USER MANUAL

EZD-LICPA23

EZS-LICPA30

May 11, 2018

GS Instech Co., Ltd.

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[CHANGE RECORD]

DATE	NAMES	DESCRIPTIONS	VERSION	REMARK
May 11, 2018	H.J.CHOI	Original Draft	0.1	

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1. General

1.1. Purpose

This document introduces features, specifications, structures and operation guideline for the EZD-LICPA23/ EZS-LICPA30.

1.2. Copyright

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1.3. FCC Warning Statements

FCC Warning Statement for system is follows. Must attach the label under manufacturing.

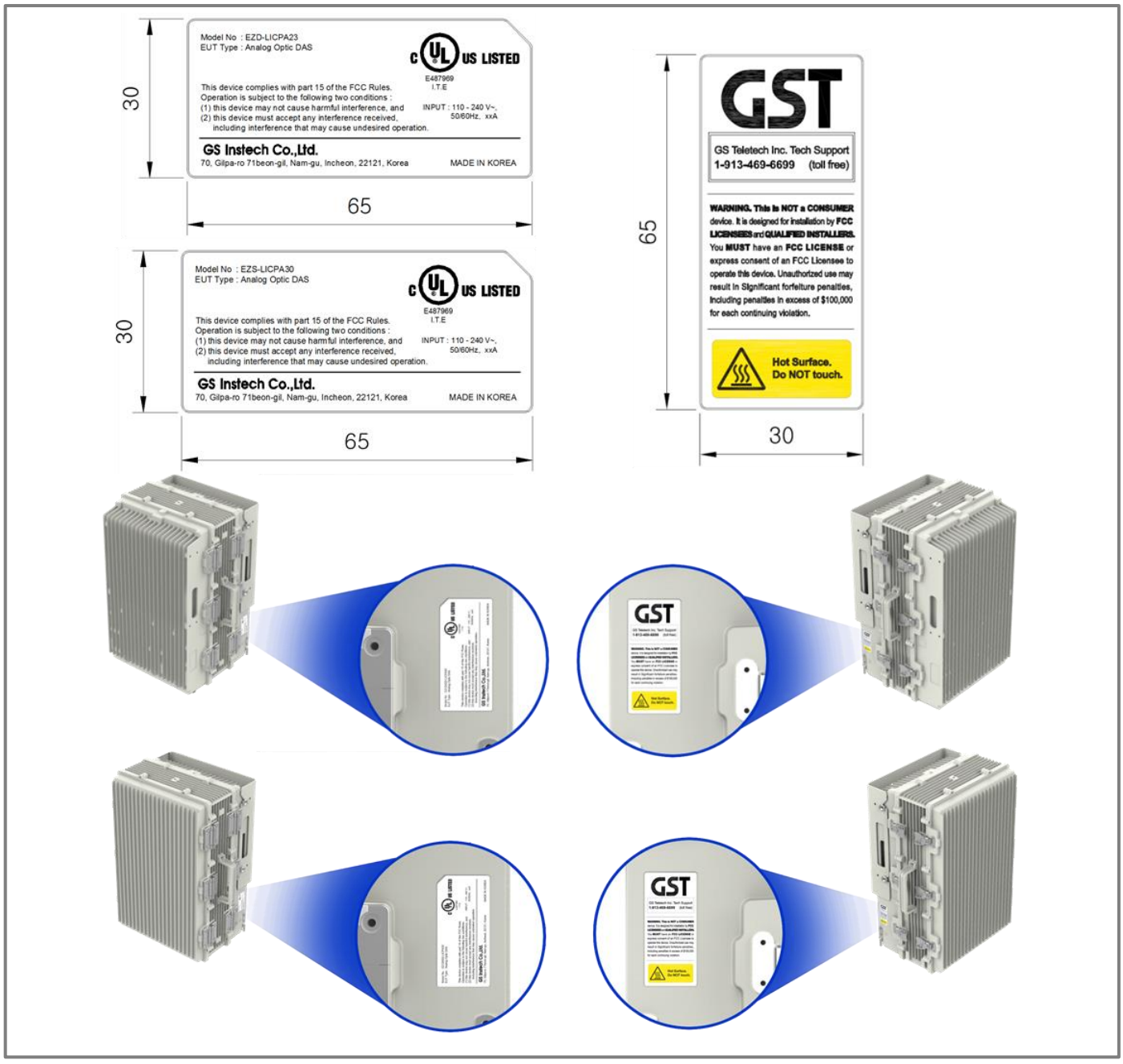

Figure 1.FCC/ UL Certification Statement

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FCC Part 15.105 statement (Class A)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Part 15.21 statement

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

- Home/ personal use are prohibited
- Use of unauthorized antennas, cables, and/or coupling devices not conforming with ERP/EIRP and/or indoor-only restrictions is prohibited

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RF Radiation Exposure

This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
RF exposure will be addressed at time of installation and the use of higher gain antennas may require larger separation distances.

Antenna installation

Antennas must be installed in accordance with FCC 27.50, 24.
The height of the antenna above average terrain (HAAT) must not exceed limit in the following table.

Type	Model name(s)	HAAT (m)	Antenna again
SU	EZ-DASS-L37	11 337.60	3dBi
	EZ-DASS-L30	25 313.42	3dBi
	EZ-DASS-IC37	4 293.78	3dBi
	EZ-DASS-IC30	9 534.59	3dBi
	EZ-DASS-P37	2 749.43	7dBi
	EZ-DASS-P30	6 135.58	7dBi
	EZ-DASS-A39	5 725.41	7dBi
	EZ-DASS-A32	13 003.80	7dBi
DU	EZ-DASD-L23	14 408.20	15dBi
	EZ-DASD-IC23	5 360.99	15dBi
	EZ-DASD-P23	3 799.80	18dBi
	EZ-DASD-A23	10 151.20	18dBi

WARNING. THIS is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licenses to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.

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2. Introduction

2.1. System Overview

EZ-DAS is designed to improve coverage and capacity of Commercial Quad Band.

Either feeding Carrier BTS signal directly or receiving signal via antenna, it provides coverage

Building in RF shadow.

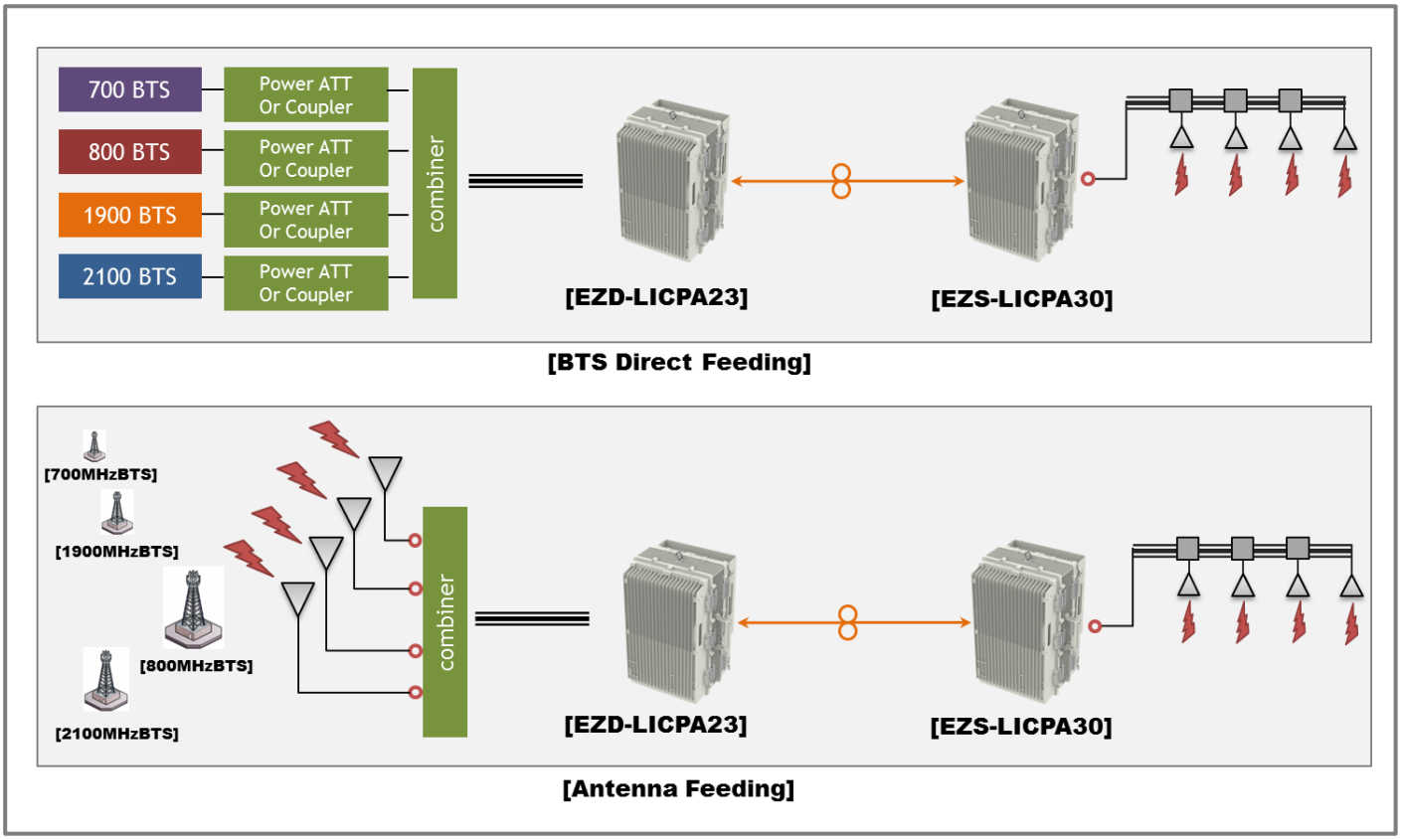

Figure 2.EZ-DAS Application Configurations

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2.2. Main Features

- All-in One Donor Unit
  - Compose several units such as Optic Transceiver, NMS, PSU, BDA, Cavity Filter etc.
  - Convenient to install in Middle Size Building with proper cost of one set
- Support the BTS or Antenna Feeding Solution
  - Either feeding Carrier BTS Signal directly or receiving signal via Antenna
  - With built-in BDA(Bi-Directional Amplifier) function, it is possible to use under Antenna feeding condition
- Choose the Filtering Methods accord to the operating condition
  - For Neutral Host installations, able to support the Full Band Filtering
- Improving Service Quality under Multi-Carriers Area
  - Up to 6 Non-Contiguous block and gain per block based on Downlink Input Topologies
  - Dealing with Near-far & Uplink Noise Floor Rise
- Topologies
  - 1:4 Branches between Donor Unit and Service Unit.
  - 3 Daisy Chain is possible with Daisy Chain Optic Unit.
- Supporting Technologies
  - CDMA, LTE
- Supporting Frequencies
  - Commercial Quad band (700M, 800+850M, 1900M, 2100M)
- Supporting Output Power
  - Composite 4W with EZ-DASS-LICPA 30 (1W per Band)
  - Composite 20W with EZ-DASS-LICPA 37 (5W per Band)
- Functions
  - Support AGC, ALC, AGA with LLA(Low Limit ALC), ASD
- FCC Part 22, 24,27,90 & Part 15B class A

