

## **Comba Public Safety NG 700/800MHz (RXxxV3) BDA Operational Manual**

**This document is a preliminary and draft version of a user's manual and installation instructions for Comba's NG 700/800MHz BDA solution.**

**This manual consists of 3 parts:**

- **Instructions for operations and commissioning of the BDA**
- **A guide to wiring and setting of system alarms**
- **A guide for the physical installation of the BDA**

# **BDA V3 and BBU V3 Installation Guide**

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## 1 INSTALLATION

### 1.1 BDA V3 WALL MOUNTING

- Remove the mounting bracket from the BDA.
- Drill four holes on the wall/plywood using the position of four holes on the mounting rack as a guide.
- Install the Mounting Rack to the wall.
- Hang the equipment and secure the enclosure to the mounting rack.

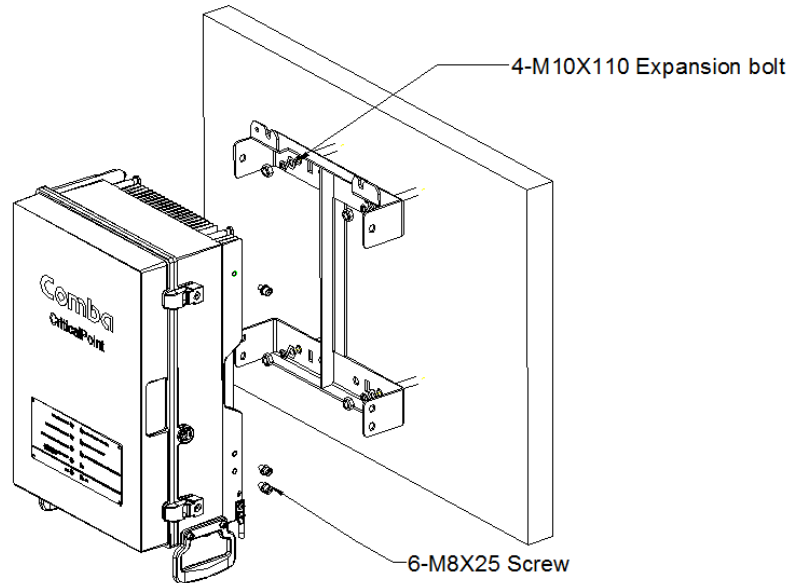


Figure 1: BDA V3 Wall Mounting

### 1.2 BBU V3 WALL MOUNTING

- Drill four holes on the wall/plywood using the position of holes from battery backup unit as a guide.
- Install the battery backup unit (without battery) to the wall.

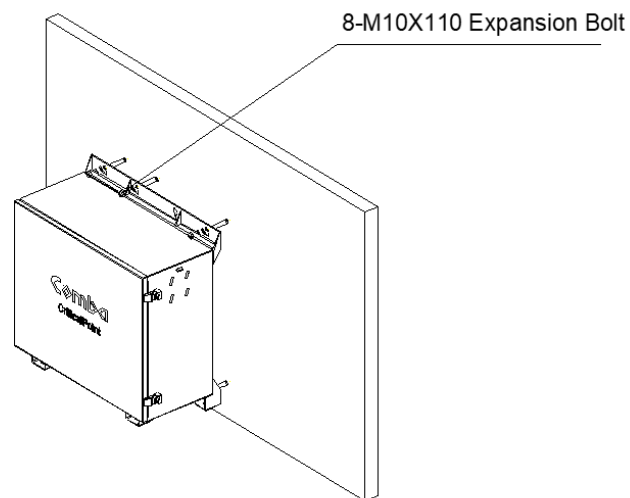


Figure 2: BBU V3 Wall Mounting

### 1.3 BATTERY INSTALLATION

- Slide the battery into the chassis.
- Make sure the <AC breaker> and <Battery Breaker> are both OFF. Connect the TWO BLACK BBU/battery wire to the positive (+) battery terminal and the TWO BLUE BBU/battery wire to the negative (-) battery terminal.
- Install the battery retaining bracket and secure with four screws.

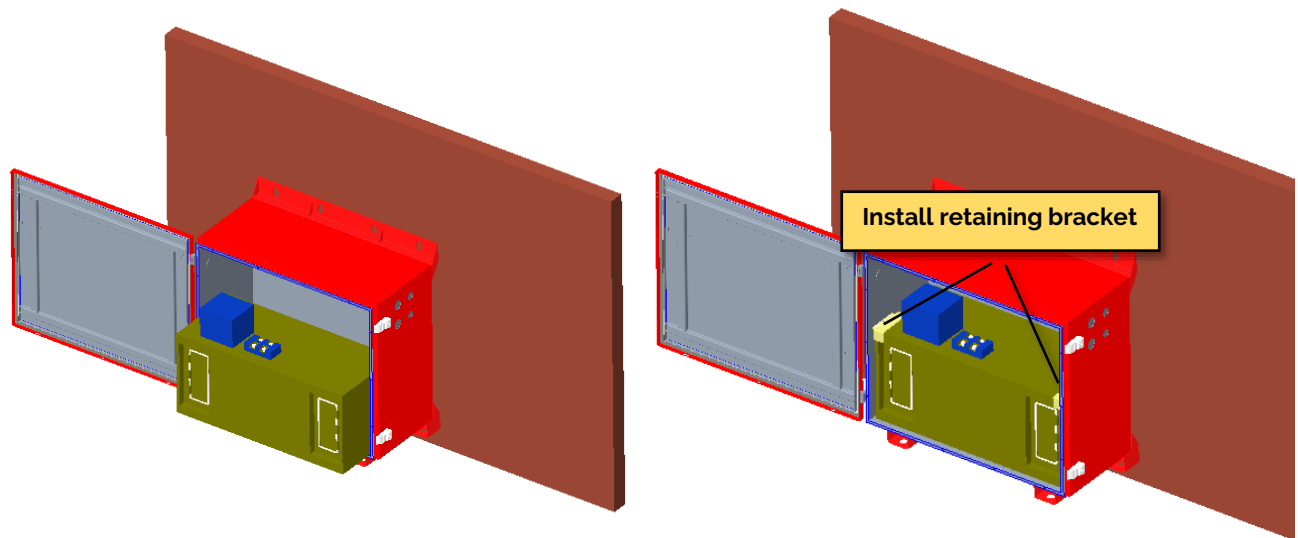
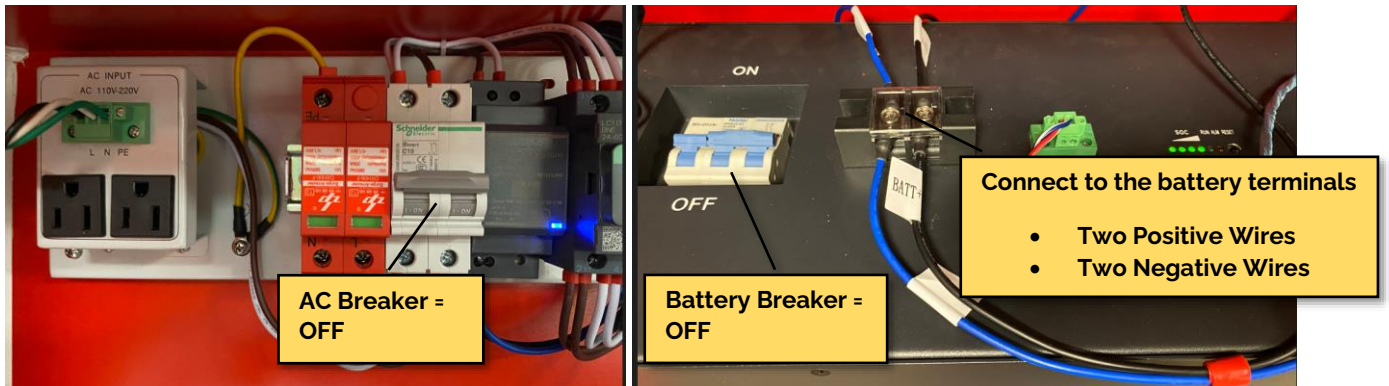


Figure 3: Battery Installation

## 1.4 BDA AND BBU CONNECTION

- The complex cable connects the BDA V3 and BBU V3 is provided with BBU V3, as Figure 4 shows.
- Make sure both AC (POWER) switch and DC (Boot w/o AC) switch are OFF in the BDA, as Figure 5 shows.
- Connect the <connectorized end> to the BBU as Figure 7 shows, then run the cable through a 3/4" knockout (recommended) from the BBU to a 3/4" knockout on the BDA, then into the BDA for connection. The cable can run through a conduit or from liquid tight connectors for water proofing.
- Connect to the BDA as below:
  - .1 (AC) Black to L
  - .2 (AC) White to N
  - .3 (AC) Green/Yellow to GND
  - .4 (DC) Brown to BATT+
  - .5 (DC) Blue to BATT-
  - .6 (Battery COMM.) Blue/White to BATT B
  - .7 (Battery COMM.) Red/White to BATT A
  - .8 Black/White wire is reserved

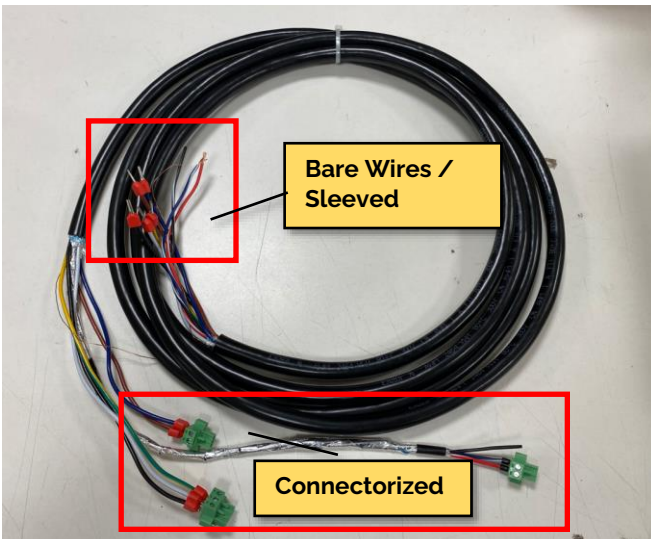


Figure 4: Complex Cable

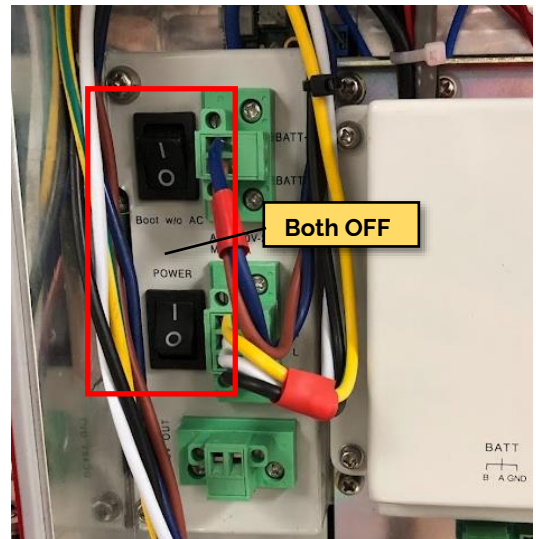


Figure 5: Complex Cable

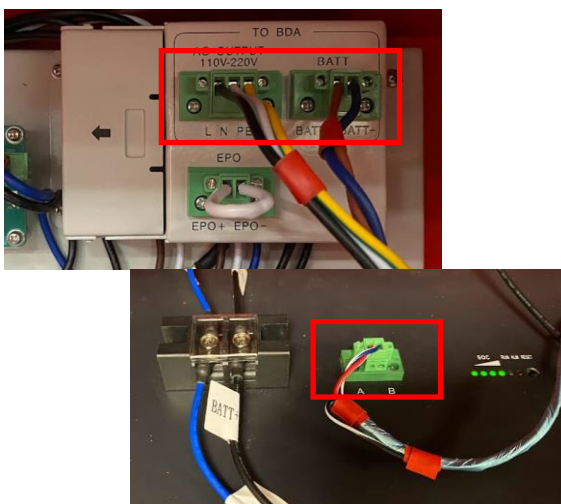


Figure 7: BBU Cable Connection

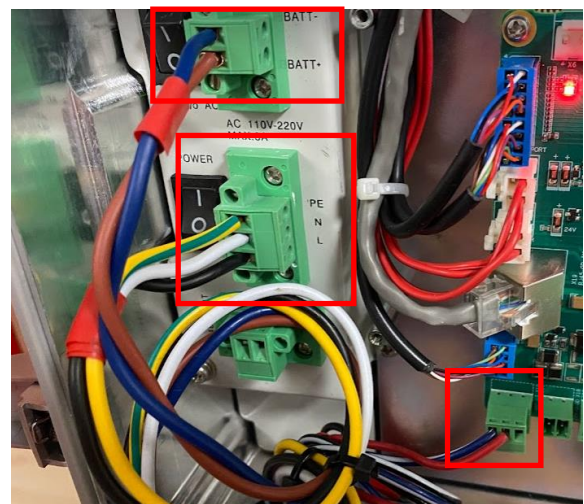


Figure 6: BDA Cable Connection

## 1.5 AC INPUT AND OTHER CONNECTIONS FOR BBU

- Make sure the <AC breaker> is OFF in the BBU
- Connect the AC input into the BBU.
- The EPO should be either connected to an external EPO switch or shorted with a jumper (as shown in Figure 8).

