Fiber DAS Operating Manual

Public Wireless

2009. 12

Contents

1. Introduction 3
   1.1. General 3
2. Network configuration of system 3
   2.1. Network configuration 3
3. System Specifications 3
   3.1. System specifications 3
      3.1.1. Frequency allocation 3
      3.1.2. System Specifications 3
4. Mechanical Specifications 3
   4.1. CM150D-01 DU 3
      4.1.1. Mechanical Design 3
      4.1.2. Mechanical specification 3
      4.1.3. Descriptions of CM150D-01 DU 3
   4.2. CM150D-01 RU 3
      4.2.1. Mechanical Design 3
      4.2.2. Mechanical Specification 3
      4.2.3. Description of CM150D-01 RU 3
      4.2.4. Module Composition 3
      4.2.5. Function of Modules 3
5. Administration Program (RptMan) 3
   5.1. System Requirement 3
   5.2. Screen 3
   5.3. Status Display 3
   5.4. Control Policy 3
   5.5. Menu 3
   5.6. Toolbar 3
   5.7. Program operation 3
      5.7.1. Initiating communication 3
      5.7.2. Disconnection 3
      5.7.3. CM150D-01 RU Status Retrieval and Control 3

FCC WARNING

This equipment generates or uses radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

1. Introduction

1.1. General

The Public Wireless Fiber Fed DAS solution allows deployment of cellular coverage in areas underserved by the current cellular network.

2. Network configuration of system

2.1. Network configuration

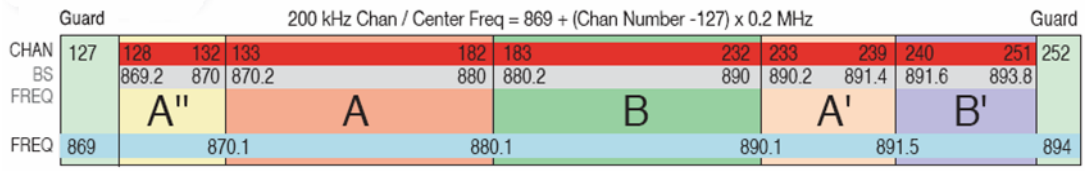
The Public Wireless Fiber Fed DAS solution conforms to the traditional analog fiber transport DAS architecture, with central hub units (DUs) feeding RF signals over fiber links to CM150D remote units (RUs).

- System configuration
  - System Connection: Single mode fiber optic cable between DU and RU
  - Optic Wavelength: 1310nm for FWD, 1550nm for RVS

3. System Specifications

3.1. System specifications

3.1.1. Frequency allocation



3.1.2. System Specifications

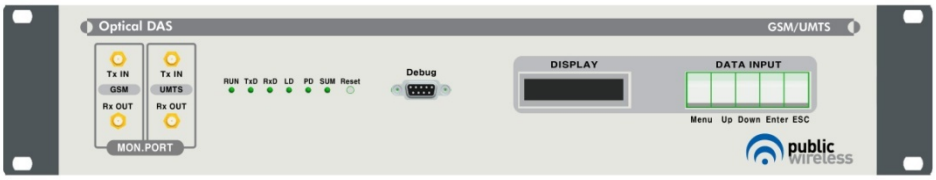
Item	Specification		Remarks
	WCDMA	GSM	
Downlink (Tx)	870 – 890 MHz	869 – 891.4 MHz	cf. 3.2.1
Uplink (Rx)	825 – 845 MHz	824 – 846.4	
Frequency Stability	0.01PPM		
System Delay	5usec max.		
Tx-Rx Isolation	100dB min.		
Impedance	50 Ohm		
RU DL Output Power	37 dBm composite	37 dBm composite	
System Gain	72dB	60dB	
FWD Spurious	3GPP, FCC compliant	3GPP, FCC compliant	
RVS Noise Figure	7dB max.	7dB max.	
EVM or Rho	12.5%		
Gain Control Range	RU: 20dB by 1dB Step	RU: 20dB by 1dB Step	
VSWR	1.5: 1 max.	1.5: 1 max.	

