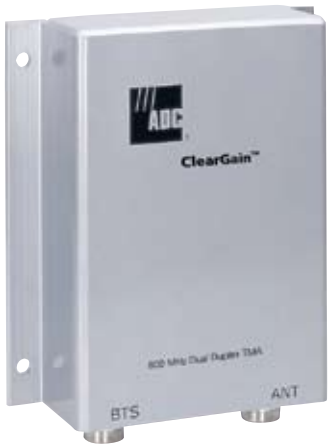
ClearGain® Tower-Mounted Amplifiers

Americas



As mobile usage continues to increase, service providers are faced with the challenge of optimizing and expanding their wireless networks to provide new and existing services. ADC's ClearGain® Tower-Mounted Amplifiers (TMAs) minimize the cost of network expansion and improve quality of service, allowing service providers to increase profitability from new and existing services.

The ClearGain TMAs improve signal quality by boosting the uplink signal of a mobile system to increase receiver performance and improve overall coverage.

SPEC SHEET

Features:

- Provides amplification of the Band
- Highly advanced LNA amplifies RX signal for improved receiver performance and increase in coverage
- Dual duplex feature reduces the number of feeder cable runs by providing simultaneous operation of TX and RX with low TX loss
- Full Band feature provides amplification of the entire band
- Advanced filtering maintains the lowest possible noise figure for improved quality of service
- Slim, stackable design conserves tower space and reduces tower-related costs
- Seamless aluminum sleeve construction protects components from the elements
- Modular system is fully compatible with all base stations
- Power and alarming for up to six masthead units is provided from a single unit at the base station

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Introduction

Unacceptable network quality is one of the main reasons for mobile subscriber churn. With industry churn at their current rates, a service provider's entire customer base could be lost in as few as three years. The cost of acquiring new subscribers to replace the existing customer base can be enormous. Improvements in quality of service can directly impact a service provider's profitability through the cost savings associated with increased subscriber retention and the additional revenue gained from increased billable minutes of use resulting from improved signal quality.

While subscribers are willing to pay a premium for data services, improved quality of service is necessary to provide new data services. Due to the tradeoff between bit rate and bandwidth inherent to data services, improved signal quality is required to achieve the same level of performance at even higher data rates. ADC's ClearGain Tower-Mounted Amplifiers help provide this improvement in signal quality.

TMAs improve signal quality by boosting the uplink (RX) signal of a mobile system immediately after the antenna. This compensates for the loss in signal strength that occurs when the signal is passed through the coaxial feeder cable to the base transceiver station (BTS) at the base of the tower. ClearGain TMAs perform this amplification with the lowest possible noise contribution, resulting in a substantial increase in receiver performance and an improvement in overall coverage. These improvements in quality of service allow mobile subscribers to place more calls, make longer calls, and successfully complete calls in an expanded geographic area, resulting in increased revenue.