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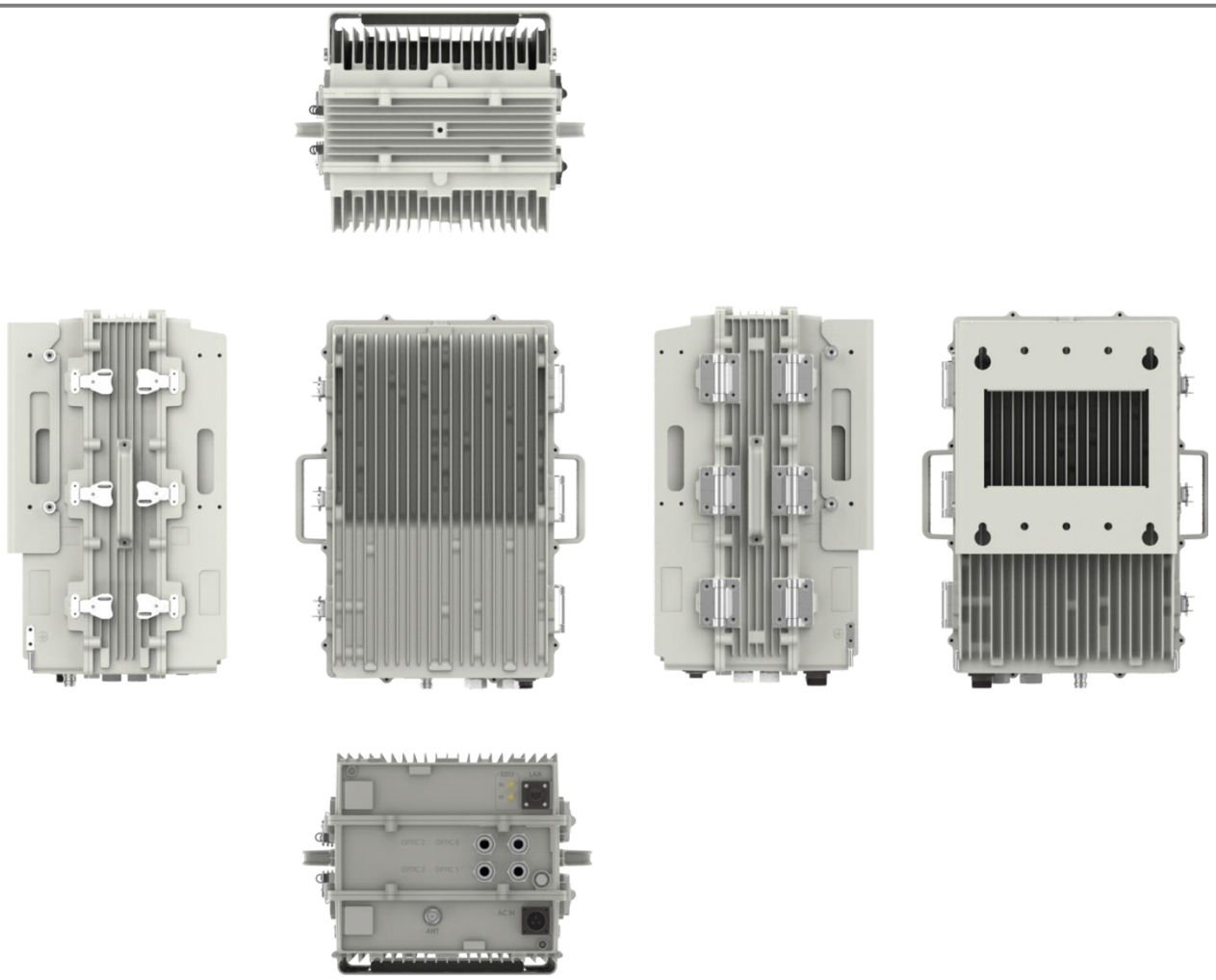
3. System Design for EZD-LICPA23 (Donor Unit)

3.1. Exterior View



ITEM	Specification
Size (W/H/D)	350mm (13.78“) x 550mm (21.6“) x310mm (12.2“)
Weight	< 42Kg (92.5lb)
Enclosure	IP54

Figure 3. EZD-LICPA23 Exterior View

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3.2. Interior View

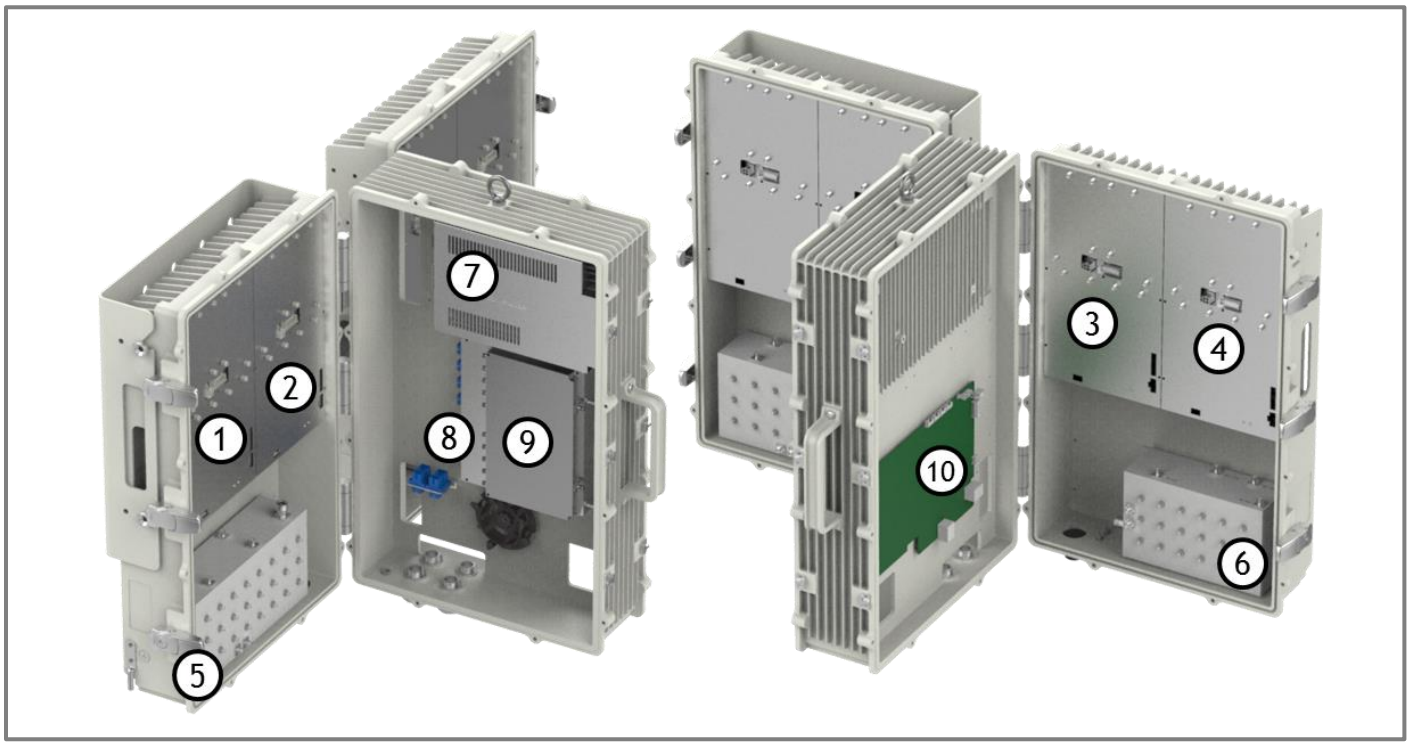

Figure 4. EZD-LICPA23 Interior View

No	Name	Remark
1	EZ-DASD-IC23	800/850MHz RF Digital Filter Unit
2	EZ-DASD-P23	1900MHz RF Digital Filter Unit
3	EZ-DASD-L23	700MHz RF Digital Filter Unit
4	EZ-DASD-A23	2100MHz RF Digital Filter Unit
5	Cavity Filter	Quadplexer for 800/850M & 1900M/ 700M+2100M Band Combiner
6	Cavity Filter	Quadplexer for 700M & 2100M
7	PSU	AC Input Voltage: 110VAC~240VAC(60Hz)/ DC Output Voltage: +6V
8	DOU	Donor Optic Unit (4Port)
9	RCDU-5W	5Way RF Channel Distribute Unit
10	SNMP Board	Apply for Web-UI/ Communicate with Service Unit

Table 1. EZD-LICPA23 Unit Configuration

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3.3. External Interface

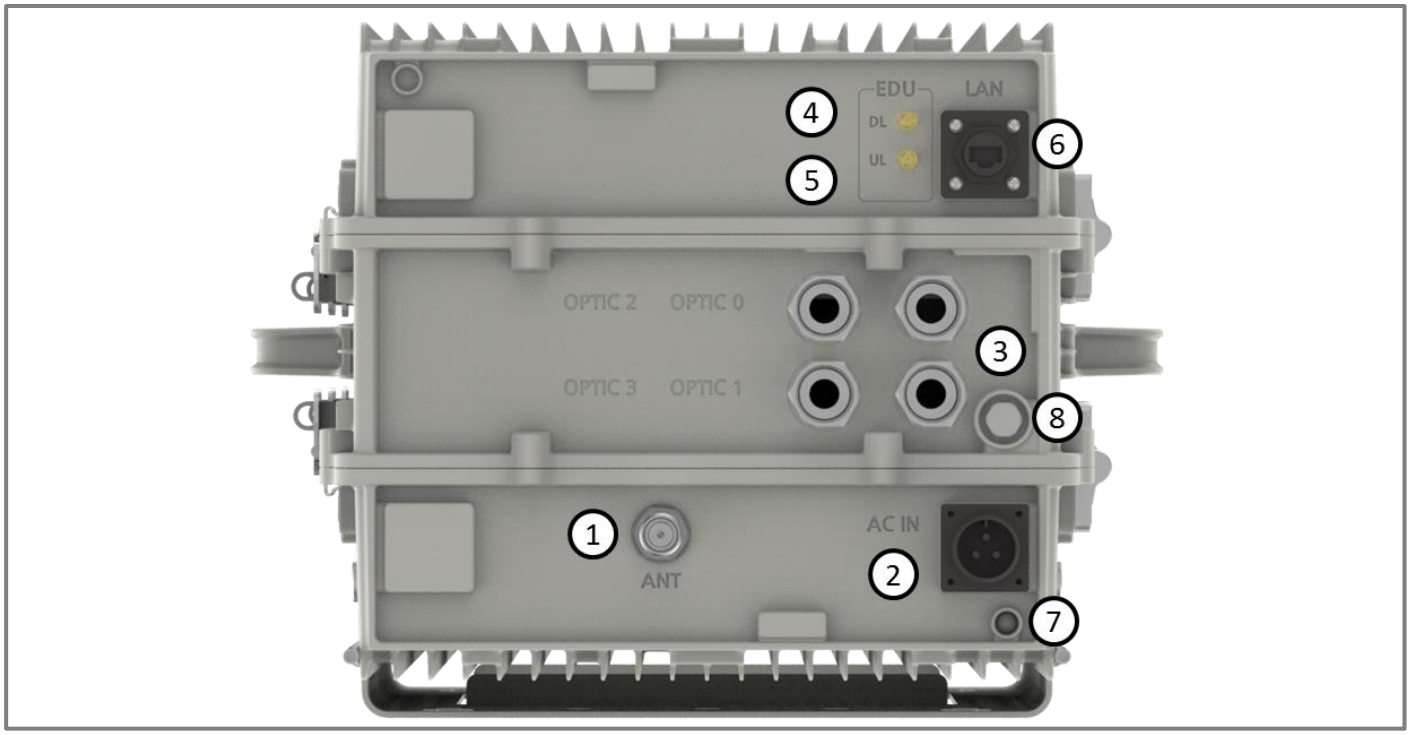

Figure 5. EZD-LICPA23 External Interface

No	NAMES	DESCRIPTION	SPECIFICATION
1	ANT	Feeding Downlink Signal / Transmit Uplink Output	4.3-10 Din Connector
2	AC IN	AC Input Outlet	MS3102A 22-2
3	OPTIC0~3	Insert the optic cable to Service Unit	Metal Cable Gland
4	EDU RF DL	Receive a Downlink RF Signal from EDU (Wire only)	SMA(F)
5	EDU RF UL	Transmit a uplink RF Signal to EDU (Wire only)	SMA(F)
6	LAN	Communicate a data between MDU & EDU or Server	RJ-45
7	LED	System Total Alarm Indication	General Performance
8	Vent-Core	Maintain Humidity & Temp Inside	IP66

