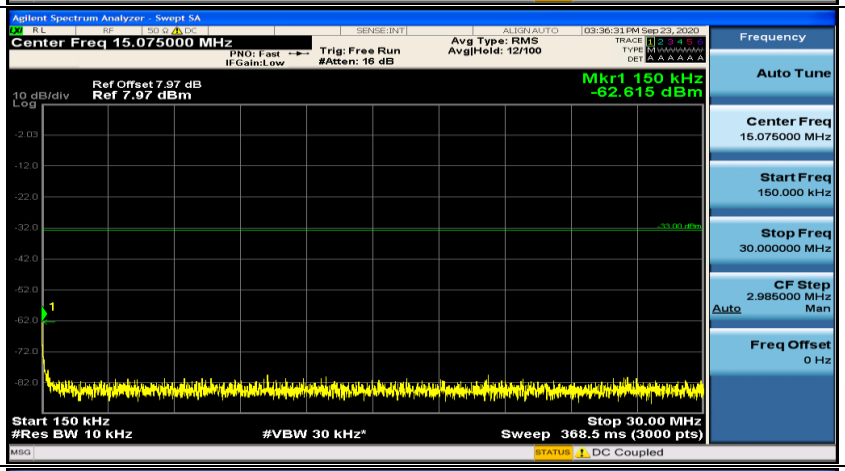


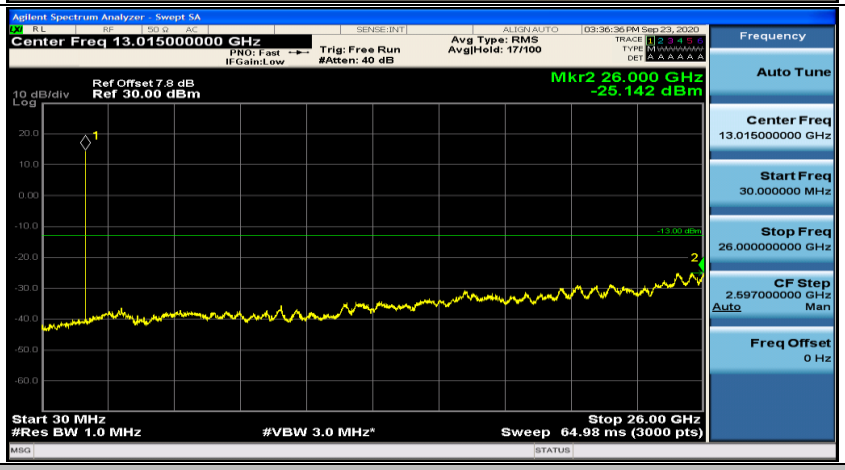




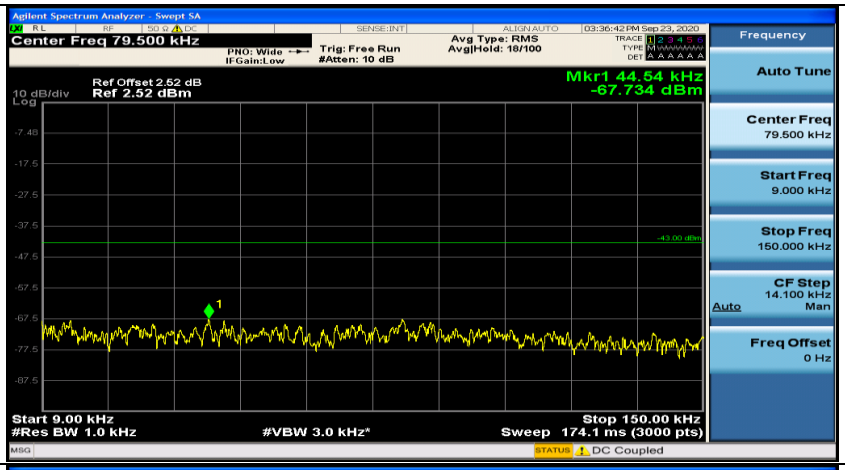
(Channel Bandwidth:20 MHz)_HCH_16QAM_1RB#49