4. Mechanical Specifications

4.1.CM150D-01 DU

4.1.1.Mechanical Design

[FRONT]



4.1.2.Mechanical specification

No	Items	Specifications
1	Exterior view	1. Shelf attachable type to both INDOOR and OPEN RACK 2. W 19" ✖ H 3.5" ✖ D 15.75" 3. Weight: 14.1 lbs
2	Material	Aluminum (AL5052, AL6063) is mainly used for protection from corrosion by external environments.
3	Connector Type	1. Optic I/O: FC/APC at rear 2. RF I/O: SMA Female at rear 3. Monitor port: SMA Female at front

4	Power Input	1.Power: 110~120Vac, 60Hz 2.Connector: IN-NO3BEH
5	Ground	14SQ 2Hole ground pipe (right side of shelf) and M4 "O" rug ground (rear side of shelf)
6	Communication Port	9P D-SUB (GUI), front side

4.1.3.Descriptions of CM150D-01 DU

[Downlink Path]

The signal from GSM or WCDMA BTS is fed to the RF input port of DU. It becomes the input signal to the optic module to be transmitted to RU.

[Uplink Path]

The optical signal from RU (GSM or WCDMA) is converted into RF and becomes the input signal to the BTS of GSM or WCDMA.

4.2.CM150D-01 RU

4.2.1.Mechanical Design

4.2.2.Mechanical Specification

No	Item	Description
1	Dimension & Weight	Dimension: W 25” ✖ H 12” ✖ D 11” Weight: 65 lbs
2	Method of Cooling	Natural convection (Heat-sink)
4	Optic I/O	1. Single port 2. Connector type: FC/APC
5	ANT PORT	1. Single port 2. Connector Type: N Type
6	Power Input	1. 65 – 90 VAC Quasi Square Wave 2. Single port 3. Connector Type : F Connector
8	Waterproof condition	IP67 compliant

4.2.3.Description of CM150D-01 RU

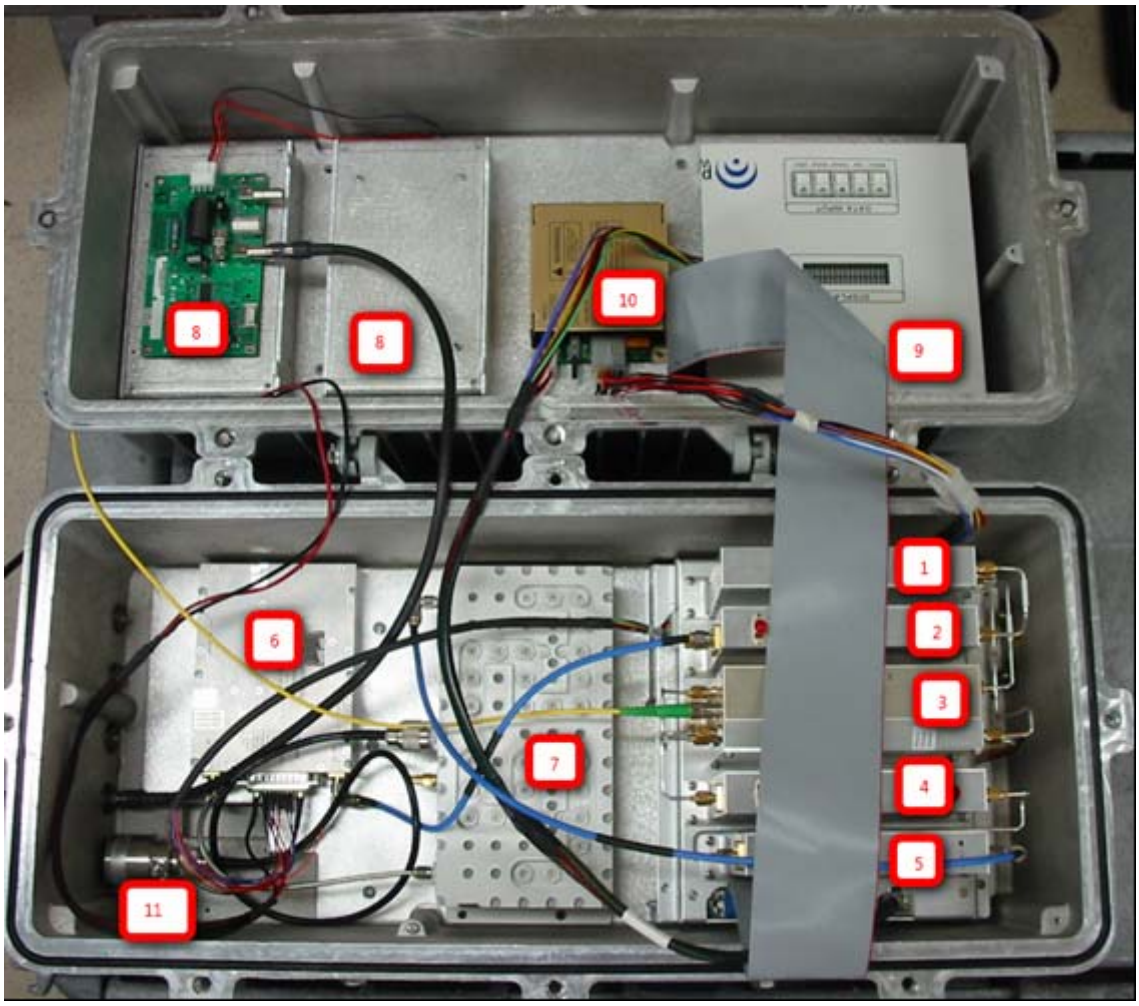
[Downlink path]

