22KW DC/DC
Graphical User Interface (GUI) Introduction

Overview of CAN

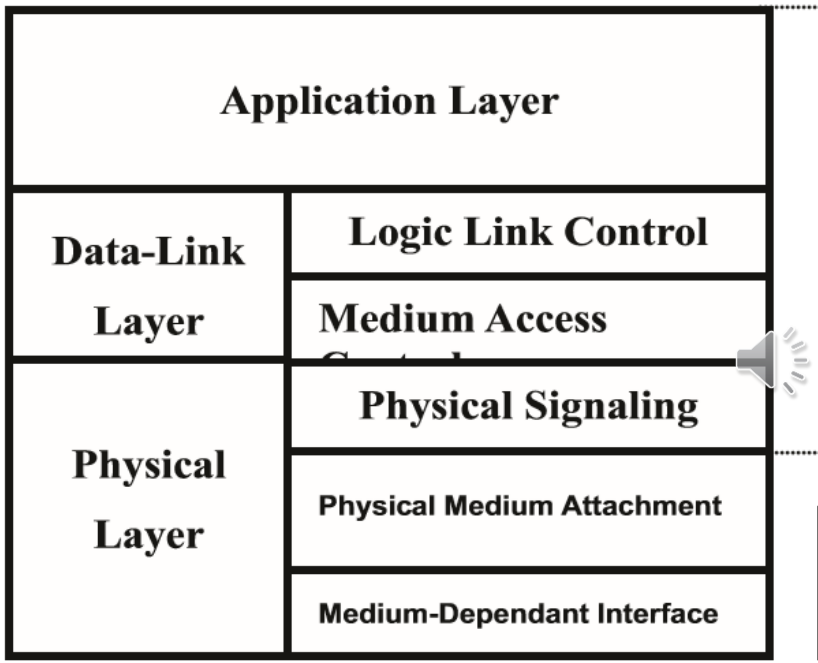
CAN Features:

- two-wire(differential signal) serial
- half duplex
- 1Mbit/s maximum
- Muti-Master network

Why is CAN used?

- Robust in noisy environments
- Reliable: built-in error confinement and detection
- High speed
- Cost effective

CAN Open Systems Interconnection (OSI)



DSP or µController

U28: TMS320F28377D CAN Controller Hardware/Software.

Embedded CAN Controller

CAN Controller, Embedded or Separate

CAN Transceiver

Electrical Specifications: Transceivers, Connectors, Cable

U53: ISO1050 Isolated CAN Receiver

CAN Bus-Line

Rx Line

Tx Line

120Ω internal resistor across Rx and TX

Connector J11: Connected to USB-CAN tools(hardware) + PC software.

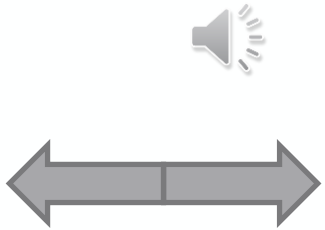
USBCAN-I Pro

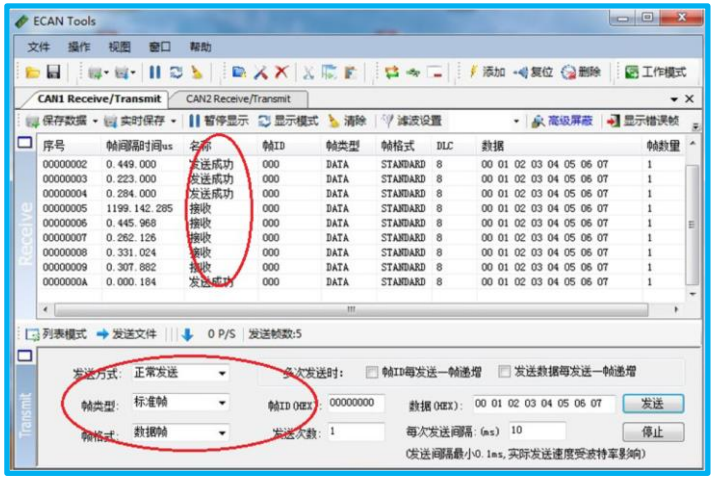
Figure 1. The Layered ISO 11898 Standard Architecture

USB-CAN Tools and GUI

- The USB to CAN tools/adapters (CAN Analyzers) enable simple connection between CAN networks and a PC.

