

INSTALLATION

AND

OPERATING INSTRUCTIONS

FOR

MW-CBDA-800A-1W60-PG2

CELLULAR BI-DIRECTIONAL AMPLIFIERS



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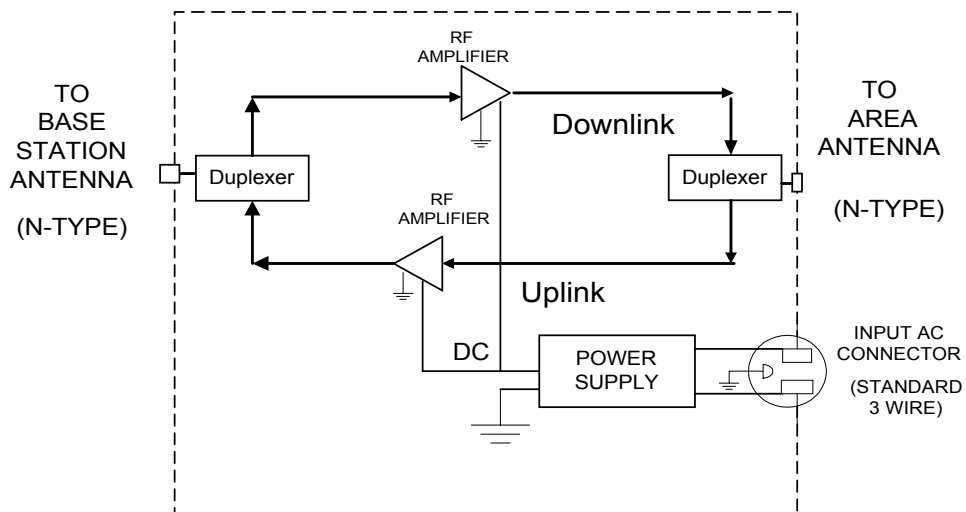
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BDA OVERVIEW:

The Bi-Directional Amplifier (BDA) assembly provides an exceptional repeater/booster performances to extend the coverage area of radio communications in buildings and RF shielded environments.

Features such as high linearity power amplifiers are contributing for the overall improved system linearity performances. The unit is based on a duplexed path configuration, having sharp out of band attenuation for improved isolation between the receiving and transmitting paths.

BDA BLOCK DIAGRAM



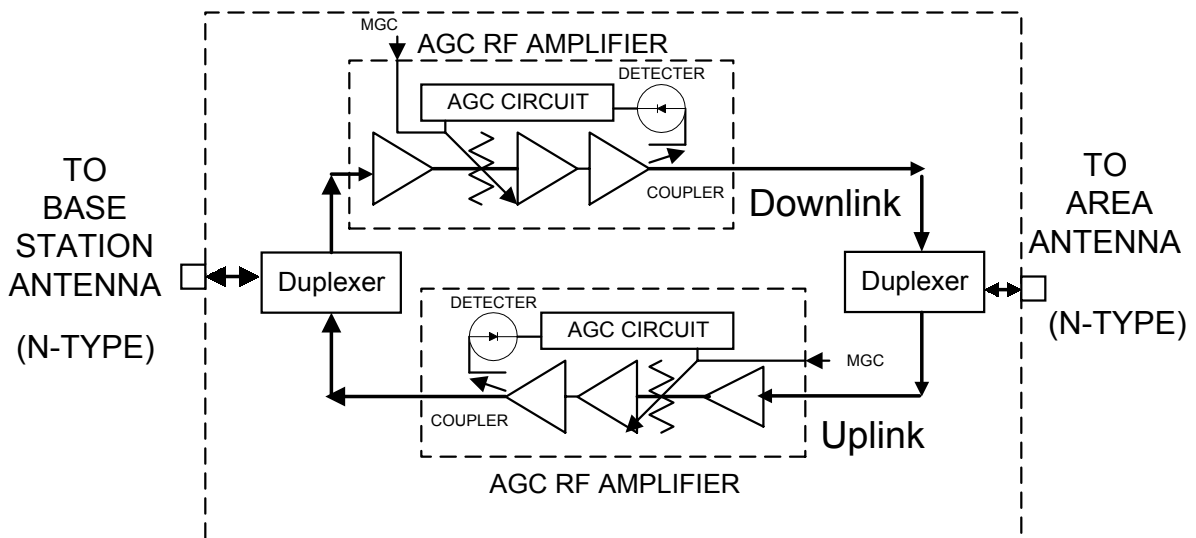
BLOCK DIAGRAM DESCRIPTION:

The amplifiers in this BDA have an AGC option switch. When switched on, the AGC circuit limits the amplifier output power. The AGC circuit senses the output power and introduces more attenuation, when the output power exceeds the preset level of +27dBm*. This way the gain of the amplifier is reduced, its output power is limited and the intermodulations products are kept below the desired level. In this manner the output power cannot exceed the +27 dBm* preset power and the IMD levels are always kept below -13 dBm.