The optical signal is converted into RF and linearly amplified at HPA, passed through the Duplexer, and finally transmitted through an external antenna.

[Uplink Path]

GSM and WCDMA signals incoming from an antenna are first passed by the Duplexer and then transmitted to DU through the optic module.

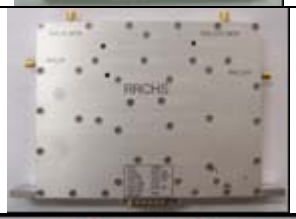
4.2.4.Module Composition

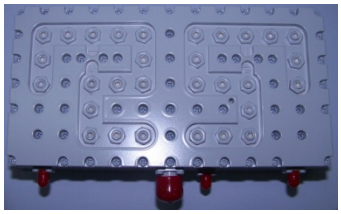
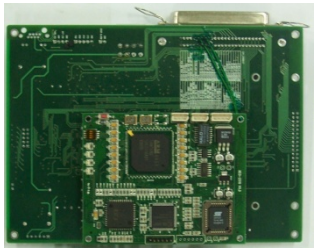
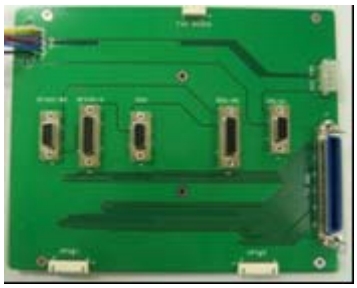


No	Module	Voltage Used	Remarks
①	RF FWD AGC for W/G (RFAGC-WG)	6.5Vdc	
②	RF FWD Channel Selector (RFCHS)	6.5Vdc	
③	Slave Optical Transceiver unit (SOU)	6.5Vdc	
④	RU RVS Channel Selector (RRCHS)	6.5Vdc	
⑤	RU RVS LNA for W/G (RRLNA-WG)	9Vdc	
⑥	HPA	27Vdc	
⑦	Front-End Filter Unit (FE-Duplexer)		
⑧	PSUs	60-90VAC	
⑨	NMS Controller	9Vdc	
⑩	DC DC Converter	28 VDC	
⑪	Surge Arrester		