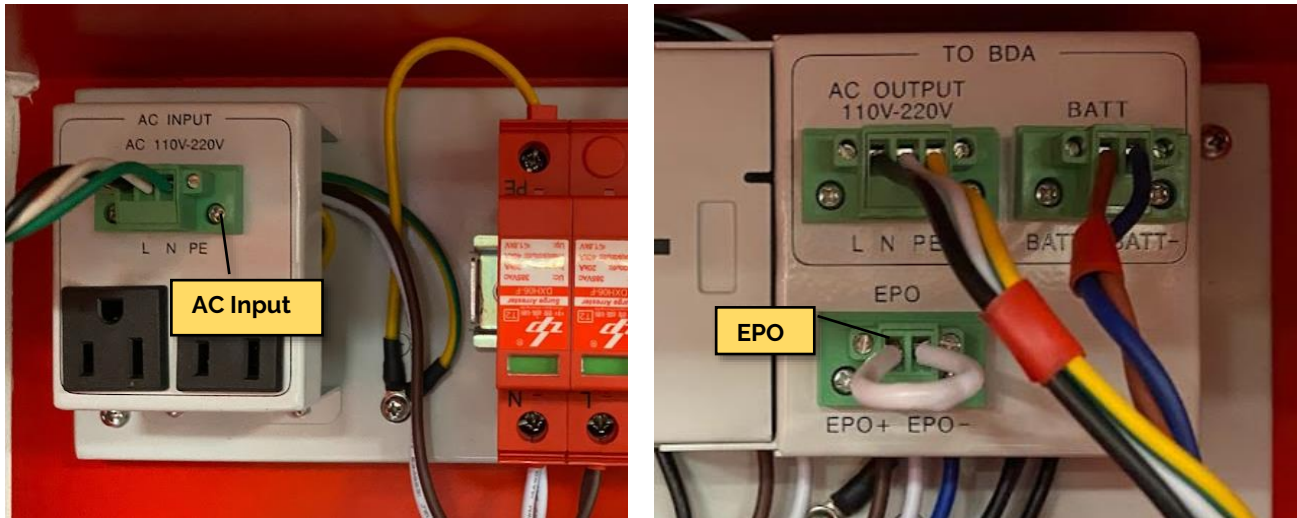


Figure 8: AC Inputs and EPO

- Final Assembly (System Overall Connection)

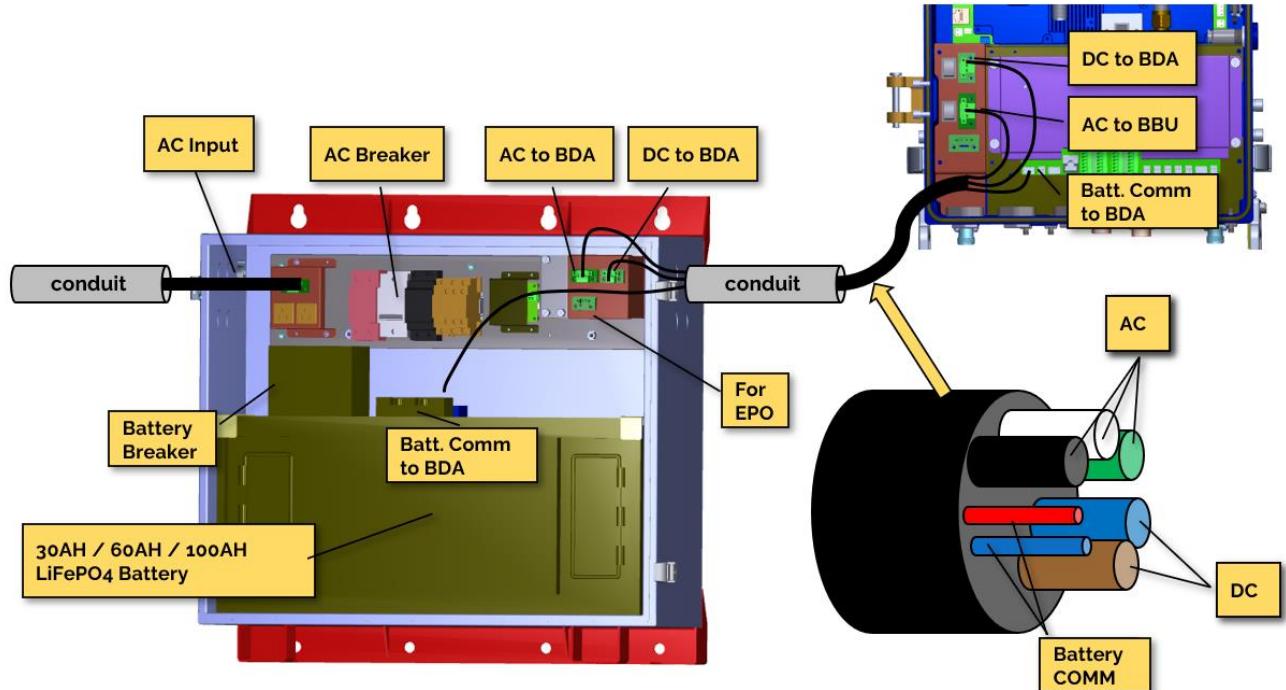


Figure 9: System Overall Connection

## 2 EQUIPMENT CONNECTIONS

### 2.1 BDA EXTERNAL CONNECTIONS



Figure 10: Equipment Connectors

Table 1: Equipment Connectors

Identifier	Descriptions
Knock Out	3/4": Recommended for hybrid cable (provided only from BBU V3) to connect to BBU V3 1" x 1: Recommended if need to run RF cable from/to the device 1/2" x 3: Recommended for dry connections or external alarm cables
DT Test	SMA connector for DT port test, -28dB coupling to DT port, available for both downlink and uplink test
MT Test	SMA connector for MT port test, -28dB coupling to MT port, available for both downlink and uplink test
DT	N-Female connector for connection to donor antenna
MT	N-Female connector for connection to service antenna
OMT	RJ45 Connector for local WEB GUI connection
LAN	RJ45 Connector for internet connection
UL/DL	Reserved for Fiber DAS system

#### Ground Connection

To ensure safe operation of the product, a ground (earth) connection is required. For single phase AC power source, the product must be grounded by connecting the "earth wire" of the power cord to the ground terminal of the AC supply. For operating this product with DC power system (such as rectifiers), the product should not be connected to power systems that switch open the return lead because the return lead could function as the ground (earth) connection for the equipment.

#### Protective Ground Connection

The enclosure must be grounded securely by connecting a copper wire (CSA 16mm<sup>2</sup>) to the grounding terminal on the equipment/rack, and the other end to a protective ground (i.e., building earth point). An internationally acceptable color code of the ground connection wire is green/yellow.

Such a ground connection implements the "Protective Ground Connection" and must be connected to the equipment at the designated ground point. In general, do not connect the supply before establishing an adequate ground (earth) connection.

Construct the ground wire and use appropriate crimp connectors where necessary. Locate and connect the equipment grounding terminal to a protective ground (i.e., building earth point).

## 2.2 ALARMS CONNECTIONS

BDA V3 has 8 dry contact outputs, each one supports either Normally Open or Normally Closed operations.

The alarms to trigger any of the dry contacts can be configured in the software.

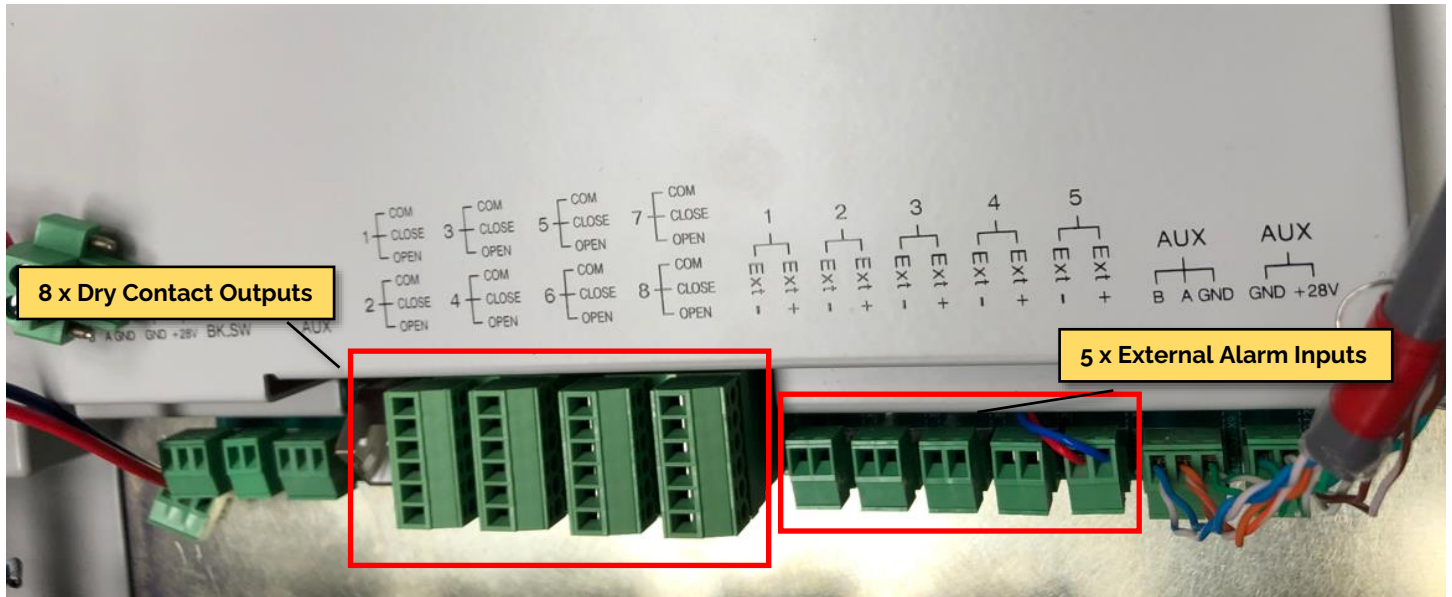


Figure 11: Dry Contact and External Alarms Connection

Table 2: Dry Contact Alarms Layout and Description

DRY CONTACT ALARMS							
TERMINATION BLOCK 1		TERMINATION BLOCK 2		TERMINATION BLOCK 3		TERMINATION BLOCK 4	
Dry Contact Alarm 1	COM1	Dry Contact Alarm 3	COM3	Dry Contact Alarm 5	COM5	Dry Contact Alarm 7	COM7
	CLOSE1		CLOSE3		CLOSE5		CLOSE7
	OPEN1		OPEN3		OPEN5		OPEN7
Dry Contact Alarm 2	COM2	Dry Contact Alarm 4	COM4	Dry Contact Alarm 6	COM6	Dry Contact Alarm 8	COM8
	CLOSE2		CLOSE4		CLOSE6		CLOSE8
	OPEN2		OPEN4		OPEN6		OPEN8

BDA V3 has 5 external alarm inputs, it takes dry contact alarms from external devices and can be setup in the software to be either Normally Open to trigger or Normally Closed to trigger.

The external alarm 5 is pre-configured as "Door Open Alarm".

Table 3: External Alarms Layout and Description

EXTERNAL ALARMS				
EXT 1	EXT 2	EXT 3	EXT 4	EXT 5
				Reserved for Door Open Alarm



### 3 SYSTEM TURN UP PROCEDURE

- Confirm the connections and polarities for all AC and DC Connections.
- Wake up the Battery:
 

Momentarily press the RESET button located on top of the LiFePO4 battery to wake it up approximately 3 seconds. Once the first SOC (State of Charge) LEDs begins to illuminate, release the RESET button immediately (NOTE: Holding the RESET button longer than approximately 5 seconds will cause the battery to go back into sleep mode. If this occurs, repeat the step to “wake-up” the battery by momentarily pressing the RESET button)
- Turn on the system: (no sequence required)
  - .1 AC Breakers in the BBU
  - .2 Battery Breakers on the battery
  - .3 Turn on AC (POWER) Switch in the BDA
- The DC (Boot w/o AC) switch in the BDA is used to turn on the system when there is no AC source so the system can bootup with Battery. It is recommended to leave it OFF under normal conditions.

Table 4: AC and DC Switches

AC and DC Switches				
System Init. Status	AC SW Init. Status	DC SW Init. Status	Action	System Status
OFF	OFF	OFF	AC SW ON	ON
OFF	OFF	OFF	DC SW ON	ON (Run on Batt.)
ON	ON	OFF	DC SW ON	ON (No Change)
ON	OFF	ON	AC SW ON	ON (Start Charging)
ON	ON	ON	AC SW OFF	ON (Run on Batt.)
ON	ON	ON	DC SW OFF	ON (No Change)
ON	ON	OFF	AC SW OFF	Shutdown
ON	OFF	ON	DC SW OFF	Shutdown

- The LED indicators help user to check the equipment status.

Table 5: LED Status

Identifier	Color	Indication
RUN	Green	Operation indicator, flashes every second to indicate normal operation.
ALM	Red	Alarm indicator. ON = Dry Contact Alarms; OFF = No Alarm.
DRY1	Red/Green	Green/OFF = Normal/No Alarm; Red=Alarm
DRY2~8	Red	Alarm indicator. ON = alarm; OFF = No Alarm.

**BDA V3 and BBU V3  
Operations, Features and  
Commissioning Guide**

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## 1 LOGIN

- Set the computer IP address to 192.168.8.xxx (except 101) / 255.255.255.0. e.g., 192.168.8.100
- Connect the computer to the OMT Port on the device using a regular Ethernet Cable.
- Use 192.168.8.101 or http://192.168.8.101 to login to the device.
- The default username is <admin> and password is <admin>.
- LAN port is configurable in WEB – Management – Network, LAN port is normally used for remote access.

## 2 WEB GUI OVERVIEW

Name	Value
Dev Info	
Dev Model	BDA V3 NG
System Version	RX11_A0AV01.00.01.06_08
Serial Num	AA12345678
Carrier mode	Class_A(High Rejection Filters)

Page	Descriptions
Home	<ul style="list-style-type: none"> <li>• Current Alarms</li> <li>• Device summary</li> </ul>
Device – Overview – BDA Overview Tab	<ul style="list-style-type: none"> <li>• RF Switches</li> <li>• Wideband Input Attenuations</li> <li>• Wideband Output Attenuations</li> <li>• Mute SW DL/UL and Thresholds</li> <li>• Buzzer Notification Setting / Buzzer Reset Time</li> <li>• Alarm Detection Duration</li> <li>• Alarms enable/disable and thresholds (BDA Alarms)</li> </ul>
Device – Overview – External/Dry Contact ALM Tab	<ul style="list-style-type: none"> <li>• External Alarms Settings</li> <li>• Dry Contact Alarm Settings</li> </ul>
Device – Overview – Internal Charger Tab	<ul style="list-style-type: none"> <li>• BBU V3 SW and Parameter and Settings</li> <li>• Alarms enable/disable and thresholds (BBU V3 Alarms)</li> </ul>
Device – Overview – External Annunciator Panel Tab	<ul style="list-style-type: none"> <li>• Comba Annunciator Panel Setting</li> <li>• Alarms enable/disable and thresholds (AP V1 Alarms)</li> </ul>
Device – Overview – Advanced Settings Tab	<ul style="list-style-type: none"> <li>• Output Power / Reflect Power Review</li> <li>• PA Protection SW</li> <li>• Net Protection SW and Setting</li> <li>• LNA Bypass SW</li> <li>• Oscillation Detection Alarm Setting</li> <li>• DT Antenna Malfunction Threshold</li> <li>• Isolation Detection Noise Floor Threshold</li> </ul>

Device – Channels	<ul style="list-style-type: none"> <li>• Create Site</li> <li>• Create/Manage Channels</li> <li>• Channel SW/Gain/Target Power/Reading</li> </ul>
Commissioning – Commission	<ul style="list-style-type: none"> <li>• Commissioning Guide/Tool</li> </ul>
Commissioning – Isolation Check	<ul style="list-style-type: none"> <li>• Isolation Detection</li> </ul>
Management – Firmware Upgrade	<ul style="list-style-type: none"> <li>• Firmware Upgrade</li> </ul>
Management – Device Information	<ul style="list-style-type: none"> <li>• Device Information Settings</li> <li>• Select Filter Set: High Rejection Set or Low Delay Set</li> <li>• Select Duplexer Configuration: S0/S1</li> </ul>
Management – User Management	<ul style="list-style-type: none"> <li>• User Account Settings</li> </ul>
Management – Network	<ul style="list-style-type: none"> <li>• LAN IP Setting</li> </ul>
Management – Tools	<ul style="list-style-type: none"> <li>• Controller Reset</li> <li>• Digital Module Reset</li> <li>• Reset Factory Default</li> <li>• Alarm Reset</li> <li>• Oscillation Alarm Reset</li> <li>• UL and DL PA Reset</li> <li>• Alarm Export</li> <li>• Excel Import / Export in Excel format or Database format</li> </ul>
Management – License	<ul style="list-style-type: none"> <li>• Device License</li> </ul>

### 3 TURNING UP SYSTEM

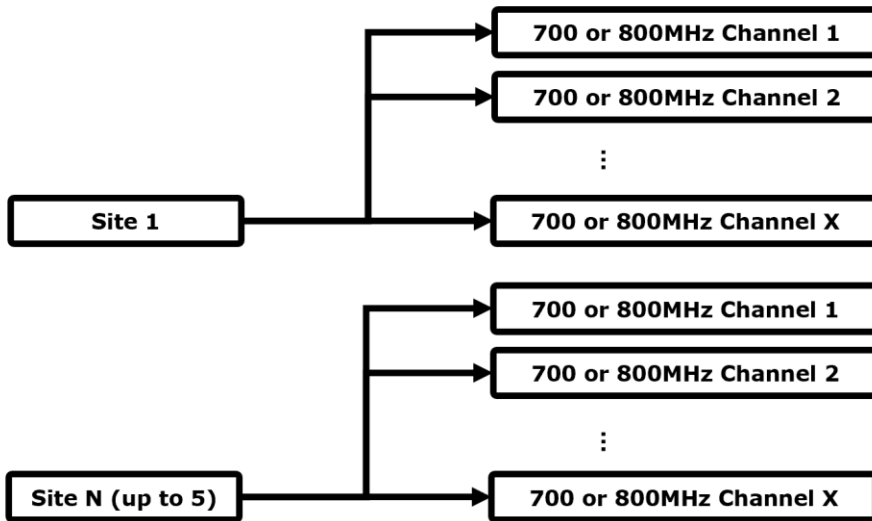
#### 3.1 COMMISSIONING PREPARATION

Comba BDA V3 can decide some of the parameters, but its highly recommended to obtain all these information manually. This is a high-level list, to learn more details, please contact customer service.

