

MAXNET®

Active Amplifiers & RF Switches Amplifiers



Patented
U.S.# 6,842,348;
Cdn.# 2,404,844

5RU Active RF Chassis
(front view)

D3.1/CCAP™
Compliant

Specifications

Forward Combining Amplifier

PART NUMBER <small>(Notes 1, 8, & 9)</small>	FWD. GAIN SPEC.				RESP. CONT.		INJECT. PORT		I/O T.P. IL	I/O RL	CURRENT
	BW (MHz)	Gain ⁽²⁾ (dB)	Slope ⁽³⁾ (dB)	Flat. (±dB)	Gain Cont.	Slope Cont.	IL (16.0±dB)	ISO ⁽⁴⁾ (dB)	(20.0±dB)	(Note 5) (dB)	(Note 6) (mA)
QMN870-18GP/F*	40-870	18	-0/+1.5	.5	Pad	EQ	.5	≥ 50	1	16	420
QMN870-22GP/F*	40-870	22	-0/+1.5	.75	Pad	EQ	.5	≥ 50	1	16	420
QMN870-25GP/F*	40-870	25	-0/+1.5	.75	Pad	EQ	.5	≥ 50	1	16	420
QMN1000-18GP/F*	40-1000	18	-0/+2	.5	Pad	EQ	.75	≥ 45	1	14.5	420
QMN1000-22GP/F*	40-1000	22	-0/+2	.75	Pad	EQ	.75	≥ 45	1	14.5	420
QMN1000-25GP/F*	40-1000	25	-0/+2	.75	Pad	EQ	.75	≥ 45	1	14.5	420

Specifications

Forward Combining Amplifier (cont'd)

PART NUMBER <small>(Notes 1, 8, & 9)</small>	DISTORTIONS					NOISE FIGURE	AMP TECH
	Output Level (dBmV)	Ch. Load (#) ⁽¹⁰⁾	Ch. Slope (dB)	CTB (-dB)	CSO (-dB)	(dB)	(Note 7)
QMN870-18GP/F*	43	79	0	76	74	< 5.0	PD GaAs
QMN870-22GP/F*	43	79	0	74	74	< 5.0	PD GaAs
QMN870-25GP/F*	43	79	0	74	72	< 5.0	PD GaAs
QMN1000-18GP/F*	43	79	0	76	74	< 5.0	PD GaAs
QMN1000-22GP/F*	43	79	0	74	74	< 5.0	PD GaAs
QMN1000-25GP/F*	43	79	0	74	72	< 5.0	PD GaAs

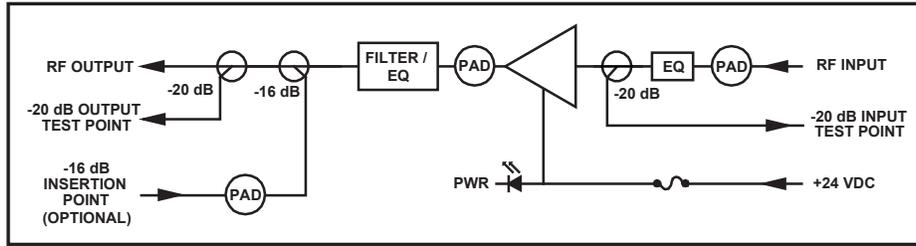
NOTES:

- Details:* = replace with I for post gain stage insertion point option.
- (1) All units supplied with -20 dB F connector front input and output test point.
- (2) Gain at 50 MHz.
- (3) Gain at highest specified frequency.
- (4) From injection port to RF input port with RF output port terminated into 75 ohm load.
- (5) Worst case return loss for input and output ports.
- (6) DC load current at +24 VDC.
- (7) PP = Push-Pull; PD = Power-Doubled; Si = Silicon; GaAs = Gallium Arsenide.
- (8) F connector mating center conductor diameter: .025" - .042".
- (9) All specifications listed include 20 dB output test point. Assume worst case of 1 dB increased insertion loss if input test point is required.
- (10) 79 CW NTSC analog channels from 54-550 MHz with 320 MHz QAM loading 6 dB below analog carrier levels.