Table 2. EZD-LICPA23 External Interface Description

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3.4. FCC Statement

Figure 6. EZD-LICPA23 UNIT FCC Statement

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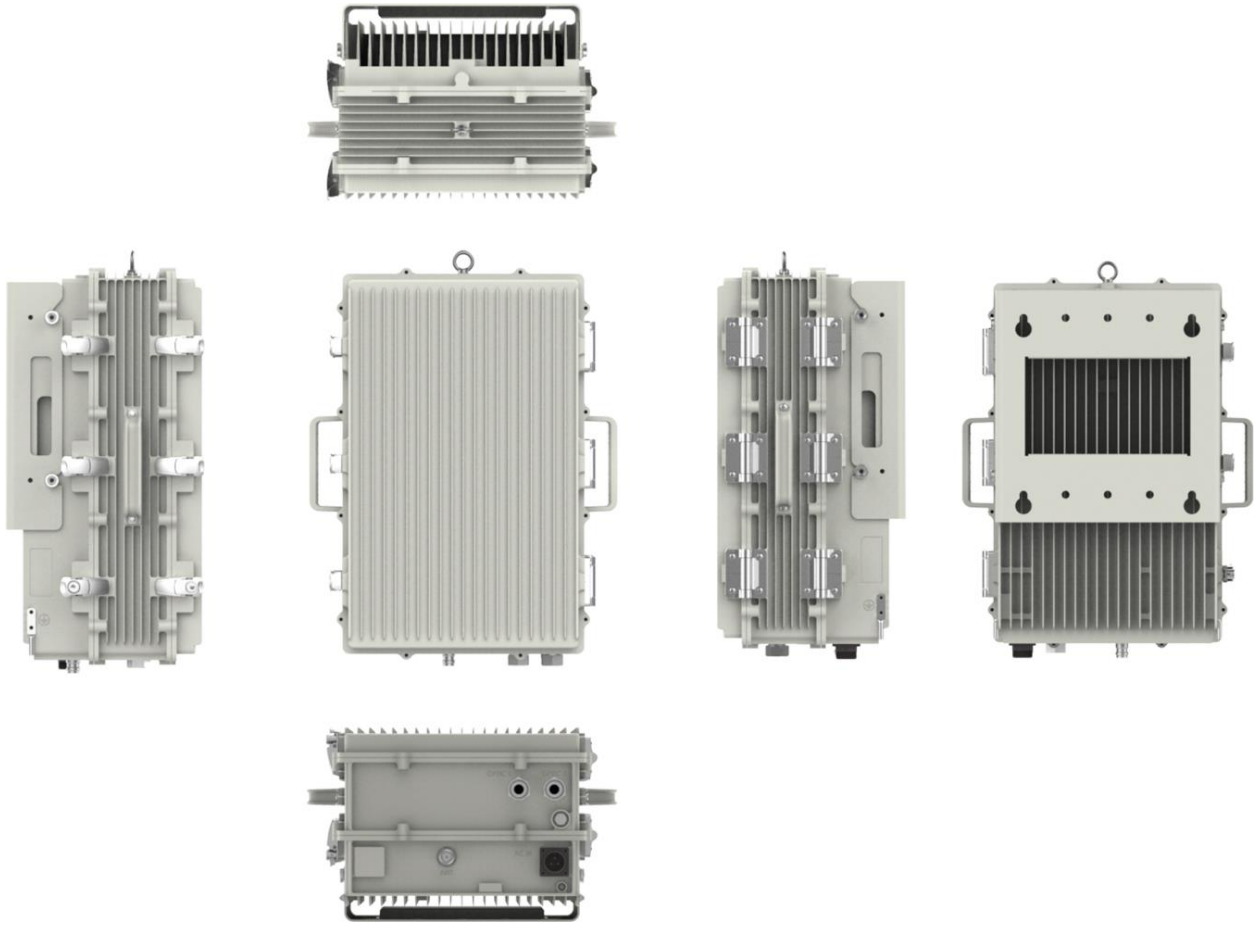
4. System Design for EZS-LICPA30 (Service Unit)

4.1. Exterior View



ITEM	Specification
Size (W/H/D)	350mm (13.78“) x 550mm (21.6“) x255mm (10.03“)
Weight	< 40Kg (88.1lb)
Enclosure	IP54

Figure 7. EZS-LICPA30 Exterior View

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4.2. Interior View

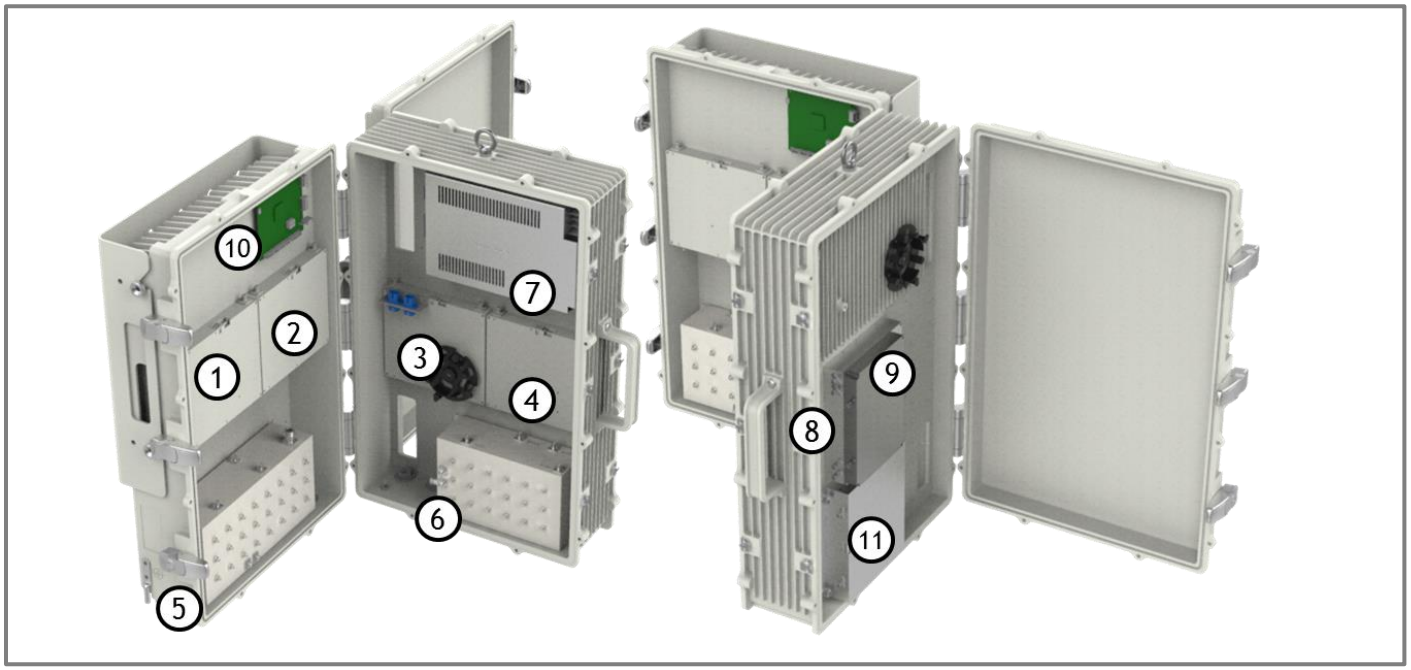

Figure 8. EZS-LICPA30 Interior View

No	Name	Remark
1	EZ-DASS-IC30	800/850MHz RF Power Amp Unit
2	EZ-DASS-P30	1900MHz RF Power Amp Unit
3	EZ-DASS-L30	700MHz RF Power Amp Unit
4	EZ-DASS-A32	2100MHz RF Power Amp Unit
5	Cavity Filter	Quadplexer for 800/850M & 1900M/ 700M+2100M Band Combiner
6	Cavity Filter	Quadplexer for 700M & 2100M
7	PSU	AC Input Voltage: 110VAC~240VAC(60Hz)/ DC Output Voltage: +6V/ +29V
8	SOU	Service Optic Unit
9	RCDU-4W	4Way RF Channel Distribute Unit
10	NMS Board	Apply for GUI/ Communicate with Donor Unit
11	DCO	Daisy Chain Optic Unit/ For SU Cascade Application

