

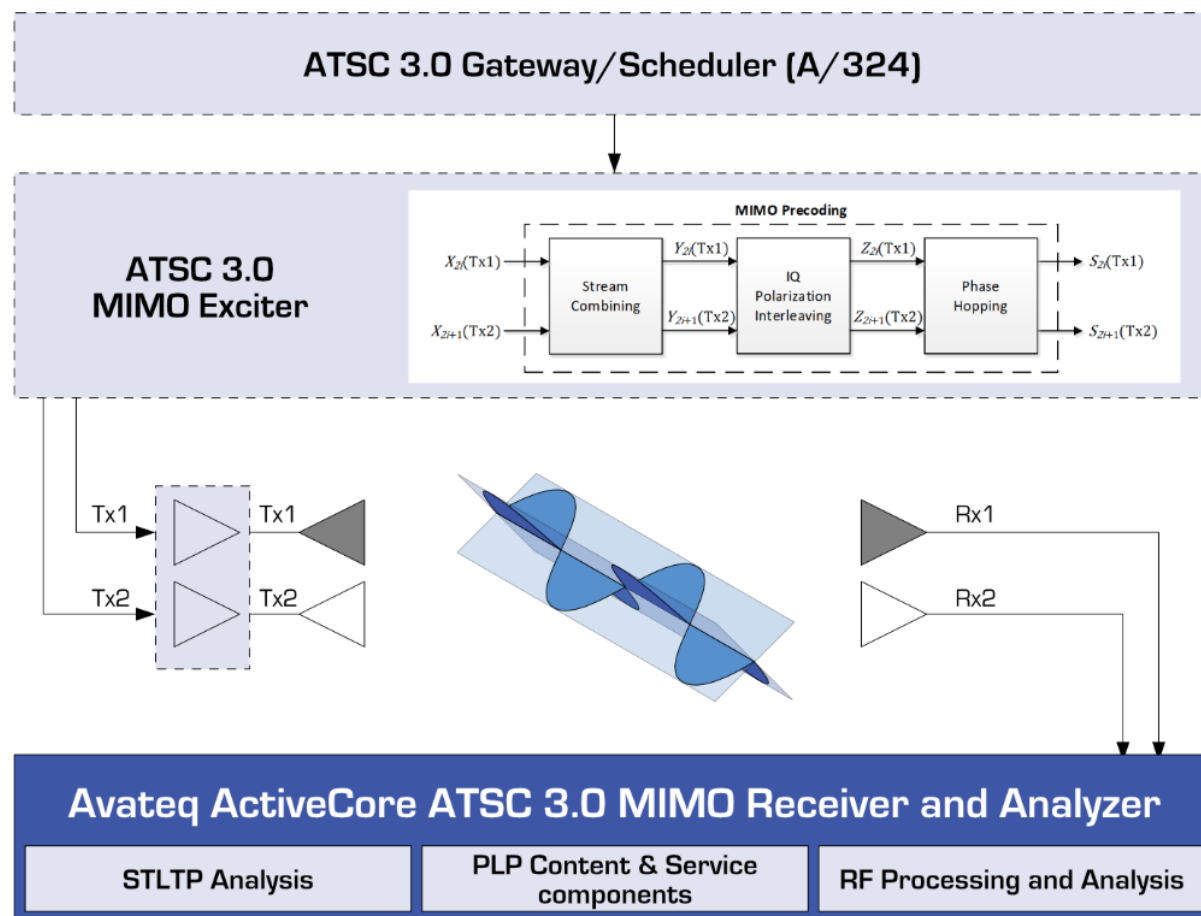


**AVQ1030**

**ATSC 3.0 MIMO RECEIVER AND SIGNAL ANALYZER**

System Deployment and Performance Verification

# AVQ1030 - ATSC 3.0 MIMO RX AND SIGNAL ANALYZER





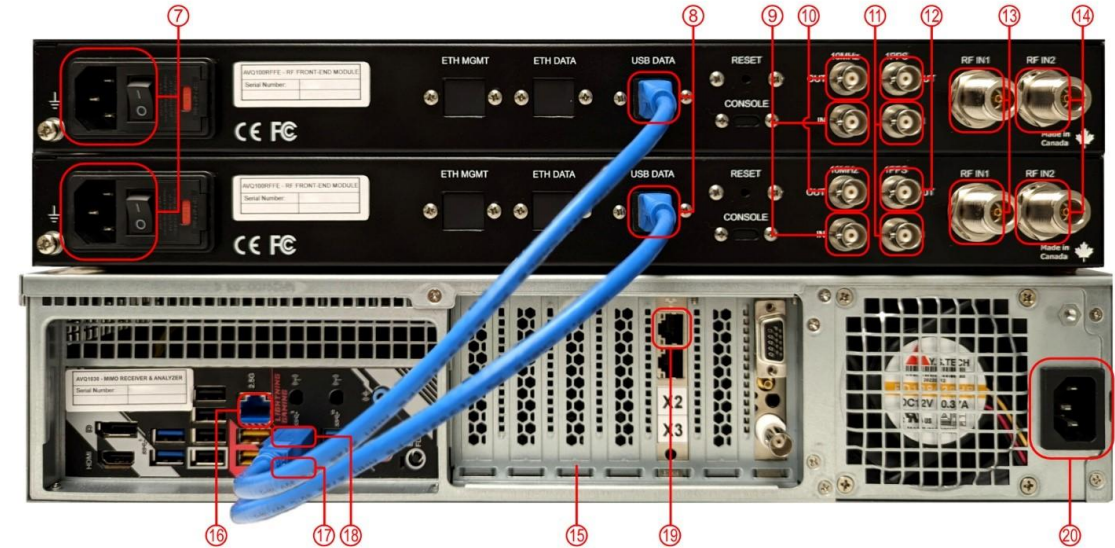
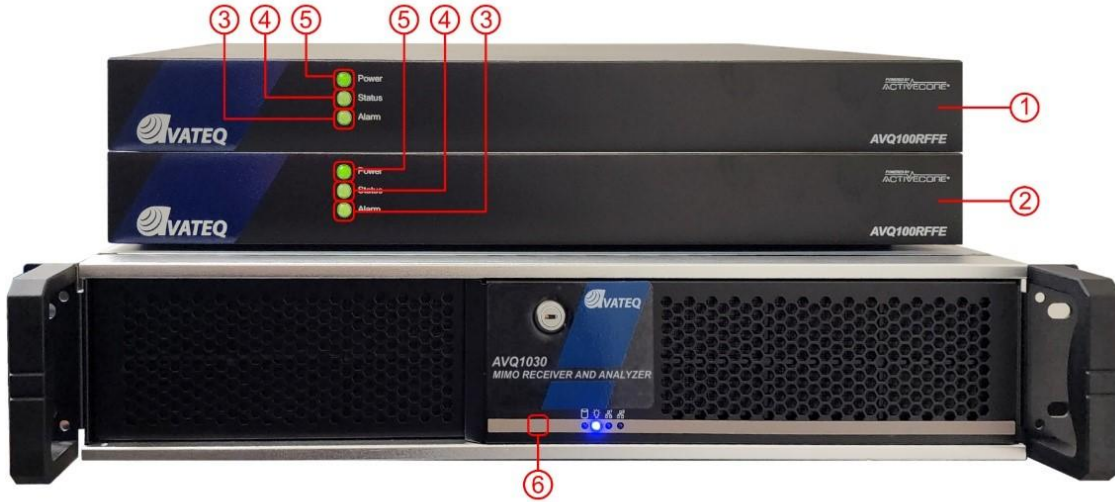
## AVQ1030 - ATSC 3.0 MIMO RX AND SIGNAL ANALYZER

# AVQ1030 ATSC 3.0 MIMO RECEIVER AND ANALYZER

## FEATURES

- ✓ Full 2x2 MIMO (ATSC 3.0 A/322) Receiver
- ✓ Support for LDM MIMO Mode
- ✓ State of the art X-pol Cancellation Engine
- ✓ In-band interference detection, estimation and visualization
- ✓ A comprehensive set of analyzed parameters and plots
- ✓ Spectrum sharing and bandwidth usage statistics
- ✓ Integrated ALP analyzer
- ✓ Signal quality troubleshooting at transmitter site and reception point

# AVQ1030 - ATSC 3.0 MIMO RX AND SIGNAL ANALYZER



Item #	Connector type	Name	Comment
1,2		AVQ100RFFE	Receiver front-end Module
3		RFFE Alarm Status	
4		RFFE System Status	
5		RFFE Power Status	
6		MIMO Processor Power ON/Off	
7	PWR ENT RCPT	AC power	
8	USB 3.0 Type B	USB DATA	AVQ100RFFE Digital Interface
9	BNC, 500hm	10MHz IN	External Reference 10MHz input
10	BNC, 500hm	10MHz OUT	10MHz output