Items	Remarks
Donor Site Location	
Donor Site System, Channel Frequency List, Control Channel	
Donor Site Channel Output ERPs (Optional)	
Roof Top Measurement	Cover Narrowband, Wideband, Neighbor bands, DL/UL
RSSI at BDA Input	Cover Narrowband, Wideband, Neighbor bands, DL/UL
Isolation	
Inbuilding cable/antenna segmental sweep test, CW test	
Inbuilding benchmark testing before commissioning	Cover Narrowband, Wideband, Neighbor bands, DL/UL
Building Exterior benchmark testing before commissioning	Cover Narrowband, Wideband, Neighbor bands, DL/UL

#### 3.2 CREATE SITES AND CHANNEL FILTERS

In BDA V3, users need to create sites first, then be able to create filters/channels under each site.

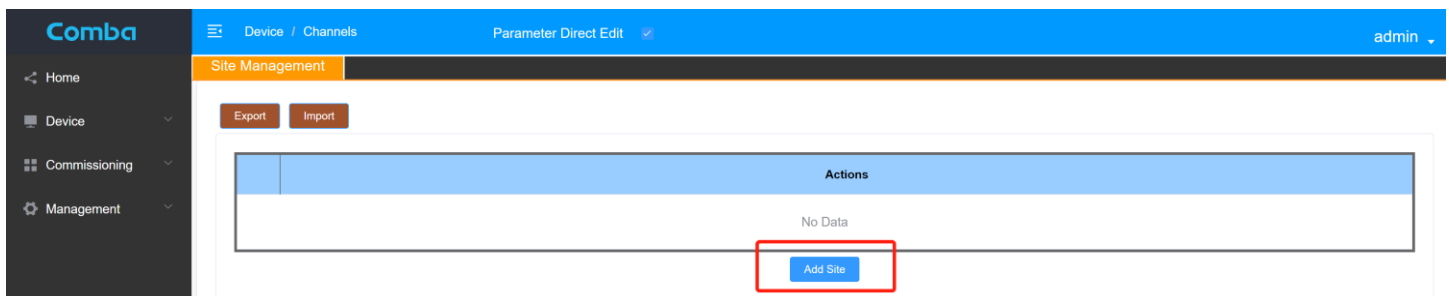


Each Site can be managed easily and individually in batches for

- Switches
- Target Output Power
- Gain

The concept for the site can be physically different donor site, or for different groups of channels which needs to be managed individually

#### Create Sites:



**Site Name:** Name of this site, for reference purpose

**Donor Site Address:** Address of the site, for reference purpose

**No of Ch. (From Donor Site):** Total channels from this donor site, for reference purpose

**Donor Site System Type:** System type, such as P25 Phase 2, for reference purpose

After the site is created. There is a new tab that will be created to create filters.

A window for "Advanced information" will be presented, the information can be filled up in the commissioning guide.

The screenshot shows the 'Site Management' interface for a site named 'Test(0)'. At the top, there are 'Export' and 'Import' buttons. Below is a table with the following data:

NO	Site Name	Donor Site Address	No. of Ch. (from Donor Site)	Donor Site System Type	Create Time	Actions
1	Test	Test	10	P25	2023-04-09 14:44:53	<a href="#">Modify</a> <a href="#">Delete</a>

Below the table is a 'Site Advanced Information' section with a 'No Suggestion' message. A table within this section is highlighted with a red box:

Name	Value
Donor Site TX ERP	0dBm
Donor Site TX/RX Delta	0dB
BDA Donor Antenna Gain	0dB
BDA Donor Cable Loss	0dB
Path Loss	0
Donor Site Max RSSI	0dBm
Donor Site Min RSSI	0dBm
Donor Site Max Noise Floor	0dBm
Donor Site Min Noise Floor	0dBm

### Create Filters:

In the new tab, click "Add Channels" to add filters.

The screenshot shows the 'Comba' interface for 'Device / Channels' in 'Parameter Direct Edit' mode. The 'Site Management' tab is active, showing site information: Site Name: Test, Address: Test, No. of Ch. (from Donor Site): 10, Donor Site System Type: P25, No. of Filter (Programmed in BDA): 0. Below this, there are two sections for channel management: '700MHz(0)' and '800MHz(0)'. Each section has a table with columns: NO, DLFreq, ULFreq, Filter, SW, DL\_IN, DL\_OUT, DL\_TAR, UL\_TAR, UL\_IN, UL\_OUT. The 'Add Channels' button in both sections is highlighted with a red box.

Filters can be added one by one, with their actual frequencies, or in batch with the same frequency, then modify the frequencies one by one before switching on. Filters cannot be turned on if they have frequency overlap.

For BDA V3, 64 filters per band (96 max for dual bands), is supported. Normally, each channel can be assigned one dedicated filter.

For:

- Filter bandwidth,
- filter switches,
- DL\_TAR, UL\_TAR (target output power)
- DL\_GAIN, UL\_GAIN (gain)

they can be left later steps to set.

700MHz(8)

Batch Setting Add Channels Delete Channels DL Only UL Only View All

NO	DLFreq	ULFreq	Filter	SW	DL_IN	DL_OUT	DL_TAR	UL_TAR	UL_IN	UL_OUT		
1	758.50000MHz	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	Modify	Delete
2	758.50000MHz	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	Modify	Delete
3	758.50000MHz	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	Modify	Delete
4	758.50000MHz	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	Modify	Delete
5	758.50000MHz	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	Modify	Delete
6	758.50000MHz	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	Modify	Delete
7	758.50000MHz	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	Modify	Delete
8	758.50000MHz	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	Modify	Delete

If user intended to use BDA's commissioning tool, the "control channel" has to be assigned.

For voice channels can select "voice", or just leave it as blank, it is for reference only.

Address Test

No. of Ch. (from Donor Site) 10 No. of Filter (Programmed in BDA) 8

700MHz(8)

Batch Setting Add Channels Delete Channels DL Only UL Only View All

DL_IN	DL_OUT	UL_IN	UL_OUT	Description	Modify	Delete
<-110.00dBm	<-7.00dBm	N/A	N/A	--	Modify	Delete
<-110.00dBm	<-7.00dBm	N/A	N/A	--	Modify	Delete
<-110.00dBm	<-7.00dBm	N/A	N/A	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	--	Modify	Delete

800MHz(0)

Batch Setting Add Channels Delete Channels DL Only UL Only View All



### 3.3 ISOLATION TEST

Comba recommends users always apply manual isolation test, aside from the isolation test from BDA.

- Home
- Device
- Overview
- Channels
- Commissioning
- Commission
- Isolation Check
- Management

700MHz
Test All

Frequency	Noise Floor	Recieved Pilot Strength	Isolation	Max Gain Allowed	Actions
769.00000MHz	-120dBm	-120	127	79	Modify Test
770.00000MHz	-120dBm	-120	127	79	Modify Test
771.00000MHz	-119.28dBm	-120	127	79	Modify Test
772.00000MHz	-119.78dBm	-89	99	79	Modify Test
773.00000MHz	-120dBm	-120	127	79	Modify Test
774.00000MHz	-120dBm	-120	127	79	Modify Test
775.00000MHz	-119.28dBm	-119	127	79	Modify Test

The minimal isolation detected is 99dB, the max gain allowed is 79dB, or if you have manual test result, you can put it in the table below and selecte "manual"

Frequency	Isolation	Max gain allowed	Use manual or auto	Actions
769.00000MHz	120dB	120dB	Manual	Modify

BDA provides 7 frequencies from 700MHz downlink and 11 frequencies from 800MHz that the users can modify and test the isolation for all these frequencies in a batch (by default, they are 1MHz apart).

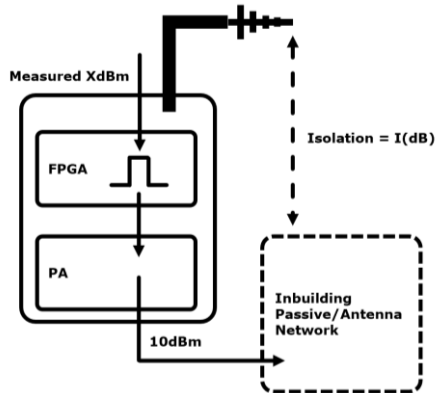


Diagram:  
BDA Isolation Detection Mechanism

$$I = 10 - X$$

For example:  
X is measured -90dBm  
 $I = 10 - (-90) = 10 + 90 = 100dB$

If Auto is selected, BDA will use the Lowest Isolation/Max Gain Allowed to limit BDA gains.

Frequency	Noise Floor	Recieved Pilot Strength	Isolation	Max Gain Allowed	Actions
769.00000MHz	-120dBm	-120	127	79	Modify Test
770.00000MHz	-120dBm	-120	127	79	Modify Test
771.00000MHz	-119.28dBm	-120	127	79	Modify Test
772.00000MHz	-119.78dBm	-89	99	79	Modify Test
773.00000MHz	-120dBm	-120	127	79	Modify Test
774.00000MHz	-120dBm	-120	127	79	Modify Test
775.00000MHz	-119.28dBm	-119	127	79	Modify Test

The minimal isolation detected is 99dB, the max gain allowed is 79dB, or if you have manual test result, you can put it in the table below and selecte "manual"

Frequency	Isolation	Max gain allowed	Use manual or auto	Actions
			Auto	Modify

If users try to use manual results to overwrite the auto results, just select manual and put manual test results.

Frequency	Noise Floor	Received Pilot Strength	Isolation	Max Gain Allowed	Actions
769.00000MHz	-120dBm	-120	127	79	Modify Test
770.00000MHz	-120dBm	-120	127	79	Modify Test
771.00000MHz	-119.28dBm	-120	127	79	Modify Test
772.00000MHz	-119.78dBm	-89	99	79	Modify Test
773.00000MHz	-120dBm	-120	127	79	Modify Test
774.00000MHz	-120dBm	-120	127	79	Modify Test
775.00000MHz	-119.28dBm	-119	127	79	Modify Test

The minimal isolation detected is 99dB, the max gain allowed is 79dB, or if you have manual test result, you can put it in the table below and select "manual"

Frequency	Isolation	Max gain allowed	Use manual or auto	Actions
769.00000MHz	120dB	120dB	Manual	Modify

BDA will always measure the noise floor first before sending out pilot for isolation test.

If there is power measured (actual signal or interferences) and it is higher than the <Noise Floor TH (Isolation Test)> in the advanced settings page, system will prompt a failure just for this frequency. But users can still proceed with other frequencies and get an isolation result.

Users can adjust the threshold, based on the actual off-the-air spectrum situation.

The screenshot shows the Comba management interface. On the left is a navigation menu with 'Overview' highlighted. The main content area contains several settings tables:

- Settings table with columns: Name, Value, Actions.
 

OSC_T2(min)	10	Modify
OSC_T2_CycleNum	12	Modify
DL700M Last Isolation Mea.	127dB	
DL800M Last Isolation Mea.	127dB	
Oscillation Shutdown(700MHz)	●	Modify
Oscillation Shutdown(800MHz)	●	Modify
Oscillation Gain Reduction(700MHz)	●	Modify
Oscillation Gain Reduction(800MHz)	●	Modify
- Settings table with columns: Name, Value, Actions.
 

DT Input Level	-120dBm	
DT ANT Disconnection Alarm TH	-90dBm	Modify
DT ANT Disconnection Alarm	●	Modify
- Settings table with columns: Name, Value, Actions. This table is highlighted with a red box.
 

Name	Value	Actions
Noise Floor TH (Isolation Test)	-90dBm	Modify

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The Max Gain allowed to use for both Downlink and Uplink follows the rule:

- Max Gain = Isolation – 20dB

For example: if Isolation is 90dB, then the Max Gain will be limited at 70dB.

The Max gain can be found in the channels page from each channel.

### 3.4 BDA TARGET POWER AND GAIN SETTINGS

Before turning ON the BDA, it is highly recommended to calculate DL / UL Target Output Power and DL/UL Gain. And learn the methods BDA provides to set up the Target Output Power and Gain.

Note: It is always viable to use external physical attenuators to adjust the power / gain.

#### Power Control

The screenshot shows the 'BDA Overview' page in the Comba interface. The 'Parameter Direct Edit' mode is active. A table displays various power control parameters for DL 700, UL 700, UL 800, and DL 800 bands. The 'Target Output Power' and 'Output ATT' rows are highlighted with a red border.

Name	DL 700	UL 700	UL 800	DL 800	Actions
Frequency Bands	DL [758, 775]	UL [788, 805]	UL [806, 824]	DL [851, 869]	
RF Switches	OFF	ON	ON	OFF	Modify
P_in(Composite)	<-90dBm	<-90dBm	<-90dBm	<-90dBm	
P_out(Composite)	<0dBm	<0dBm	<0dBm	<0dBm	
Target Output Power	33dBm	27dBm	27dBm	33dBm	Modify
Input ATT	0dB	0dB	0dB	0dB	Modify
Output ATT	0dB	0dB	0dB	0dB	Modify

**Target Output Power:** Wideband ALC to limit the output power.

21-33dBm tunable for Downlink and 21-27dBm tunable for Uplink. It will not reduce the total usable gain.

**Output ATT:** Wideband attenuators 0-20dBm tunable for both Downlink and Uplink. When this ATT is set >10dB, it may not maintain the same attenuation to noise floor (a worse noise figure, which, an external same value external attenuator could approach a better result regarding the noise figure). Setting this Output ATT will reduce the maximum available gain accordingly. For example, Output ATT = 10dB, the Max Gain in the channel page will display as 80dB. (90dB - 10dB)

The screenshot shows the 'Channels' page in the Comba interface for a 700MHz(8) channel. A table lists channel parameters, with 'DL\_TAR' and 'UL\_TAR' columns highlighted in red.

Ch	ULFreq	Filter	SW	DL_IN	DL_OUT	DL_TAR	UL_TAR	UL_IN	UL_OUT	DL_GAIN	U	Actions
1	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB		Modify Delete
2	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB		Modify Delete
3	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB		Modify Delete
4	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB		Modify Delete
5	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB		Modify Delete
6	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB		Modify Delete
7	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB		Modify Delete
8	788.50000MHz	12.5KHz	OFF	<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB		Modify Delete

**DL\_TAR, UL\_TAR:** The Output ALC per Channel in the FPGA/Digital Domain. (Downlink 0-33dBm, Uplink 0-27dBm). It can be set individually and differently.

