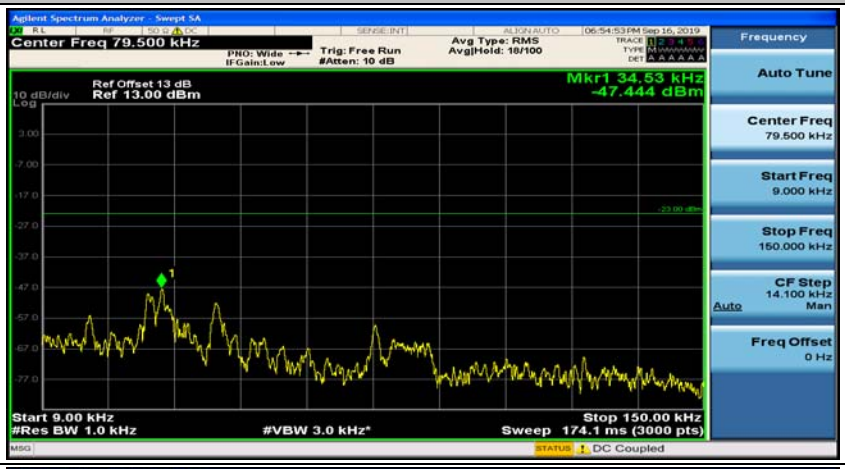
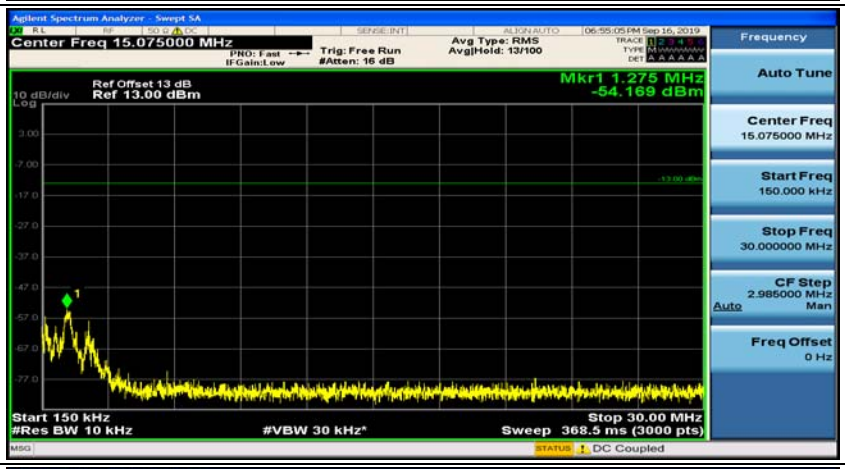
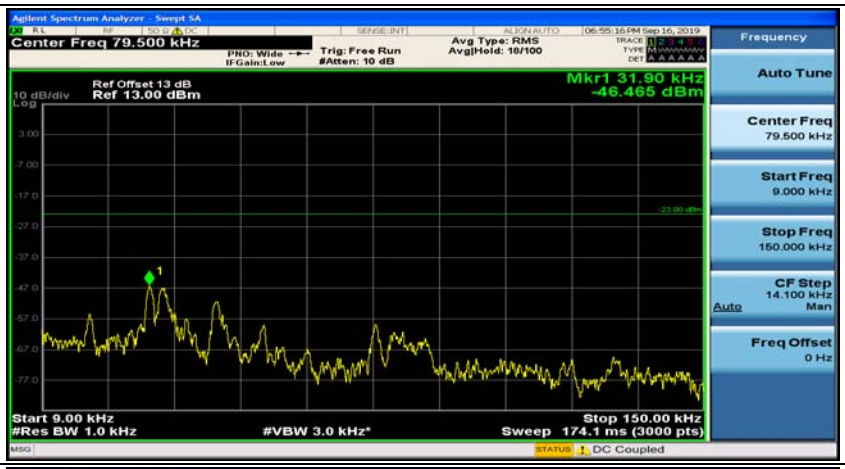
Channel Bandwidth: 10 MHz_HCH_16QAM_50RB#0