Operating temperature: 0°C to +50°C (+32°F to +122°F)
Humidity: 5-95% (without condensation)
Dimensions: 8.66"H x 1.82"W x 6.0"D (21.99H x 4.62W x 15.24D cm)
Weight: 1.9 lbs (0.96 kgs)



Amplifier



Functional Schematic

Ordering Information

Part Number	Description
QMN870-18GP/F	870 MHz, 18 dB, GaAs PD, F Connectors, 20 dB Input and Output TPs
QMN870-22GP/F	870 MHz, 22 dB, GaAs PD, BNC Connectors (rear only), 20 dB Input and Output TPs
QMN870-25GP/F	870 MHz, 25 dB, GaAs PD, F Connectors, 20 dB Input and Output TPs
QMN1000-18GP/F	1000 MHz, 18 dB, GaAs PD, F Connectors, 20 dB Input and Output TPs
QMN1000-22GP/F	1000 MHz, 22 dB, GaAs PD, F Connectors, 20 dB Input and Output TPs
QMN1000-25GP/F	1000 MHz, 25 dB, GaAs PD, F Connectors, 20 dB Input and Output TPs

Specifications

Forward Dual Hybrid Amplifier

PART NUMBER	FWD. GAIN SPEC.			RESP. CONT.		I/O T.P. IL (20.0±dB)	I/O RL (Note 2) (dB)	CUR. (Note 3) (mA)	DISTORTIONS					NOISE FIGURE (dB)	AMP TECH (Note 4)
	BW (MHz)	Gain (dB)	Flat. (±dB)	Gain Cont. (-dB)	Slope Cont. (-dB)				Output Level (dBmV)	Ch. Load (#) ⁽⁶⁾	Ch. Slope (dB)	CTB (-dB)	CSO (-dB)		
QMN2870-30GP/F	40-870	30	.5	8	8	0.8	17	665	43	79	0	76	74	5	PD GaAs
QMN2870-34GP/F	40-870	34	.5	8	8	0.8	17	670	43	79	0	76	73.5	4.5	PD GaAs
QMN21000-30GP/F	40-1002	30	.7	8	8	1	15	665	43	79	0	76	74	5.3	PD GaAs
QMN21000-34GP/F	40-1002	34	.7	8	8	1	15	670	43	79	0	76	74	4.8	PD GaAs
QMN2F1000-30GP/F	40-1002	30	.7	JXP	JXP	1	15	665	43	79	0	76	74	5.3	PD GaAs
QMN2F1000-34GP/F	40-1002	34	.7	JXP	JXP	1	15	665	43	79	0	76	74	5.3	PD GaAs

NOTES:

A maximum of five forward dual hybrid amplifiers can be used in one active chassis, if it is powered with MNAC-110, MNAC-220, or MNDC power supplies.

(1) All front test points are F connectors.

(2) Worst case return loss for input and output ports.

(3) DC load current (worst case) at +24 VDC.

(4) PP = Push-Pull; PD = Power-Doubled; Si = Silicon; GaAs = Gallium Arsenide

(5) F connector mating center conductor diameter: .025" - .042".

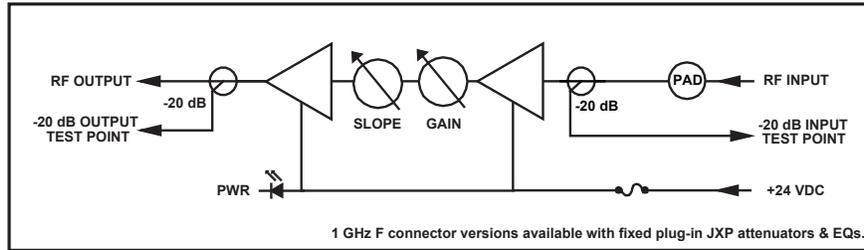
(6) 79 CW NTSC analog channels from 54-550 MHz with 320 MHz QAM loading 6 dB below analog carrier levels.

Operating temperature: 0°C to +50°C (+32°F to +122°F)

Humidity: 5-95% (without condensation)

Dimensions: 8.66"H x 1.82"W x 6.0"D (21.99H x 4.62W x 15.24D cm)

Weight: 1.9 lbs (0.96 kgs)



Functional Schematic

Ordering Information

Part Number	Description
QMN2870-30GP/F	870 MHz, 30 dB, GaAs PD, F Connectors
QMN2870-34GP/F	870 MHz, 34 dB, GaAs PD, F Connectors
QMN21000-30GP/F	1002 MHz, 30 dB, GaAs PD, F Connectors
QMN21000-34GP/F	1002 MHz, 34 dB, GaAs PD, F Connectors
QMN2F1000-30GP/F	1002 MHz, 30 dB, GaAs PD, JXP Fixed Gain/Slope Adjust ⁽¹⁾ , F Connectors
QMN2F1000-34GP/F	1002 MHz, 34 dB, GaAs PD, JXP Fixed Gain/Slope Adjust ⁽¹⁾ , F Connectors

NOTE:

(1) Use MN*PAD and MN*EQ for gain and slope adjust in "Fixed" adjustment amplifiers.