Table 3. EZS-LICPA30 Unit Configuration

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4.3. External Interface

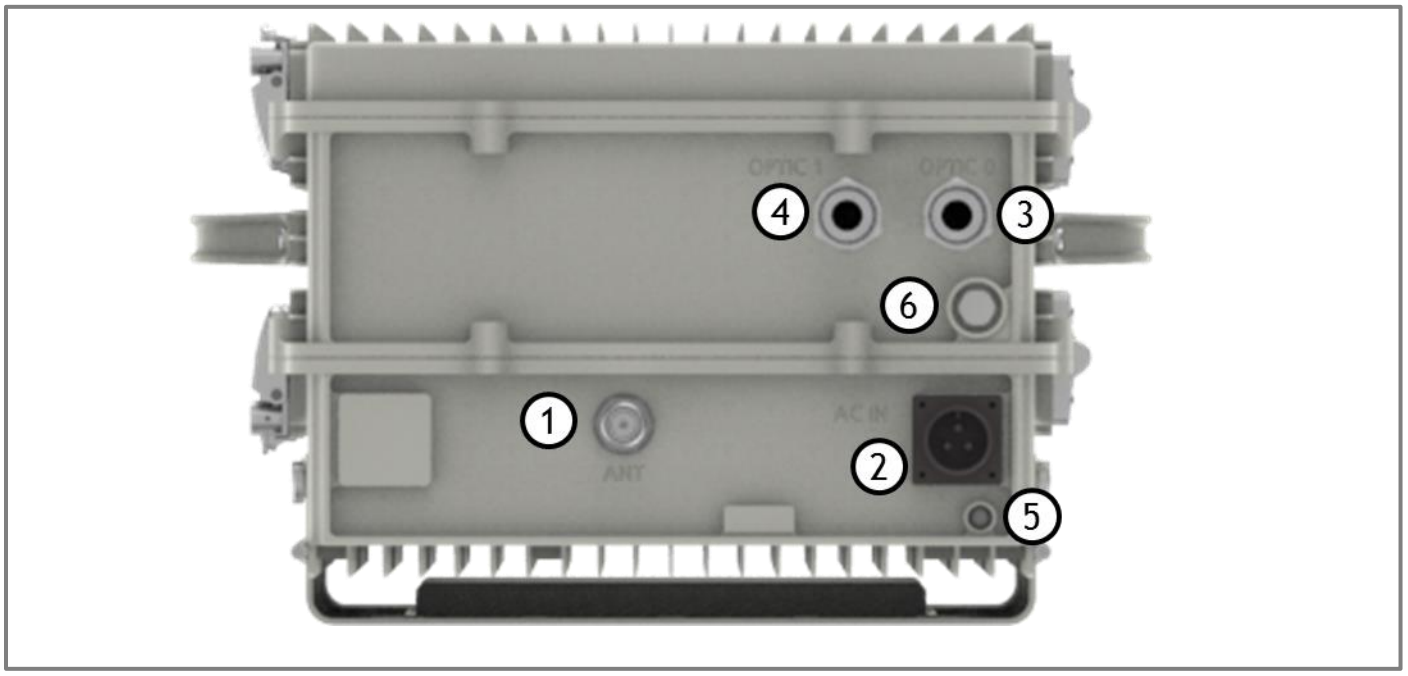

Figure 9. EZS-LICPA30 External Interface

No	NAMES	DESCRIPTION	SPECIFICATION
1	ANT	Feeding Uplink Signal / Transmit Downlink Output	4.3-10 Din Connector
2	AC IN	AC Input Outlet	MS3102A 22-2
3	OPTIC0	Insert the optic cable to Donor Unit	Metal Cable Gland
4	OPTIC1	Insert the optic cable to Next SU for Daisy Chain	Metal Cable Gland
5	LED	System Total Alarm Indication	General Performance
6	Vent-Core	Maintain Humidity & Temp Inside	IP66

Table 4. EZS-LICPA30 External Interface Description

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4.4. FCC Statement

Figure 10. EZS-LICPA30 UNIT FCC Statement

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5. System Specification

5.1. RF Performance

Parameter		Down Link	Up Link	Remark
Frequency Range		728MHz~756MHz	698MHz~716MHz/ 777MHz~787MHz	700MHz
		862MHz~894MHz	817MHz~849MHz	800/850MHz
		1930MHz~1995MHz	1850MHz~1915MHz	1900MHz
		2110MHz~2180MHz	1710MHz~1755MHz	2100MHz
Input Range		-60dBm ~ -30dBm/ Total	-67dBm	Per Band
Output Power		+30dBm with EZS-LICPA30	+23dBm(0.2W) With EZD-LICPA23	700M
		+30dBm with EZS-LICPA30		800/850MHz
		+30dBm with EZS-LICPA30		1900M
		+32dBm with EZS-LICPA30		2100M
Channel Capacity		【CDMA】 15MHz max/ 1.25MHz Step		
		【LTE】 5M, 10M, 20M		
Gain	Range	50dB ~ 90dB with EZS-LICPA30		ALC, AGC Included
	Adjust Step	1dB		
	Accuracy	±1dB		
Ripple		4dB p-p		
Roll off		> 50dBc @ Channel OBW ±1MHz		
Rho		≥ 0.912 (Rho)		For CDMA
EVM		< 4% for 256QAM	< 4% for 64QAM	For LTE

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Parameter	Down Link		Up Link	Remark
Frequency Error	< 0.05ppm			
System Delay	< 5us			Exclude Fiber Optic Delay
Noise Figure	Less than 6dB @ Min & Max Gain			Only UL
VSWR	< 1.5 : 1			
OB Unwanted Emission	<-5.5dBm @50KHz ≤ Δf < 5.05MHz (RBW: 100KHz)			For LTE
	<-12.5dBm @5.05MHz ≤ Δf < 10.05MHz (RBW: 100KHz)			
	<-13dBm @10.5MHz ≤ Δf < 15MHz (RBW: 1MHz)			
ACLR	> 45dBc @ ±5MHz, ±10MHz, ±20MHz, ±40MHz			For LTE
Spurious Emission For CDMA	885 kHz	-45dBc with a 30KHz RBW		
	1.98 MHz	$P_{out} \geq$ 33dBm; -55dBc with a 30KHz RBW		
		28dBm≤ P_{out}<33dBm; -22dBm with a 30KHz RBW		
	2.25 MHz	-13dBm with a 30KHz RBW		
	4.0 MHz	-13dBm / 1 kHz: 9 kHz < f < 150 kHz		ITU category A
		-13dBm / 10 kHz: 150 kHz < f < 30 MHz		
		-13dBm/100 kHz: 30 MHz < f < 1 GHz		
		-13dBm / 1 MHz: 1 GHz < f < 12.75 GHz		

Table 5. EZ-DAS RF Performance Description

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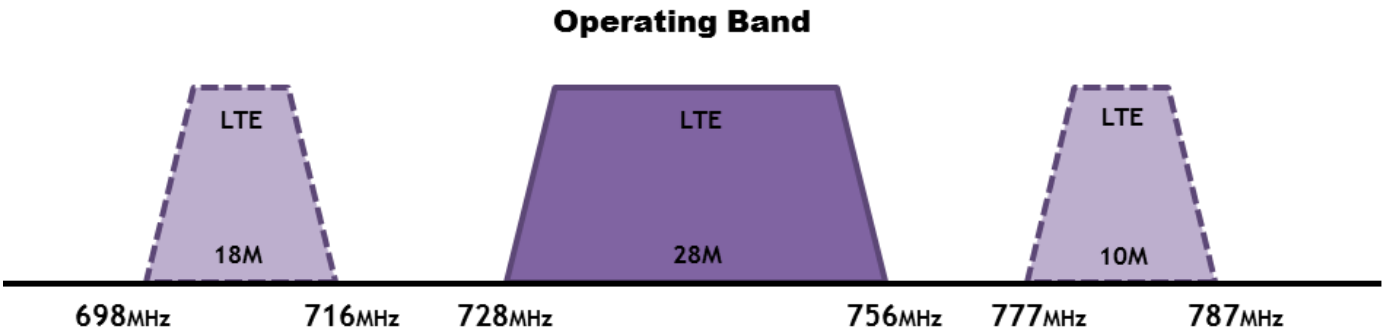
5.2. Frequency Information

5.2.1. 700MHz



[LTE]

Block	Transmit frequency band (MHz)				Bandwidth UL / DL
	Uplink		Downlink		
LTE 10M	698	716	728	756	18 (Lower C)
	777	787	746	756	10 (Upper C)

Table 6. EZ-DAS 700MHz Operating Frequency Information

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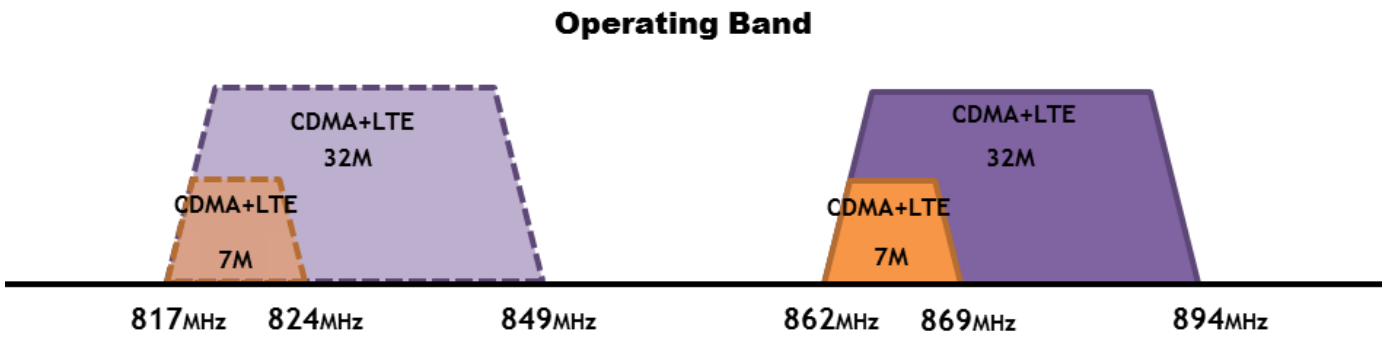
5.2.2. 800/850MHz



[CDMA]

Block	Transmit frequency band (MHz)				Bandwidth UL / DL
	Uplink		Downlink		
A1	824	835	869	880	11
B1	835	845	880	890	10
A2	845	846.5	890	891.5	1.5
B2	846.5	849	891.5	894	2.5

Table 7. EZ-DAS 800/850MHz Operating Frequency Information for CDMA

[LTE]

Block	Transmit frequency band (MHz)				Bandwidth UL / DL
	Uplink		Downlink		
LTE 5M	817	849	862	894	32

Table 8. EZ-DAS 800/850MHz Operating Frequency Information for LTE

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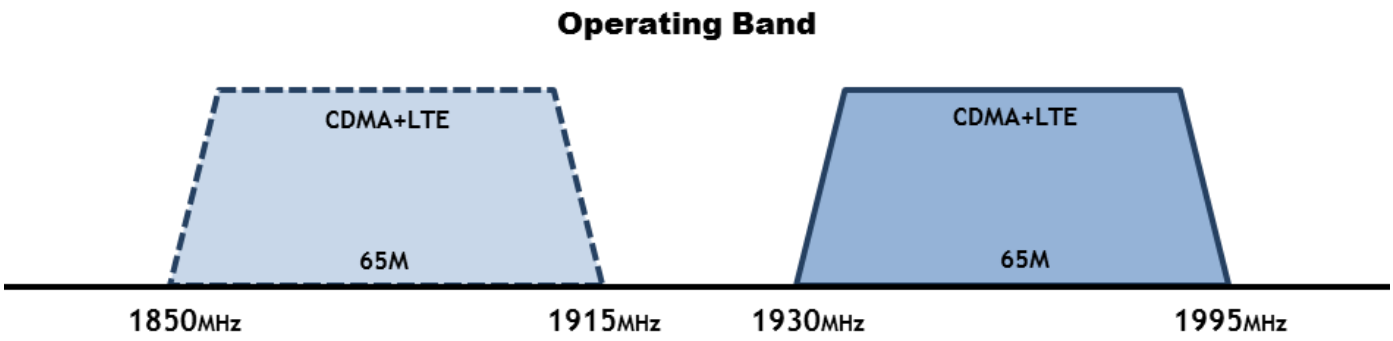
5.2.3. 1900MHz



[CDMA]

Block	Transmit frequency band (MHz)				Bandwidth UL / DL
	Uplink		Downlink		
A	1850	1865	1930	1945	15
D	1865	1870	1945	1950	5
B	1870	1885	1950	1965	15
E	1885	1890	1965	1970	5
F	1890	1895	1970	1975	5
C	1895	1910	1975	1990	15