4.2.5.Function of Modules

No	Module	Description

1		[RFAGC-WG] Divides RF signal (GSM and WCDMA) and modem signal
2		[RFCHS] Controls the level of FWD output signal, select the downlink band and perform the ALC function. The module output is sent to HPA.
3		[SOU] Converts E/O (or O/E) of FWD and RVS signals. Wavelength: TX 1550[nm], RX 1310[nm]
4		[FSK Modem] Data modem for RU and DU communication RU → DU frequency: 340MHz DU → RU frequency: 360MHz
5		[RRCOM-WG] Combines RF and data signal into a signal and provides the combined signal to optical module in order to convert E/O.
6		[RRCHS] Amplifies RVS signal, select the filtering band and control the uplink path gain of RU.
7		[RRLNA-WG] A low noise amplifier module for GSM and WCDMA. It has 20dB coupling gain compared to the output of the module. And includes built-in local oscillator to check uplink path gain.
8		[HPA] 8Watt High power amplifier that amplifies the signal from the RFCHS.

9		[FE-Duplexer] Front end duplexer that passes through desired frequency bands.
11		[NMS] Monitors/controls the status, and the configurable items and the modules of RU.
12		[Interface BD] Provides DC current to modules which are connected to interface B'D and supports a connection port to communicate with NMS B'D.

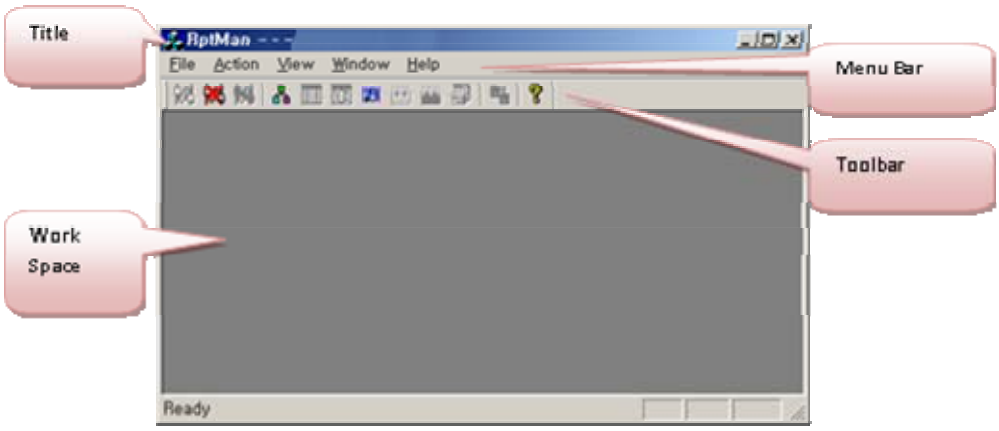
5. Administration Program (RptMan)

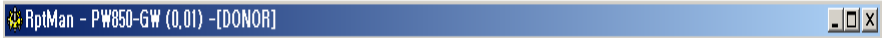
Administration program (RptMan) is a management program for CM150D-01 and provides status monitoring and control functions to users.

5.1. System Requirement

- System: Desktop or laptop PC
- OS: Windows XP or later
- Resolution: 1024 ✖ 768 or more
- Connection Cable: 9 pin serial cable (cross type)

5.2. Screen



Section	Description
Window Title	 Displays the name of management program (GUI), i.e. RptMan. Displays the type of equipment which is currently connected to program (DU or RU).
Menu Bar	Presents working menu for operators. It is associated with tool icons, which can activate the tool bar menus.
Toolbar	Presents icons (button type) for frequently used command. User friendly icons are used. Icons are activated or disabled as to the status of repeater.
Work Space	Status information and control function are provided with a block diagram view of DU and RU. Provides the working space of windows or dialogs.

