

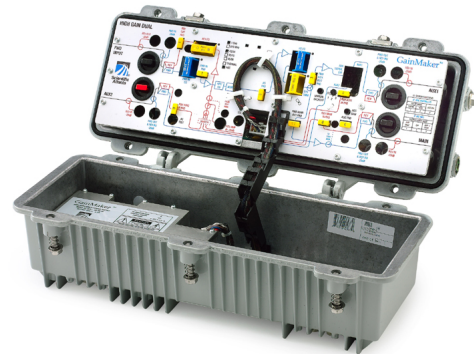
Optoelectronics

## GainMaker® Unbalanced Triple System Amplifier 1 GHz with 42/54 MHz Split

### Description

The GainMaker® Broadband Amplifier Platform includes a variety of RF amplifiers that address the divergent needs of today's broadband networks. All GainMaker amplifiers provide superior 2-way performance and reliability combined with a user-friendly layout. All share common plug-in accessories and perform to 1002 MHz in the forward path. The System Amplifiers in this family provide multiple forward RF output ports while the Line Extenders provide a single forward RF output port.

GainMaker System Amplifiers now utilize GaAsFET technology in the interstage and output gain stages for improved distortion performance.



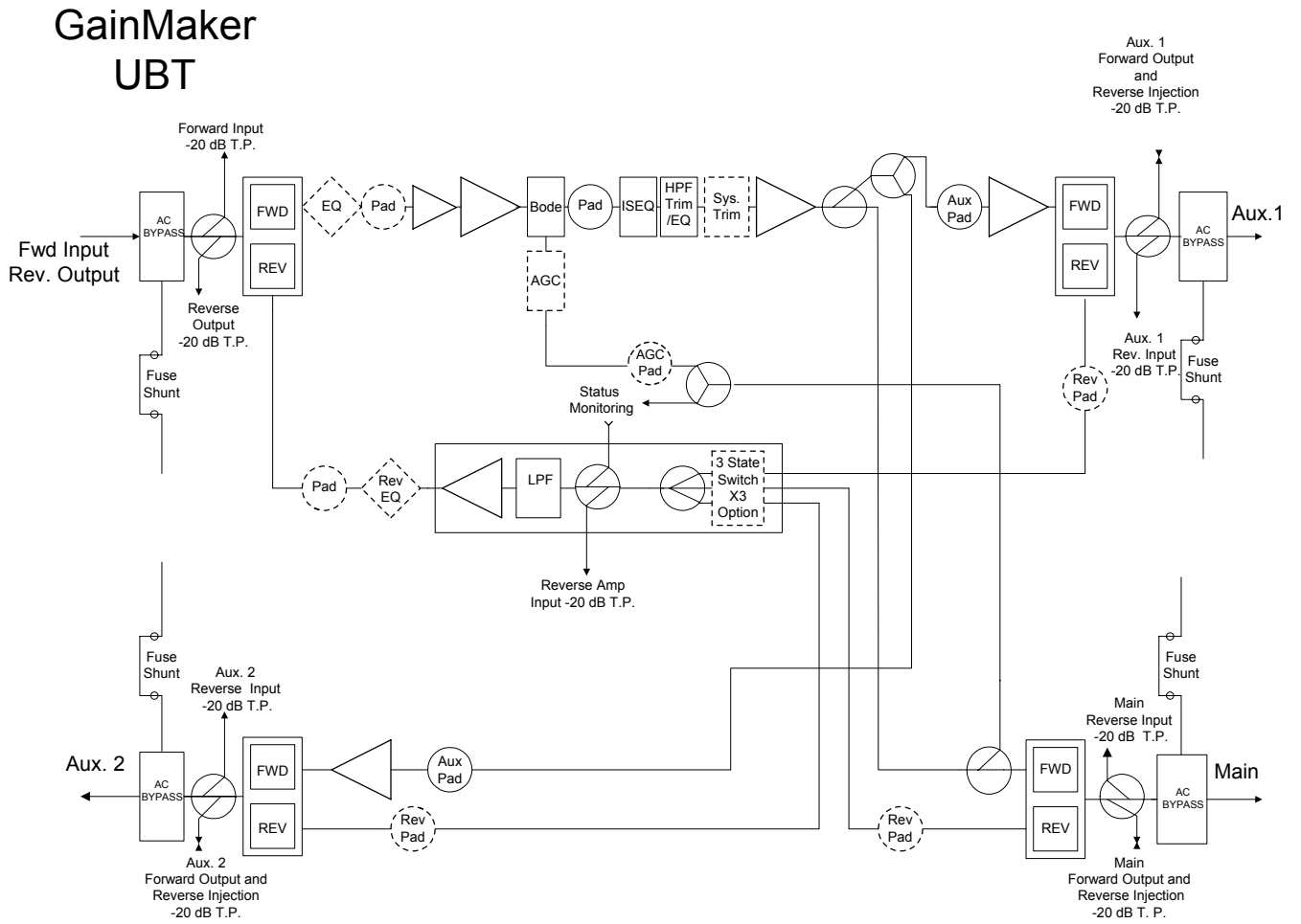
The GainMaker System Amplifier modules have increased gain and are mechanically compatible with previous System Amplifier II, II+, and III housing bases, often enabling upgrade to higher bandwidth with no re-spacing or re-splicing. The DC power supply is modular and located in an updated housing lid for easy access. All GainMaker System Amplifier modules are factory configured with reverse amplifier, diplex filters, thermal compensation circuit, forward interstage pads, and equalizer to ensure optimal performance. Optional single-pilot Automatic Gain Control (AGC) configurations are also available.