Table 9. EZ-DAS 1900MHz Operating Frequency Information for CDMA

[LTE]

Block	Transmit frequency band (MHz)				Bandwidth UL / DL
	Uplink		Downlink		
LTE 20M	1850	1915	1930	1995	65

Table 10. EZ-DAS 1900MHz Operating Frequency Information for LTE

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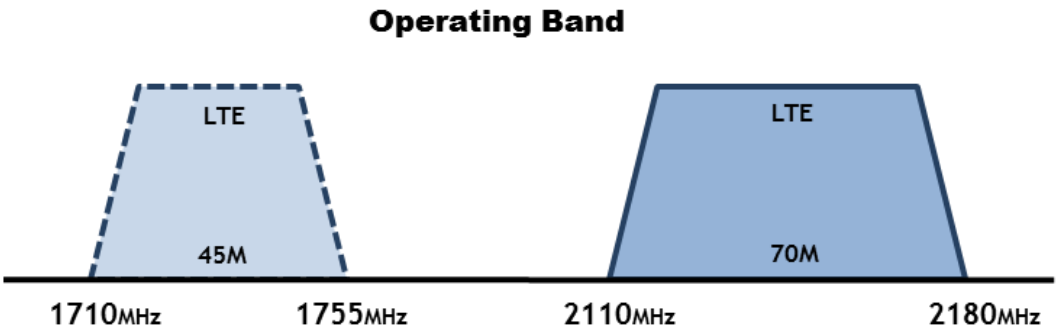
5.2.4. 2100MHz



[LTE]

Block	Transmit frequency band (MHz)				Bandwidth UL / DL
	Uplink		Downlink		
LTE 10M	2110	2180	1710	1755	45M/ 70M

Table 11. EZ-DAS 2100MHz Operating Frequency Information

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5.3. Configuration & Mechanical Specification

Parameter	Specification	Remark
Donor/ Service Antenna Filter	QUADPLEXER+BAND COMBINER	One port In/Output
Power Supply	AC Input Voltage: 110VAC~240VAC(60Hz)	Free Voltage
	DC Output Voltage: +6V	EZD-LICPA23
	DC Output Voltage: +6V/ +29V	EZS-LICPA30
Operation Temperature	-10°C~+50°C (100%RH)	
Storage Temperature	-10°C~+80°C (5~95%RH)	
Connectors	Antenna: 4.3-10 DIN Female	EZD-LICPA23 EZS-LICPA30
	AC: MS-3102A 22-2	
	Optic Connection: Metal Cable Gland	
	EDU Connection: SMA Female(RF)/ MS3102A18-8(DATA)	EZD-LICPA23
Cable	1/2" Plenum-Rated Air-Dielectric Coaxial Cable	
Size	13.78" x 21.6" x 12.2" without Bracket	EZD-LICPA23
	13.78" x 21.6" x 10.3" without Bracket	EZS-LICPA30
Weigh	Less than 42kg (92.5lb) without Bracket	EZD-LICPA23
	Less than 40kg (88.1lb) without Bracket	EZS-LICPA30
Power Consumption	Less than 200W	EZD-LICPA23
	Less than 250W	EZS-LICPA30
Environment	IP54	
MTBF	100,000 hours or higher	
Grounding	nonferrous metal and anchoring point on bottom side	For RF and power cabling
Mount Application	Wall Mount	

Table 12. EZ-DAS Configuration & Mechanical Specification

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6. System Block Configuration

6.1. Block Diagram

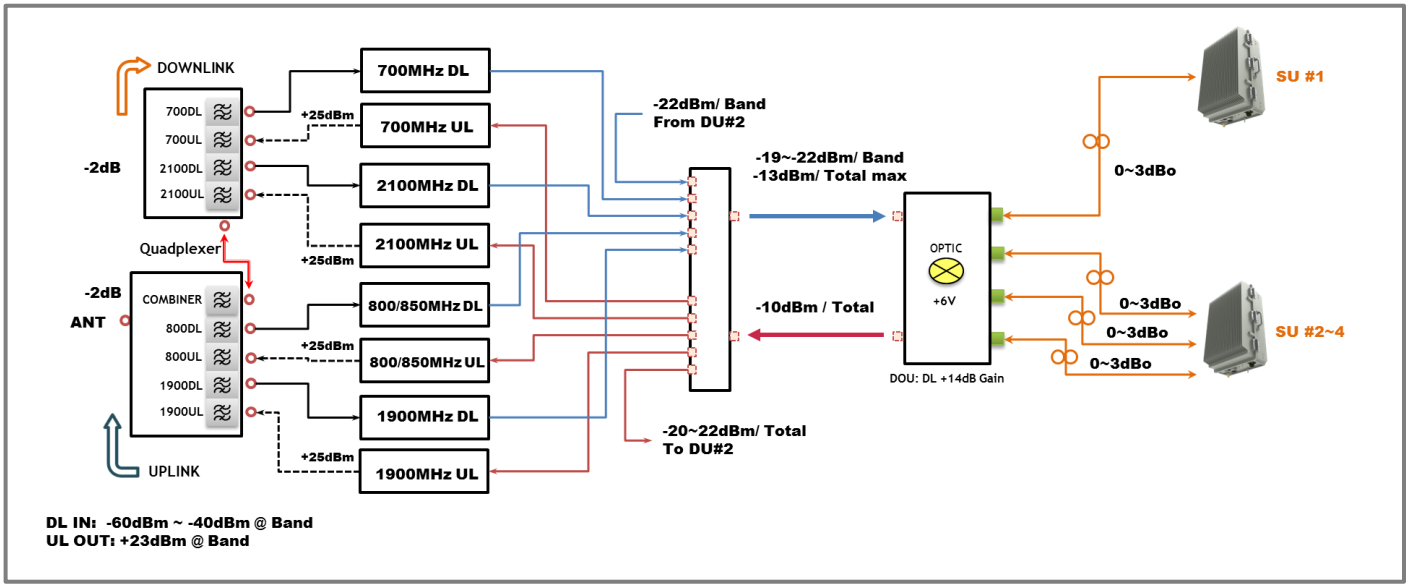

Figure 11. EZD-LICPA23 Block Diagram Configuration

The repeater improves service in the commercial Quad-Band.

User may select frequency band according to the site peculiarities.

After receiving a weak signal from Donor antenna or BTS directly, the EZD-LICPA23 sends downlink signal to EZS-LICPA30 using DOU (Donor Optic Unit).

DOU supports the translation of RF signal to Optic signal for connecting EZS-LICPA30 through the fiber optic cable. And then Uplink Signal that received from EZS-LICPA30 amplify, is send to the Base station via Donor Antenna or is connected to BTS directly.

In other words, EZD-LICPA23 is only transmitting the Uplink Signal over the air.

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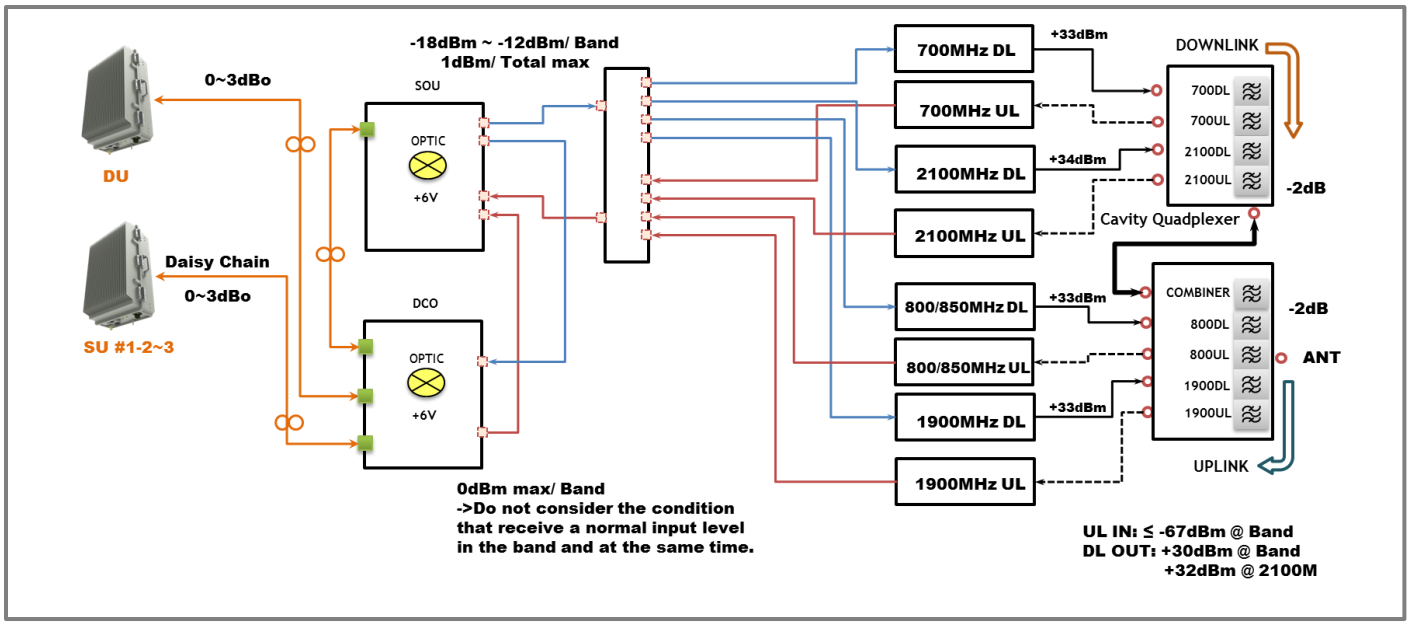

Figure 12. EZS-LICPA30 Block Diagram Configuration

EZS-LICPA30 is operating very similar to the EZD-LICPA23

After receiving an Uplink Signal from service antenna, the EZ-DASD-LICPA30 sends Uplink signal to

EZD-LICPA23 using SOU (Service Optic Unit).

SOU supports the translation of RF signal to Optic signal for connecting EZD-LICPA23 through

the fiber optic cable. And then Down Signal that received from EZD-LICPA23 amplify,

is send to the Mobile station via Service Antenna.

In other words, EZD-LICPA23 is only transmitting the Uplink Signal over the air.

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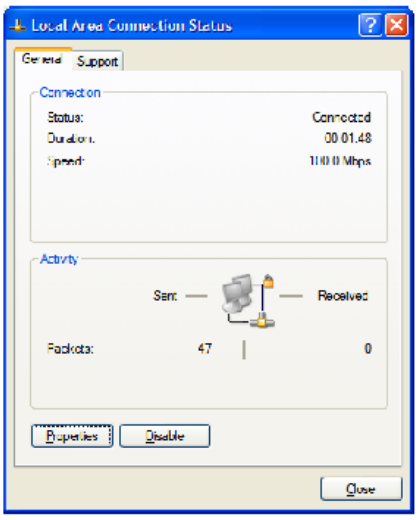
7. GUI Overview

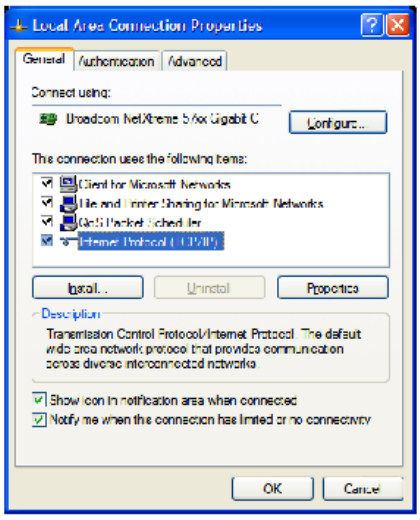
- Provide all functions that can be performed at Service Unit will be available thru the Donor Unit.
- Support the GUI pages that will be addressable via UDP Interface.