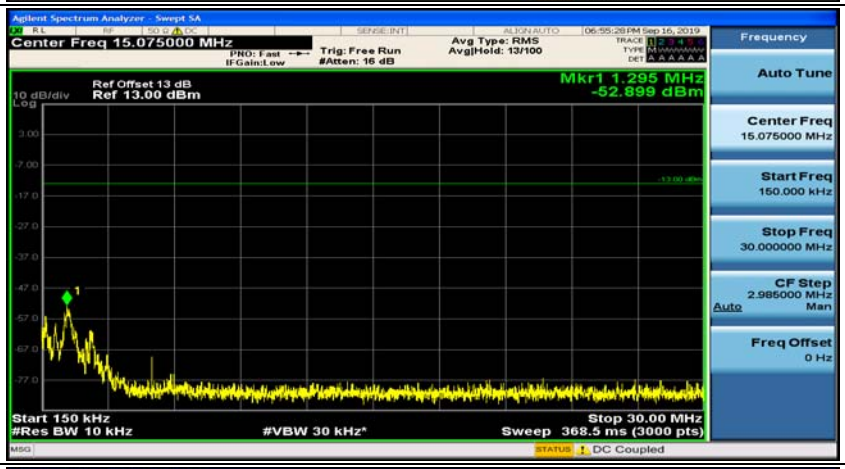
Appendix E: Conducted Spurious Emission

Test Graphs

Channel Bandwidth: 5 MHz

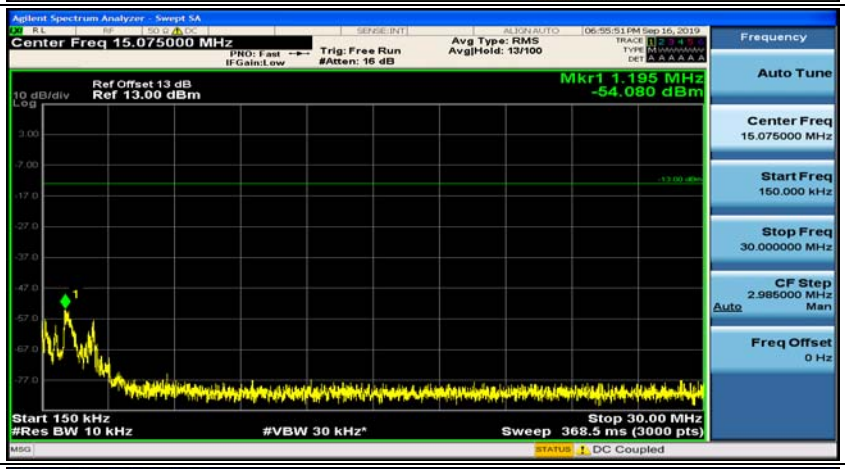
(Channel Bandwidth: 5 MHz)_LCH_QPSK_1RB#0


(Channel Bandwidth: 5 MHz)_LCH_QPSK_1RB#12





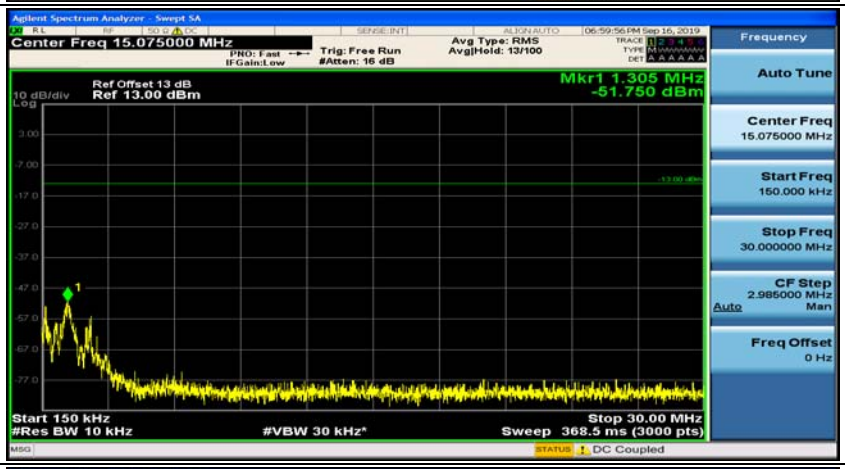
(Channel Bandwidth: 5 MHz)_LCH_QPSK_1RB#24

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
06:55:39 PM Sep 16, 2019
Ref Offset 13 dB
10 dB/div Ref 13.00 dBm
Log
Mkr1 34.72 kHz
-44.907 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

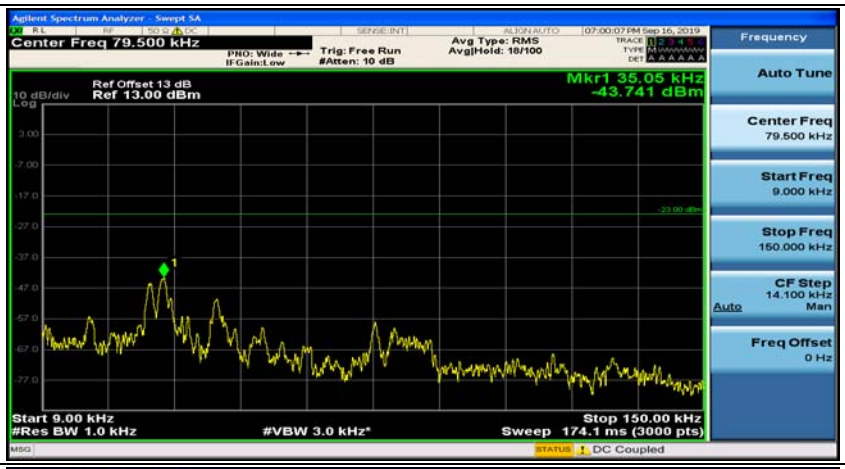

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 13/100
06:55:51 PM Sep 16, 2019
Ref Offset 13 dB
10 dB/div Ref 13.00 dBm
Log
Mkr1 1.195 MHz
-54.080 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 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

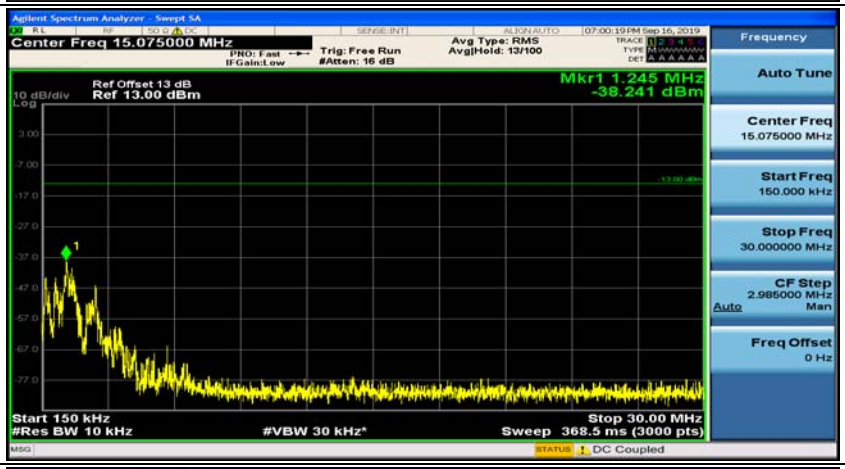
Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 17/100
06:55:57 PM Sep 16, 2019
Ref Offset 12.95 dB
10 dB/div Ref 30.00 dBm
Log
Mkr2 24.779 GHz
-21.105 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 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