The GainMaker Unbalanced Triple System Amplifier is ideally suited as a trunk/bridger amplifier. The Unbalanced Triple provides one low level RF output for the trunk (express) path and two high (bridger) level RF outputs for the feeder network.

### Features

- Common RF test points for forward output and reverse injection simplify reverse balancing
- Increased forward gain
- High-performance GaAsFET gain stage technology
- Fixed-value plug-in accessories are common to all GainMaker products
- 60 and 90 volt AC powering capability
- 15 ampere current capacity (steady state) and 25 ampere surge survivability
- Optional 3-state reverse switch (on/off/-6 dB) allows each reverse input to be isolated for noise and ingress troubleshooting (status monitoring required)
- AGC has Thermal backup, which eliminates disruptive RF output variation in the event of pilot loss
- Improved hum modulation
- Plug-in, self-contained diplex filters
- Modular high-efficiency power supply allows simplified maintenance
- Reverse input pad and RF test point for each reverse input port allow optimum reverse path design and alignment
- Directional Coupler RF test points provide best accuracy
- Surge resistant circuitry ensures gain stage protection without fuses or other nuisance failure causing devices

## Block Diagram



## Specifications

General Station Performance		Units	Forward		Reverse	Notes
Pass Band		MHz	54-1002		5-42	
Amplifier Type		---	GaAs FET		PP	
Frequency Response		dB	±0.5 Main, ±0.6 Aux		±0.4	
Auto Slope and Gain Range		dB	±5.5		n/a	
Return Loss		dB	16		16	7
Max AC Through Current (continuous)		Amps	15		-	
Max AC Through Current (surge)		Amps	25		-	
Hum Modulation @ 12 A (over specified frequency range)		dB	70 (54-870 MHz) 60 (870-1002 MHz)		60 (5-10 MHz) 70 (11-42 MHz)	
Hum Modulation @ 15 A (over specified frequency range)		dB	65 (54-870 MHz) 60 (870-1002 MHz)		60 (5-10 MHz) 65 (11-42 MHz)	
Test Points (± 0.5 dB)		dB	-20		-20	
Reference Output Level @...		dBmV	<b>MAIN</b>	<b>AUX</b>		
	1002 MHz		40.5	49.5	35 (@ 42MHz)	
	870 MHz		38.5	47.5		
	750 MHz		36.7	45.7		
	650 MHz		35.0	44.0		
	550 MHz		33.5	42.5		
	55 MHz		26.0	35.0	35 (@ 5 MHz)	
Reference Output Tilt (55-1002 MHz)		dB	14.5			1

Forward Station Performance	Units	Auto/Thermal with 10.5 dB I/S EQ		Notes
		MAIN	AUX	
Operational Gain (minimum)	dB	34	43	2
Internal Tilt (± 0.5 dB)	dB	+15.5	+15.5	3
Noise Figure @ 54 MHz	dB	8.5	8.5	2
Noise Figure @ 1 GHz	dB	7.5	7.5	2
<b>78 NTSC Channels (CW) with digital</b>				4
Composite Triple Beat	dB	89	79	
Cross Modulation	dB	79	71	5
Composite Second Order (high side)	dB	76	73	
<b>94 NTSC Channels (CW) with digital</b>				8
Composite Triple Beat	dB	84	74	
Cross Modulation	dB	75	67	5
Composite Second Order (high side)	dB	74	69	