7.1. Configuration the Laptop to Connect to the Repeater

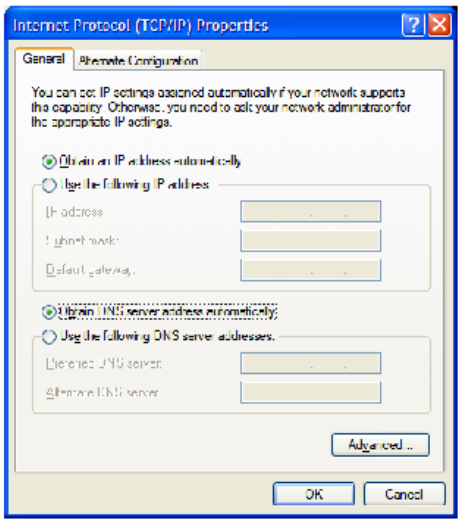
- Connect an Ethernet crossover cable from the LAN port of the repeater's bottom side to your laptop



1. Go to Local Connection
2. Click on "Properties"



3. Highlight "Internet Protocol"
4. Click on "Properties"



5. Choose "Obtain DNS Server address automatically"
6. Clink OK

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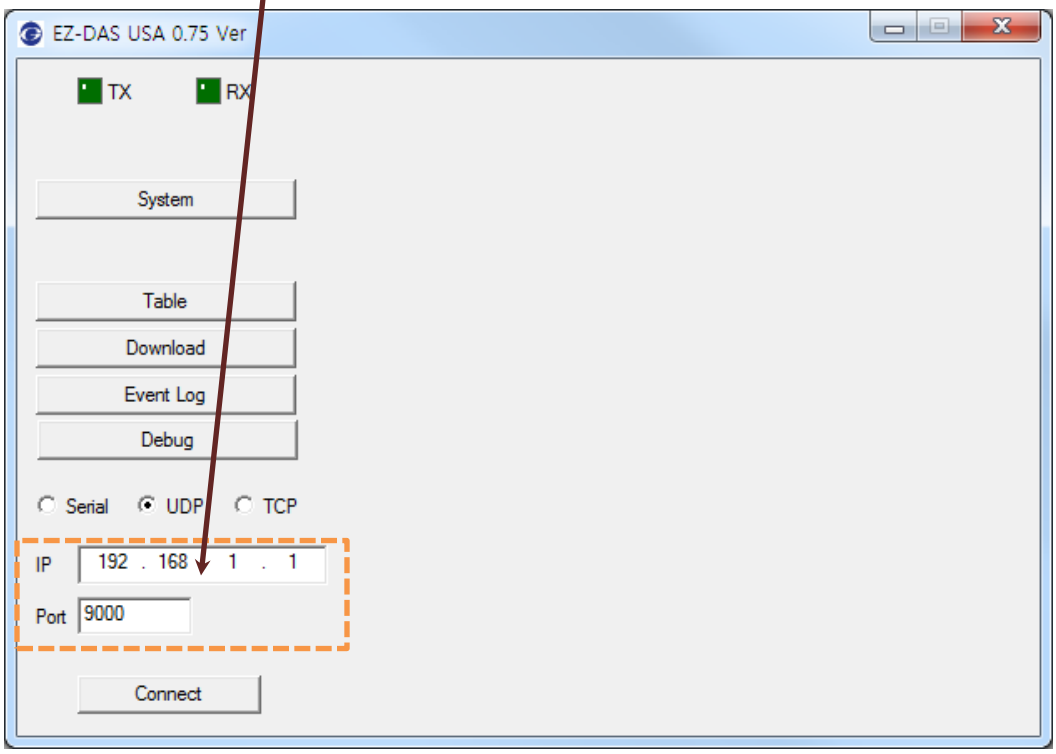
7.2. Login-In Screen

- GUI Screen for Log-In
- Enter the IP Address "**192.168.1.1**" and Port into GUI Main Screen. And then Connect.



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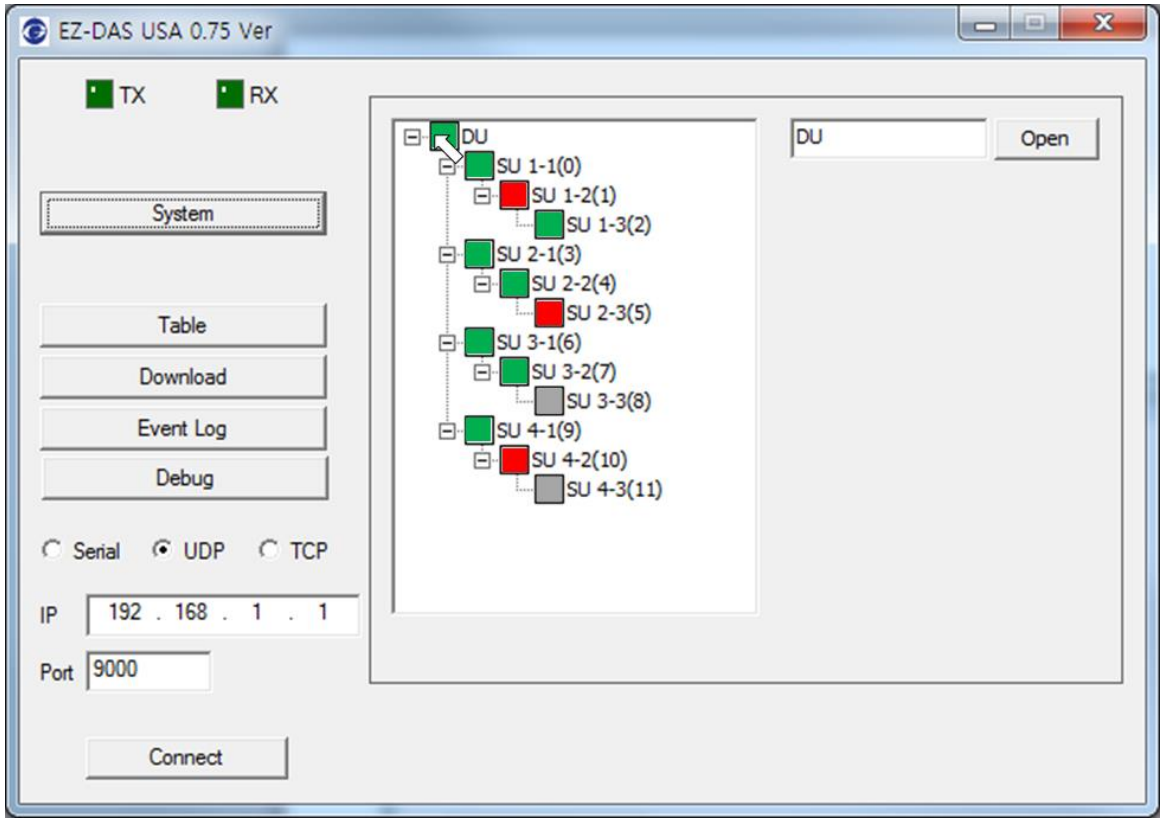
7.3. Main Screen

- GUI Screen for Main Menu
- Able to select system that user control, Configuration & Status monitoring



- Green means that the system is operating under normal condition.
- Red means that the system is operating under abnormal condition. In other words, system is likely non-working.
- Gray means that the system is not linked or communicated fail. But if it is not communicated between DU and SU, Donor Unit is also changed Red.

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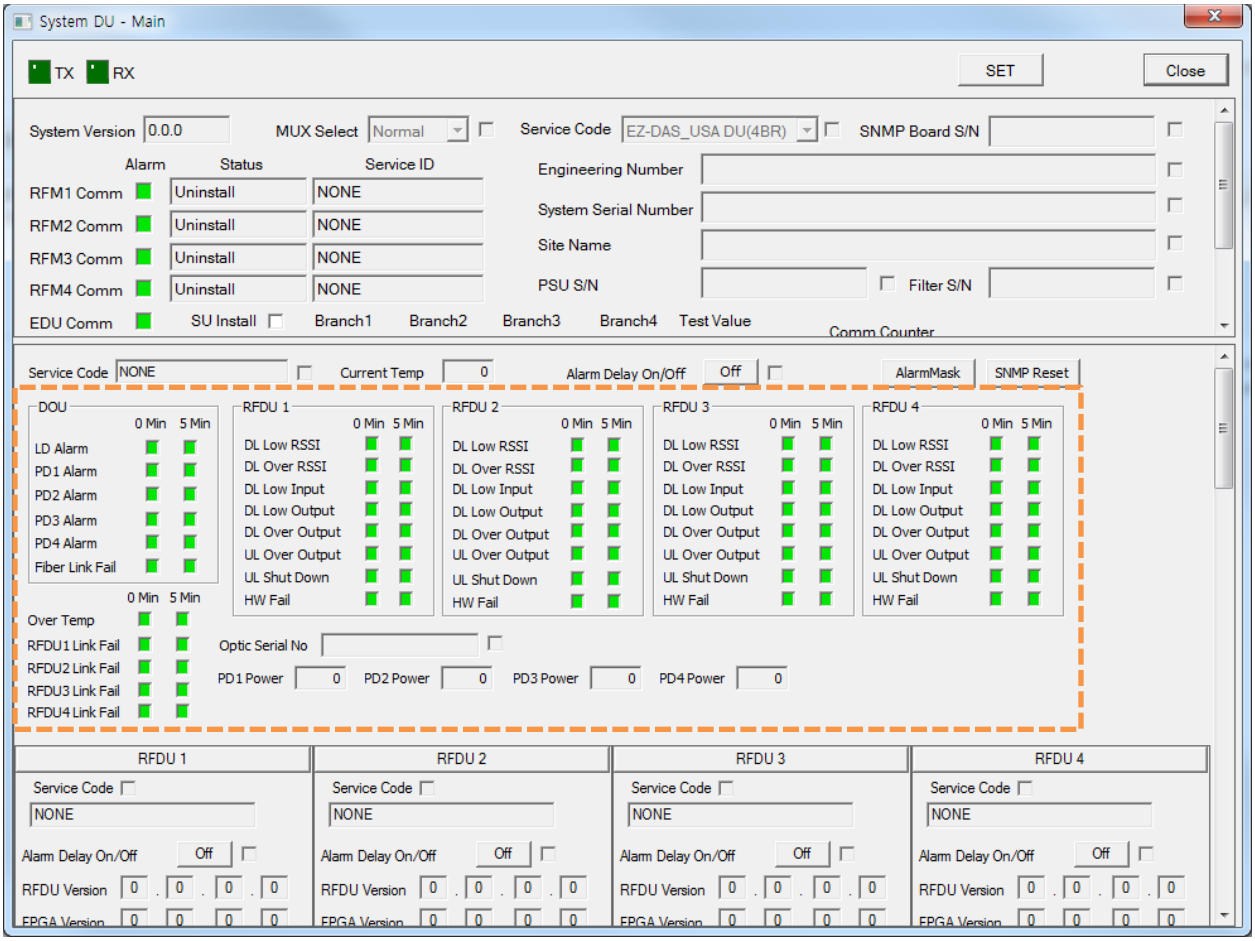
7.4. RF Status