This is the most common way to set output limits at per channel base.

## Gain Control

700MHz(8)

Batch Setting Add Channels Delete Channels DL Only UL Only View All

DL_IN	DL_OUT	DL_TAR	UL_TAR	UL_IN	UL_OUT	DL_GAIN	UL_GAIN	DL_AGC	UL_AGC	Description	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	60dB	N/A	N/A	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	60dB	N/A	N/A	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	60dB	N/A	N/A	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	60dB	N/A	N/A	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	60dB	N/A	N/A	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	60dB	N/A	N/A	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	60dB	N/A	N/A	--	Modify	Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	60dB	N/A	N/A	--	Modify	Delete

800MHz(0)

Batch Setting Add Channels Delete Channels DL Only UL Only View All

NO	DLFreq	ULFreq	Filter	SW	DL_IN	DL_OUT	DL_TAR	UL_TAR	UL_IN	UL_OUT
----	--------	--------	--------	----	-------	--------	--------	--------	-------	--------

**DL\_GAIN / UL GAIN:** 30dB range (below the max gain), for both Downlink and Uplink. This is adjusted in the FPGA / Digital Domain. It can be set individually for each of the filters.

Comba Device / Overview Parameter Direct Edit admin

BDA Overview External / Dry Contact ALM Internal Charger Status External Annunciator Panel Advanced Settings

Name	DL 700	UL 700	UL 800	DL 800	Actions
Frequency Bands	DL [758, 775]	UL [788, 805]	UL [806, 824]	DL [851, 869]	
RF Switches	OFF	ON	ON	OFF	Modify
P_in(Composite)	<-90dBm	<-90dBm	<-90dBm	<-90dBm	
P_out(Composite)	<0dBm	<0dBm	<0dBm	<0dBm	
Target Output Power	33dBm	27dBm	27dBm	33dBm	Modify
Input ATT	0dB	0dB	0dB	0dB	Modify
Output ATT	0dB	0dB	0dB	0dB	Modify

**Input ATT:** 0-30dB attenuation for the input side for both Downlink and Uplink. It is wideband ATT will affect all filters. Setting this Input ATT will reduce the maximum available gain accordingly. For example, Input ATT = 20dB, the Max Gain in the channel page will display as 70dB. (90dB - 20dB)

The screenshot shows the Comba management interface. A 'Setting 1' dialog box is open, showing 'DL Gain Limit(700MHz)' set to 90dB. Below, a table lists gain limits: UL Gain Limit (65dB), DL Gain Limit(700MHz) (90dB), and DL Gain Limit(800MHz) (90dB). Another table shows LNA bypass settings: LNA1\_BYPASS (OFF), LNA2\_BYPASS (ON), and LNA3\_BYPASS (ON).

Name	Value	Actions
UL Gain Limit	65dB	Modify
DL Gain Limit(700MHz)	90dB	Modify
DL Gain Limit(800MHz)	90dB	Modify

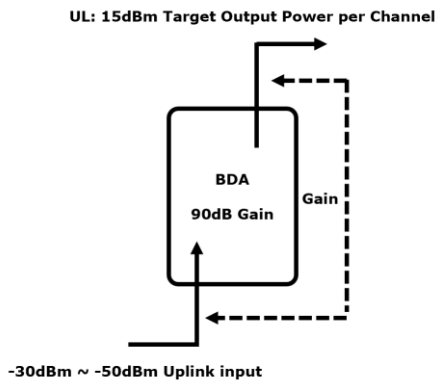
LNA1_BYPASS	OFF	OFF	OFF	OFF
LNA2_BYPASS	OFF	ON	ON	OFF

Another Gain Control BDA provides is done by bypassing the LNAs. LNA are the amplifiers from the front end. BDA provides three stages: 40dB, 65dB, 90dB. For both Downlink and Uplink individually. After set in the Advanced Settings page. The Gain Limit status can be found on the Overview page.

- When setting 65dB gain limit, LNA2\_BYPASS will be ON
- When setting 40dB gain limit, both LNA2\_BYPASS and LNA1\_BYPASS will be ON.

When a system input power / target output power can work with Max 65dB gain or 40dB, setting Gain Limit (LNA Bypass) is recommended. This usually results in a better Noise Figure.

### Example for using different gain settings:



4 different ways to set the gain:

1. Set 90dB gain, rely on BDA Output ALC and Input AGC.
2. Set 65dB gain, 25dB ATT in the channel page for each channel.
3. Set 65dB gain, set wideband 25dB Input ATT.
4. Set 65dB gain limit for Uplink.

From Noise Figure Performance: 4 (best) > 3 > 2 > 1

### 3.5 DECIDING DL TARGET OUTPUT POWER / GAIN

A typical way is to reserve power for each channel based on the channel counts and calculate the target output power per channel. The following table calculates the results.

Channel Counts	BDA Output	Back Off	Per Channel Power
2	33dBm	3dB	30dBm
4	33dBm	6dB	27dBm
8	33dBm	9dB	24dBm
16	33dBm	12dB	21dBm
32	33dBm	15dB	18dBm
64	33dBm	18dB	15dBm

Refer to the Power Control Section to set the Output Power Limit.

Both setting DL\_TAR to the calculated Per Channel Power or leave them as Max (33dBm) are common, based on the character for Downlink inputs are normally around same level.

Gain is decided based on the input power and target output power.

Measure control channel power at the BDA input (Available in BDA Commission Guide), then:

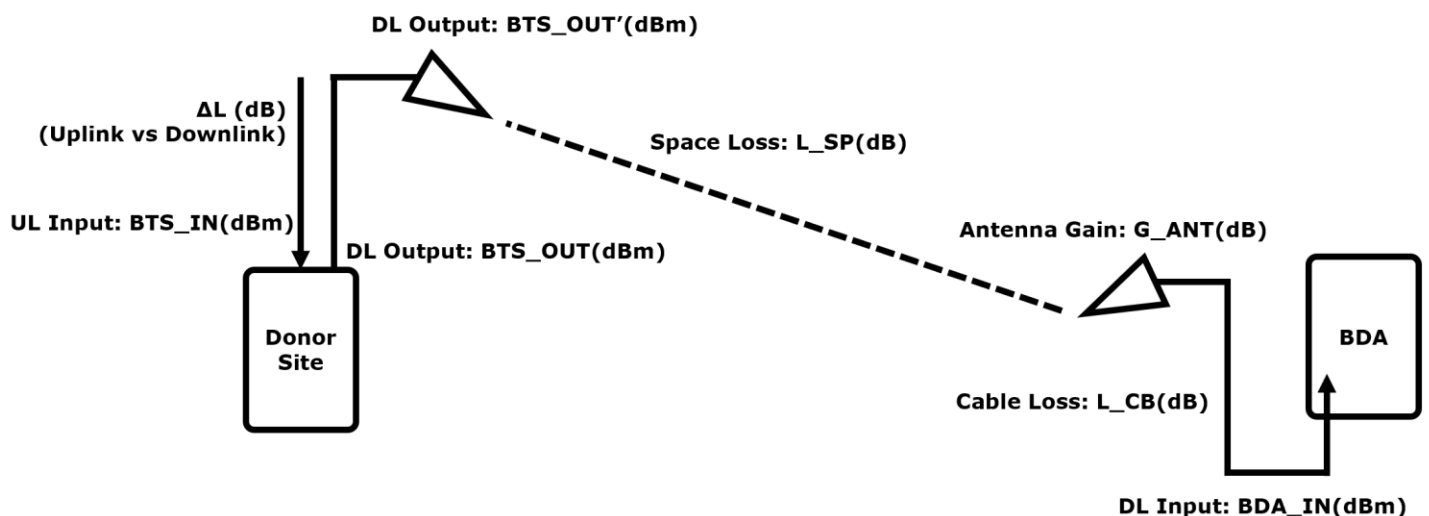
- $\text{Gain} = \text{Target Output Power} - \text{Input Power}$

Other scenarios, may require fine tuning the DL Target Output Power/Gain:

1. Too much power that bleeds to the building exterior: Turn down the gain / Output Target Power.
2. Per Channel Power from this table is not enough to provide the appropriate coverage. This could possibly be resulted from poor design. Users need to use higher gain / DL\_TAR than normal to meet the coverage requirements.
3. Sometimes, the BDA coverage cannot provide appropriate dominance over external off-the-air signal from the donor site and causes TDI problems. The BDA per Channel Power / Gain needs to be re-evaluated and some other solutions need to be considered to fix this problem.

### 3.6 DECIDING UL TARGET OUTPUT POWER

To calculate the BDA target output power, will require to calculate the "Total loss (uplink) between the BTS and BDA."



### **Solution 1 for Total loss (uplink) between the BTS and BDA:**

- Total Loss Downlink =  $BTS\_OUT - BDA\_IN$ .
- Total Loss Uplink = Total Loss Downlink +  $\Delta L$

In practical,

- if  $BTS\_OUT$  is known:  
 $\Delta L$  is the difference between the gain (loss) from "BTS output to the antenna in the Downlink" vs gain (loss) from "(BTS) Antenna to  $BTS\_IN$  in the Uplink".
- if  $BTS\_OUT'$  is known:  
 $\Delta L$  is gain (loss) from "(BTS) Antenna to  $BTS\_IN$  in the Uplink".
- If  $\Delta L$  could not be obtained. 0dB can be used for a rough estimation.

$BTS\_OUT$ ,  $BTS\_OUT'$  or  $\Delta L$  information can be possibly acquired from Licensee or AHJ.

### **Solution 2 for Total loss (uplink) between the BTS and BDA:**

- Total Loss Uplink =  $L\_CB + G\_ANT + L\_SP + \Delta L$   
Where:  
 $L\_CB$  = BDA Donor Antenna Cable Loss, a negative number  
 $G\_ANT$  = Antenna Gain in dBd, a positive number  
 $L\_SP$  = Space Loss, calculated by distance to the Donor Site  
 $\Delta L$  = (BTS) Antenna to  $BTS\_IN$  in the Uplink, use 0dB if unknown.

This will not be as accurate as solution 1, the obstacles between the Donor Site to BDA Site (trees, buildings), antenna azimuth and etc. will affect the result.

### **BTS Required Uplink Receiving Level**

This is the key information has to be obtained from Licensee / AHJs.

It could be a min level requirement such as -100dBm, or a max level requirement such as -95dBm, or a range requirement such as -85 ~ -95dBm.

If min level is required =  $BTS\_IN$

- **BDA Output Min** >  $BTS\_IN - \text{Total Loss Uplink}$

If max level is required =  $BTS\_IN$

- **BDA Output Max** <  $BTS\_IN - \text{Total Loss Uplink}$   
In this case, minimal requirement is possibly to guarantee the radio will work.

If a range is required =  $BTS\_IN\_Max$  and  $BTS\_IN\_Min$

- **BDA Output Max** <  $BTS\_IN - \text{Total Loss Uplink}$ , and **BDA Output Min** >  $BTS\_IN - \text{Total Loss Uplink}$ .

**BDA Output Max / Min has to be calculated or estimated for a proper commissioning.**

### 3.7 DECIDING UL GAIN

The uplink input is a range: **UL\_IN\_Max, UL\_IN\_Min** (Available in BDA Commission Guide)

The gain is:

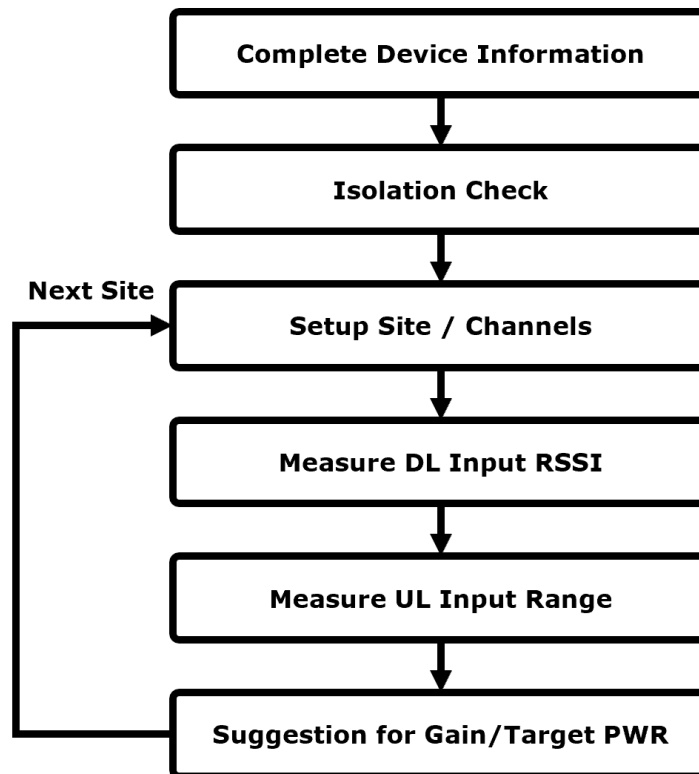
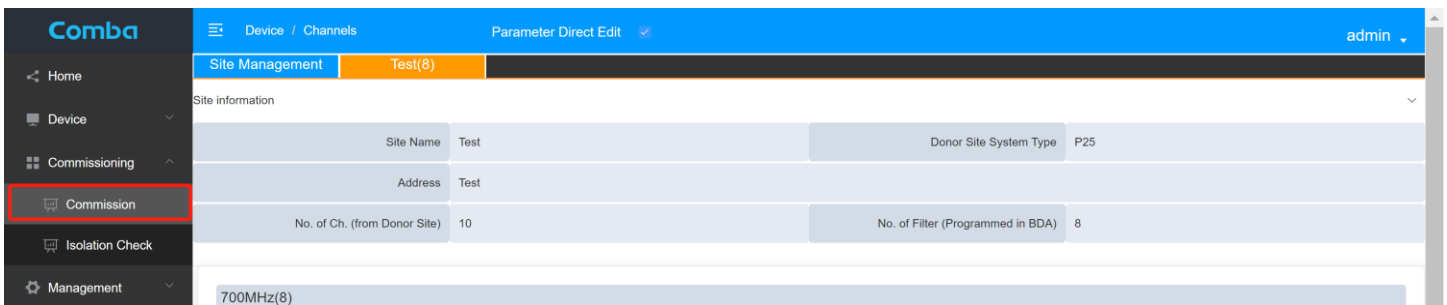
$$G = \text{BDA Output Min} - \text{UL\_IN\_MIN}$$

If there is no BDA Output Min, then:

$$G \leq \text{BDA Output Max} - \text{UL\_IN\_MIN}$$

## 4 COMMISSIONING GUIDE

BDA's commissioning guide will lead the user to obtain key information for commissioning step by step.





## Steps 1: Complete Device Information

Comba

Commissioning / Commission Parameter Direct Edit admin

Step 1: Device Information Setting

Device Information

Name	Value	Actions
Dev Info	Comba Demo BDA	Modify
Latitude		Modify
Longitude		Modify
Date/Time	2023-04-09 21:24:37	Modify

next

## Step 2: Isolation Check

Refer to Section 3.3 for Isolation Check details.

If isolation is done, this step can be skipped by clicking "Next".