Reverse Station Performance	Units		Notes
Operational Gain (minimum)	dB	19.5	6,7
Internal Tilt (± 0.5 dB)	dB	0	3
Noise Figure	dB	12	6,7
<b>6 NTSC Channels (CW)</b>			
Composite Triple Beat	dB	92	
Cross Modulation	dB	80	5
Composite Second Order (high side)	dB	82	

Unless otherwise noted, specifications reflect typical performance and are referenced to 68°F (20°C). Specifications are based upon measurements made in accordance with SCTE/ANSI standards (where applicable), using standard frequency assignments.

## Specifications, continued

Station Delay Characteristics			
Forward (Chrominance to Luminance Delay)		Reverse (Group Delay in 1.5 MHz bandwidth)	
Frequency (MHz)	Delay (ns)	Frequency (MHz)	Delay (ns)
55.25 - 58.83	37	5.0 - 6.5	60
61.25 - 64.83	14	6.5 - 8.0	22
67.25 - 70.83	8	8.0 - 9.5	12
77.25 - 80.83	6	37.5 - 39.0	16
		39.0 - 40.5	22
		40.5 - 42.0	35

Station Powering Data														
GainMaker Unbalanced Triple	I <sub>DC</sub> (Amps)		AC Voltage											
			90	85	80	75	70	65	60	55	50	45	40	35
Thermal	1.91	AC Current (A)	0.77	0.78	0.77	0.79	0.82	0.86	0.97	1.03	1.13	1.25	1.44	1.70
		Power (W)	51.5	51.3	51.2	51.1	51.0	50.9	50.9	50.9	50.9	51.0	51.2	51.6
AGC	1.95	AC Current (A)	0.78	0.80	0.79	0.81	0.84	0.89	1.00	1.06	1.17	1.30	1.49	1.75
		Power (W)	52.8	52.6	52.6	52.5	52.3	52.2	52.2	52.2	52.2	52.3	52.6	53.0
AGC with Status Mon. & Reverse Switch	2.09	AC Current (A)	0.82	0.84	0.83	0.86	0.90	0.95	1.07	1.14	1.25	1.39	1.59	1.88
		Power (W)	56.5	56.3	56.3	56.1	56.0	55.9	55.9	55.9	56.0	56.1	56.4	56.8

Data is based on stations configured for 2-way operation. AC currents specified are based on measurements made with typical CATV type ferro-resonant AC power supply (quasi-square wave), and standard GainMaker System Amplifier power supply (2.2 amp, 24 V DC, pn 734771).

DC supply has a user configurable 30 V, 40 V, or 50 V AC under voltage lockout circuit. Default setting is 30 V. 40 V or 50 V AC under voltage lockout may be selected by changing the position of the lockout jumper.

### Notes:

- Reference output tilt is specified as "LINEAR" tilt (as opposed to "cable" tilt).
- Forward Gain and Noise Figure measured with 0 dB input EQ and 1 dB input pad.
- Down tilt, the effect of cable, is represented by a (-). Up tilt, the effect of equalization, is represented by a (+). Forward internal tilt specified is primarily due to an on board equalizer and a factory configured 10.5 dB plug-in interstage equalizer.
- 78 CW NTSC channels loaded from 55 to 550 MHz. Digital refers to 550-1002 MHz loading with QAM carriers at -6 dB levels relative to analog video carrier levels.
- X-mod (@ 15.75 kHz) specified using 100% synchronous modulation and frequency selective measurement device.
- Reverse Gain and Noise Figure for station with 0 dB reverse input pad, 0 dB reverse output EQ, and 1 dB output pad.
- Reverse Operational Gain, Noise Figure, and Return Loss are specified without reverse switch option. If switch is installed, reduce Gain by 0.5 dB, increase Noise Figure by 0.5 dB, and decrease Return Loss by 1 dB.
- 94 CW NTSC channels loaded from 55 to 650 MHz. Digital refers to 650-1002 MHz loading with QAM carriers at -6 dB levels relative to analog video carrier levels.