- GUI Screen for display Repeater's RF Status



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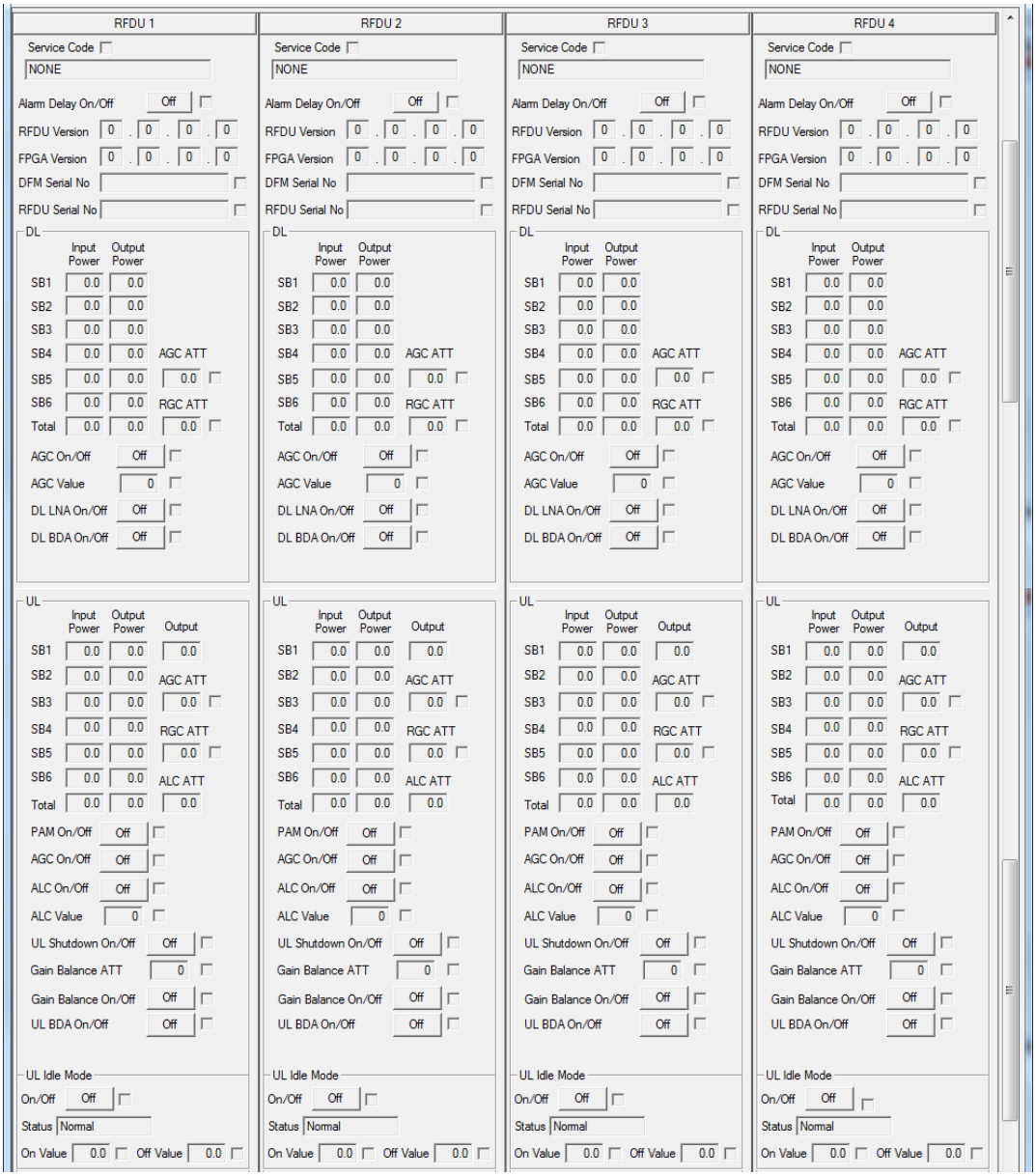
7.5. RF Configuration

- GUI Screen in order to change the RF values
- User may change the various RF values of the repeater on this page
- Changes will not take effect until you click "Apply" button
- This menu is where the installer will choose references for specific implementation



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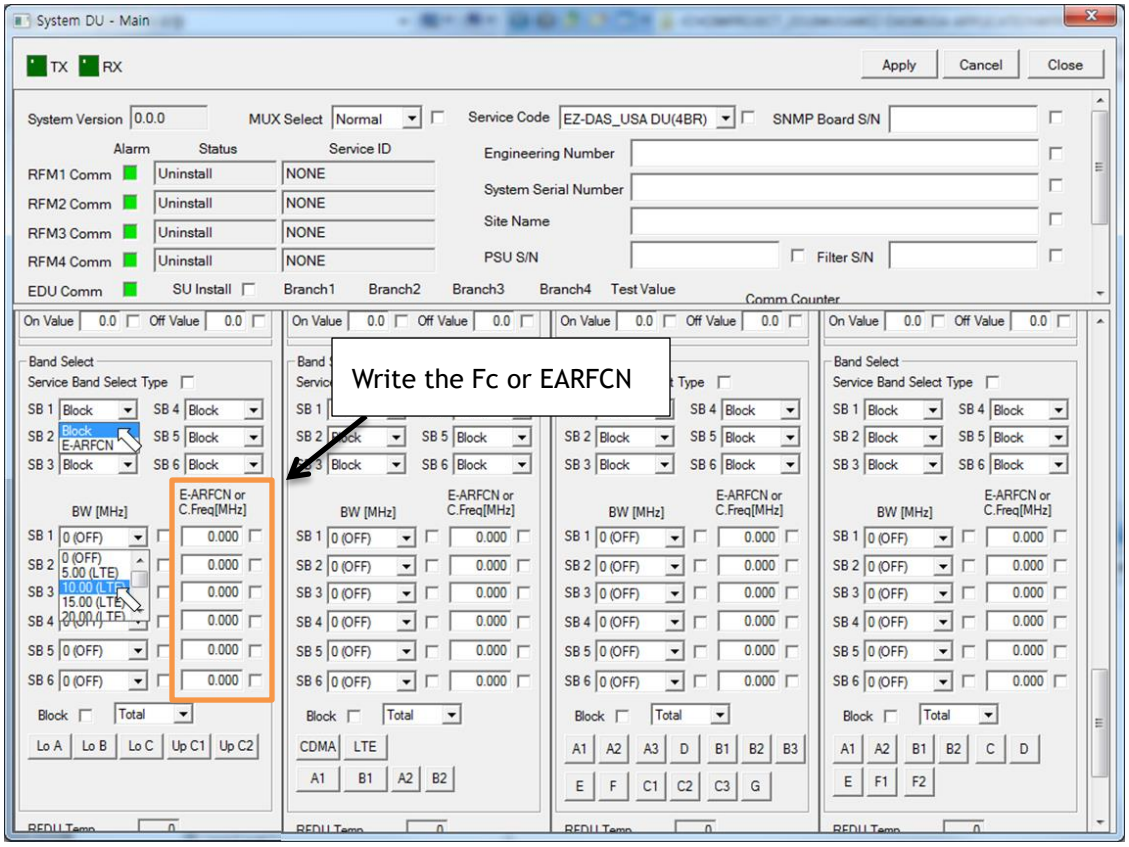
7.6. Band Selection

- Repeater support the capacity of CDMA and LTE Technologies
- Ability to set the 6 Non-Contiguous channel
- Support the CDMA 15MHz max per 1.25 step and LTE 5MHz, 10MHz, 20MHz
- User can set the desired channel using the GUI



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8. System Installation

- This chapter describes how to install the repeater and Cabling method
- The needed accessories and tools are list up as below

#	Contents		Picture	Q'ty
1	Mounting Bracket			1EA
2	AC Power Cable SJT 3/16 AWG, 6ft			1EA
3	Frame Ground Cable with Tubular Cable Lug, 6ft			1EA
4	Installation purchase set	EYE BOLT(M12)		1EA
		M5x12mm WRENCH BOLT, SEMS		2EA
		PH(+) M4x8mm ,SEMS		4EA
5	Mounting Screw set	LAG SCREW 3/8"x3"		2EA
		HEX HEAD 3/8"x2", SCM440		2EA
		Φ10.5mm/Φ21mm PLAIN WASHER		2EA
		Φ10.2mm/Φ18.4mm SPRING WASHER		2EA
6	Tubing Tube Sleeve Black	Φ30mm/L:150mm Adhesive Polyolefin 3:1 Heat Shrink		1EA

Table 13. EZ-DAS Installation Accessories

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8.1. Warnings and Hazards

8.1.1. Electric Shock

- Opening the Repeater could result in electrical shock and may cause severe injury
- Operating the Repeater with antennas in very close proximity facing each other could lead to severe damage to the repeater

8.1.2. Exposure to RF

Working with the repeater while in operation, may expose the technician to RF electromagnetic fields that exceed FCC Rules for human expose.

Visit the FCC Website at http://www.fcc.gov/oet/rfsafety to learn more about

The effects of exposure to RF electromagnetic fields

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8.2. Service Man Installation Guide

8.2.1. Wall Mount Installation

The procedure for fixing the pole type system is as follows.

Service man is mounting the same way the EZD-LICPA23 and EZS-LICPA30.

1) To mount the system on the wall, first fix the bracket on the wanted position.
2) Hang the system to the hooking position at the top of the mounting bracket
3) Push the system to the hooking position at the bottom of the mounting bracket.