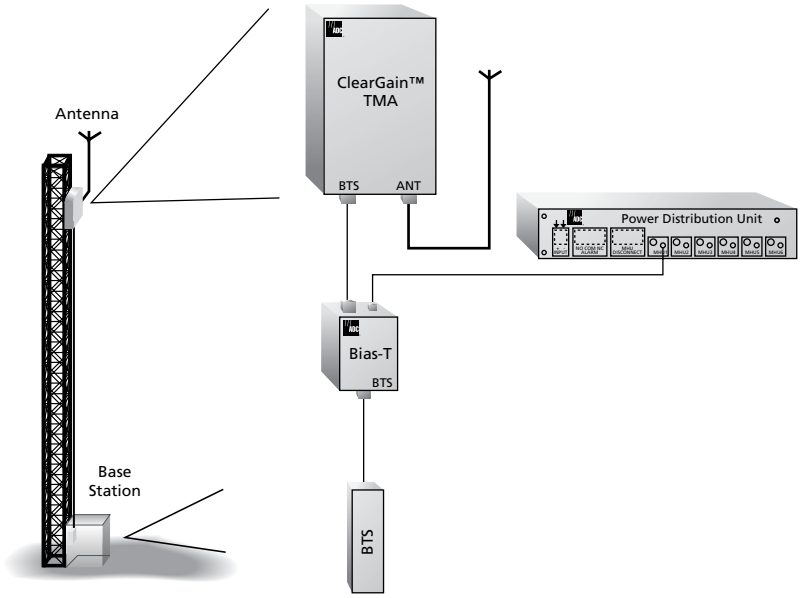
System Overview

The ClearGain TMA system is modular, consisting of a Masthead Unit (MHU), a Power Distribution Unit (PDU) and a Bias-T Unit. This system provides full compatibility with all base stations. The ClearGain MHU offers dual duplex operation and incorporates a highly advanced fixed-gain, low-noise amplifier (LNA) and high-performance filters for added reliability. The MHU amplifies each band to maximize signal quality and optimize coverage.

The ClearGain MHU features a slim, lightweight design. This allows two ClearGain TMAs to be mounted with one set of brackets thereby, conserving valuable and costly tower space and reducing clutter on the tower. The TMA is protected with a strong, aluminum sleeve construction designed to ensure superior weather protection and resistance to corrosion, resulting in increased reliability.

In the ClearGain TMA system, DC power is supplied to the MHU from a ClearGain PDU. The PDU also provides alarming and monitoring of the feeder cable and up to six MHUs from a single unit. The flexible design of the ClearGain PDU allows it to be rack- or wall-mounted on the side of a BTS cabinet.

An external Bias-T Unit is used in conjunction with the ClearGain PDU. The Bias-T inserts DC power onto the coaxial cable and extracts alarm and monitoring signals from the coaxial cable.



DD800 Full Band Typical Specifications

ELECTRICAL	
Nominal Impedance of RF Inputs and Outputs:	50 Ohm
Frequency Range:	
TX:	869-894 MHz
RX:	824-849 MHz
Passband (RX)	
Gain:	12 dB
Noise Figure:	1.5 dB
Dynamic Range	
Input at 1 dB Gain Compression:	0 dBm
IIP3:	+13 dBm
Max Input Power:	+10 dBm
851 MHz Rejection:	<30 dB
Bypass Insertion Loss:	2.0 dB
Isolation in Tx Path:	80 dB
Rejection 1850-1998 MHz:	80 dB
Insertion Loss of TX Path (TX to Antenna):	0.4 dB
Passband Return Loss	
TX Band:	>18 dB
RX Band:	>18 dB
Intermodulation:	-120 dBm
Maximum Input Power (RMS Power):	500 W
Tx Rejection in Rx Band:	40 dB
POWER	
Operational Voltage:	7 to 15 Vdc
Operational Current:	140 ±10 mA
PHYSICAL	
Dimensions (HxWxD):	332 mm x 250 mm x 84 mm
Weight:	6.3 kg (13.9 lbs.)
Color:	Silver
Housing:	Aluminum
CONNECTORS	
Antenna Connector:	7/16 DIN female
BTS Connector:	7/16 DIN female
ENVIRONMENTAL	
Operating Temperature:	-40°C to +60°C
Lightning Protection:	IEC 61000-4-5
Vibration	
Storage:	ETS3019-1-1
Transport:	ETS3019-1-2
Operation:	ETS3019-1-3
REGULATORY	
EMC:	ETS300 342-2
APPROVALS	
FCC:	Part 15, Class A
UL:	1950
QUALITY	
MTBF:	900,000 hours

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DD800 B-Band Typical Specifications