Environmental	
Operating Temperature Range	-40 to +140°F (-40 to +60°C)
Mechanical	
Housing Dimensions	439.4 mm L x 182.9 mm H x 198.1 mm D 17.3 in. L x 7.2 in. H x 7.8 in. D
Weight	
<ul style="list-style-type: none"> <li>Housing with power supply</li> <li>Module</li> </ul>	5.6 kg (12 lbs, 5 oz.) 2.4 kg. (5 lbs, 5 oz.)

Unless otherwise noted, specifications reflect typical performance and are referenced to 68°F (20°C). Specifications are based upon measurements made in accordance with SCTE/ANSI standards (where applicable), using standard frequency assignments.

## Ordering Information

The **GainMaker Ordering Matrix** provides ordering information for configured amplifier modules or stations. This page contains ordering information for required and optional accessories that are not included as part of a configured amplifier module or station. Consult your account representative or customer service representative for ordering assistance.

The following **Required Accessories** must be ordered separately (not included via GainMaker Ordering Matrix):

Required Accessories	Part Number
Plug-in Pads (attenuators) - Available in 0.5 dB steps from 0 to 20.5 dB <ul style="list-style-type: none"> <li>• 1 required for forward input</li> <li>• 1 required for AGC, if applicable*</li> <li>• 4 required for reverse (3 input, 1 output)</li> </ul> *To determine AGC pad value, subtract 26 dB from the design value main port RF output level at the AGC pilot frequency (applies to UBT only)	589693 (0 dB) sequentially thru 589734 (20.5 dB)
Plug-in Forward Equalizer - Available in 1.5 dB steps from 0 to 30 dB at 1002 MHz <ul style="list-style-type: none"> <li>• 1 required for forward input</li> </ul>	4007228 (0 dB) sequentially thru 4007248 (30 dB)
Plug-in Reverse Equalizer - Available in 1 dB steps from 0 to 12 dB at 40 MHz <ul style="list-style-type: none"> <li>• 1 required for reverse output - unless design value is 0 dB (0 dB EQ is provided)</li> </ul>	712719 (0 dB) and 589628 (1 dB) sequentially thru 589639 (12 dB)

The following **Optional Accessories** may be ordered separately:

Optional Accessories	Part Number
230 V AC Crowbar Surge Protector (plug-in, one per station)	715973
Plug-in Inverse Equalizer. Simulates cable equivalent tilts (creates tilt opposite that of equalizers). Use in place of forward input EQ as needed to maintain proper output tilt in short spaced locations. Available in approx. 1.6 dB "cable equivalent" steps from 1.6 to 16.2 dB.	4007486 (1.6 dB) sequentially thru 4007495 (16.2 dB)
Long Reach Test Point Adapter	562580
Status Monitoring Transponder – * see GainMaker Status Monitoring Transponder Data Sheet	*

The following **Housing Options** may be included with the product if ordered using the GainMaker Ordering Matrix. They may also be ordered separately.

GainMaker System Amplifier Housing – 1 required Housing includes housing base, lid, wiring harness, and 24 V power supply # 734771. All Housings have 15 amp capacity.	Part Number
• Uncoated 4 port housing <i>without</i> external test point access	714027
• Coated 4 port housing <i>without</i> external test point access	714026
• Uncoated 4 port housing <i>with</i> external test point access	714025
• Coated 4 port housing <i>with</i> external test point access	714024
<b>GainMaker System Amplifier Housing Upgrade Kit</b> - 1 required if <b>upgrading</b> an existing SA II, II+, or III housing to allow use of GainMaker System Amplifier modules. Includes a GainMaker System Amplifier housing lid, wiring harness, and 24 V power supply # 734771.	
• Uncoated 4 port housing lid <i>without</i> external test point access	714023
• Coated 4 port housing lid <i>without</i> external test point access	714022
• Uncoated 4 port housing lid <i>with</i> external test point access	714021
• Coated 4 port housing lid <i>with</i> external test point access	714020
<b>Seizure Upgrade Kit</b> – 1 required if upgrading an existing SAII or SAII+ housing base to allow use of GainMaker System Amplifier Modules. Includes high current (15 amp) rated seizure screws and anvils.	548775



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Scientific-Atlanta, Inc.  
1-800-722-2009 or 770-236-6900  
[www.scientificatlanta.com](http://www.scientificatlanta.com)

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