Specifications

High Gain Amplifier

MEASUREMENT	FREQUENCY	QMN21000-41PHF	QMN2F1000-42PHF
		QA	QA
GAIN	50-1002 MHz	41 +/- 1.0 dB	42 +/- 1.0 dB
RETURN LOSS	50-1002 MHz	≥ 14.5 dB	
INPUT PAD	50-1002 MHz	MN_PAD ⁽¹⁾	MN_PAD ⁽¹⁾
GAIN CONTROL	50-1002 MHz	10 (-dB)	MN_PAD ⁽¹⁾
SLOPE CONTROL (-dB)	50-1002 MHz	8 (-dB)	QAE_EQ ⁽²⁾
TEST POINT	50-1002 MHz	20 +/- 1.0 dB	
NOISE FIGURE	50-1002 MHz	< 4.5 dB	
INPUT CURRENT	DC	730mA @ 24 VDC ⁽³⁾	
POWER CONSUMPTION	DC	17W	
OPERATING TEMPERATURE		0°C to +50°C (+32°F to +122°F)	
HUMIDITY		5-95% (without condensation)	
DIMENSIONS		8.66"H x 1.82"W x 6.0"D (21.99H x 4.62W x 15.24D cm)	
WEIGHT		1.9 lbs (0.96 kg)	
DIGITAL PERFORMANCE		MOSTLY DIGITAL ⁽⁴⁾	
REF OUTPUT MAX./QAM 256		43 dBmV ⁽⁵⁾	
MINIMUM INPUT POWER/CH		-2 dBmV QAM 256, +10 dBmV Analog ⁽⁶⁾	
MINIMUM MER AT REF OUTPUT		40 dB	
BER BEFORE/AFTER AMP ⁽⁷⁾		< 1E-9	

NOTES:

(1) Ships with MN0PAD. See page 6.

(2) Ships with 0 dB QAE EQ. See page 6.

(3) A maximum of five forward high gain amplifiers can be used in one active chassis, if it is powered with MNAC-110, MNAC-220, or MNDC power supplies.

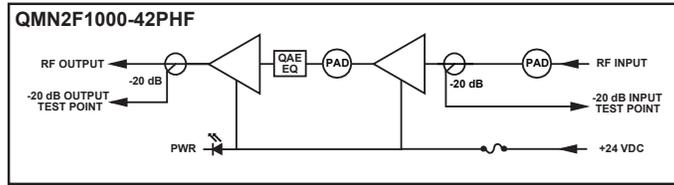
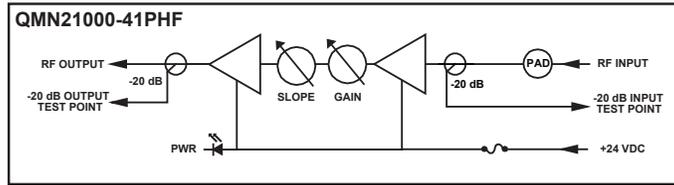
(4) Tested with 150x QAM 256 channels up to 1002 MHz at specified output power, as well as 4 CWs @ +6 dB output relative to QAMs to simulate pilot channels.

(5) See chart for other maximum output ratings for the number of QAM channels.

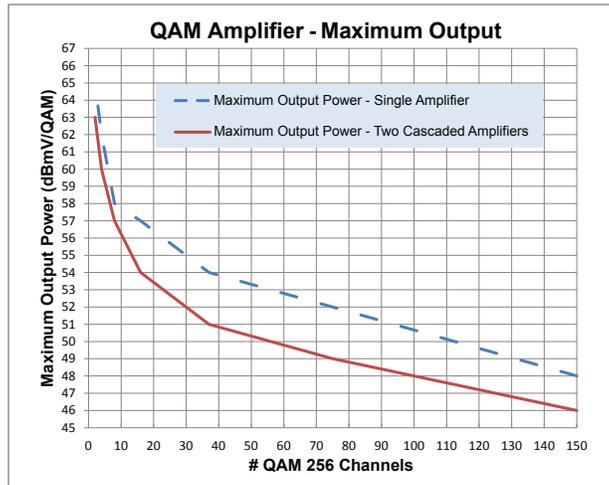
(6) If any analog channels present then they should be ≥ 10 dBmV to avoid CNR impacts.