- CREE's GUI for its 22KW OBC also relies on a unique driver.
  - Thus, the GUI can only work with USBCAN-I hardware from GCAN.
  - Without this restriction any other USB to CAN tools could be used.





Official GUI

CAN Network and CAN Data Frame Format

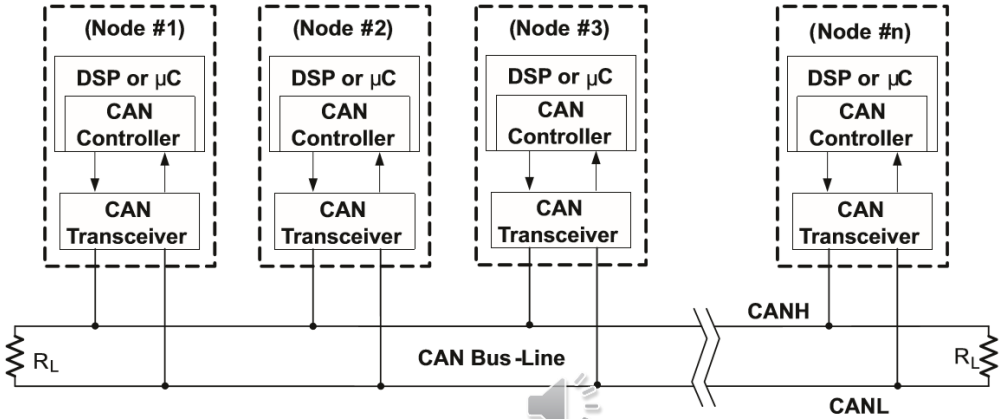


Figure 2. CAN Network (R_L = 120R Typ.)

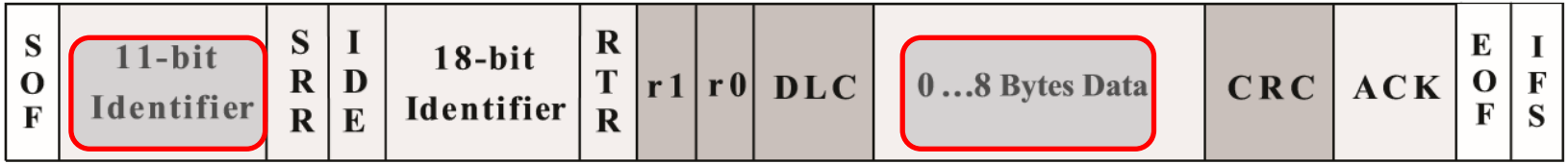


Figure3. Extended CAN (CAN2.0B) frame format

- Only 29-bit Identifier and Data Bytes are used by users.
- Remaining bits are calculated and stuffed by CAN hardware.

GUI CAN Data Format

If you don't have GCAN tools, you can also send command to adjust the output voltage in the data format described below without visually displaying. You also have to judge if there is warning in the data stream.

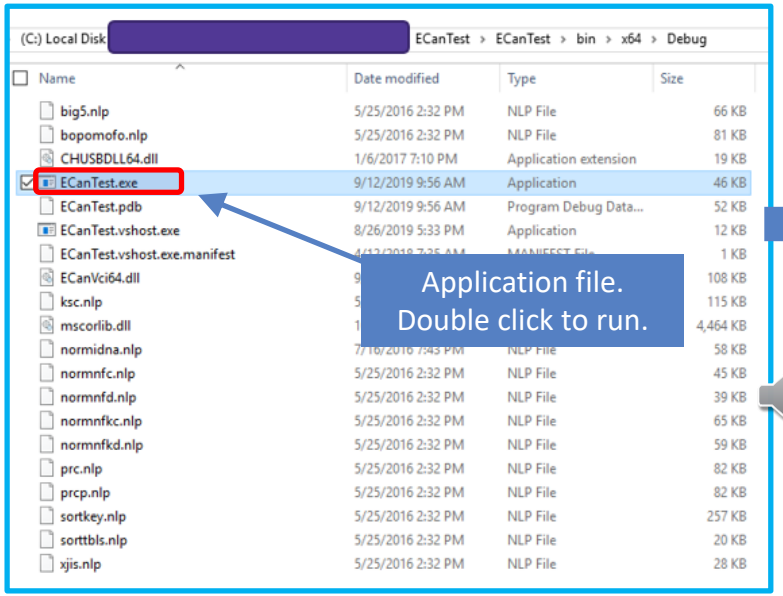
Message Identifier: 0x18A5E5F4					
Data	Byte0 = 01	Byte1= 00	Byte2+Byte3	Byte4+Byte5 = 0x12C0	Byte6+Byte7 = 0x0168
Property	Charging Mode; Full Bridge	On	Reserved 0xFFFF	DC Voltage: 0x12C0*0.1V = 480V	DC Current: 0x0168*0.1A = 36A