ELECTRICAL	
Nominal Impedance of RF Inputs and Outputs:	50 Ohm
Frequency Range:	
TX:	880-894 MHz
RX:	835-849 MHz
Passband (RX)	
Gain:	12 dB
Noise Figure:	1.7 dB
Dynamic Range	
Input at 1 dB Gain Compression:	0 dBm
IIP3:	+13 dBm
Max Input Power:	+10 dBm
Antenna Isolation 851-869 MHz:	>35 dB
Bypass Insertion Loss:	2.0 dB
Isolation in Tx Path:	80 dB
Rejection 1850-1998 MHz:	80 dB
Insertion Loss of TX Path (TX to Antenna):	0.4 dB
Passband Return Loss	
TX Band:	>18 dB
RX Band:	>18 dB
Intermodulation:	-120 dBm
Maximum Input Power (RMS Power):	500 W
Tx Rejection in Rx Band:	40 dB
POWER	
Operational Voltage:	7 to 20 Vdc
Operational Current:	140 ±10 mA
Alarm Current Level:	350 ± 10 mA
PHYSICAL	
Dimensions (HxWxD):	332 mm x 250 mm x 84 mm (13 in x 9.8 in x 3.3 in)
Weight:	6.3 kg (13.9 lb)
Color:	Silver
Housing:	Aluminum
CONNECTORS	
Antenna Connector:	7/16 DIN female
BTS Connector:	7/16 DIN female
ENVIRONMENTAL	
Operating Temperature:	-40° to +60° C
Lightning Protection:	IEC 61000-4-5
Vibration	
Storage:	ETS3019-1-1
Transport:	ETS3019-1-2
Operation:	ETS3019-1-4
REGULATORY	
EMC:	ETS300 342-2
APPROVALS	
FCC:	Part 15, Class A
UL:	1950
QUALITY	
MTBF:	900,000 hours

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DD1900 Full Band Typical Specifications

ELECTRICAL	
Nominal Impedance of RF Inputs and Outputs:	50 Ohm
Frequency Range	
TX:	1930-1990 MHz
RX:	1850-1910 MHz
Passband (RX)	
Gain:	12 dB
Noise Figure:	1.6 dB
Dynamic Range	
Input at 1 dB Gain Compression:	+3 dBm
IIP3:	+13 dBm
Max Input Power:	+10 dBm
1915 MHz Rejection:	<15 dB
1916 MHz Rejection:	<30 dB
Bypass Inserion Loss:	2.0 dB
Isolation in Tx Path:	80 dB
Rejection 824-894 MHz:	80 dB
Insertion Loss of TX Path (TX to Antenna):	.4 dB
Passband Return Loss	
TX Band:	>18 dB
RX Band:	>18 dB
Intermodulation:	-120 dBm
Maximum Input Power (RMS Power):	250 W
Tx Filter Rejection in Rx Band:	40 dB
POWER	
Operational Voltage:	7 to 15 Vdc
Operational Current:	140 ± 10 mA
Alarm Current Level:	350 ± 20 mA
PHYSICAL	
Dimensions (HxWxD):	297 mm x 287 mm x 70 mm
Weight:	5.5 kg (12.1 lbs.)
Color:	Silver
Housing:	Aluminum
CONNECTORS	
Antenna Connector:	7/16 DIN female
BTS Connector:	7/16 DIN female
ENVIRONMENTAL	
Operating Temperature:	-40°C to +60°C
Lightning Protection:	IEC61000-4-5
Vibration	
Storage:	ETS3019-1-1
Transport:	ETS3019-1-2
Operation:	ETS3019-1-3
REGULATORY	
EMC:	ETS300 342-2
APPROVALS	
FCC:	Part 15, Class A
UL:	1950
QUALITY	
MTBF:	900,000 hours