This means min. QAM level would be -6 dB relative. If all QAM channels, then QAMs may be as low as -2 dBmV/QAM 256.

(7) Pre-FEC BER. Results show no detectable bit errors if operated within recommended range.



Functional Schematics



Notes/Assumptions:

- 1) This graph shows the actual test results with various quantities of QAM 256 channels applied, recorded as the highest level before MER decrease noted from source at > 41 dB.
- 2) This plot assumes no analog channels if the number of QAMs is less than 100 channels, or up to four analog channels (pilots) if more than 100 QAMs are present.
- 3) Note that doubling the number of amplifiers in cascade results in approx. 3 dB less output power recommended. This could be extrapolated to another 3 dB drop-in rating with four amplifiers in cascade. All assumed with passive loss between amplifier stages that equals gain of each stage.
- 4) ATX recommends operating at least 3 dB below the maximum output level defined in the above chart. For example, with 150 QAM 256 channels, operate at ≤ 45 dBmV with up to two amplifiers in cascade. Operate at < 42 dBmV with up to four amplifiers in cascade.
- 5) These are all approximate guidelines and can vary based on many conditions unique to each headend. In-system testing is always recommended. For each device in the system, decrease output level by 1 dB using interstage attenuation and note if end of line MER decreases to indicate this device is limiting performance.

Ordering Information

Part Number	Description
QMN21000-41PHF	1002 MHz, 41 dB, GaN PD, F Connectors
QMN2F1000-42PHF	1002 MHz, 42 dB, GaN PD, F Connectors, Plug-in Pad/EQ

Specifications

Narrowcast QAM Amplifier

PART NUMBER	# AMPS.	BW (MHz)	GAIN SPECIFICATIONS				OUT. T.P. (20±dB) <small>(Note 2)</small>	RETURN LOSS		
			Gain ⁽³⁾			Flat. ⁽⁴⁾ (±dB)		Input (MHz)		Output
<small>(Note 1)</small>			870 MHz (dB)	500 MHz (±dB)	54 MHz (±dB)			54-500 MHz (≥dB)	500-870 MHz (≥dB)	54-870 MHz (≥dB)
QMNN1-13P*	Single	54-870	13	0.5	1	0.2	1	16	16	16
QMNN2-13P*	Dual	54-870	13	0.5	1	0.2	1	16	16	16
QMNN1-17P*	Single	54-870	17	0.5	1	0.2	1	16	16	16
QMNN2-17P*	Dual	54-870	17	0.5	1	0.2	1	16	16	16
QMNN1-21P*	Single	54-870	21	0.5	1	0.2	1	16	16	16
QMNN2-21P*	Dual	54-870	21	0.5	1	0.2	1	16	16	16

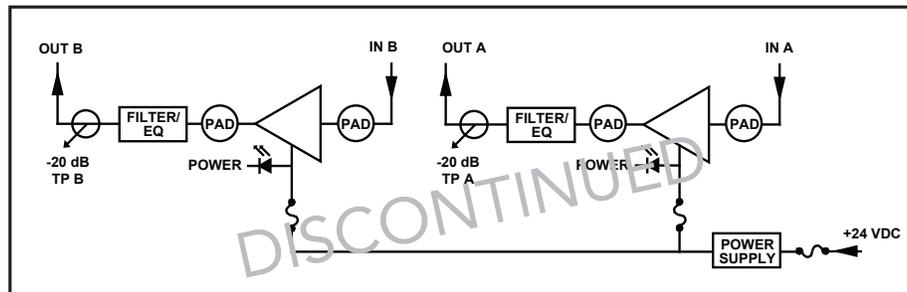
Specifications

Narrowcast QAM Amplifier (cont'd)

PART NUMBER	I _{MAX} @24V (mA)	NOISE FIG. (dB)	REV. ISO. (dB)	OUTPUT LEVEL w MER >43 dB & Pre BER <10 ⁻¹⁰			
				QAM Channel Loading 550-870 MHz ⁽⁵⁾⁽⁷⁾			
<small>(Note 1)</small>				1 (dBmV)	2 (dBmV)	4 (dBmV)	8 (dBmV)
QMNN1-13P*	175	6	20	+63	+57	+51	+47
QMNN2-13P*	350	6	20	+63	+57	+51	+47
QMNN1-17P*	175	6	23	+64	+58	+52	+48
QMNN2-17P*	350	6	23	+64	+58	+52	+48
QMNN1-21P*	175	6	26	+64	+58	+52	+48
QMNN2-21P*	350	6	26	+64	+58	+52	+48