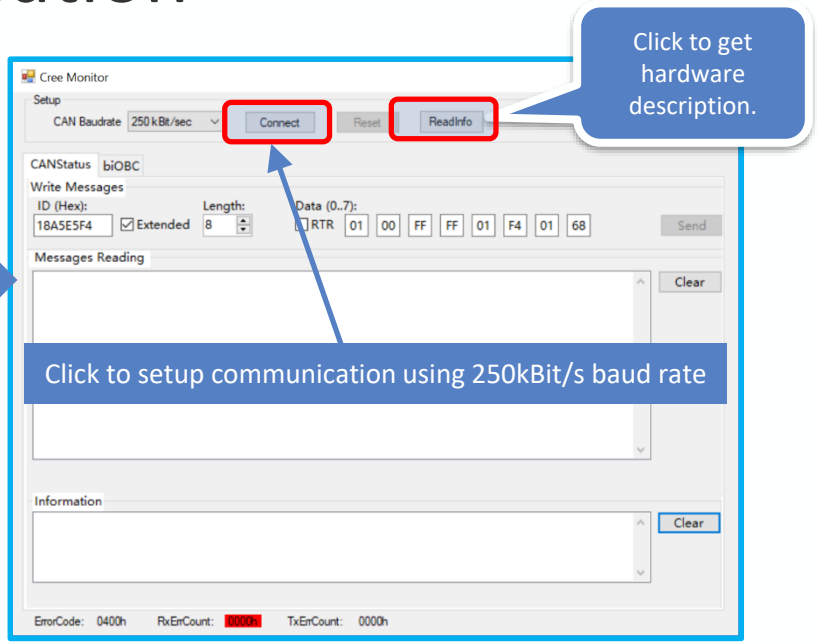
Table 7: Example of Control Command

For example, use "0x18A5E5F4" as the message identifier and "0x0100FFFF12C00168" as CAN data to set the OBC to 480V with full current capacity. The first byte in the CAN instruction needs to match the real work mode situation when the second byte is zero or the instruction will be ignored by the reference board. The voltage control message only matters in charging mode because the output voltage is fixed in discharging mode.

For other frames, please refer to section 12.2/12.3 in user's guide.

GUI Execution





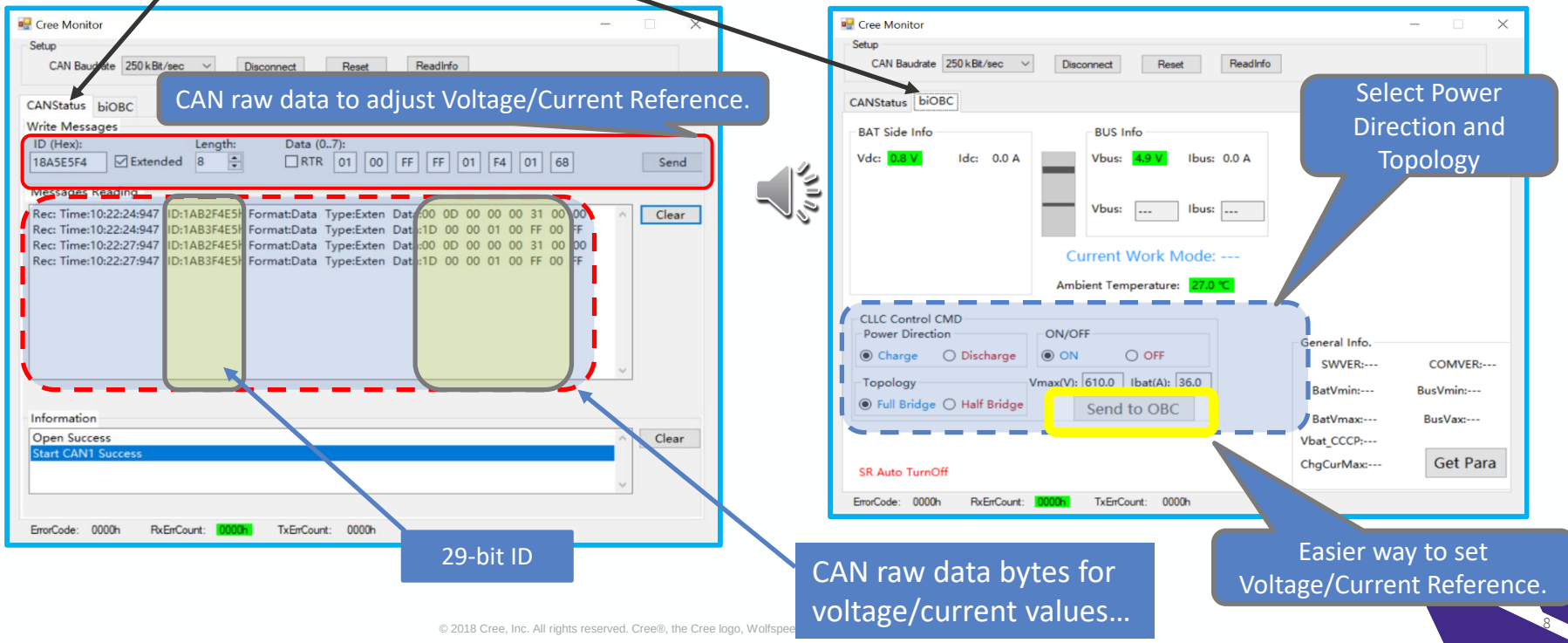
Step 1: Start the program after hardware connection is done. Connect USB port to PC and CAN port to connector J11 of OBC.