Comba

Commissioning / Commission Parameter Direct Edit admin

Step 2: Isolation Test

previous next

700MHz Test All

Frequency	Noise Floor	Received Pilot Strength	Isolation	Max Gain Allowed	Actions
769.00000MHz	-120dBm	-120	127	79	Modify Test
770.00000MHz	-120dBm	-120	127	79	Modify Test
771.00000MHz	-119.28dBm	-120	127	79	Modify Test
772.00000MHz	-119.78dBm	-89	99	79	Modify Test
773.00000MHz	-120dBm	-120	127	79	Modify Test
774.00000MHz	-120dBm	-120	127	79	Modify Test
775.00000MHz	-119.28dBm	-119	127	79	Modify Test

The minimal isolation detected is 99dB, the max gain allowed is 79dB, or if you have manual test result, you can put it in the table below and select "manual"

Frequency	Isolation	Max gain allowed	Use manual or auto	Actions
769.00000MHz	120dB	120dB	Manual	Modify

## Step 3: Create Site and Channels

Comba

Commissioning / Commission Parameter Direct Edit admin

Step 3: Site Information Setting

previous

Export Import

Actions
No Data

Add Site

In this step, user can fill in the "Site Advanced Setting."

The screenshot shows the Comba web interface. On the left is a navigation menu with 'Home', 'Device', 'Commissioning', and 'Management'. The main area displays a table with the following data:

NO	Site Name	Donor Site Address	No. of Ch. (from Donor Site)	Donor Site System Type	Create Time	Actions
1	Test	Test	10	P25 Phase 2	2023-04-09 21:28:45	Modify Delete Next

Below the table is a 'Site Advanced Information' section with a 'No Suggestion' message. A table lists parameters and their values:

Name	Value
Donor Site TX ERP	0dBm
Donor Site TX/RX Delta	0dB
BDA Donor Antenna Gain	0dB
BDA Donor Cable Loss	0dB
Path Loss	0
Donor Site Max RSSI	0dBm
Donor Site Min RSSI	0dBm
Donor Site Max Noise Floor	0dBm
Donor Site Min Noise Floor	0dBm

A 'Site Advanced Setting' button is highlighted with a red box. An 'Add Site' button is also visible at the bottom.

Refer to Section 3.6 for guidance for the parameters.

Donor Site TX ERP (dBm) is used for Solution 1 of calculating Total Loss Uplink

And BDA Donor Antenna Gain / Donor Cable Loss / Distance to Donor are used for Solution 2, fill in either one.

At least fill in Donor Site Max RSSI or Donor Site Min RSSI for a proper suggestion for the ALC/Gain settings.

Donor Site Max Noise Floor / Donor Site Min Noise Floor are only for reference purpose in this version.

The screenshot shows the 'Site Advanced Setting' dialog box with the following input fields:

- Donor Site TX ERP(dBm): 0
- Donor Site TX/RX Delta(dB): 0
- BDA Donor Antenna Gain(dB): 0
- BDA Donor Cable Loss(dB): 0
- BDA Distance to Donor(Mi): [input field] Mi Loss:0dB
- Donor Site Max RSSI(dBm): 0
- Donor Site Min RSSI(dBm): 0
- Donor Site Max Noise Floor(dBm/10kHz): 0
- Donor Site Min Noise Floor(dBm/10kHz): 0

'Submit' and 'Close' buttons are at the bottom.

After Site is created, click "Next" in the Site Table to complete the channel settings.

NO	Site Name	Donor Site Address	No. of Ch. (from Donor Site)	Donor Site System Type	Create Time	Actions
1	Test	Test	10	P25 Phase 2	2023-04-09 21:28:45	Modify Delete Next

Create filters for channels (Refer to Section 3.2)

Assign Control Channel (Refer to Section 3.2) for DL RSSI measurement, then click next.

If channels are already created, go directly to the next step.

Comba Commissioning / Commission Parameter Direct Edit admin

Step 4: Channel Information Setting

previous next

Site information

Site Name	Test	Donor Site System Type	P25 Phase 2
Address	Test		
No. of Ch. (from Donor Site)	10	No. of Filter (Programmed in BDA)	5

700MHz(5)

Batch Setting Add Channels Delete Channels DL Only UL Only View All

DL_IN	DL_OUT	DL_TAR	UL_TAR	UL_IN	UL_OUT	DL_GAIN	UL_GAIN	DL_AGC	UL_AGC	Description	
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	35dB	N/A	N/A	Control	Modify Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	35dB	N/A	N/A	Control	Modify Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	35dB	N/A	N/A	--	Modify Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	35dB	N/A	N/A	--	Modify Delete
<-110.00dBm	<-7.00dBm	0dBm	0dBm	<-110.00dBm	<-7.00dBm	60dB	35dB	N/A	N/A	--	Modify Delete

#### Step 4: DL Input RSSI Measurement

Select from the drop-down list which lists all the channels that assigned as "Control Channel", then click the "Test".

BDA will read the input power for this channel and use it for DL gain calculation.

The Test can be repeated if try to verify the reading.

After getting the input power, click Next.

Comba Commissioning / Commission Parameter Direct Edit admin

Step 5: DL Input Test

Site information

Site Name	Test	Donor Site System Type	P25 Phase 2
Address	Test		
No. of Ch. (from Donor Site)	10	No. of Filter (Programmed in BDA)	5

Frequency(MHz) Choose the frequency

Result(dBm) Choose the frequency

758.50000

759.50000

Test

previous next

Frequency(MHz) 758.50000

Result(dBm) -78.58

Test

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## Steps 5: Uplink Input Range Measurement

Comba

No. of Ch. (from Donor Site) 10

No. of Filter (Programmed in BDA) 5

DL Input Freq(MHz) 769.00625 [Modify](#)

UL Input Freq(MHz) N/A

\* Transmitting Power from test device(dBm)

\* Transmitting Power Radio (for reference)(dBm)

UL Input min(dBm) N/A

UL Input max(dBm) N/A

Current Measurement(dBm)

UL min. Input TH(dBm) -110.00 [Modify](#)

[Test](#)

[previous](#) [next](#)

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In this step, users need to use a signal source to walk the whole building to determine the UL Input Range.

- Setup the test frequency, this needs to input a DL frequency, and UL frequency will populate in the next line. The UL frequency is the actual frequency user will use to test the input range.
- Set the Transmission Power from the Signal Source the user will use to test the UL Input Range
- Set the Actual Radio RX Power, 35dBm is a common number. The system needs to compensate the difference between Actual Radio RX Power and Test Signal Source's Power when calculating the Input Range.
- Double Check the UL Min. Input TH: this is used to judge if the Signal Source is turned off during the walking test. Set a number higher than the noise floor (but should be lower than the min input)

Then click Test, the BDA will be in UL Input Range Test Mode. It will record all inputs and pick the Max Input and Min Input for the final calculation.

When the walking is done. Click to exit the test mode and click next for next step.

DL Input Freq(MHz) 769.00625 [Modify](#)

UL Input Freq(MHz) 799.00625

\* Transmitting Power from test device(dBm)

\* Transmitting Power Radio (for reference)(dBm)

UL Input min(dBm) N/A

UL Input max(dBm) N/A

Current Measurement(dBm) -110

UL min. Input TH(dBm) -110.00 [Modify](#)

[Click here to stop the test](#)

[previous](#) [next](#)

## Step 6: Select Loss, confirming results from previous steps

This page will let the user select solution 1 (UL Space Loss 1) or solution 2 (UL Space Loss 2) to be used for final calculation and display the DL Input Power, UL Input Range.

Click Next for the next step.

Name	Value	Note
UL Space Loss 1	78.58dB	From Donor Site TX Power and BDA receiving level (Preferred)
UL Space Loss 2	0dB	From Donor Antenna Gain, Cable Loss, and Free Space Loss
Selected Loss(dB)	78.58	<a href="#">Choose</a>
UL Input min	-120dBm	
UL Input max	-120dBm	
Control Channel Input	-78.58dBm	

[previous](#)

[next](#)

## Step 7: Results

This table recommends:

- **DL Target Output / DL Gain**
- **UL Target Output / UL Gain**

Refer to Section 3.4 ~ 3.7 for details.

If there is another site to commission, click "Commission a new site" or click "Finish" to exit.

Name	Suggested Value
DL Target Output(700MHz)	27dBm
DL Gain(700MHz)	90dB
DL Target Output(800MHz)	33dBm
DL Gain(800MHz)	90dB
UL Target Output	0dBm
UL Gain	0dB

[previous](#)

[commission a new site](#)

[finish](#)

## 5 OTHER SETTINGS

### 5.1 FILTER TEMPLATES

Users can select High Rejection Filters or Low Delay Filters set. See below table for their specifications

The screenshot shows the Comba Management interface. The left sidebar contains navigation options: Home, Device, Commissioning, Management, Firmware Upgrade, Device Information (highlighted), User Management, Network, Tools, License, and Upgrade. The main content area is titled 'Device Info' and contains a table with the following data:

Name	Value	Actions
Dev Info	Comba Demo BDA	Modify
Serial Num	AA12345678	
Dev ID	0	
Site ID	00000000	Modify
Dev Model	BDA V3 NG	Modify
Device Band/Region Configuration	S0	Modify
Carrier mode	Class-A(High Rejection Filters)	Modify
Latitude		Modify
Longitude		Modify
Date/Time	2023-04-09 22:02:03	Modify
IP Address	192.168.1.101	Modify
Netmask	255.255.255.0	Modify
Gateway	192.168.1.1	Modify
System Version	RX11_A0AV01.00.01.06_13_1	

Filter	Bandwidth (kHz)	Delay( $\mu$ s)*	Out-of-Band Suppression
High rejection Filter Set	12.5	$\leq 48$	$\geq 60$ dBc @ filter edge + 30KHz
	25	$\leq 30$	$\geq 60$ dBc @ filter edge + 50KHz
	75	$\leq 18$	$\geq 60$ dBc @ filter edge + 130KHz
	75 LD	$\leq 15$	$\geq 60$ dBc @ filter edge + 200KHz
Low Delay Filter Set	12.5	$\leq 30$	$\geq 60$ dBc @ filter edge + 65KHz
	25	$\leq 27$	$\geq 60$ dBc @ filter edge + 75KHz
	37.5	$\leq 26$	$\geq 60$ dBc @ filter edge + 75KHz
	50	$\leq 26$	$\geq 60$ dBc @ filter edge + 100KHz
	75	$\leq 15$	$\geq 60$ dBc @ filter edge + 200KHz
	100	$\leq 14$	$\geq 60$ dBc @ filter edge + 200KHz
	150	$\leq 13$	$\geq 60$ dBc @ filter edge + 205KHz

### 5.2 NETPROTECT

NetProtect™ feature shutdown the entire Uplink when there is no UL inputs therefore the BDA will generate zero noise to the donor site. It has to work together with UL Squench.

The PA OFF Delay decides the delay for Uplink to shut down when there are no UL inputs. Recommend using the default value 3s.

Name	Value	Actions
NetProtect Switch	ON	Modify
PA OFF Delay	3s	Modify
PA Protection Switch	OFF	Modify

### 5.3 PA PROTECTION

PA ON = System will shut down the PA if there is PA related alarm

PA OFF (Default) = System will not shut down PA if there is PA related alarm

Refer to User Manual – Alarm.

Name	Value	Actions
NetProtect Switch	ON	<a href="#">Modify</a>
PA OFF Delay	3s	<a href="#">Modify</a>
PA Protection Switch	OFF	<a href="#">Modify</a>

### 5.4 FIRMWARE UPGRADE

Comba Management / Firmware Upgrade Parameter Direct Edit admin

**Local Upgrade**

Dev Model BDA V3 NG

System Version RX11\_A0AV01.00.01.06\_13\_1

[Select File](#) [Upgrade](#)

**Slaver Upgrade**

Module Info RX-1122D7W

Version M55RX1122D7WH10V5418

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### 5.5 ALARM LOG EXPORT

Digital Module Reset DL 700MHz PA Reset DL 800MHz PA Reset Oscillation Alarm Reset

**Alarm Log**

[Export](#)

Import / Export in database format

[Export](#) [Import](#)

Import / Export in excel format

[Export Configuration](#) [Import Configuration](#)

## 5.6 LICENSE UPGRADE

Report Comba Customer Service the Serial Number and Device Identification Code.

Comba will send the Device Authorization Code to update the system.

The result will be in the last table showing the authorization status.

The screenshot shows the Comba Management / License interface. The top navigation bar includes 'Management / License', 'Parameter Direct Edit', and 'admin'. The left sidebar contains various management options, with 'License' highlighted. The main content area displays a table of license parameters and a table of authorization status.

Name	Value	Actions
Serial Num	AA12345678	
Device Identification Code	273D2BBD80AB	
Device Authorization Time	2023-04-05 10:02:51	
Device Authorization Code	987BB857AFB842B2CD2FB7E3A112924A30E77469	Modify

State	Class A	Class B	33dBm	27dBm
700MHz	√	√	√	√
800MHz	√	√	√	√

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## 5.7 RF CONTROL THROUGH EXTERNAL ALARMS

Refer to User Manual - Alarm



# BDA V3 and BBU V3 Alarm Guide

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# 1 ALARM OVERVIEW

## 1.1 ALARM INDICATORS IN THE WEB GUI

### Home page

- View of all dry / contact alarm status.
- View of all other current alarms.

### Device – Overview Page – Overview Tab

- Alarms for 700MHz, 800MHz band and for the device.

### Device – Overview Page – External/Dry Contact ALM Tab

- External Alarm setting.
- Dry contact Alarm setting.

### Device – Overview Page – Internal Charger Status

- Power Supply and Battery Charger status and alarms.

### Device – Overview – External Annunciator Panel

- Comba External Annunciator Panel V1 status and alarms.

### Device – Overview – Advanced Settings

- Settings for Oscillation Alarm and Antenna Disconnection Alarm.

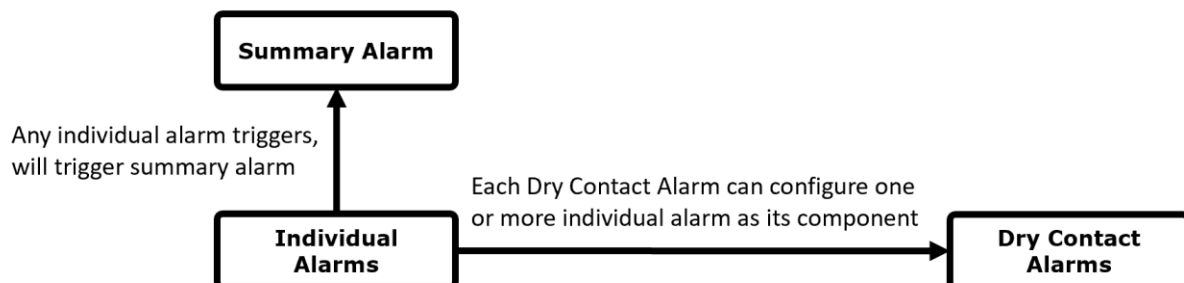
The screenshot shows the 'Alarm View' page in the Comba web GUI. The page is titled 'Device / Overview' and 'Parameter Direct Edit'. The user is logged in as 'admin'. The page has a navigation menu on the left with options: Home, Device, Overview (selected), Channels, Commissioning, and Management. The main content area shows a table of alarm settings for four device configurations: DL 700, UL 700, UL 800, and DL 800. The table has columns for Name, DL 700, UL 700, UL 800, DL 800, and Actions. The rows include: Name, Frequency Bands, RF Switches, Input ATT, Output ATT, Mute Switch, Mute TH, PA\_Status, LNA1\_BYPASS, LNA2\_BYPASS, P\_in Low, and P\_in Low TH. Callouts point to specific settings: 'Device, 700MHz, 800MHz Alarms' points to the DL 700 column; 'PSU/Charger Alarms' points to the Mute TH row; 'Oscillation Alarm, Ant. Disconnection Alarm Setting' points to the PA\_Status row; 'Annunciator Panel Alarm' points to the Mute Switch row; and 'External Alarm, Dry Contact Alarm' points to the Mute TH row.