The AGC amplifier has a Power LED lamp that illuminates when the output power has reached the preset power limit.

***note:** AGC preset level can be factory modified to +24dBm upon customer request.

In addition the BDA has a trimmer that enables the reduction of the gain by 15 dB.



BDA with AGC & MGC RF BLOCK DIAGRAM



BDA OPERATION

The BDA comes with a standard 3-wire male plug with phase, neutral and safety ground wires. A high efficiency DC switching power supply supplies DC power to two amplifiers (Uplink and Downlink) and the Power On lamp.

The RF connection is made via two type “N” female connectors. The RF connector labeled “Base” must be connected to the antenna pointing to the base station. The RF connection labeled “Mobile” must be connected to the antenna pointing into the area to be covered by the BDA.

The isolation between the base station antenna and the mobile antenna should be at least 12 dB higher than the BDA gain. If the isolation is less than the BDA gain, oscillation would start and would saturate the amplifier. Isolation of few dB higher than the BDA gain cannot start oscillations but would causes gain ripple in the band.

AGC & MGC FUNCTION

The BDA model No: MW-CBDA-800A-1W60-PG2 has AGC function. Their amplifier has a directional coupler and a detector at the output of the high power amplifier to monitor the output power. When a high signal is received the automatic level control detects the amplitude and sends a feedback signal to a voltage variable attenuator, which attenuates the signal level so that the output power of the amplifier does not exceed the preset limit. The LED on the amplifier illuminates when the power out the amplifier is within the set limit (both when the AGC is On and when the AGC is OFF).

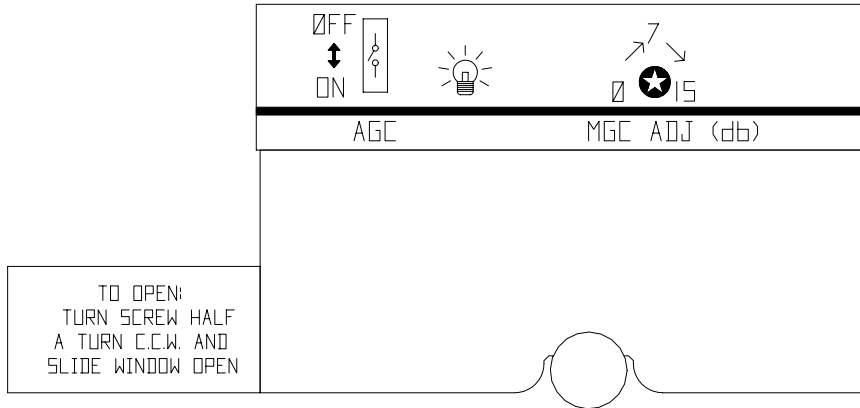
The switch on the RF amplifier enables the AGC function. If the AGC is disabled then the amplifier gives maximum gain.

MGC: The RF gain of the BDA can be reduced linearly by about 15 dB using the trimmer on the amplifier. The RF gain is at maximum when the trimmer is at anti-clockwise direction. To reduce the gain, turn the trimmer clockwise using a screwdriver. Turning it halfway would reduce the gain by 7.5 dB.

The AGC and MGC functions for the uplink path are reached by opening a small cover located on the DBA side adjacent to the Mobile antenna port. For the downlink path the window is located on the side near the Base antenna port.

Note: The BDA is shipped with the AGC switch in the OFF position and maximum RF gain.

| | | |
|--------|-------|--------------|
| AGC | Power | Gain Control |
| Enable | Out | Trimmer |
| Switch | LED | (MGC) |



AGC & MGC CONTROL
 (Control Window Located at BDA sides)



BDA INSTALLATION

Install the BDA Repeater in a shielded, ventilated and easy to reach area. Use low loss cables to connect antennas to the BDA. Install the BDA close to the service area to improve output power and noise figure. Mount the BDA with RF connectors pointing down. The RF connection is made via two type "N" female connectors. The RF connector labeled "Base" must be connected to the antenna; usually a Yagi; pointing to the base station. The RF connection labeled "Mobile" must be connected to the antenna pointing into the area to be covered by the BDA.