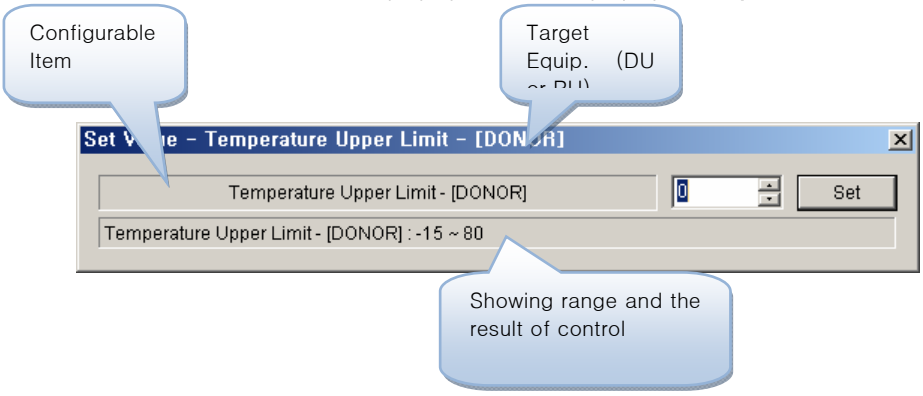
5.3. Status Display

Status of repeater is displayed by LED and values. The meanings are as follows.

- LED
  - Alarm: /■ blinking means ALARM, ■ means NORMAL
  - On/Off: ■ ON, ■ OFF
    Exception) for HPA, ■ is ON, ■ is OFF
- Value
  - Units are not displayed (omitted).
  - Value displayed in box (0.0)
- Control
  - The shape of mouse cursor is changed to on controllable item.
  - The texts of controllable LED or values are displayed in BOLD font.

5.4. Control Policy

- System parameter is controlled one at a time.
- Click a control item (button) to popup a control popup dialog.



- Once a dialog popup window is opened, it stays there for repeated control.

5.5. Menu

Menu	Sub Menu	Function
File	Connect	Connects GUI and repeater to communicate
	Disconnect	Disconnects GUI and repeater
	Exit	Finishes admin program.
Action	Power Table	Presents a dialog to manipulate RF power table
	TC Table	Presents a dialog to manipulate temperature compensation table
	Image Compression	Compressed the firmware file (executable file of repeater) to download
	Image Downloader	Downloads compressed firmware file to repeater
	Factory Setting	Sets configured values of repeater back to values of factory settings
	Gain Setting	Tx: set ATT to have 33dBm remote HPA output. Rx: set ATT to have 40dB gain of Rx path including optical loss.
View	Donor Window	Presents DU status window in work space
	Remote Window	Presents RU status window in work space
Window	Cascade	Cascade or tile horizon arrangement of repeater status windows in work space
	Tile Horizon	
	Packet Debug	Presents debug window in work space displaying packets between repeater and GUI program

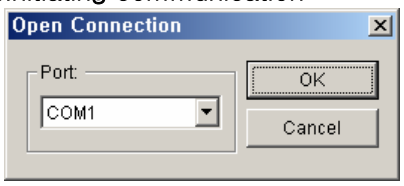
Help	About RptMan	Displays version of GUI program named RptMan (Repeater Manager)

5.6. Toolbar

ITEM	ICON	Function
Communication Establishment		Establishes RS-232C connection to the repeater, then GUI starts to communicate and status of repeater are polled and displayed.
Communication Disconnection		Disconnects communication with connected repeater. Status of repeater is not updated.
Polling Stop/Resume		Stops or resumes polling action of GUI program. (activated in toggling way)
Power Table		Presents a dialog to manipulate RF power table
T/C table		Presents a dialog to manipulate temperature compensation table
Debug Packet		Displays packet data between GUI and repeater like protocol analyzer and it may help debugging of software
Compression of image file		Compresses image file of repeater
Gain Setting		TX: set ATT to have 33dBm HPA RX: set ATT to have 40dB gain of Rx path
Donor Download		Download donor firmware files to a designated equipment.
Remote Download		Download remote firmware files.
Donor Factory Setting		Changes donor parameters to factory setting.
Remote Factory Setting		Changes remote parameters to factory setting.
Help		Shows version information