NOTES:

- (1) * = F for F connectors or B for BNC connectors.
 - (2) All front test points are F connectors. F connector mating center conductor diameter: .025" - .042".
 - (3) Gains at 500 MHz and 50 MHz are referenced to the gain at 870 MHz.
 - (4) As measured over any consecutive 6 MHz bandwidth.
 - (5) All QAM channels adjacent.
 - (6) QAM signal(s) performance at input: MER > 45 dB and Pre BER < 10⁻¹⁰.
 - (7) QAM signal(s) output performance: MER > 43 dB and Pre BER < 10⁻¹⁰.
- Operating temperature: 0°C to +50°C (+32°F to +122°F)
 Humidity: 5-95% (without condensation)
 Dimensions: 8.66"H x 1.82"W x 6.0"D (21.99H x 4.62W x 15.24D cm)
 Weight: 1.9 lbs (0.96 kg)



Functional Schematic

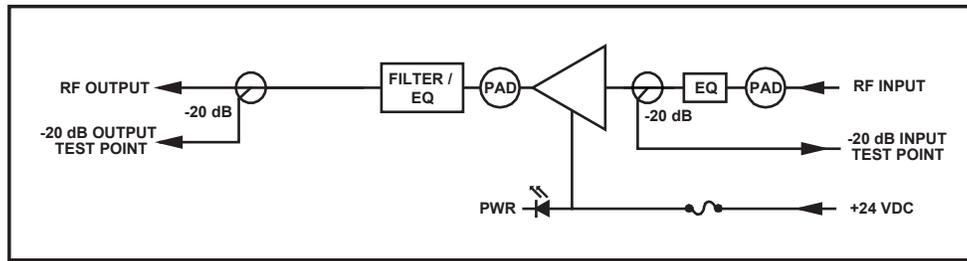
Specifications

Return Amplifier

PART NUMBER	GAIN SPEC.				RESP. CONT.		I/O T.P. IL	I/O RL	CURRENT	DISTORTIONS					NOISE FIGURE	AMP TECH
	BW (MHz)	Gain ⁽³⁾ (dB)	Slope ⁽⁴⁾ (dB)	Flat. (±dB)	Gain Cont.	Slope Cont.				(Note 6) (mA)	Output Level (dBmV)	Ch. Load (#)	Ch. Slope (dB)	CTB (-dB)		
(Notes 1 & 2)		Plug-in				(20.0±dB)	(Note 5) (dB)									
QMN200-22/F	5-200	22	-1/+5	.5	Pad	EQ	.5	18	220	50	22	0	70	74	5	PP Si
QMN200-28L/F	5-200	28	-1/+5	.5	Pad	EQ	.5	18	140	50	10	0	67	70	5	PP Si

NOTES:

- (1) F connector mating center conductor diameter: .025" - .042".
 - (2) All specifications listed include 20 dB output test point. Assume worst case of 1 dB increased insertion loss if input test point is required.
 - (3) Gain at 5 MHz.
 - (4) Gain at highest specified frequency.
 - (5) Worst case return loss for input and output ports.
 - (6) DC load current at +24 VDC.
 - (7) PP = Push-Pull; PD = Power-Doubled; Si = Silicon; GaAs = Gallium Arsenide.
- Operating temperature: 0°C to +50°C (+32°F to +122°F)
 Humidity: 5-95% (without condensation)
 Dimensions: 8.66"H x 1.82"W x 6.0"D (21.99H x 4.62W x 15.24D cm)
 Weight: 1.9 lbs (0.96 kg)



Functional Schematic

Ordering Information

Part Number	Description
QMN200-22F	200 MHz, 22 dB, Si PP, F Connectors, 20 dB Input and Output TPs
QMN200-28LF	200 MHz, 28 dB, Si PP, Low Current, F Connectors, 20 dB Input and Output TPs

Plug-in Pad & EQ



* is MN*PAD value from 0-20 dB in 1 dB steps



* is EQ value from 1.5-24 dB in 1.5 dB steps

For Plug-in Pad and EQ specifications and ordering information, see MAXNET Plug-in Pad & EQs data sheet (#ANW0741)

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MAXNET specifications are only valid when ATX plug-in pads and EQs are used.

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