BASE / DONOR ANTENNA INSTALLATION

Typically this is a directional antenna such as Yagi or Dish antenna of 10 to 15 dB gain. This antenna is pointed to the base station to get maximum input power. This antenna should be in line of sight with the base site. Raise this antenna higher if no line of sight is achieved. The required Base signals should be the dominant signals; at least 6 dB higher power than other signals.

Choose the antenna site to get the maximum isolation from the remote (mobile serving) antenna.

REMOTE / SERVICE ANTENNA INSTALLATION

The remote antenna is an Omni antenna or a directional antenna according to the coverage requirements.

For indoor applications covering a large building, the RF signals are split using power dividers and distributed to many antennas each covering a floor or a small area.

ANTENNA ISOLATION

For proper operation the isolation between these two antennas must be at least 12 dB higher than the BDA gain. Lower isolation would lead to high in-band ripple. Oscillations will build up when the isolation is lower than BDA gain.

The isolation between the antennas is critical for high gain outdoor repeaters.

To measure the isolation; inject a known signal into one antenna and measure the power at the other antenna. This should be done across the frequency range of both uplink and downlink bands.



INSTALLATION STEPS

1. Install all antennas and connect them to the BDA inputs.
2. Open the access windows at the sides of the BDA so that the variable attenuator is reached and the LED is visible.
3. Turn the AGC On. This AGC limits the output power of the BDA. The AGC on the Downlink path guarantees constant downlink power when and if the Donor power changes.
4. Set downlink gain to minimum; uplink gain to minimum (by turning the gain control trimmer clockwise).
5. Increase the downlink channel gain (by turning the gain control trimmer counterclockwise) till the LED turns from off to on. This is the best gain setting giving highest usable power.
6. The LED on the downlink power amplifier will illuminate if adequate donor power has reached the BDA. If the donor power is low the LED will not lit and the BDA usable power is not used efficiently.
7. Set the uplink gain to the same as the downlink gain.
8. Check that the uplink LED on the BDA monitor does not lit permanently. This LED would lit permanently If the isolation between antennas is low (BDA oscillations) or the BDA is faulty.
9. If the uplink LED light permanently then:
 - Disconnect one of the cables from the BDA connectors and connect a load at the connectors.
 - If the LED on this amplifier illuminates permanently then the BDA is faulty (oscillating) and needs replacing.
 - If the LEDs stops illuminating then the isolation between the donor and remote antennas is low. Either improve the isolation (e.g. increase separation) or reduce BDA gain.
 - To reduce gain, reconnect the antenna cables. Reduce the gain at both uplink and downlink path until this LED stops illuminating. Reduce the gain further by 10 dB. This is the maximum usable gain.

DIAGNOSTICS GUIDE

The BDA provides long term, carefree operation and requires no periodic maintenance. This section covers possible problems related to the installation environment.

RF Faults and RF Power Amplifiers LED Indications

The LEDs on the power amplifier are set to turn on when the transmitted power has reached or exceeded the specified composite power.

Normally the LED at the downlink power amplifier should be on indicating good forward power transmission. The LED on the uplink power amplifier turns on only when a near by mobile is transmitting.

| Indication | Cause | Action |
|---|---|---|
| Downlink LED does not light | Indicates low RF power at downlink path | Check base antenna connection Check antenna alignment to base. Use higher gain BDA |
| Downlink LED lights (This is not a fault) | Indicates good power transmission in the downlink amplifier. Make sure the amplifier is not overloaded | Turn AGC on, or reduce gain so that LED just turns from off to on. Set the same gain for the uplink channel |
| Uplink LED lights all the time | Bad antenna isolation causing the repeater system to oscillate | Improve the isolation between the antennas or reduce RF gain. To verify disconnect one RF port; LED should turn off |
| Uplink LED lights all the time | Faulty system. Can be diplexer or power amplifier fault | System fault. To verify disconnect one RF port to verify. If LED remains on then system is faulty. |
| Excessive intermodulation or spurious | Amplifier oscillation caused by insufficient isolation | Improve the isolation between the antennas or reduce RF gain. |
| Excessive noise in downlink | High input power causing amplifier overload | Turn AGC on, or reduce gain so that LED just turns from off to on. Set the same gain for the uplink channel |