5.7. Program operation

5.7.1. Initiating communication

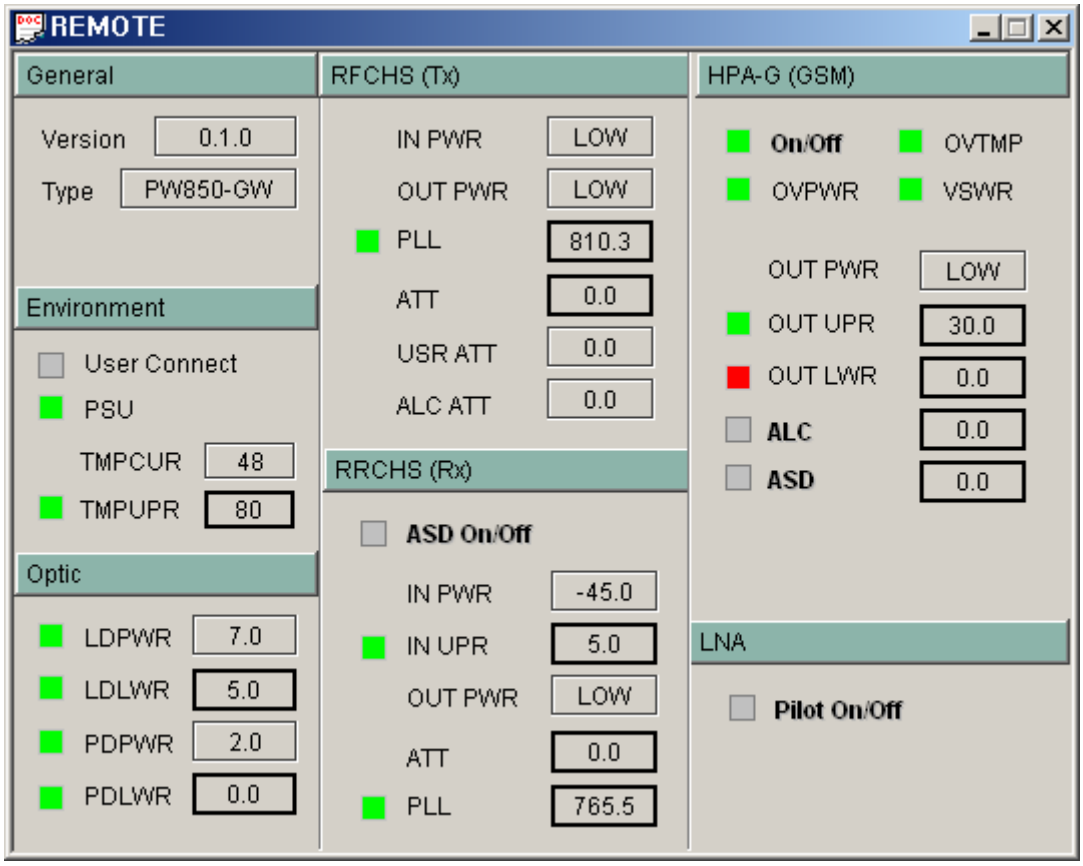


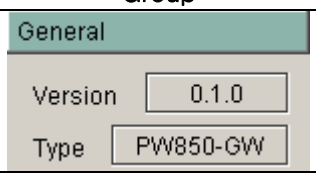
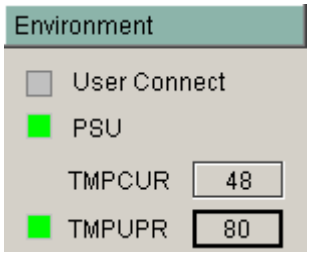
Function	Establishment of communication between GUI and repeater	
Method	Click button in toolbar of GUI program	
Description	Port	Combo box to choice com port (COM1, COM2, …)
	OK Button	Initiates communication between GUI and repeater, then close this popup window("Open Connection")
	Cancel Button	Cancels communication establishment and close the popup window