11	BNC, 500hm	1PPS IN	External Reference 1PPS input (optional)
12	BNC, 500hm	1PPS OUT	1PPS output (optional)
13	N-type F, 500hm	RF IN1	RF signal input, Tx Output and Off-Air modes
14	N-type F, 500hm	RF IN2	RF signal input, Tx Output mode only
15		AVQ1030	AVQ1030 Processor Module
16	RJ45	2.5G	AVQ1030 Management LAN
17, 18	USB 3.0 Type A	SS 5	Processor Module Digital Interface
19	RJ45	X2	AVQ1030 STLTP Analyzer Interface (optional)
20	PWR ENT RCPT	AC power	



# AVQ1030 - ATSC 3.0 MIMO RX AND SIGNAL ANALYZER

## AVQ1030 WEB GUI


AVQ1030 - ATSC 3.0 MIMO Receiver and Analyzer

Standard	Freq, kHz	RF In	Pin, dBm	Freq, kHz	RF In	Pin, dBm
ATSC3.0	577,000	RFin1	-27.6	557,000	RFin1	-23.0

MER, dB RF 0: 0.0

MER, dB RF 1: 36.0

Shoulder Attenuation, dB

Left: 56.5 Right: 56.5

Left: 57.3 Right: 56.8

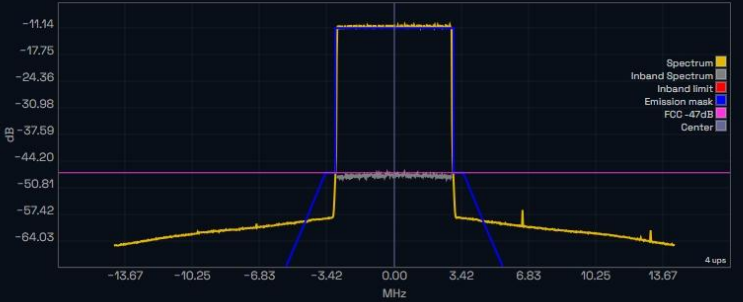
Freq offset, Hz RF 0: 99.7

Freq offset, Hz RF 1: 12.6

Site Name: Avateq Lab

Site ID: AVQ

### RF 0



### RF 1



RF 0	
Active Input	RFin1
Input RF power (dBm)	-27.57
Central Freq, kHz	577000
Ch.#	Unknown
System MER (dB)	0
Link Margin (dB)	0

RF 1	
Active Input	RFin1
Input RF power (dBm)	-23.04
Central Freq, kHz	557000
Ch.#	Ch.2B <557MHz>
System MER (dB)	36
Link Margin (dB)	29.68

Connected: Processing (No errors)
Powered by ACTIVECORE®
2025-04-22 12:40:47 SYNC

## LDM MIMO MODE SUPPORT

PLPs in RF 0												
▲ List of PLPs												
ID	Layer	Select	LLS	MOD	COD	FEC type	Mbit/sec	BW Share	MIMO	Stream combining	IQ interleaving	MIMO PH
0	Core	Selected	Not present	QPSK	4/15	64K	1.367	0.666	Not used	--	--	--
1	Enhanced	-----	Not present	QPSK	5/15	64K	1.712	0.666	Type B	Not used	Not used	Not used

PLPs in RF 1												
▲ List of PLPs												
ID	Layer	Select	LLS	MOD	COD	FEC type	Mbit/sec	BW Share	MIMO	Stream combining	IQ interleaving	MIMO PH
0	Core	Selected	Not present	QPSK	4/15	64K	1.367	0.666	Not used	--	--	--
1	Enhanced	Select	Not present	QPSK	5/15	64K	1.712	0.666	Type B	Not used	Not used	Not used

## LINK MARGIN ANALYSIS FOR EACH CHANNEL

### Channel RF 0

Link Margin					
Sel	Modulation	Link Margin, dB	Bitrate (Mbit/sec)	Spectral Efficiency (bit/s/Hz)	Fill Factor
>>	16QAM - NUC - 8/15	0	3.321	0.2	1
	QPSK - 4/15	2.7	0.830	0.05	0.25
	QPSK - 5/15	1.6	1.038	0.06	0.31
	QPSK - 6/15	0.5	1.245	0.07	0.37