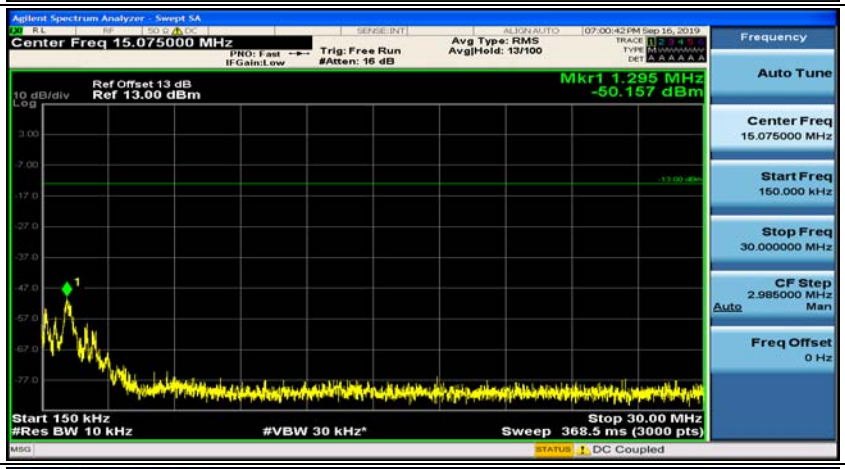
(Channel Bandwidth: 5 MHz)_HCH_QPSK_1RB#12





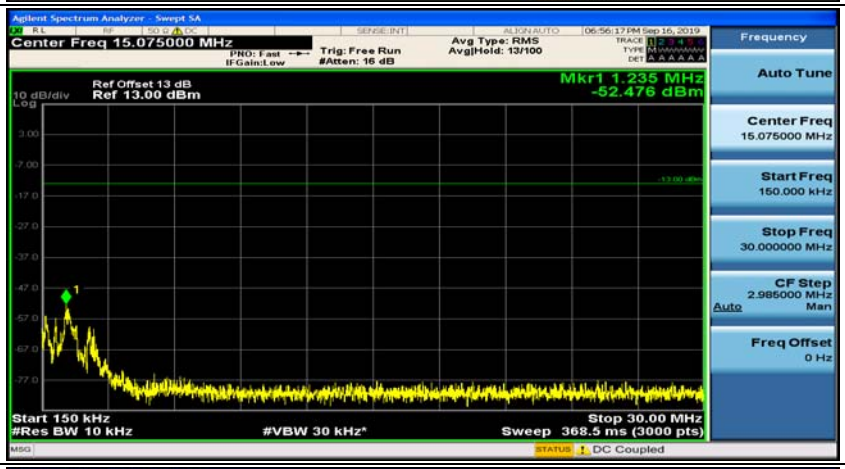
(Channel Bandwidth: 5 MHz)_HCH_QPSK_1RB#24

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
07:00:30 PM Sep 16, 2019
Ref Offset 13 dB
10 dB/div Ref 13.00 dBm
Log
Mkr1 32.27 kHz
-46.027 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

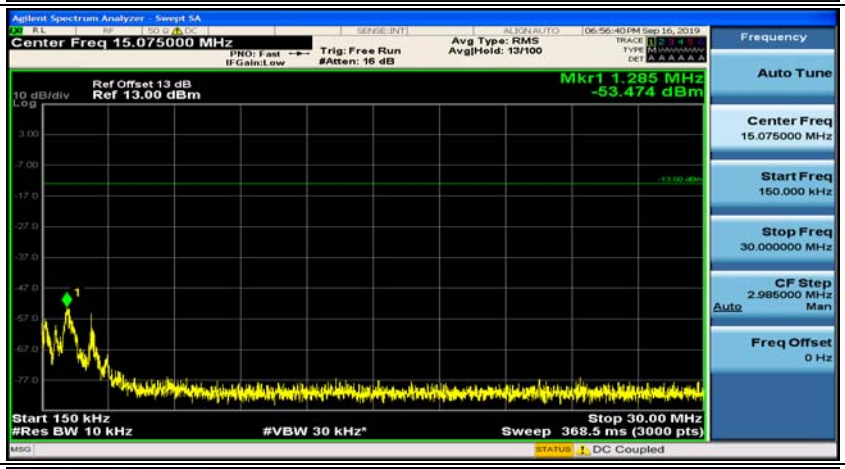

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 13/100
07:00:42 PM Sep 16, 2019
Ref Offset 13 dB
10 dB/div Ref 13.00 dBm
Log
Mkr1 1.295 MHz
-50.157 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 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
07:00:47 PM Sep 16, 2019
Ref Offset 12.95 dB
10 dB/div Ref 30.00 dBm
Log
Mkr2 24.874 GHz
-20.376 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