Name	DL 700	UL 700	UL 800	DL 800	Actions
Frequency Bands	DL [758, 775]	UL [788, 805]			
RF Switches					Modify
Input ATT	<0dBm		<0dBm	<0dBm	
Output ATT	33dBm		27dBm	33dBm	Modify
Mute Switch	0dB	0dB	0dB	0dB	Modify
Mute TH	ON	ON	ON	ON	Modify
Mute TH	-90dBm	-90dBm	-90dBm	-90dBm	Modify
PA_Status	Normal	Normal	Normal	Normal	
LNA1_BYPASS	OFF	OFF	OFF	OFF	
LNA2_BYPASS	OFF	OFF	OFF	OFF	
P_in Low					Modify
P_in Low TH	-90			-90	Modify

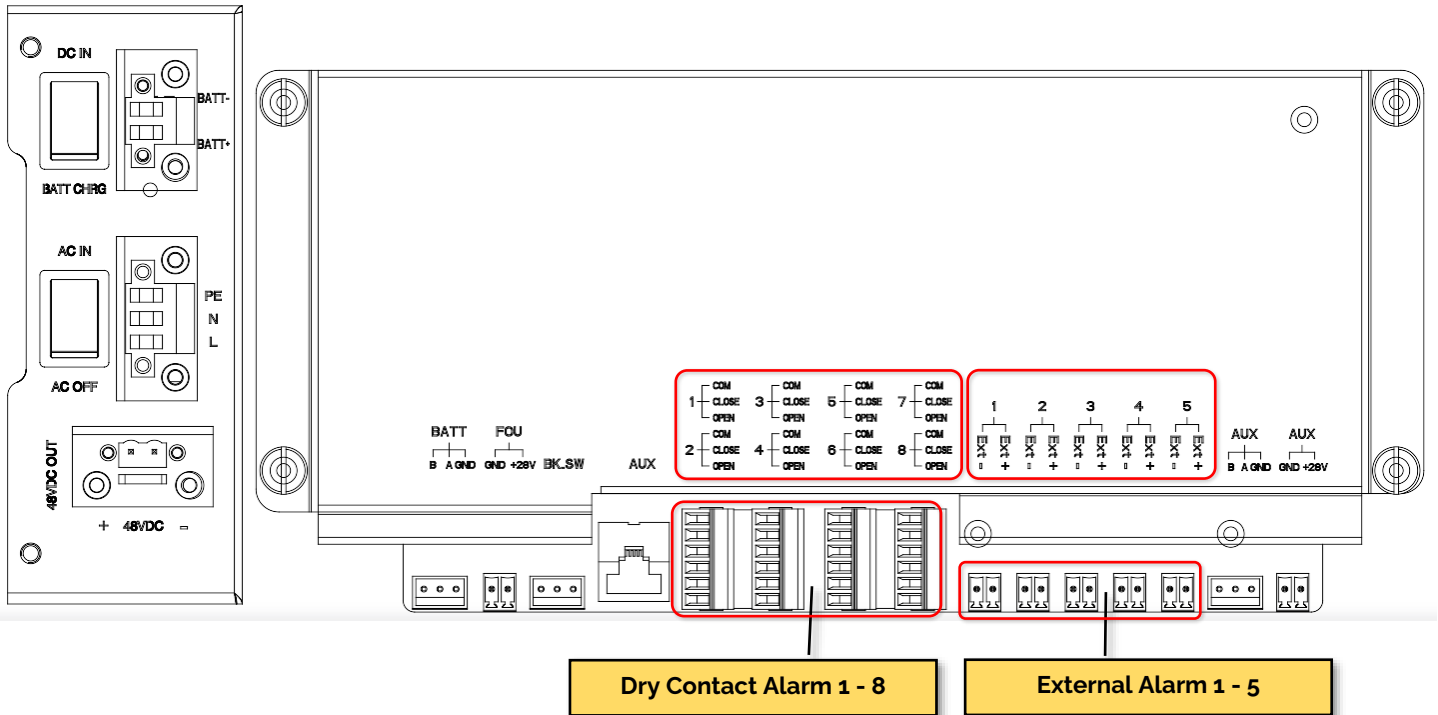
## 1.2 FULL ALARM LIST

(A)	(B)	Individual Alarms (C)	Related Bands / Modules / Devices
Summary Alarm	Dry Contact Alarm 1-8	P_in Low Alarm	DL 700MHz, DL 800MHz
		P_out Low Alarm	DL 700MHz, DL 800MHz
		P_in Over Alarm	DL 700MHz, DL 800MHz
		P_out Over Alarm	DL 700MHz, DL 800MHz, UL 700/800MHz
		LNA Alarm	DL 700MHz, DL 800MHz, UL 700/800MHz
		PA Alarm	DL 700MHz, DL 800MHz, UL 700/800MHz
		PA Shutdown Alarm	DL 700MHz, DL 800MHz, UL 700/800MHz
		VSWR Alarm	DL 700MHz, DL 800MHz
		Oscillation Shutdown Alarm	700MHz, 800MHz, hidden when the feature is OFF
		Oscillation Gain Reduction Alarm	700MHz, 800MHz, hidden when the feature is OFF
		Digital Clock Lock Alarm	Device
		DT ANT Disconnection Alarm	Device
		Over Temperature Alarm	Device
		External Alarms 1-4	Device
		External Alarm 5	Device / Preconfigured as Door Open Alarm
		Loss Of Normal AC Power	BBU, hidden when not using BBU V3
		Battery Low Alarm	BBU, hidden when not using BBU V3
		Charger Fault Alarm	BBU, hidden when not using BBU V3
		Battery Over-Discharge Alarm	BBU, hidden when not using BBU V3
		Battery Over Temperature Alarm	BBU, hidden when not using BBU V3
		Battery Connection Fail Alarm	BBU, hidden when not using BBU V3
		Battery Comm. Fault Alarm	BBU, hidden when not using BBU V3
		Charger Comm. Fault Alarm	BBU, hidden when not using BBU V3
		AP 1 Comm. Fault Alarm	Comba AP 1, hidden when no AP is connected
		AP 2 Comm. Fault Alarm	Comba AP 2, hidden when no AP is connected

### Relationships between different alarms:



### 1.3 DRY CONTACT ALARM AND EXTERNAL ALARM WIRING



#### Dry Contact Alarms:

Dry Contact Alarms connect to one or more external alarm panels or fire alarm panels.

BDA V3 provides both Normally Open and Normally Closed contacts, and doesn't measure voltage from the contacts.

For BDA V3, Dry Contact Alarms are not hard coded and can be configured in the WEB GUI, users can select any individual alarms to trigger Dry Contact Alarms.

#### External Alarms:

External alarm termination carries 5V DC.

The positive and negative marks on the terminations indicate the polarity of the DC.

External alarms take external/other devices' dry contact alarm into the BDA. So that BDA can manage these alarms. For example, configure them into dry contact alarms or control RF switches.

External alarms can be triggered by either Normally Open or Normally Closed contacts. The trigger level can be configured in the WEB GUI. The input to the External Alarms should NOT carry any voltage.

External Alarm 5 is preconfigured for Door Open Alarm. There is a pair of wires that came internally on External Alarm 5 terminal, it can be removed for other external alarm but losing the monitoring of the door opening.

#### Using external alarm to Control BDA RF Output

The BDA supports "RF Control" feature from external alarms. A typical way is to use an external physical switch connecting to one of the BDA V3 external alarms, then turn on the RF control from external alarm setting.

After this is setup, turning ON or OFF the physical switch will turn ON/OFF the RF Switches in the BDA so to control the RF output.

An external Dry Contact Alarm can also be used to control the RF output. And if External Alarm is used to control the RF, it will no longer work as an alarm (for example: it will not trigger Dry Contact Alarms)

## 1.4 DRY CONTACT ALARM AND EXTERNAL ALARM SETTINGS

Dry Contact Alarm and External Alarm settings can be found in Device – Overview - <External/Dry Contact ALM> Tab

### Dry Contact Alarm Preset

Users can select Dry Contact Alarm preset from:

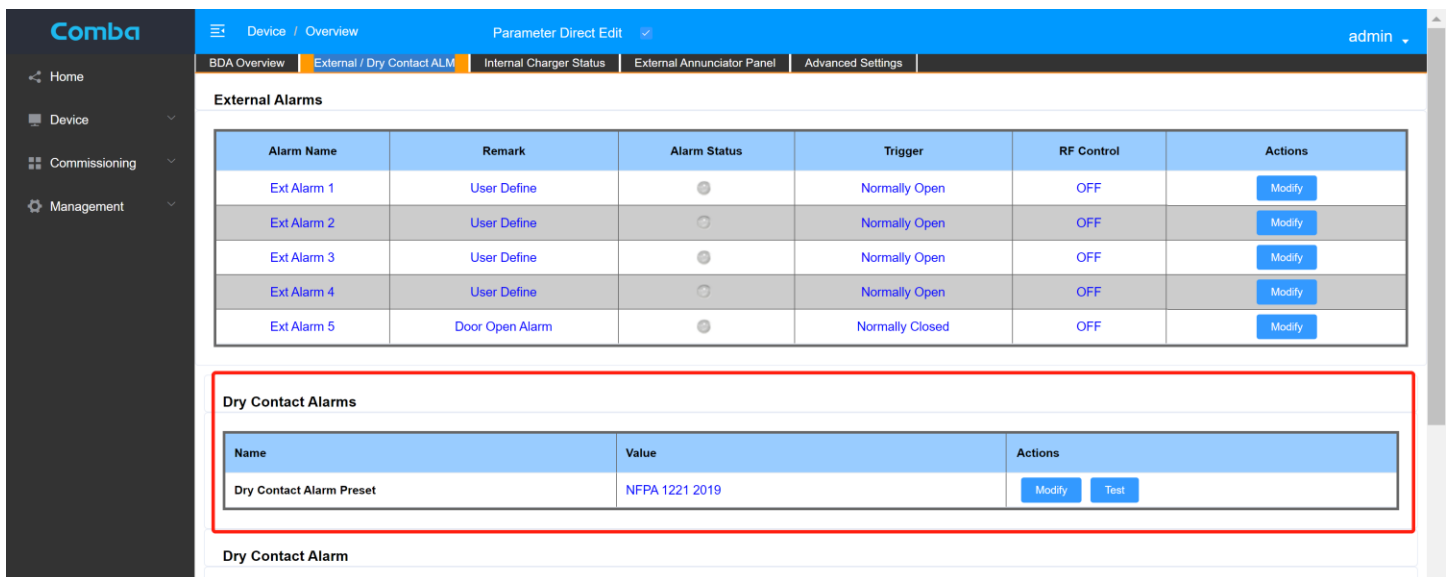
- NFPA 1221 2019
- UL2524 OCT 19 2018
- NFPA 1225 2022
- IFC 510 2021

Dry contact alarms 1 through 8 are configured according to these standards.

The BDA door has a replaceable alarm indicator plate that matches the software alarm presets. The replacing indicator plates are included in the BDA accessories. One blank plate is also included for customization.

### Lamp Test

The Test button can generate a Lamp test.



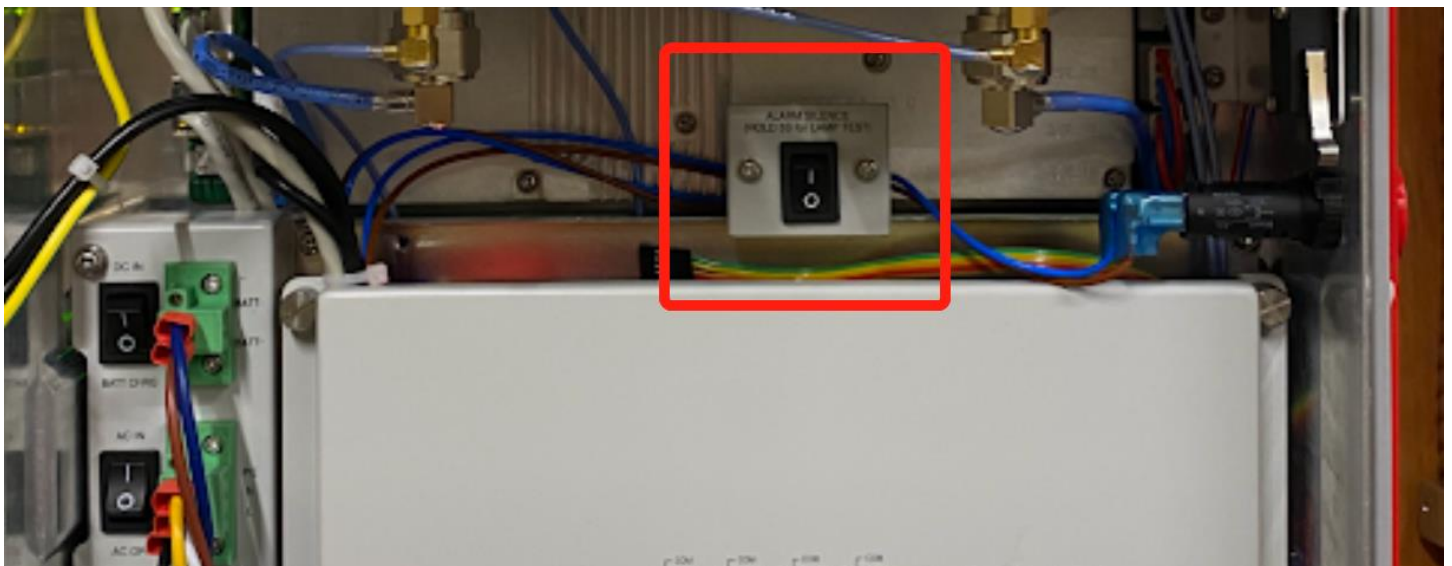
The screenshot shows the Comba web interface. The top navigation bar includes 'Device / Overview', 'Parameter Direct Edit', and 'admin'. The main content area is titled 'External Alarms' and contains a table with the following data:

Alarm Name	Remark	Alarm Status	Trigger	RF Control	Actions
Ext Alarm 1	User Define	●	Normally Open	OFF	Modify
Ext Alarm 2	User Define	●	Normally Open	OFF	Modify
Ext Alarm 3	User Define	●	Normally Open	OFF	Modify
Ext Alarm 4	User Define	●	Normally Open	OFF	Modify
Ext Alarm 5	Door Open Alarm	●	Normally Closed	OFF	Modify

Below this table is a section for 'Dry Contact Alarms' with a table:

Name	Value	Actions
Dry Contact Alarm Preset	NFPA 1221 2019	Modify Test

The lamp test can also be done through the physical button inside the BDA – by pressing it for more than 5 seconds.



## Customize Dry Contact Alarms

Users can change the dry contact alarm name and configurations from the setting table.