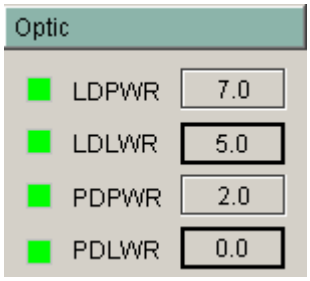
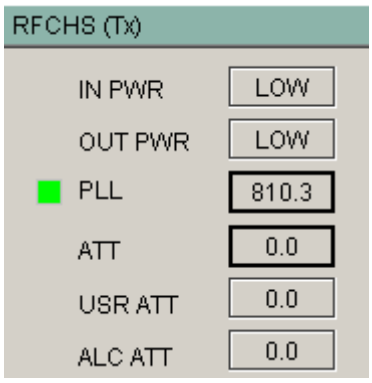
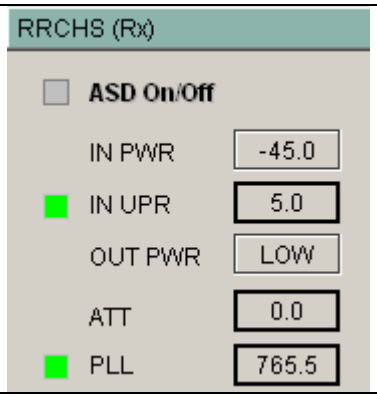
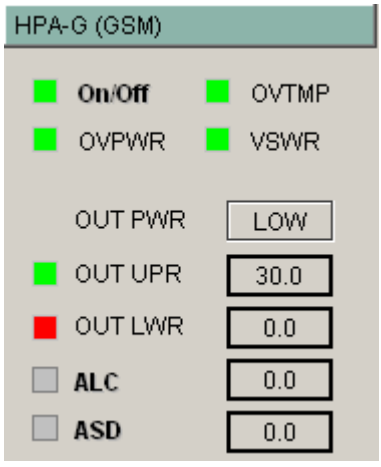
5.7.2. Disconnection

Function	Disconnection of GUI and repeater
Method	Click button in toolbar of GUI program
Description	GUI on PC and repeater disconnect communication with each other by this action.

5.7.3.CM150D-01 RU Status Retrieval and Control



Group	Description
	● Version: Version of firmware ● Type: Type of repeater
	● User Connect: Connection status of COM port of repeater ● PSU: Status of PSU ● TMPCUR: Current temperature of repeater ● TMPUPR: Value/control of upper threshold of temperature (button) and alarm status (LED)

	● LDPWR: Value of LD power (box) and status of LD (LED) ● LDLWR: Value/control of lower threshold of LD power (button) and lower alarm status of LD power (LED) ● PDPWR: Value of PD power (box) and status of PD (LED) ● PDLWR: Value/control of lower threshold of PD power (button) and lower alarm status (LED)
	● INPWR: FWD RF input power display ● OUTPWR: FWD RF output power display ● PLL: Set PLL value, and shows PLL alarm status ● ATT: Set ATT to control FWD level, and shows it s value. When ATT is set manually, ALC ATT is set to zero, and USR ATT is set to ALC ATT + (ATT change). Displayed ATT value = USR ATT + ALC ATT ● USR ATT: When ATT is set, USR ATT is set to ALC ATT + (ATT change). ● ALC ATT: It is automatically adjusted by HPA ALC to control FWD gain, and it is set to “0” when ATT is controlled.
	● ASD: When input upper threshold alarm occurs, set ASD activation, and shows its status. ● IN PWR: RVS input power value ● IN UPR: Set RVS input upper threshold, and shows the alarm status of input upper threshold RVS. ● OUTPWR: RVS RF output power ● ATT: Set ATT to control RVS level, and shows it s value. ● PLL: Set PLL value, and shows PLL alarm status
	● On/Off: Status/control the operation state of HPA ● OVTMP: Alarm status of HPA Over-temperature ● OVPWR: Alarm status of HPA Over-Power (LED) ● VSWR: Alarm status of HPA VSWR (LED) ● OUT PWR: Output power level of HPA (box) ● OUT UPR: Value/control of upper threshold of HPA output power (button), alarm status (LED) ● OUT LWR: Value/control of lower threshold of HPA output power (button), alarm status (LED) ● ALC: Set ALC level for HPA output, and shows ALC status. RFCHS ALC ATT is used

	to control HPA level. ● ASD(Auto Shutdown): ASD level (button), e running status of function (LED)
	● Pilot On/Off: Set CW signal generation, and shows its status. It is used for RVS gain setting.