DD1900 Full Band with 800 Bypass Typical Specifications

ELECTRICAL	
Nominal Impedance of RF Inputs and Outputs:	50 Ohm
Frequency Range	
TX:	1930-1990 MHz
RX:	1850-1910 MHz
Passband (RX)	
Gain:	12 dB
Noise Figure:	1.6 dB
Dynamic Range	
Input at 1 dB Gain Compression:	+3 dBm
IIP3:	+15 dBm
Insertion Loss TX Path (TX to ANT): .	4 dB
1915 MHz Rejection:	<15 dB
1916 MHz Rejection:	<30 dB
Bypass Insertion Loss:	2.0 dB
Isolation in Tx Path:	80 dB
Rejection 824-894 MHz:	80 dB
Max Input Power:	+10 dBm
Passband Return Loss	
TX Band:	>18 dB
RX Band:	>18 dB
Intermodulation:	-120 dBm
Maximum Input Power (RMS Power):	250 W
Tx Filter Rejection in Rx Band:	40 dB
POWER	
Operational Voltage:	7 to 20 Vdc
Operational Current:	140 ± 10 mA
Alarm Current Level:	350 ± 20 mA
PHYSICAL	
Dimensions (HxWxD):	297 mm x 287 mm x 70 mm
Weight:	5.5 kg (12.1 lbs.)
Color:	Silver
Housing:	Aluminum
CONNECTORS	
Antenna Connector:	7/16 DIN female
BTS Connector:	7/16 DIN female
ENVIRONMENTAL	
Operating Temperature:	-40°C to +60°C
Lightning Protection:	IEC 61000-4-5
Vibration	
Storage:	ETS3019-1-1
Transport:	ETS3019-1-2
Operation:	ETS3019-1-3
REGULATORY	
EMC:	ETS300 342-2
APPROVALS	
FCC:	Part 15, Class A
UL:	1950
QUALITY	
MTBF:	900,000 hours

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ClearGain® Tower-Mounted Amplifiers
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Dual Band 800/1900 MHz Full Band Typical Specifications

ELECTRICAL	
Nominal Impedance of RF Inputs and Outputs:	50 Ohm
Frequency Range	
TX: 800:	869-894 MHz
1900:	1930-1990 MHz
RX: 800:	824-849 MHz
1900:	1850-1910 MHz
Filter Bandwidth:	25/60 MHz
Passband (RX)	
Gain:	12 dB
Noise Figure:	
800:	1.5 dB
1900:	1.6 dB
Dynamic Range	
Input at 1 dB Gain Compression:	+0 dBm
IIP3:	+13 dBm
Max. Input Power:	+10 dBm
851 MHz Rejection:	<30 dB
1915 MHz Rejection:	<15 dB
1916 MHz Rejection:	<30 dB
Bypass Insertion Loss:	2.0 dB
Isolation in TX Path:	80 dB
Insertion Loss of TX Path (TX to Antenna):	4 dB
Passband Return Loss:	
TX Band:	>18 dB
RX Band:	>18 dB
Intemodulation:	-120 dBm
Max. Input Power (RMS Power):	
800:	500 W
1900:	250 W
Tx Filter Rejection in RX Path:	40 dB
POWER	
Operational Voltage:	7 to 20 Vdc
Operational Current:	280 ± 10 mA
Alarm Current Level:	350-520 mA
PHYSICAL	
Dimensions (HxWxD):	357 mm x 287 mm x 149 mm
Weight:	10.5 kg (22.5 lbs.)
Color:	Silver
Housing:	Aluminum
CONNECTORS	
Antenna Connector:	7/16 DIN female
BTS Connector:	7/16 DIN female
ENVIRONMENTAL	
Operating Temperature:	-40° to +60 °C
Lightning Protection:	IEC 61000-4-5
Vibration:	
Storage:	ETS3019-1-1
Transport:	ETS3019-1-2
Operation:	ETS3019-1-3
REGULATORY	
EMC:	ETS300 342-2
APPROVALS	
FCC:	Part 15, Class A
UL:	1950
QUALITY	
MTBF:	900,000 hours

ClearGain® Tower-Mounted Amplifiers
Americas


STRB-NF-NM-G-KIT


STRB-NM-NF-G-KIT


STRB-DM-DF-G-KIT


STRB-DF-DM-G-KIT

Bias-T Units

ADC's newly enhanced Bias-T Units can be used indoors and outdoors in conjunction with the ClearGain power distribution unit (PDU). These versatile units, also known as a DC current injector, insert DC power into the coaxial cable and extract alarm and monitoring signals from the coaxial cable. These units can also be used with a SMART PDU.