**Dry Contact Alarms**

Name	Value	Actions
Dry Contact Alarm Preset	NFPA 1221 2019	Modify Test

**Dry Contact Alarm**

Dry Contact Alarm Name	Alarm Status	Actions
NORMAL AC POWER	●	Modify Test
LOSS OF NORMAL AC POWER	●	Modify Test
BATTERY CHARGER FAILURE	●	Modify Test
LOW-BATTERY CAPACITY	●	Modify Test
DONOR ANTENNA MALFUNCTION	●	Modify Test
ACTIVE RF-EMITTING DEVICE MALFUNCTION	●	Modify Test
ACTIVE SYSTEM COMPONENT MALFUNCTION	●	Modify Test

Select one or more alarms for the dry contact alarms

\* Alarm name NORMAL AC POWER

Select all

AC Normal

AC Lost Alarm

Charger Fault Alarm

Charger Comm. Fault Alarm

PA Alarm DL 700MHz

LNA Alarm DL 700MHz

PA Shutdown Alarm DL 700MHz

Ext Alarm 1

PA Alarm DL 800MHz

LNA Alarm DL 800MHz

PA Shutdown Alarm DL 800MHz

Ext Alarm 2

PA Alarm UL 700&800MHz

LNA Alarm UL 700&800MHz

PA Shutdown Alarm UL 700&800MHz

Ext Alarm 3

DL P\_in Over Alarm 700MHz

DL P\_in Low Alarm 700MHz

Oscillation Shutdown Alarm

Ext Alarm 4

DL P\_out Over Alarm 700MHz

DL P\_out Low Alarm 700MHz

Oscillation Gain Reduction Alarm

Ext Alarm 5

DL P\_in Over Alarm 800MHz

DL P\_in Low Alarm 800MHz

PLL Alarm

Over Temperature Alarm

DL P\_out Over Alarm 800MHz

DL P\_out Low Alarm 800MHz

Digital Clock Alarm

DT ANT Disconnection Alarm

VSWR Alarm DL 700MHz

VSWR Alarm DL 800MHz

Battery Low Alarm

Battery Connection Fail Alarm

Battery Over Temperature Alarm

Battery Comm. Fault Alarm

Battery Over-Discharge Alarm

## External Alarm settings

Comba

Device / Overview Parameter Direct Edit admin

BDA Overview External / Dry Contact ALM Internal Charger Status External Annunciator Panel Advanced Settings

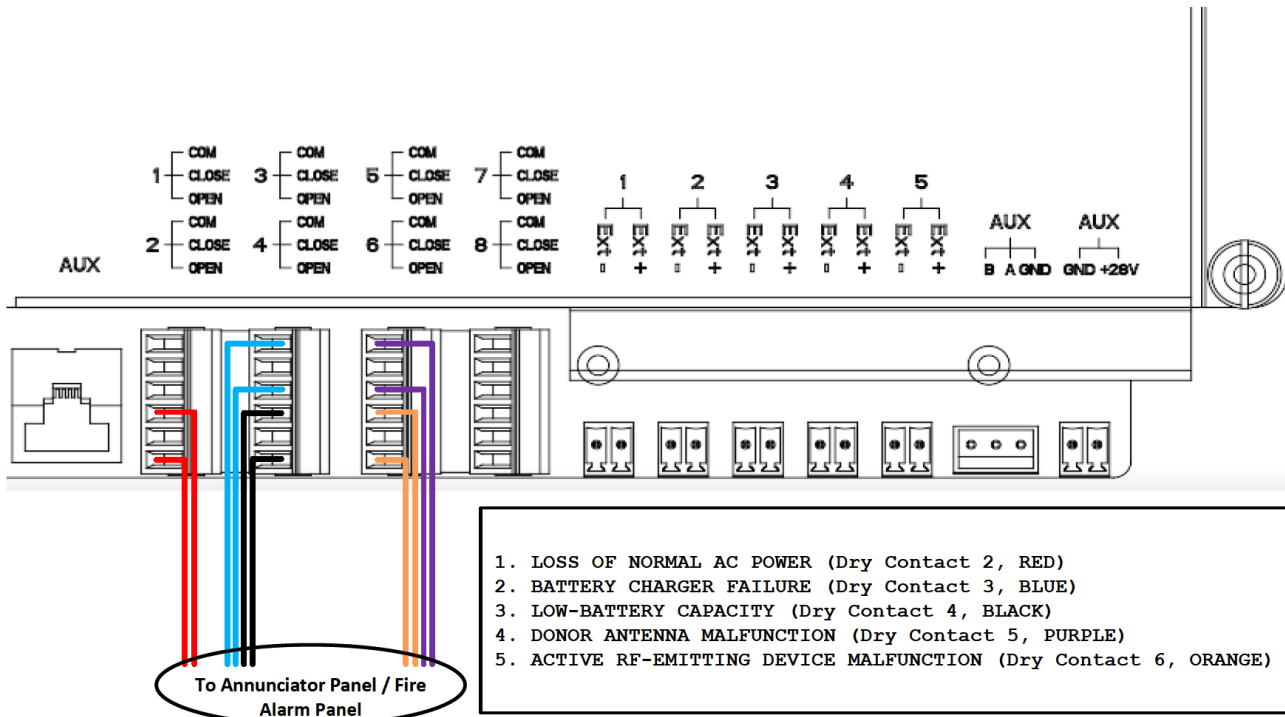
**External Alarms**

Alarm Name	Remark	Alarm Status	Trigger	RF Control	Actions
Ext Alarm 1	User Define	●	Normally Open	OFF	Modify
Ext Alarm 2	User Define	●	Normally Open	OFF	Modify
Ext Alarm 3	User Define	●	Normally Open	OFF	Modify
Ext Alarm 4	User Define	●	Normally Open	OFF	Modify
Ext Alarm 5	Door Open Alarm	●	Normally Closed	OFF	Modify

## Typical Alarming Wiring Scenarios:

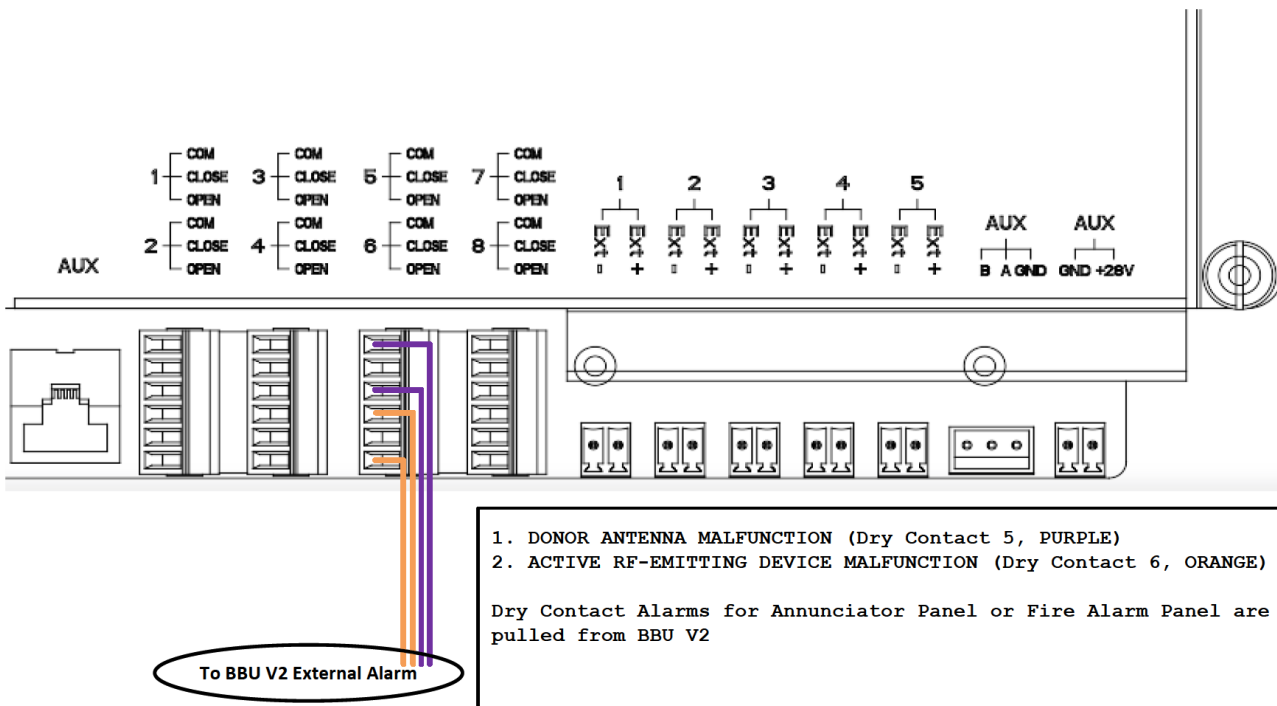
Example 1: BDA V3 + BBU V3

Using Normally Open and NFPA 1221 2019 preset



Example 2: BDA V3 + BBU V2

Using Normally Open and NFPA 1221 2019 preset



## 1.5 LED INDICATOR AND BUZZER

### Summary Alarm / Software Alarm LED in the WEB GUI home page:

- Status is always the same as Summary Alarm

### ALM LED / RUN LED in the front Panel:

LED name	LED	Remark
ALM	Green / Red / OFF	1. OFF: No alarm
		2. Solid Red: Dry Contact 1-8
		3. Red (1 blink, pause): Any Other alarms except Dry Contact Alarms
RUN	Green / Red / OFF	1. OFF: MCU cannot be powered up
		2. Solid Red: Software is not ready / cannot boot up
		3. Solid Green: Software is normally running
		4. Green (1 blink, pause): Not commissioned
		5. Green (2 blink, pause): RF switches are both off

### Alarm Detection Duration:

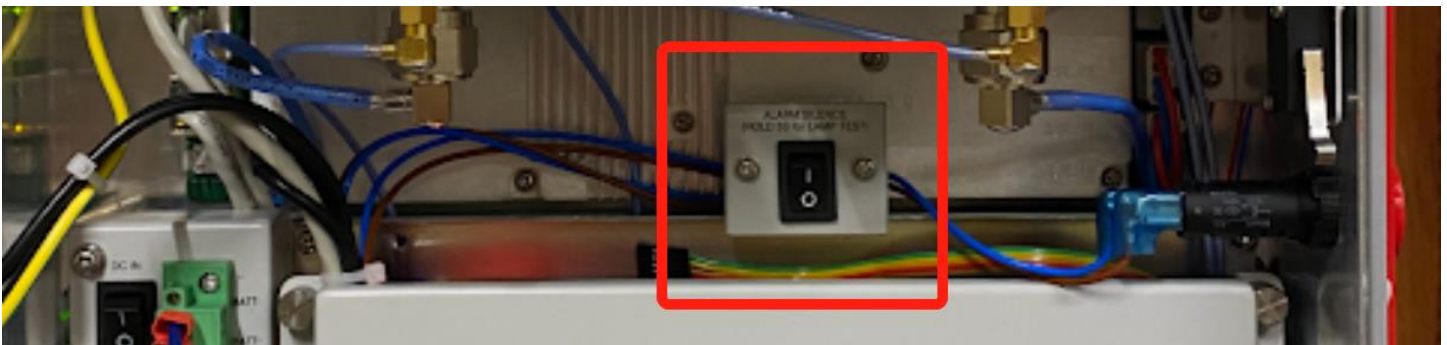
This parameter is in "Device – Overview" page, to set a delay before triggering the alarm. It is for the system to collect data to make sure not to send out any false alarms. Each number is the setting represents  $[(N \times 10) + 10]$  seconds delay. for example, 5 means the system will delay 60s to trigger alarms and 8 means 90s delay. Default setting is 3.

### Buzzer:

Buzzer control is in "Device – Overview" Page, the buzzer can be turned ON or OFF

When Buzzer Notification = ON	<p>Any dry contact alarm(s) will trigger the buzzer. Any alarms other than dry contact alarms will NOT trigger the buzzer.</p> <p>When the physical silence switch is pushed (located inside the unit) the buzzer will go muted. When the buzzer is muted, any new dry contact alarm(s) will reactivate the buzzer. When the buzzer is muted, it will automatically reactivate after "Buzzer Silence Reset Time".</p> <p>The "Buzzer Silence Reset Time" should be set to 24 hours per code (86400s in the software) Unless for test or other special purposes</p>
When Buzzer Notification = OFF	The buzzer will stay muted for all the time

Buzzer (Alarm) Silence and Lamp Test (pressing the button for more than 5 seconds)





## 1.6 DRY CONTACT ALARM SIMULATIONS FOR INSPECTION

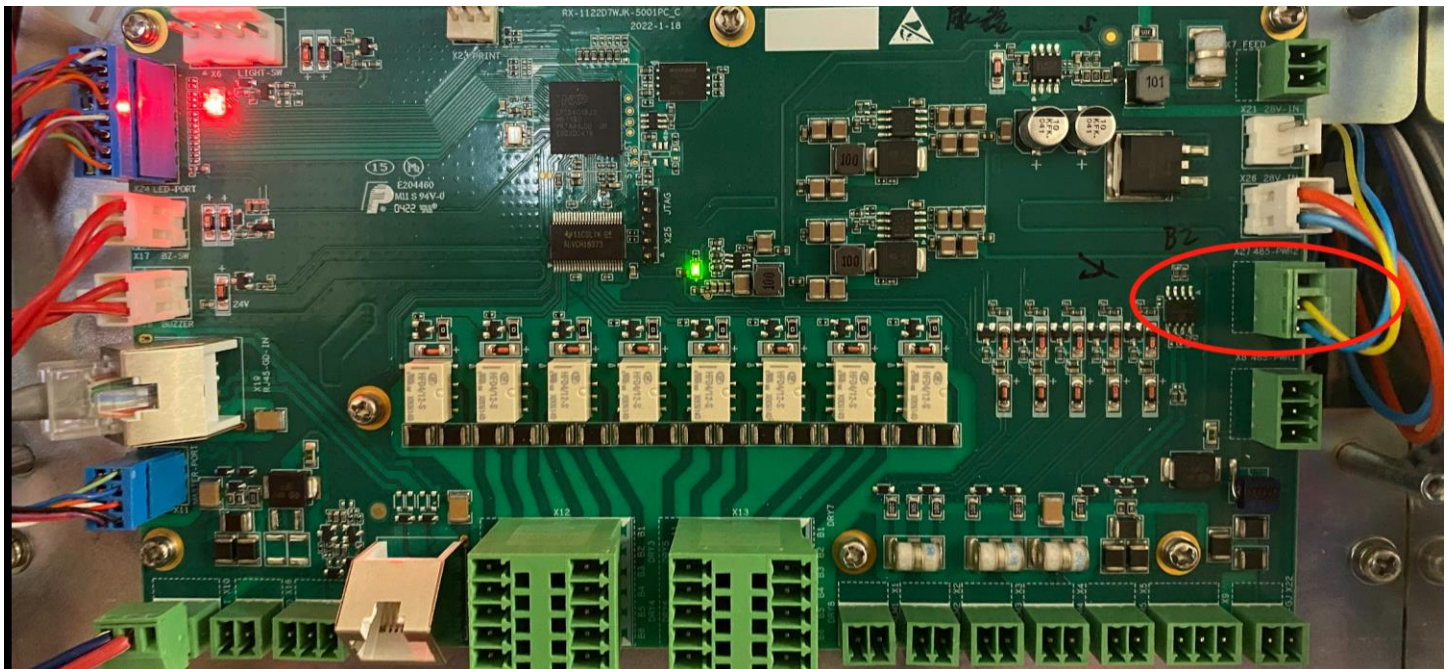
For BDA V3 NG and BBU V3 NG

Alarms	Simulation
Signal Booster Fail / RF-Emitting Device Fail	Disconnect the service cable from MT port
Donor Antenna Disconnection	Disconnect the donor cable from DT port
AC Lost / AC Normal	Turn off AC switch inside the BDA, or turn off AC breaker inside the BBU
Charger Fail	Open the cover of the distribution board, unplug the Charger Communication Cable (This alarm will take longer time to trigger)
Battery Low	Switch off battery breaker, or disconnect the DC cable from BDA or BBU Let the system run on battery until the battery capacity is less than the alarm threshold

Charger Fai: remove the cover of the distribution board



Charger Fai: unplug the connector to trigger Charger Fail Alarm, this alarm does not use "Alarm Detection Duration" and could take up to 3-5min to trigger



## 2 ALARM CAUSES / REMEDIES:

### 2.1 BDA ALARMS

	<b>DL P_in Low Alarm 700MHz, DL P_in Low Alarm 800MHz</b>
Cause	The composite downlink input power is lower than the DL P_in low threshold.
Remedy	When the composite downlink input power is higher than the DL P_in low threshold, system will clear this alarm.