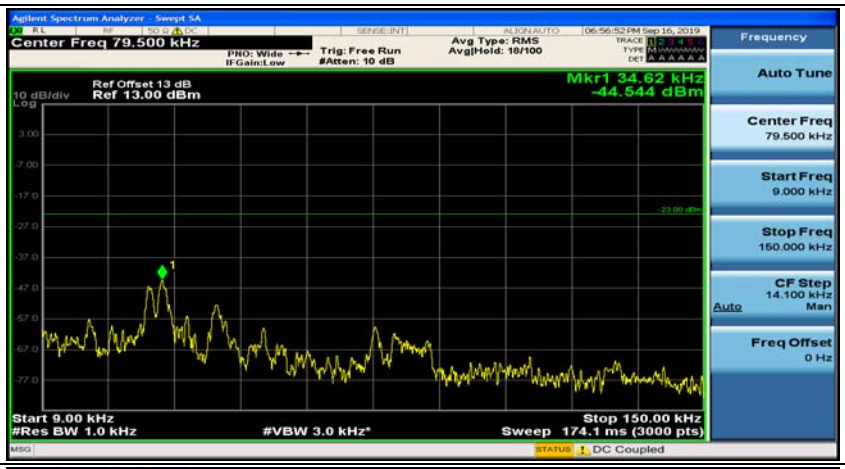
(Channel Bandwidth: 5 MHz)_LCH_16QAM_1RB#0

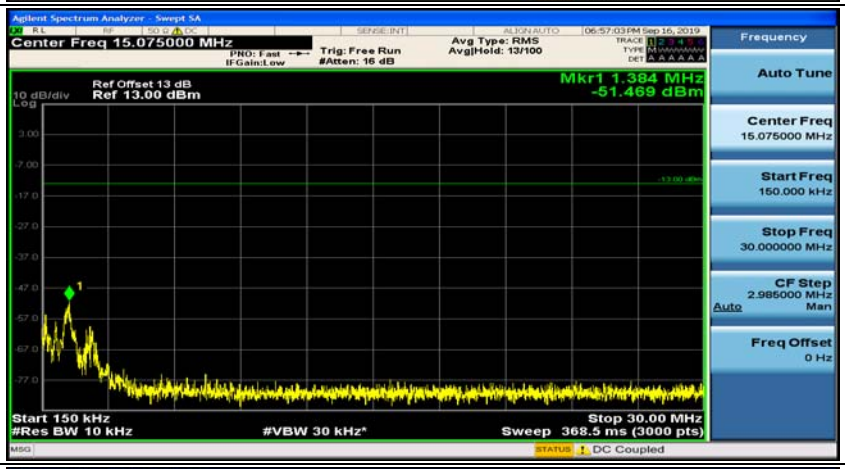


(Channel Bandwidth: 5 MHz)_LCH_16QAM_1RB#12



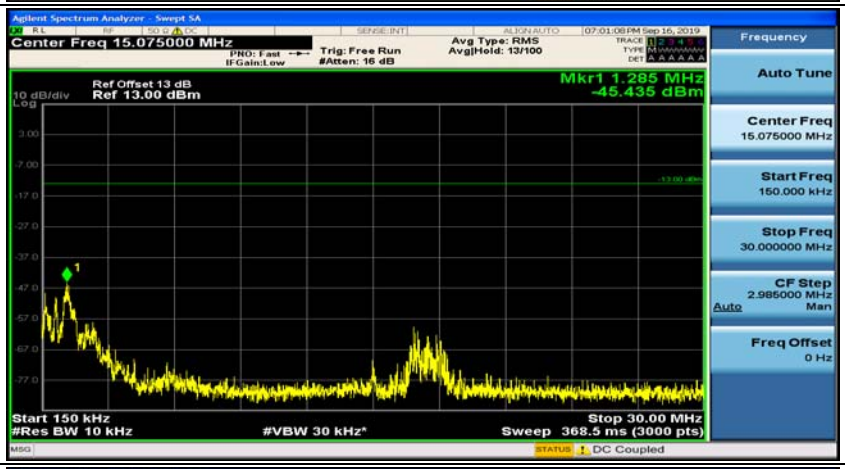
(Channel Bandwidth: 5 MHz)_LCH_16QAM_1RB#24


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
06:56:52 PM Sep 16, 2019
Ref Offset 13 dB
10 dB/div Ref 13.00 dBm
Log
Mkr1 34.62 kHz
-44.544 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

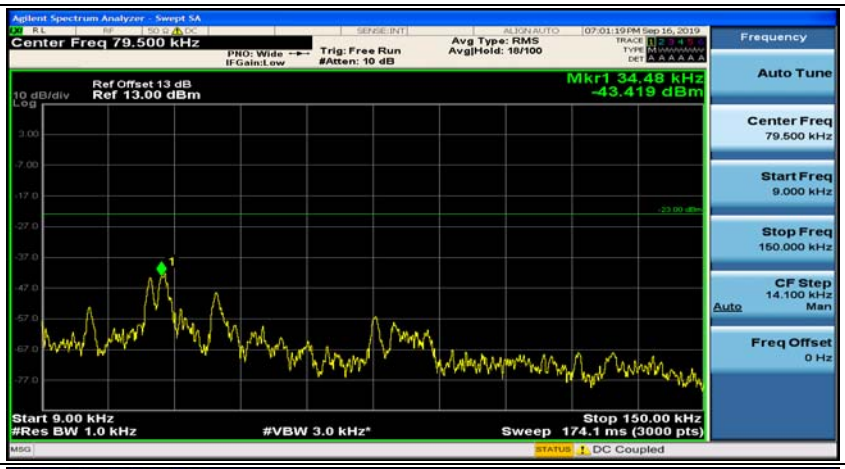

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 13/100
06:57:03 PM Sep 16, 2019
Ref Offset 13 dB
10 dB/div Ref 13.00 dBm
Log
Mkr1 1.384 MHz
-51.469 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 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