Bias-T Unit Typical Specifications

PRODUCT CONFIGURATION	
Main path connectors:	Refer to ordering information for configurations
DC injection/Sample port connector:	TNC jack (female)
Mounting and grounding:	/M8 / brk (MH - bulkhead mounting/ M - screw / brk - bracket)
TECHNICAL DATA	
Impedance:	50 ohms
Frequency range:	800 to 2200 MHz
Return loss:	> 19 dB
Insertion loss:	< 0.2 dB
RF CW power:	500 W
PIM 3rd order:	-108 dBm
Surge current handling capability:	3kA single
Operating temperature:	-40°C to + 65°C
Waterproof degree:	IP 65
DC injection / DC bypass current:	< 2 A
DC supply / DC bypass voltage:	< 48 V
MTBF:	600,000 hours
Size:	125 mm x 110 mm x 45 mm (4.9 in x 4.3 in x 1.8 in)
Weight:	0.8 kg (1.8 lbs.)

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Singlemode and Dual Mode 800/1900 MHz Power Distribution Unit

Time and space are important considerations when selecting and installing wireless components at base transceiver station sites. The simple, compact design of ADC's ClearGain Power Distribution Unit (PDU) is intended to help service providers save both. From a compact unit that is easily mounted on a wall or a rack, ClearGain PDUs provide power and alarming for ADC's tower-mounted amplifiers.

Features:

- Provides power and alarm functions for on-site monitoring of masthead units (MHUs)
- Monitors condition of feeder cable
- Wall- or rack-mountable to fit available space
- LED indicators for alarm functions
- Simple, compact design allows for easy installation and connections

The ClearGain PDU is an integrated unit that provides power and alarm functions for the ClearGain TMA system. The ClearGain Singlemode PDU provides power for up to six single frequency TMAs. For dual band systems, the ClearGain Dual Mode PDU provides power for up to six dual band TMAs or twelve multi-frequency systems that amplify a single frequency.

The PDU monitors the current of the MHU. If an MHU fails, the ClearGain PDU gives an alarm indication. The ClearGain PDU also monitors the condition of the feeder cable. Alarm indicators identify failure in the feeder cable or MHUs and in which MHU the failure occurred, providing fast and easy on-site diagnostics. The flexible design of ClearGain PDUs allows them to be rack-mounted or mounted indoors on the wall or on the side of a BTS cabinet.

An external Bias-T unit is used in conjunction with the PDU and is designed to connect directly into the BTS coaxial connector. Bias-T units are available with various connector types, with gas tube arrestors for lightning protection on the ANT and MHU ports. Quarter wave stub lightning protection is integrated on the BTS port of the Bias-T units.

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Singlemode and Dual Mode 800/1900 MHz PDU Typical Specifications

ELECTRICAL	
Input Voltage:	20-56 Vdc positive/negative ground
Output Voltage:	18 Vdc each
Maximum Current Drawn:	3.8A
PHYSICAL	
Dimensions (HxWxD):	43 x 196 x 103 mm (1.69" x 7.72" x 4.06")
Weight:	<460 g
Color:	Silver
CONNECTORS	
Output for MHUs:	SMB, male (qty 6)
Power Connector:	4-pin male
General Alarm Connector:	3-pin male
Indicators	
Singlemode PDU:	Green OK/NOK LEDs
Red General Alarm LED	
Dual Mode PDU:	Green/Yellow OK/NOK LEDs
Red General Alarm LEDs	
Alarm output:	Alarm output is isolated 3-pin relay connection Normally open and normally closed connection available
ENVIRONMENT	
Storage:	ETS3019-1-1
Transport:	ETS3019-1-2
Operation:	ETS3019-1-3
Housing:	IP40
Temperature Range (Indoor Use):	-20ºC to +65ºC (-4ºF to +149ºF)
Lightning Protection:	IEC 1000-4-5 EMC
APPROVALS	UL
QUALITY	MTBF 250,000 hours. Manufactured under ISO 9001 quality system
ACCESSORIES	
Basic Accessories:	Power supply cable (10 m), alarm cable (10 m), grounding cable (2 m) and wall mounting screws
Optional Accessories:	Mounting hardware for 19" rack mount