	<b>DL P_out Low Alarm 700MHz, DL P_out Low Alarm 800MHz</b>
Cause	The composite downlink output power is lower than the DL P_out low threshold.
Remedy	When the composite downlink output power is higher than the DL P_out low threshold, system will clear this alarm.

	<b>DL P_in Over Alarm 700MHz, DL P_in Over Alarm 800MHz</b>
Cause	The composite downlink input power is higher than the DL P_in Over threshold.
Remedy	When the composite downlink input power is lower than the DL P_in Over threshold, system will clear this alarm.

	<b>DL P_out Over Alarm 700MHz, DL P_out Over Alarm 800MHz, UL P_out Over Alarm 700/800MHz</b>
Cause	The composite downlink/uplink output power is higher than the DL P_out Over threshold or the UL P_out Over threshold.
Remedy	When the composite downlink/uplink output power is lower than the DL P_out Over threshold or the UL P_out Over threshold, system will clear this alarm.

	<b>LNA Alarm DL 700MHz, LNA Alarm DL 800MHz, LNA Alarm UL 700/800MHz</b>
Cause	LNA (Low Noise Amplifier) is located at front end of the RF link for both downlink and uplink. For the LNA status, BDA constantly measures the current going through the LNAs. When the current measures abnormal (e.g., short or open) leads to a malfunctioned LNA and system will trigger the alarm. A malfunctioned LNA could be caused by quality issue, high input power or a high reflect power. The power a LNA can normally handle is < 0dBm (refer to datasheets for actual models)
Remedy	Contact customer service. RMA the device.

	<b>PA Alarm DL 700MHz, PA Alarm DL 800MHz, PA Alarm UL 700/800MHz</b>
Cause	<p>PA alarm is to monitor the final stage power amplifier for both downlink and uplink. The following conditions will trigger PA alarm:</p> <ol style="list-style-type: none"> <li>1) High Temperature (Using internal threshold)</li> <li>2) High Current</li> <li>3) Bias Voltage High</li> <li>4) Overdrive (high output power), could be due to oscillation</li> <li>5) Return Loss high (when the DL output power is between 28dBm – 33dBm)</li> <li>6) Other hardware issue</li> </ol> <p>When PA Protection is ON: PA will shut down upon alarms, and reboot at 1min, 5min, 10min, 20min, 30min, and 1hour. After that, if the PA still cannot be turned on, PA will be permanently shut down.</p> <p>When PA Protection is OFF: PA will not shut down upon alarms</p>
Remedy	Check isolation, make sure the any gain setting meets < (isolation – 20dB), then reset PA in "tools – DL PA reset 700MHz or 800MHz / UL PA reset". if the alarm doesn't go away, need to RMA the device.

	<b>PA Shutdown Alarm DL 700MHz, PA Shutdown Alarm DL 800MHz, PA Shutdown Alarm UL 700/800MHz</b>
Cause	1) RF switches are off, 2) PA is shutdown (During PA Protection, or oscillation shutdown)
Remedy	Turn on RF switches. Check PA alarms (refer to PA Alarm) Check Oscillation alarms

	<b>VSWR Alarm DL 700MHz, VSWR Alarm DL 800MHz</b>
Cause	Triggers when both of these criteria are met: 1) the 700MHz or 800MHz downlink output power is > 5dBm. 2) the reflected power is > (output power - 6dB).
Remedy	Use a 50ohm termination load to the MT port to check if the alarm will automatically clear. If it is cleared, perform troubleshooting of passive components and coaxial cables from the MT port. Call customer service for more details and supports. If it is NOT cleared, contact customer service for further troubleshooting and RMA.

	<b>Oscillation Shutdown Alarm, Oscillation Gain Reduction Alarm</b>
Cause	When system detects oscillation, it will re-test the isolation, and set the gain according to the new isolation, if the gain can be set to meet the new isolation number (gain = isolation - 20dB). Then system will send Oscillation Gain Reduction alarm. If the desired gain is out of the setting range, system will shut down the PA and send Oscillation Shutdown Alarm.
Remedy	To recover from Oscillation Gain Reduction alarm and Oscillation Shutdown Alarm. it requires to examine the isolation and fix the isolation issue first (refer to isolation / oscillation troubleshooting section). Then go to "Tools - tools" page to "Oscillation Alarm Reset". Bad isolation is possibly caused by: Not enough isolation between Donor antenna and Service antenna(s) Bad components such as bad coaxial cable or passives. Interfered by other systems - in-building commercial / neighbor units. Check other active systems near.

	<b>Digital Clock Lock Alarm</b>
Cause	The status of internal Digital Clock Lock module
Remedy	Contact customer service. RMA the device.

	<b>DT ANT Disconnection Alarm</b>
Cause	The composite downlink input power is lower than the DT ANT Disconnection low threshold. This alarm will always use dual band composite input power when the BDA is licensed for dual band, when the DL P_in Low is per band base.
Remedy	When the composite downlink input power is higher than the DT ANT Disconnection low threshold, system will automatically clear this alarm.

	<b>Over Temperature Alarm</b>
Cause	When the temperature is higher than the threshold, the temperature reading, and threshold can be found in the "Overview" page.
Remedy	Check the environmental temperature and the threshold setting.

	<b>External Alarm 1-5</b>
Cause	When external alarm is set to Normally Open, it will trigger alarm when external source is short. When external alarm is set to Normally Closed, it will trigger alarm when external source is open.
Remedy	Check the external circuitry status by a voltage meter to confirm the alarm status. Note: this external input must be a dry contact (no voltage), otherwise it will damage the external alarm circuitry inside the BDA.

## 2.2 BBU/AP ALARMS

	<b>Loss Of Normal AC Power</b>
Cause	Loss of AC, AC switches are OFF
Remedy	Check AC power source, check AC switches in the BDA and BBU

	<b>Battery Low Alarm</b>
Cause	Battery capacity is lower than the threshold (normally 30%)
Remedy	Login to the WEB GUI to check exact alarms that caused Battery Low Dry Contact Alarms. And: Check Battery Low threshold and current battery capacity, in Overview – <Internal Charger> Tab. Check "RUN on Battery" time and "SOC (State of Charge)", in Overview – <Internal Charger> Tab. Call customer service for other supports

	<b>Charger Fault Alarm</b>
Cause	Charger has high voltage output or high current output
Remedy	Call customer support for RMA

	<b>Battery Over-Discharge Alarm</b>
Cause	Battery is over-discharged
Remedy	Login to the WEB GUI to check exact alarms that caused Battery Low Dry Contact Alarms. And: Check Battery Low threshold and current battery capacity, in Overview – <Internal Charger> Tab. Check "RUN on Battery" time and "SOC (State of Charge)", in Overview – <Internal Charger> Tab. Call customer service to support other tests

	<b>Battery Over Temperature Alarm</b>
Cause	Battery Internal Temperature is high
Remedy	Room temperature is suggested to be < 35°C. If room temperature is normal, call customer service for support

	<b>Battery Connection Fail Alarm</b>
Cause	Battery is disconnected.
Remedy	Visually check battery + and - terminals, 485+ and 485- are correctly connected. If the connections are correct and system still have alarms or device cannot boot up, call customer service for support.

	<b>Battery Comm. Fault Alarm</b>
Cause	Battery (Battery BMS to BDA) communication has issue.
Remedy	Visually check battery + and - terminals, 485+ and 485- are correctly connected. If the connections are correct and system still have alarms or device cannot boot up, call customer service for support.

	<b>Charger Comm. Fault Alarm</b>
Cause	Charger (to BDA) communication has issue
Remedy	Check the communication cable connection (refer to Alarm Simulation Section), Call customer service for further support

	<b>AP 1/2 Comm. Fault Alarm</b>
Cause	AP (to BDA) communication has issue
Remedy	Check the communication cable connection (refer to Alarm Simulation Section), Call customer service for further support

### 2.3 DRY CONTACT ALARM DEFAULT SETTINGS:

	<b>NFPA 1221 2019</b>	<b>Default Alarm Configuration</b>
<b>1</b>	<b>NORMAL AC POWER</b>	AC Normal
<b>2</b>	<b>LOSS OF NORMAL AC POWER</b>	AC Lost Alarm
<b>3</b>	<b>BATTERY CHARGER FAILURE</b>	Charger Fault Alarm Charger Comm. Fault Alarm
<b>4</b>	<b>LOW-BATTERY CAPACITY</b>	Battery Low Alarm Battery Connection Fail Alarm Battery Over Temperature Alarm Battery Comm. Fault Alarm Battery Over Discharge Alarm
<b>5</b>	<b>DONOR ANTENNA MALFUNCTION</b>	DT ANT Disconnection Alarm
<b>6</b>	<b>ACTIVE RF-EMITTING DEVICE MALFUNCTION</b>	PA Alarm 700/800 DL/UL DL P_in Over Alarm 700/800 DL DL P_out Over Alarm 700/800 DL LNA Alarm 700/800 DL/UL Oscillation Shutdown Alarm Gain Reduction Alarm PLL Alarm Digital Clock Alarm VSWR Alarm DL 700/800 Over Temperature Alarm
<b>7</b>	<b>ACTIVE SYSTEM COMPONENT MALFUNCTION</b>	Same as "ACTIVE RF-EMITTING DEVICE MALFUNCTION"
<b>8</b>	<b>Blank</b>	Blank

	<b>UL2524 OCT 19 2018</b>	<b>Default Alarm Configuration</b>
<b>1</b>	<b>NORMAL AC POWER</b>	AC Normal
<b>2</b>	<b>LOSS OF NORMAL AC POWER</b>	AC Lost Alarm
<b>3</b>	<b>BATTERY CHARGER FAILURE</b>	Charger Fault Alarm Charger Comm. Fault Alarm
<b>4</b>	<b>LOSS OF BATTERY CAPACITY</b>	Battery Low Alarm Battery Connection Fail Alarm Battery Over Temperature Alarm Battery Comm. Fault Alarm Battery Over Discharge Alarm
<b>5</b>	<b>DONOR ANTENNA DISCONNECTION</b>	DT ANT Disconnection Alarm
<b>6</b>	<b>ACTIVE RF-EMITTING DEVICE MALFUNCTION</b>	PA Alarm 700/800 DL/UL DL P_in Over Alarm 700/800 DL DL P_out Over Alarm 700/800 DL LNA Alarm 700/800 DL/UL Oscillation Shutdown Alarm Gain Reduction Alarm PLL Alarm Digital Clock Alarm VSWR Alarm DL 700/800 Over Temperature Alarm
<b>7</b>	<b>ACTIVE SYSTEM COMPONENT MALFUNCTION</b>	Same as "ACTIVE RF-EMITTING DEVICE MALFUNCTION"
<b>8</b>	<b>DONOR ANTENNA MALFUNCTION</b>	DT ANT Disconnection Alarm

	<b>NFPA 1225 2022</b>	<b>Default Alarm Configuration</b>
<b>1</b>	<b>NORMAL AC POWER</b>	AC Normal
<b>2</b>	<b>LOSS OF NORMAL AC POWER</b>	AC Lost Alarm
<b>3</b>	<b>BATTERY CHARGER FAILURE</b>	Charger Fault Alarm Charger Comm. Fault Alarm
<b>4</b>	<b>LOW-BATTERY CAPACITY</b>	Battery Low Alarm Battery Connection Fail Alarm Battery Over Temperature Alarm Battery Comm. Fault Alarm Battery Over Discharge Alarm
<b>5</b>	<b>SIGNAL SOURCE MALFUNCTION</b>	DT ANT Disconnection Alarm
<b>6</b>	<b>ACTIVE RF-EMITTING DEVICE MALFUNCTION</b>	PA Alarm 700/800 DL/UL DL P_in Over Alarm 700/800 DL DL P_out Over Alarm 700/800 DL LNA Alarm 700/800 DL/UL Oscillation Shutdown Alarm Gain Reduction Alarm PLL Alarm Digital Clock Alarm VSWR Alarm DL 700/800 Over Temperature Alarm
<b>7</b>	<b>ACTIVE SYSTEM COMPONENT MALFUNCTION</b>	Same as above "ACTIVE RF-EMITTING DEVICE MALFUNCTION"
<b>8</b>	<b>Blank</b>	Blank

	<b>IFC 510 2021</b>	<b>Default Alarm Configuration</b>
<b>1</b>	<b>LOSS OF NORMAL AC POWER SUPPLY</b>	AC Lost Alarm
<b>2</b>	<b>SYSTEM BATTERY CHARGER(S) FAILURE</b>	Charger Fault Alarm Charger Comm. Fault Alarm
<b>3</b>	<b>MALFUNCTION OF THE DONOR ANTENNA(S)</b>	DT ANT Disconnection Alarm
<b>4</b>	<b>FAILURE OF ACTIVE RF-EMITTING DEVICE(S)</b>	PA Alarm 700/800 DL/UL DL P_in Over Alarm 700/800 DL DL P_out Over Alarm 700/800 DL LNA Alarm 700/800 DL/UL Oscillation Shutdown Alarm Gain Reduction Alarm PLL Alarm Digital Clock Alarm VSWR Alarm DL 700/800 Over Temperature Alarm
<b>5</b>	<b>LOW-BATTERY CAPACITY AT 70% REDUCTION OF OPERATING CAPACITY</b>	Battery Low Alarm Battery Connection Fail Alarm Battery Over Temperature Alarm Battery Comm. Fault Alarm Battery Over Discharge Alarm
<b>6</b>	<b>FAILURE OF CRITICAL SYSTEM COMPONENTS</b>	Same as "FAILURE OF ACTIVE RF-EMITTING DEVICE(S)"
<b>7</b>	<b>ERRCS ANNUNCIATOR PANEL COMMUNICATION ALARM</b>	AP Comm. Fault Alarm 1 AP Comm. Fault Alarm 2
<b>8</b>	<b>OSCILLATION OF ACTIVE RF-EMITTING DEVICE</b>	Oscillation Shutdown Alarm Gain Reduction Alarm

# Support



## COMBA TECHNICAL SUPPORT

Comba provides direct access to our technical support team 8 hours-a-day, 5 days-a-week (Mon-Fri) from 9:00AM to 6:00PM (PST).

Technical support is provided for free for the entire time the product is covered by the equipment warranty.

Please contact us at the toll-free number or email below for support.

Tel: 1-408-526-0810, Ext 3 - (Mon-Fri) from 9:00AM to 6:00PM (PST)

Email: [techsupport@combausa.com](mailto:techsupport@combausa.com)

If you need to request an RMA, please call below or fill the form out and a Comba representative will contact you shortly.

Tel: 1-408-526-0810, Ext 3 - to get a Comba RMA number -(Mon-Fri) from 9:00AM to 6:00PM (PST)

[RMA Request Form](#)

If you need sales assistance, please contact Sales at 1-408-526-0810, Ext 3 or email: [sales.nam@combausa.com](mailto:sales.nam@combausa.com)