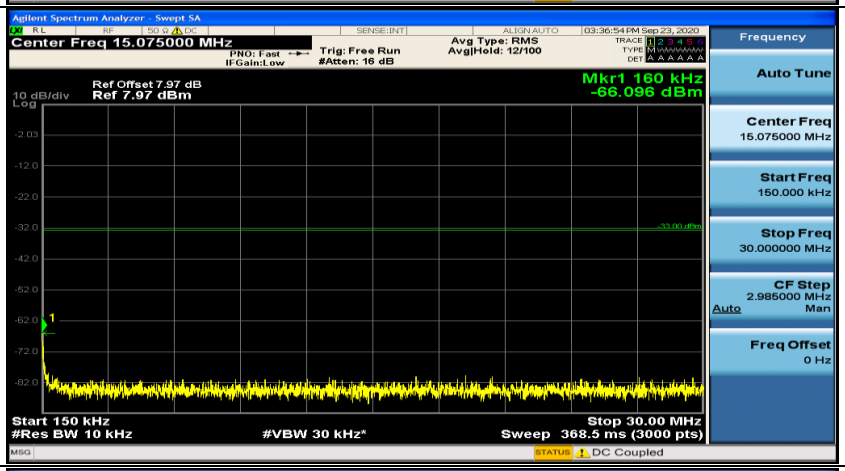


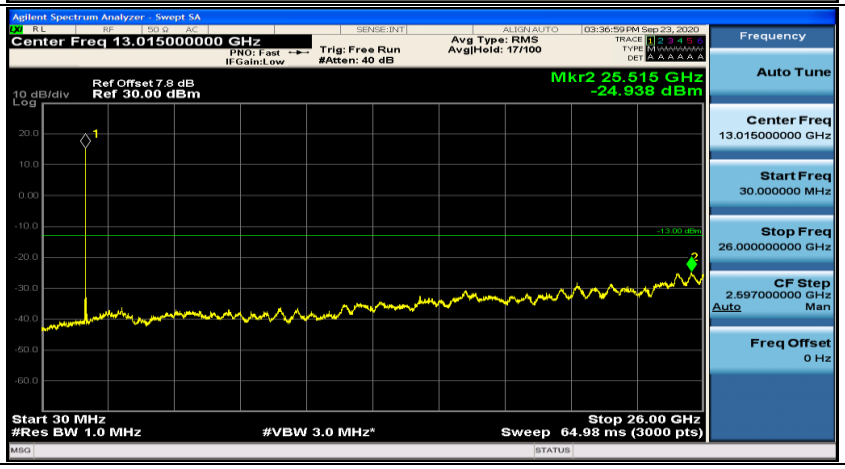




(Channel Bandwidth:20 MHz)_HCH_16QAM_1RB#99


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: 16/100
03:36:42 PM Sep 23, 2020
Ref Offset 2.52 dB
10 dB/div
Ref 2.52 dBm
Mkr1 44.54 kHz
-67.734 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
03:36:54 PM Sep 23, 2020
Ref Offset 7.97 dB
10 dB/div
Ref 7.97 dBm
Mkr1 160 kHz
-66.096 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
03:36:59 PM Sep 23, 2020
Ref Offset 7.8 dB
10 dB/div
Ref 30.00 dBm
Mkr2 25.515 GHz
-24.938 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: 1.4 MHz