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ClearGain® Tower-Mounted Amplifiers
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Ordering Information

Description	Catalog Number
ClearGain Masthead Units	
DD800 Full Band	CG-800DD-FULL-DIN
DD800 B-Band	CG0800DDB14DTTX
DD1900 Full Band	CG-1900DD-FULL-DIN
DD1900 Full Band w/800 Bypass	CG1900DDBFBDTBP
Full Band 800/1900 MHz	CG-1900/800-DB-FB-DIN
Bias-T Kits*	
7/16 DIN male to BTS, 7/16 DIN female to ANT	STRB-DM-DF-G-KIT
7/16 DIN female to BTS, 7/16 DIN male to ANT	STRB-DF-DM-G-KIT
N male to BTS, N female to ANT	STRB-NM-NF-G-KIT
N female to BTS, N male to ANT	STRB-NF-NM-G-KIT
Power Distribution Units	
Single Mode PDU; includes power cable and grounding cable	CG-PDU-SMPWR
Dual Mode PDU; includes power cable and grounding cable	CG-PDU-DMPWR

*Bias-T, DC Cable 4.25 meters (SMB to TNC), Grounding Cable 1.5 meters (one end terminated)

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Creating a Bill of Materials

A typical site includes three components in various quantities.

You have six TMA options:

1. CG-800DD-FULL-DIN	DD800 Full Band TMA, DIN Connectors
2. CG-800DDB14DT00	DD800 B-Band TMA, DIN Connectors
3. CG-1900DD-FULL-DIN	DD1900 Full Band TMA, DIN Connectors
4. CG-1900W800-FULL-DIN	DD1900 with 800 Bypass Full Band TMA, DIN Connectors
5. CG1900DDBFBDTBP	DD1900 with 800 Bypass Full Band TMA with DC Block, DIN Connectors
6. CG-1900/800-DB-FB-DIN	Dual Band-Full Band TMA, DIN Connectors

The TMAs include:
- Mounting hardware
- Grounding cable/strap (length 1.5 meters)

Ordering information: Order two per sector

You have four Bias-T options (based on connector type and orientation):

1. STRB-DF-DM-G-KIT	DIN Female to BTS Port, DIN Male to ANT Port
2. STRB-DM-DF-G-KIT	DIN Male to BTS Port, DIN Female to ANT Port
3. STRB-NF-NM-G-KIT	N Female to BTS Port N Male to ANT Port
4. STRB-NM-NF-G-KIT	N Male to BTS Port, N Female to ANT Port

The Bias-Ts include:
- Grounding cable/strap (length 1.5 meters)
- Bias-T cable; go from Bias-T to the PDU (length 14 feet)

Ordering information: Order two per sector

You have two PDU options:

1. CG-PDU-SMPWR	Single Power PDU
2. CG-PDU-DMPWR	Dual Power PDU*

*Typically used in conjunction with the Dual Power TMA

The PDUs include:
- Power cable (length 10 meters)
- Alarm cable (length 10 meters)
- Grounding cable/strap (length 1.5 meters)

Ordering information: Order one per site

Optional Accessories:
Longer Bias-T Cable CG-PDU-30CABLE (30 foot Bias-T cable)
PDU Rack Mounting Brackets AUX-000076 (19" rack mounting bracket)
AUX-000076 and EB-17P (23" mounting bracket)
AUX-000084 (Siemens cabinet mounting bracket)

SPEC SHEET

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