### Channel RF 1

Link Margin					
Sel	Modulation	Link Margin, dB	Bitrate (Mbit/sec)	Spectral Efficiency (bit/s/Hz)	Fill Factor
>>	16QAM - NUC - 8/15	29.7	3.321	0.2	0.2
	64QAM - NUC - 12/15	20.4	7.471	0.47	0.46
	1024QAM - NUC - 12/15	10.5	12.452	0.78	0.76
	4096QAM - NUC - 13/15	3.1	16.188	1.01	1

# AVQ1030 - ATSC 3.0 MIMO RX AND SIGNAL ANALYZER

## MIMO vs SISO PERFORMANCE



Tx Antenna gain dB	13	Rx Sensitivity dB	-60
Rx Antenna gain dB	13	Central Frequency MHz	521
Cable loss dB	10	Link Margin, dB	2

MIMO vs SISO Transmission comparison

Free space path loss dB	SISO						MIMO						SISO power/MIMO power
	Rx MER	Tx power level dBm	Total power Watt	MODCOD	Bitrate Mbitps	1x Tx Watt/Mbitps	Rx MER	Tx power level dBm	Total power Watt	MODCOD	Bitrate Mbitps	1x Tx Watt/Mbitps	
120.41	35	59.41	872.73	4K-13/15	55.4	15.75	20	44.41	55.20	64-13/15	55.4	1	15.81
120.41	31	55.41	347.44	4K-11/15	46.8	7.42	17	41.41	27.66	64-11/15	46.8	0.59	12.56
120.41	27	51.41	138.32	4K-9/15	38.3	3.61	15	39.41	17.45	64-9/15	38.3	0.46	7.92
120.41	23	47.41	55.07	4K-8/15	34	1.62	13	37.41	11.01	64-9/15	34	0.32	5.00



# AVQ1030 - ATSC 3.0 MIMO RX AND SIGNAL ANALYZER

## MIMO vs SISO PERFORMANCE



MIMO field tests - transmission power for different code rates based on sub-optimal frame configuration.

Distance, km	Free space path loss, dB	Rx MER, dB	Link Margin, dB	Tx power level, dBm	2xTx power, Watt	MODCOD	Shannon Limit, dB	2xTx Bitrate, Mbitps	Spectral Efficiency Bit/s/Hz
42.4	118.98	31	3	53.98	499.69	1024-13/15	28	72.1	12.02
35.5	117.43	31	3	52.43	350.29	1024-13/15	28	72.1	12.02
23.3	113.78	31	3	48.78	150.90	1024-13/15	28	72.1	12.02
13.4	108.97	31	3	43.97	49.91	1024-13/15	28	72.1	12.02
67.2	122.98	27	3	53.98	499.70	1024-11/15	24	61	10.17
56.3	121.44	27	3	52.44	350.74	1024-11/15	24	61	10.17
36.8	117.75	27	3	48.75	149.85	1024-11/15	24	61	10.17
21.3	113.00	27	3	44.00	50.20	1024-11/15	24	61	10.17
119.5	127.98	22	3	53.98	499.70	256-11/15	19	48.8	8.13
100.1	126.44	22	3	52.44	350.62	256-11/15	19	48.8	8.13
65.5	122.75	22	3	48.75	150.12	256-11/15	19	48.8	8.13
37.8	117.98	22	3	43.98	50.00	256-11/15	19	48.8	8.13
189.4	131.98	18	3	53.98	499.72	64-11/15	15	36.6	6.10
158.5	130.43	18	3	52.43	349.97	64-11/15	15	36.6	6.10
103.8	126.75	18	3	48.75	150.09	64-11/15	15	36.6	6.10
60	121.99	18	3	43.99	50.15	64-11/15	15	36.6	6.10
300.2	135.98	14	3	53.98	499.79	16-12/15	11	26.6	4.43
251.2	134.43	14	3	52.43	349.95	16-12/15	11	26.6	4.43
164.5	130.75	14	3	48.75	150.07	16-12/15	11	26.6	4.43
95	125.98	14	3	43.98	50.05	16-12/15	11	26.6	4.43

## AVQ1030 - ATSC 3.0 MIMO RX AND SIGNAL ANALYZER

TECHNOLOGY STATUS:  
**AVQ1030 – ATSC 3.0 MIMO RECEIVER AND  
SIGNAL ANALYZER**

- ✓ End-to-end Avateq's MIMO solution including high-capacity datacasting applications
- ✓ Commercial/customer MIMO antennas
- ✓ Full set of ATSC 3.0 analytical tools:
  - STLTP analyzer
  - Comprehensive RF measurements
  - PLP content and service component analyzer
  - Spectral efficiency estimator





## CONTACT INFORMATION

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