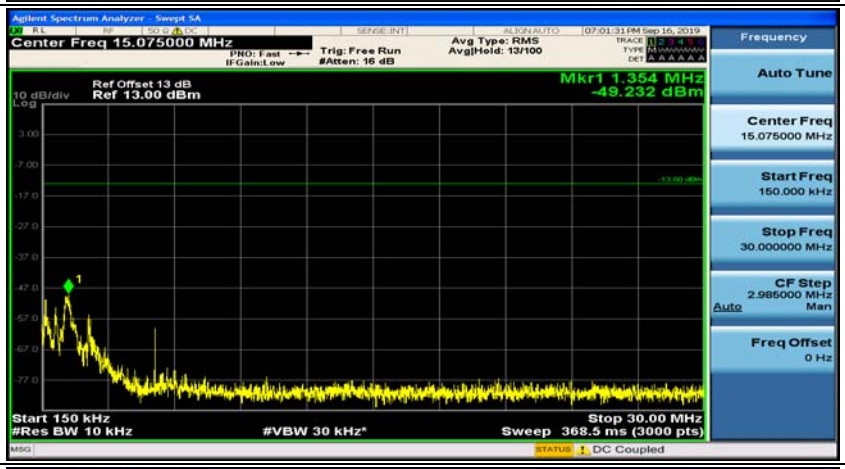
Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 17/100
06:57:09 PM Sep 16, 2019
Ref Offset 12.95 dB
10 dB/div Ref 30.00 dBm
Log
Mkr2 24.805 GHz
-20.088 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 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



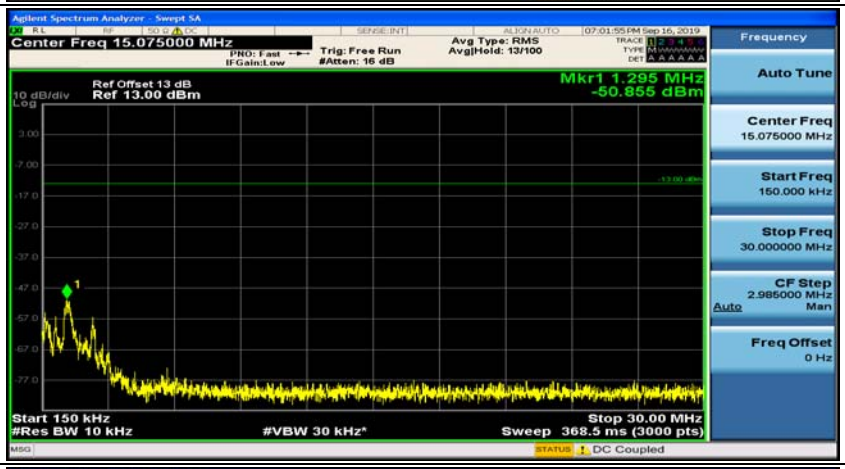
(Channel Bandwidth: 5 MHz)_HCH_16QAM_1RB#12





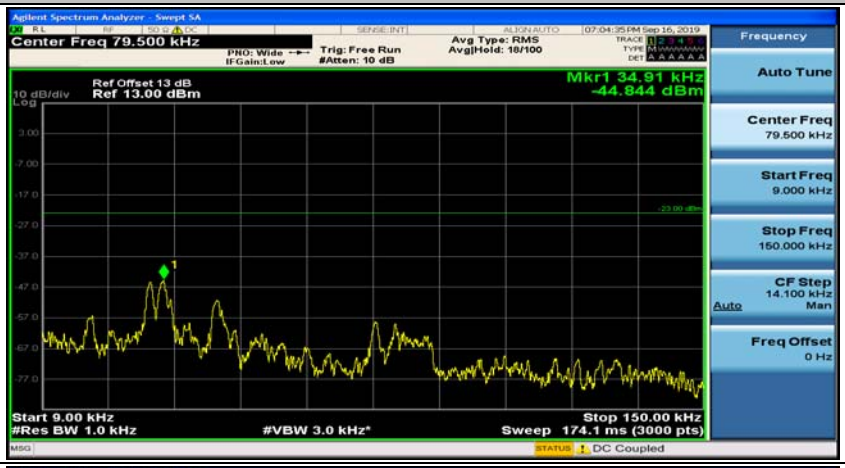
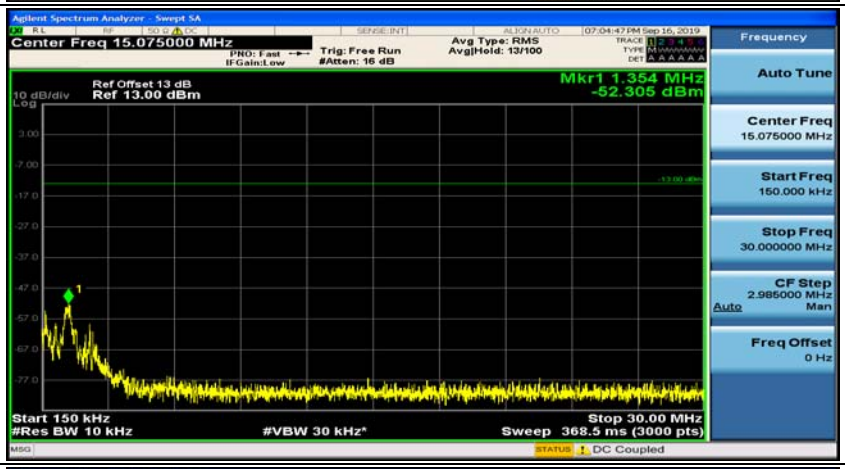
(Channel Bandwidth: 5 MHz)_HCH_16QAM_1RB#24