ELECTRICAL SPECIFICATIONS:

| | |
|---|-------------------------------------|
| Frequency Range | Up Link : 898 – 904 MHz |
| | Down Link : 929-942 MHz |
| Passband Gain @ min attenuation | 60 dB minimum |
| Passband Ripple | ±1.5 dB typical |
| Output Power AGC Set * | +27 dBm nom. |
| AGC Dynamic Range | 30 dB min |
| MGC (Manual Gain Control) Dynamic Range | 15 dB min |
| Noise Figure @+25°C at max gain | 6.0 dB max |
| 3rd Order Intercept point | +45 dBm typical |
| IMD @2 tone @+20 dBm/carrier | 50 dBc typical |
| Spurious @ 27dBm output power (two tone, 24dBm each) | < -13dBm |
| Isolation between Up/Down Link | 75 dB min |
| Impedance Level | 50 Ohms |
| VSWR | 1.5 : 1 max |
| Power Supply | 80 to 240 VAC; 50 to 60 Hz; @500 mA |

***note:** AGC preset level can be factory modified to +24dBm upon customer request.

MECHANICAL SPECIFICATIONS:

| | |
|---------------|--|
| Size | : 10 x 10 x 5 inch approx. (250 x 250 x 120 mm approx.) |
| RF Connectors | : N-type Female |
| Weight | : 15 Lbs. (7 kg.) approx. |

ENVIRONMENTAL CONDITIONS:

The unit is designed for indoor applications:

| | |
|-----------------------|--------------------|
| Operating temperature | : - 30°C to + 50°C |
| Storage temperature | : - 50°C to + 80°C |

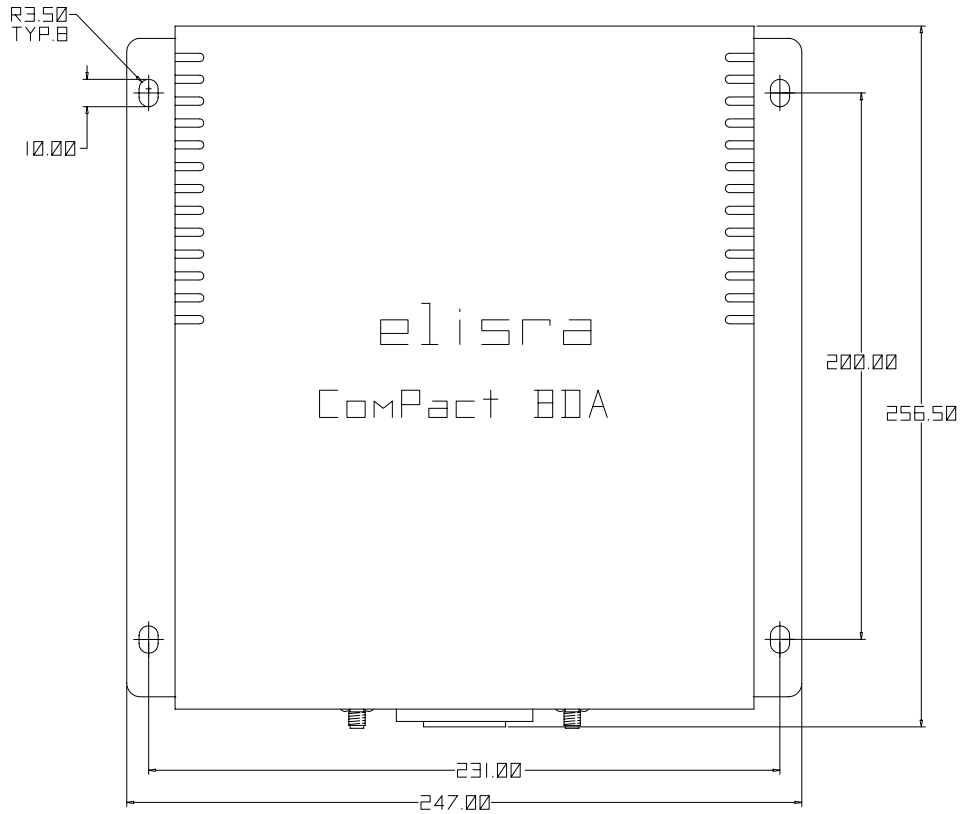
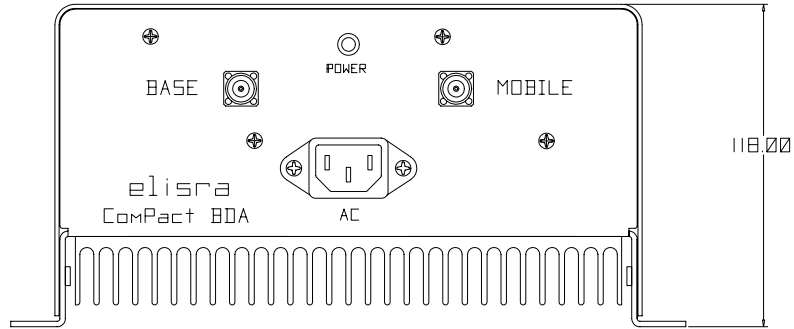