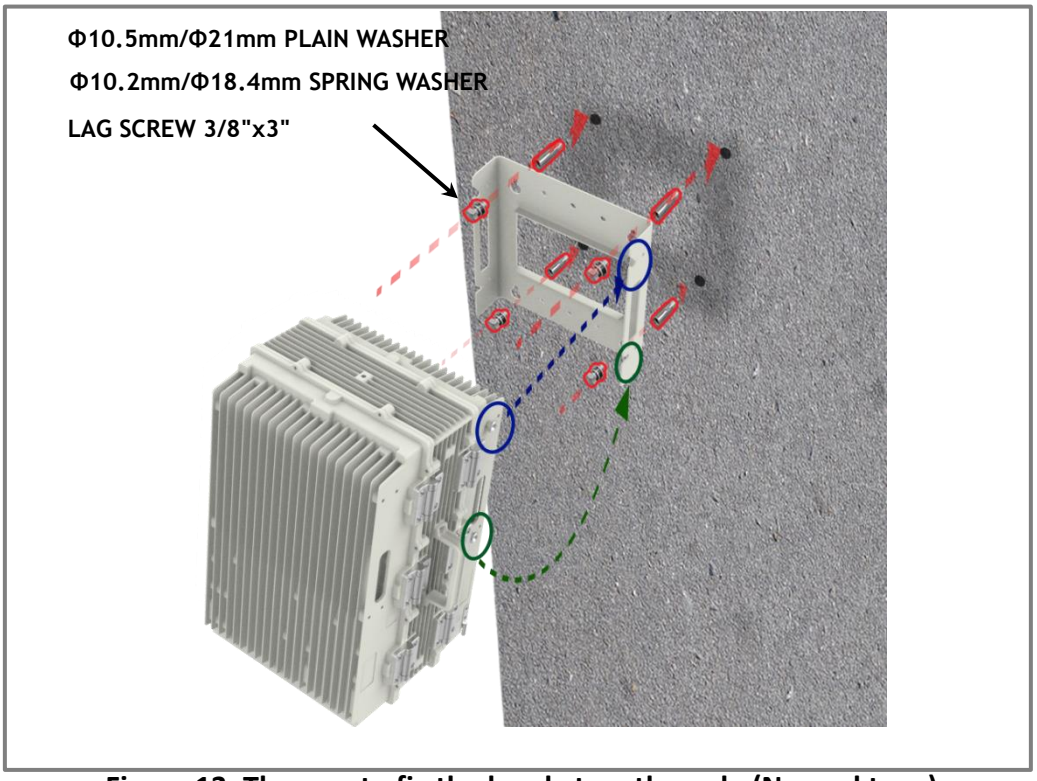

Figure 13. The way to fix the bracket on the pole (Normal type)

WARNING

Protection gloves and goggles

Make sure that worker wears protection gloves and goggles to prevent damages from debris while drilling holes in a Pole or Wall

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Cautions while drilling on the pole

Drilling thru-hole on a center of the pole

4) Align the system with the fixing holes of the mounting bracket and fix them firmly

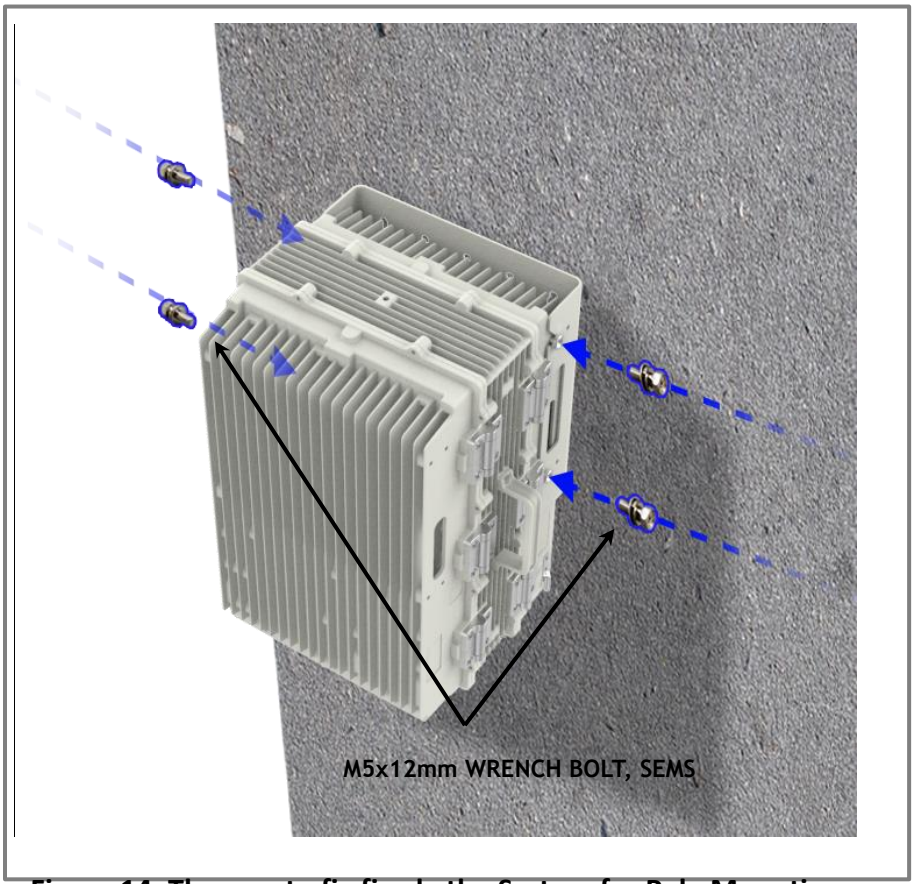

Figure 14. The way to fix firmly the System for Pole Mounting

Cautions System leveling

Before fixing the system, Check the horizontal and vertical level using a spirit level

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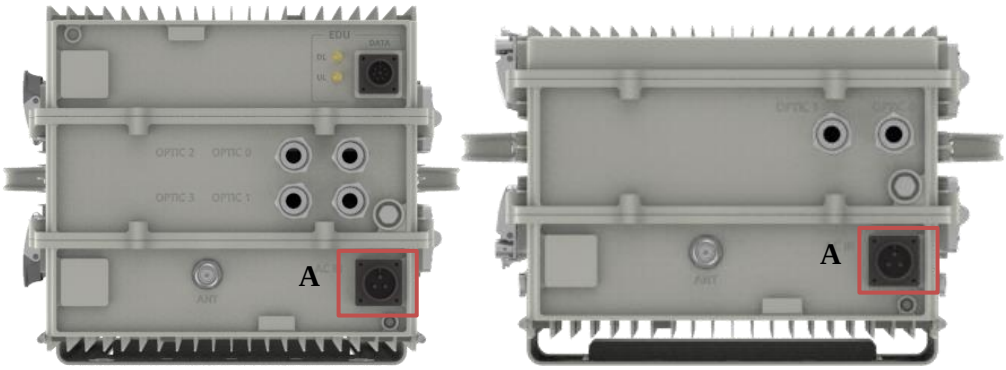
8.3. Cable Connection

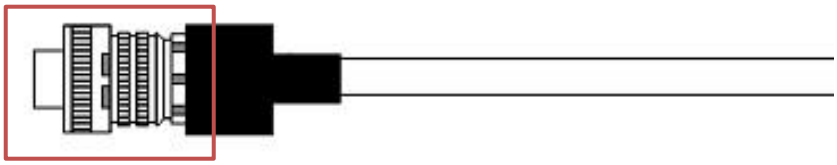
8.3.1. AC Power cable connection

- Repeater supports a free AC Input voltage from 110V to 240V
- Provided Power cable is single type, so it can be used flexibly
- The pin description of AC Port is below. User should connect exact polarity of AC

Port Outlook (System Side)	Port numbering for MS	NAME	Description
MS-3102A-10SL-3P	A	AC_H	AC Hot
	B	AC_N	AC Neutral
	C	F.G	Frame Ground

- The specification & Connection of AC Power Cable



A 

- A: MS3106A-22-2
- Connect Port A for inserting AC Power

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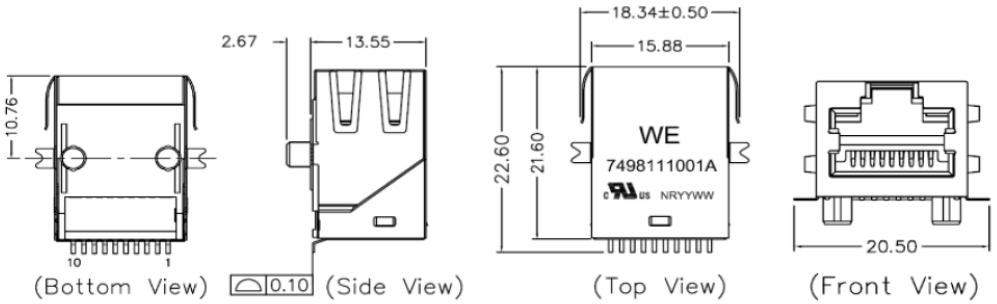
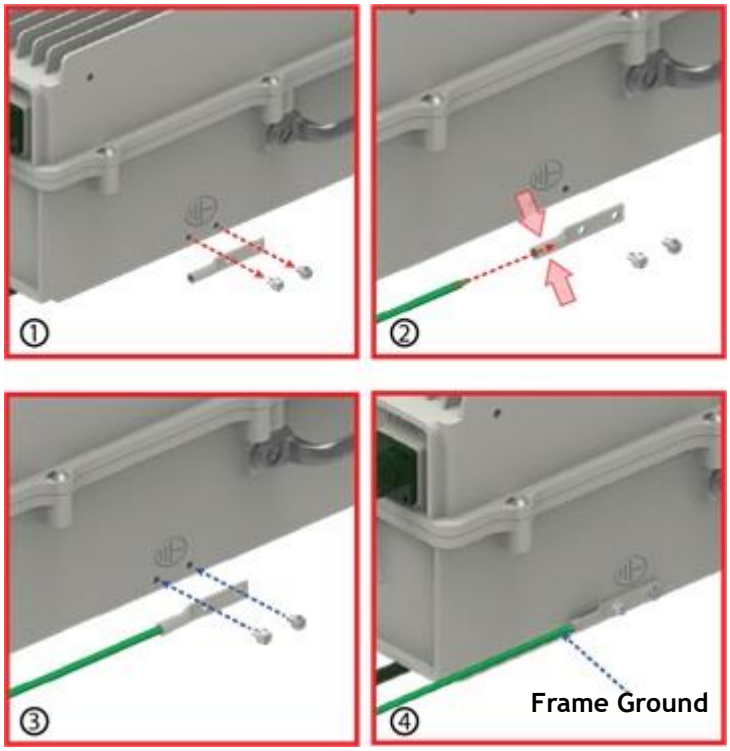
8.3.2. Local Maintenance Connection

- Repeater Support a RJ-45 connector



8.3.3. Grounding cable Connection

- Frame(Earth) Wire size is AWG #6. The way to install the grounding cable is below



- The specification of ground terminal lug is like below (Refer to JOCT 0202-RL05)

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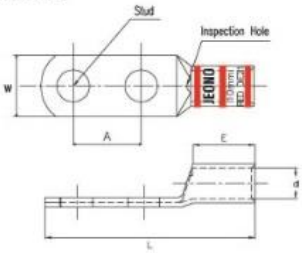
TUBULAR CABLE LUGS, TWO-HOLE, STANDARD BARREL AND LONG BARREL
TYPE-CT

- Material : Electrolytic Copper (TPC)
- Surface : Tin Plated
- With Inspection Hole
- Color Coded to Show Proper Die Number and Color 10㎟~630㎟
- To IEC 60228 Class 2 and Class 5
- UL Listed 486A-486B up to 35KV



Part No Explation : JOCO 0201-X X 04 → Stud Size(mm, UNC)

Tongue Form R : Round Type
S : Square Type

Barrel Form *S : Standard Barrel Type
*L : Long Barrel Type

Part Number	Wire Range				Stud Size	Dimension (mm)							Color Code & Die No	Q'ty / bag
	CODE		FLEX			W	d	A	E		L			
	AWG	㎟	AWG	㎟					*S	*L	*S	*L		
JOCT 0202-XX05	6	16	6	16	M5	12	5.4	16	15	30	52	67	Blue 24 JOCD-6	300
JOCT 0202-XX06					M6									
JOCT 0202-XX08					M8	15.5		19			67	82		
JOCT 0202-XX10					M10									
JOCT 0202-XX12					M12	18		22			70	85		

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