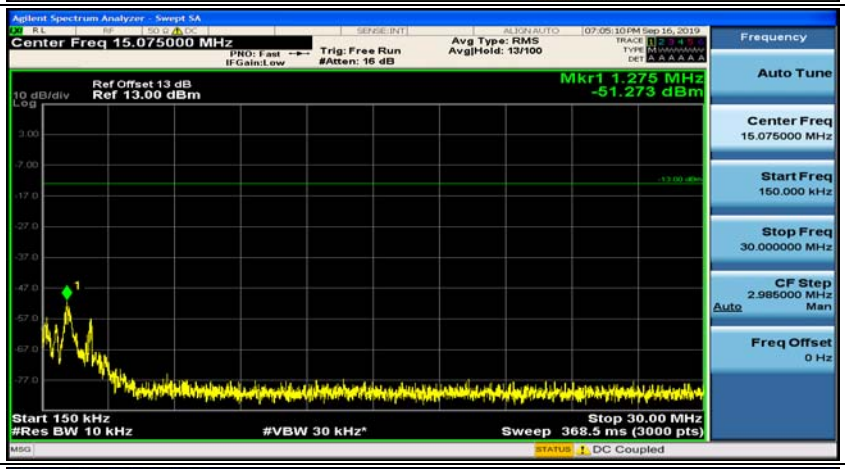
Agilent Spectrum Analyzer - Swept SA
Center Freq 79.500 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: RMS
Avg|Hold: 18/100
07:01:43 PM Sep 16, 2019
Ref Offset 13 dB
10 dB/div
Ref 13.00 dBm
Mkr1 35.05 kHz
-42.896 dBm
Start 9.00 kHz
#Res BW 1.0 kHz
#VBW 3.0 kHz*
Stop 150.00 kHz
Sweep 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
07:01:55 PM Sep 16, 2019
Ref Offset 13 dB
10 dB/div
Ref 13.00 dBm
Mkr1 1.295 MHz
-50.855 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
07:02:00 PM Sep 16, 2019
Ref Offset 12.95 dB
10 dB/div
Ref 30.00 dBm
Mkr2 24.831 GHz
-20.154 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

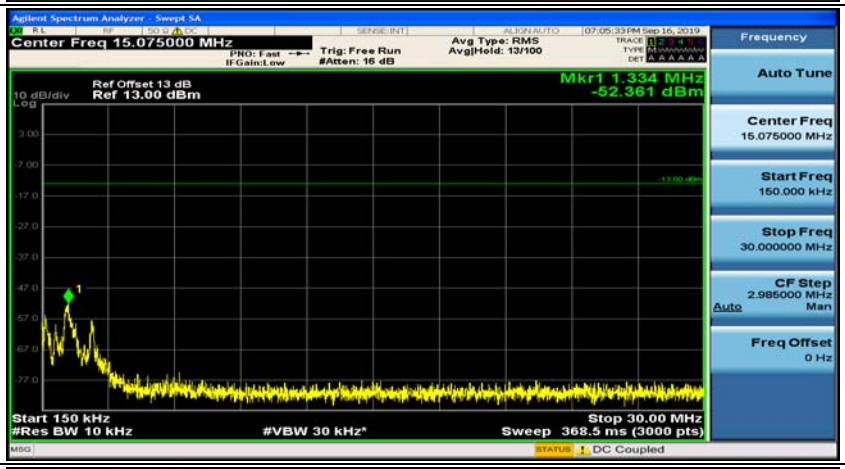
Channel Bandwidth: 10 MHz

Channel Bandwidth: 10 MHz_MCH_QPSK_1RB#0


Channel Bandwidth: 10 MHz_MCH_QPSK_1RB#24

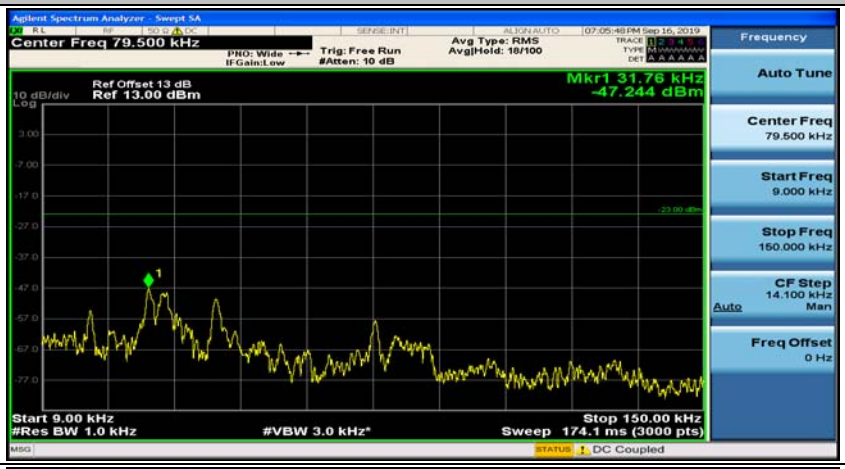
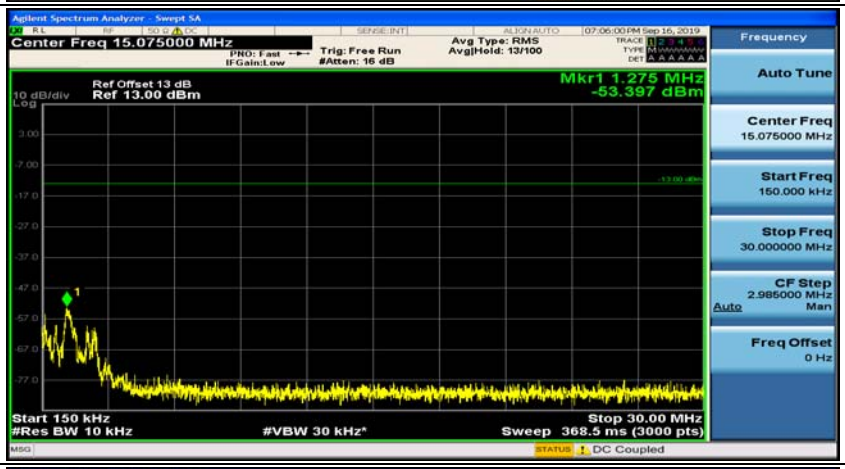