Channel Bandwidth: 1.4 MHz							
Voltage							
Modulation	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VL	TN	-28.48	-0.016649	± 2.5	PASS
		VN	TN	-7.28	-0.004256	± 2.5	PASS
		VH	TN	-7.27	-0.004084	± 2.5	PASS
	MCH	VL	TN	-6.61	-0.003766	± 2.5	PASS
		VN	TN	-10.71	-0.006105	± 2.5	PASS
		VH	TN	-4.63	-0.002619	± 2.5	PASS
	HCH	VL	TN	-0.39	-0.000226	± 2.5	PASS
		VN	TN	-8.10	-0.004550	± 2.5	PASS
		VH	TN	-6.79	-0.003972	± 2.5	PASS
16QAM	LCH	VL	TN	-4.81	-0.002810	± 2.5	PASS
		VN	TN	-2.42	-0.001413	± 2.5	PASS
		VH	TN	2.50	0.001463	± 2.5	PASS
	MCH	VL	TN	-5.05	-0.002952	± 2.5	PASS
		VN	TN	1.85	0.001051	± 2.5	PASS
		VH	TN	-2.49	-0.001455	± 2.5	PASS
	HCH	VL	TN	-3.92	-0.002291	± 2.5	PASS
		VN	TN	-1.95	-0.001093	± 2.5	PASS
		VH	TN	-2.16	-0.001263	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	0.43	0.000251	± 2.5	PASS
		VN	-20	-10.64	-0.006221	± 2.5	PASS
		VN	-10	-1.99	-0.001162	± 2.5	PASS
		VN	0	-8.21	-0.004800	± 2.5	PASS
		VN	10	-4.33	-0.002534	± 2.5	PASS
		VN	20	-1.97	-0.001154	± 2.5	PASS
		VN	30	2.98	0.001739	± 2.5	PASS
		VN	40	-5.88	-0.003437	± 2.5	PASS
		VN	50	-9.01	-0.005268	± 2.5	PASS
	MCH	VN	-30	-10.46	-0.005958	± 2.5	PASS
		VN	-20	-13.70	-0.007809	± 2.5	PASS
		VN	-10	-0.86	-0.000489	± 2.5	PASS
		VN	0	-11.46	-0.006529	± 2.5	PASS
		VN	10	-0.14	-0.000082	± 2.5	PASS
		VN	20	-6.67	-0.003798	± 2.5	PASS

		VN	30	-13.05	-0.007434	± 2.5	PASS
		VN	40	-9.73	-0.005543	± 2.5	PASS
		VN	50	-7.45	-0.004247	± 2.5	PASS
	HCH	VN	-30	1.63	0.000917	± 2.5	PASS
		VN	-20	-0.67	-0.000378	± 2.5	PASS
		VN	-10	-6.44	-0.003618	± 2.5	PASS
		VN	0	-2.72	-0.001528	± 2.5	PASS
		VN	10	-6.92	-0.003891	± 2.5	PASS
		VN	20	-0.63	-0.000354	± 2.5	PASS
		VN	30	-1.47	-0.000828	± 2.5	PASS
		VN	40	-1.99	-0.001118	± 2.5	PASS
		VN	50	-4.66	-0.002621	± 2.5	PASS
16QAM	LCH	VN	-30	-10.70	-0.006255	± 2.5	PASS
		VN	-20	-5.42	-0.003169	± 2.5	PASS
		VN	-10	-5.48	-0.003203	± 2.5	PASS
		VN	0	-2.06	-0.001204	± 2.5	PASS
		VN	10	-6.49	-0.003796	± 2.5	PASS
		VN	20	-2.35	-0.001371	± 2.5	PASS
		VN	30	-6.27	-0.003663	± 2.5	PASS
		VN	40	-1.76	-0.001029	± 2.5	PASS
		VN	50	-10.37	-0.006063	± 2.5	PASS
	MCH	VN	-30	-4.99	-0.002845	± 2.5	PASS
		VN	-20	-3.10	-0.001769	± 2.5	PASS
		VN	-10	-7.77	-0.004426	± 2.5	PASS
		VN	0	-7.15	-0.004076	± 2.5	PASS
		VN	10	-12.20	-0.006953	± 2.5	PASS
		VN	20	-8.17	-0.004654	± 2.5	PASS
		VN	30	-4.26	-0.002429	± 2.5	PASS
		VN	40	1.32	0.000750	± 2.5	PASS
		VN	50	3.13	0.001785	± 2.5	PASS
	HCH	VN	-30	-8.34	-0.004687	± 2.5	PASS
		VN	-20	-1.23	-0.000691	± 2.5	PASS
		VN	-10	-1.10	-0.000619	± 2.5	PASS
		VN	0	0.31	0.000177	± 2.5	PASS
		VN	10	-3.65	-0.002050	± 2.5	PASS
		VN	20	3.39	0.001905	± 2.5	PASS
		VN	30	-8.71	-0.004896	± 2.5	PASS
		VN	40	-3.56	-0.002002	± 2.5	PASS
		VN	50	-5.35	-0.003007	± 2.5	PASS