RF EXPOSURE WARNING

In order to satisfy the FCC RF exposure requirements, you must ensure that the installation complies with the following:

One antenna is connected via cable that has typical 1~10 dB attenuation (depends on the length of the cable) to the BDA BASE port. This antenna is installed outdoor by fixed mounting, and has very sharp beam (Yagi type or similar) pointed to the donor (BTS). This type of antenna has up to 15 dBi gain. Typical specifications: gain: 15 dBd (=10.1 dBi), VSWR: better than 1.5:1 , Impedance: 50 ohm. The outdoor antenna must be installed to provide a minimum separation distance of 0.5 m (50 cm) from persons within the area.

The second antenna is connected via cable that has typical 1~10 dB attenuation (depends on the length of the cable) to the CBDA MOBILE port. This type of antenna is omnidirectional (isotropic), or wide beam, with 0 to 2 dBi typical gain and is installed and distributes indoor (in buildings, tunnels, basements, park lots, shopping centers etc.). Typical specifications: gain: 2 dBi, VSWR: better than 2:1 , Impedance: 50 ohm. The indoor antenna must be installed to provide a minimum separation distance of 0.2 m (20 cm) from persons within the area.



MECHANICAL OUTLINE



LIMITED WARRANTY

Dekolink Wireless [Ltd.] ("Dekolink"), manufacturer of this product (the "Product") warrants to the original purchaser ("Purchaser") that the Product is free from defects in materials and workmanship for a term that ends on the earlier of twelve (12) months from the date of activation of the Product or fifteen (15) months from the date of shipment of the Product by Dekolink. The obligations of Dekolink under this warranty shall be limited solely to the repair or exchange or giving credit for, at the option of Dekolink, any Product that may prove defective in accordance with evidence satisfactory to Dekolink. Any repair or replacement of the Product by Dekolink shall not extend the original warranty period. This warranty is exclusive to the original Purchaser and is not assignable.

This warranty applies only upon the condition that the Product has been installed, maintained and operated under conditions of normal use. The provisions of this warranty shall not apply if, in Dekolink's judgment, the Product has been subject to misuse or neglect, damaged in an accident or by act of vandalism, or repaired or altered in any way that adversely affects its performance or reliability.

To obtain warranty service, Purchaser may, upon the prior written authorization of Dekolink or its authorized service representative, return the defective Product to Dekolink's authorized service center. All shipping and insurance charges are the sole responsibility of Purchaser and are not included in this warranty.

Dekolink expressly excludes and disclaims all other warranties, including but not limited to any warranties of merchantability or fitness for a particular purpose.

Dekolink shall in no event be liable for any special, indirect, incidental, consequential or punitive damages or for loss, damage, or expense, including loss of use, profits, revenue, or goodwill, directly or indirectly arising from purchaser's use or inability to use the merchandise, or for loss or destruction of other property or from any other cause, even if Dekolink has been advised of the possibility of such damage. Some states do not allow the exclusion or limitation of incidental or consequential damages so these limitations may not apply under certain circumstances.

The liability of Dekolink shall in no event exceed an amount equivalent to the purchase price paid by the purchaser for the defective product.

This warranty shall not be extended, altered or varied except by a written instrument duly signed by Dekolink.