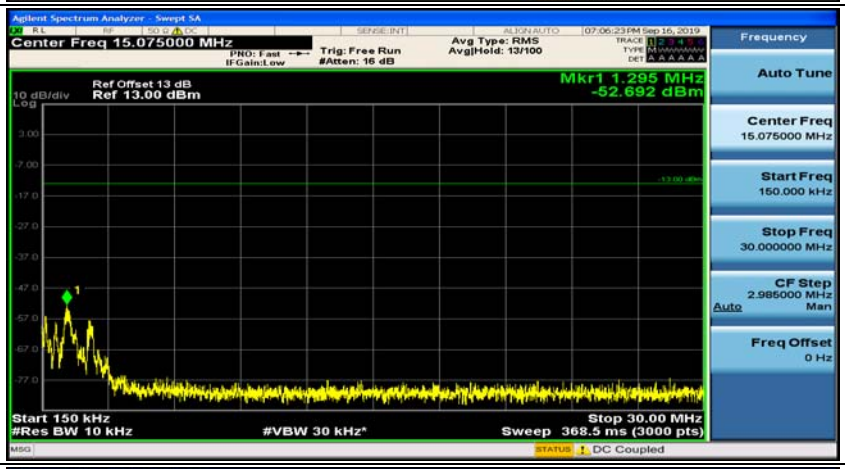
Channel Bandwidth: 10 MHz_MCH_QPSK_1RB#49

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
07:05:21 PM Sep 16, 2019
Ref Offset 13 dB
10 dB/div
Ref 13.00 dBm
Mkr1 34.86 kHz
-45.972 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

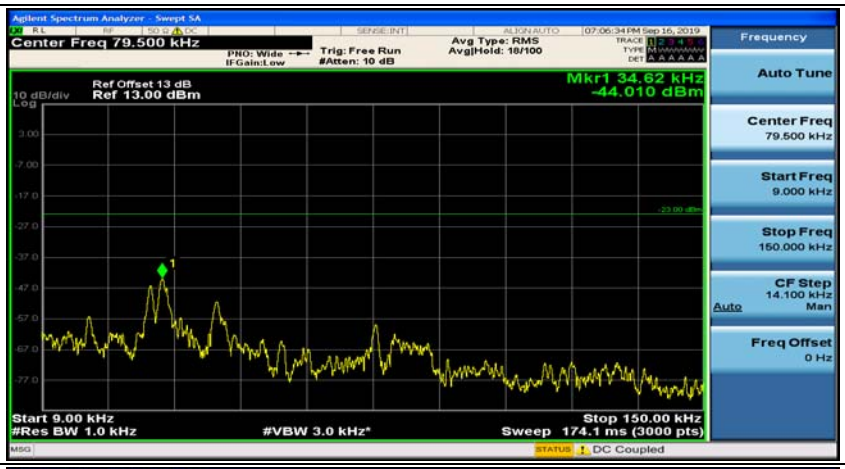

Agilent Spectrum Analyzer - Swept SA
Center Freq 15.075000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: RMS
Avg|Hold: 13/100
07:05:33 PM Sep 16, 2019
Ref Offset 13 dB
10 dB/div
Ref 13.00 dBm
Mkr1 1.334 MHz
-52.361 dBm
Start 150 kHz
#Res BW 10 kHz
#VBW 30 kHz*
Stop 30.00 MHz
Sweep 368.5 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

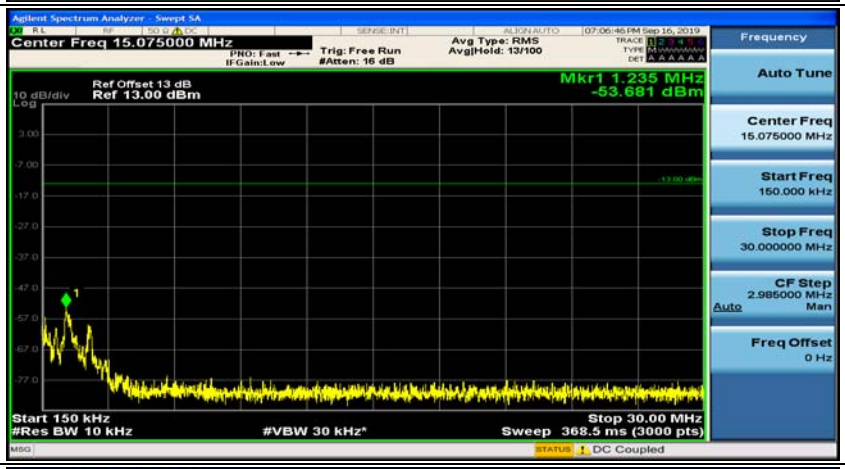
Agilent Spectrum Analyzer - Swept SA
Center Freq 13.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 17/100
07:05:39 PM Sep 16, 2019
Ref Offset 12.95 dB
10 dB/div
Ref 30.00 dBm
Mkr2 24.822 GHz
-20.535 dBm
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.00 GHz
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
Ref Offset 13 dB
10 dB/div Ref 13.00 dBm
Mkr1 34.62 kHz
-44.010 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
Ref Offset 13 dB
10 dB/div Ref 13.00 dBm
Mkr1 1.235 MHz
-53.681 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
Ref Offset 12.95 dB
10 dB/div Ref 30.00 dBm
Mkr2 24.866 GHz
-20.728 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	4.96	0.002150	± 2.5	PASS
		VN	TN	0.04	0.000017	± 2.5	PASS
		VH	TN	0.79	0.000342	± 2.5	PASS
	HCH	VL	TN	1.1	0.000476	± 2.5	PASS
		VN	TN	3.52	0.001522	± 2.5	PASS
		VH	TN	3.31	0.001431	± 2.5	PASS
16QAM	LCH	VL	TN	1.13	0.000490	± 2.5	PASS
		VN	TN	1.52	0.000659	± 2.5	PASS
		VH	TN	0.61	0.000264	± 2.5	PASS
	HCH	VL	TN	0.38	0.000164	± 2.5	PASS
		VN	TN	2.27	0.000982	± 2.5	PASS
		VH	TN	1.96	0.000848	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
QPSK	LCH	VN	-30	-1.47	-0.000637	± 2.5	PASS
		VN	-20	3.16	0.001369	± 2.5	PASS
		VN	-10	4.62	0.002002	± 2.5	PASS
		VN	0	3.72	0.001612	± 2.5	PASS
		VN	10	4.48	0.001941	± 2.5	PASS
		VN	20	2.96	0.001283	± 2.5	PASS
		VN	30	0.05	0.000022	± 2.5	PASS
		VN	40	2.42	0.001049	± 2.5	PASS
		VN	50	-1.69	-0.000732	± 2.5	PASS
	HCH	VN	-30	-1.92	-0.000830	± 2.5	PASS
		VN	-20	0.75	0.000324	± 2.5	PASS
		VN	-10	1.59	0.000688	± 2.5	PASS
		VN	0	3.77	0.001630	± 2.5	PASS
		VN	10	4.9	0.002119	± 2.5	PASS
		VN	20	2.05	0.000886	± 2.5	PASS
		VN	30	1.99	0.000861	± 2.5	PASS

		VN	40	2.85	0.001232	± 2.5	PASS
		VN	50	-0.01	-0.000004	± 2.5	PASS
16QAM	LCH	VN	-30	2.16	0.000936	± 2.5	PASS
		VN	-20	-0.83	-0.000360	± 2.5	PASS
		VN	-10	4.41	0.001911	± 2.5	PASS
		VN	0	4.77	0.002067	± 2.5	PASS
		VN	10	-0.77	-0.000334	± 2.5	PASS
		VN	20	3.44	0.001491	± 2.5	PASS
		VN	30	4.79	0.002076	± 2.5	PASS
		VN	40	1.21	0.000524	± 2.5	PASS
		VN	50	3.7	0.001603	± 2.5	PASS
	HCH	VN	-30	4.72	0.002041	± 2.5	PASS
		VN	-20	3.7	0.001600	± 2.5	PASS
		VN	-10	-0.23	-0.000099	± 2.5	PASS
		VN	0	-1.64	-0.000709	± 2.5	PASS
		VN	10	0.4	0.000173	± 2.5	PASS
		VN	20	2.82	0.001219	± 2.5	PASS
		VN	30	1.39	0.000601	± 2.5	PASS
		VN	40	-0.54	-0.000234	± 2.5	PASS
		VN	50	0.2	0.000086	± 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	0.000208	0.000208	± 2.5	PASS
		VN	TN	0.002108	0.002108	± 2.5	PASS
		VH	TN	0.000558	0.000558	± 2.5	PASS
16QAM	MCH	VL	TN	2.1	0.000909	± 2.5	PASS
		VN	TN	0.9	0.000390	± 2.5	PASS
		VH	TN	-0.23	-0.000100	± 2.5	PASS
Temperature							
Modulation	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
16QAM	MCH	VN	-30	1.55	0.000671	± 2.5	PASS
		VN	-20	2.88	0.001247	± 2.5	PASS
		VN	-10	-0.58	-0.000251	± 2.5	PASS
		VN	0	3.51	0.001519	± 2.5	PASS
		VN	10	-0.25	-0.000108	± 2.5	PASS
		VN	20	2.41	0.001043	± 2.5	PASS
		VN	30	1.3	0.000563	± 2.5	PASS
		VN	40	1.89	0.000818	± 2.5	PASS
		VN	50	4.31	0.001866	± 2.5	PASS
QPSK	MCH	VN	-30	0.16	0.000069	± 2.5	PASS
		VN	-20	0.9	0.000390	± 2.5	PASS
		VN	-10	4.15	0.001797	± 2.5	PASS
		VN	0	0.97	0.000420	± 2.5	PASS
		VN	10	2.52	0.001091	± 2.5	PASS
		VN	20	-1.71	-0.000740	± 2.5	PASS
		VN	30	-0.36	-0.000156	± 2.5	PASS
		VN	40	1.48	0.000641	± 2.5	PASS
		VN	50	0.29	0.000126	± 2.5	PASS