Step 2: Click “connect” to setup the communication.

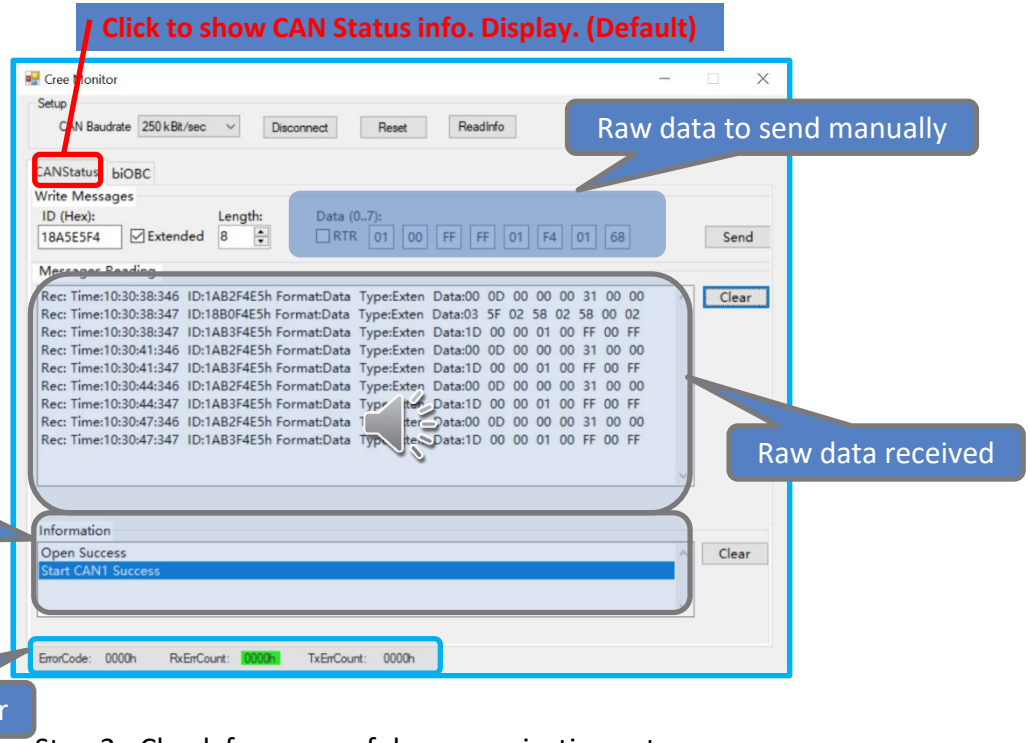
Note: Microsoft C# visual studio was used to develop the GUI application. Installation is not needed.

The CREE GUI Overview

- The Cree GUI is dependent on the GCAN tool and its driver.
- **Raw data** and **processed information** are displayed in different tab pages.

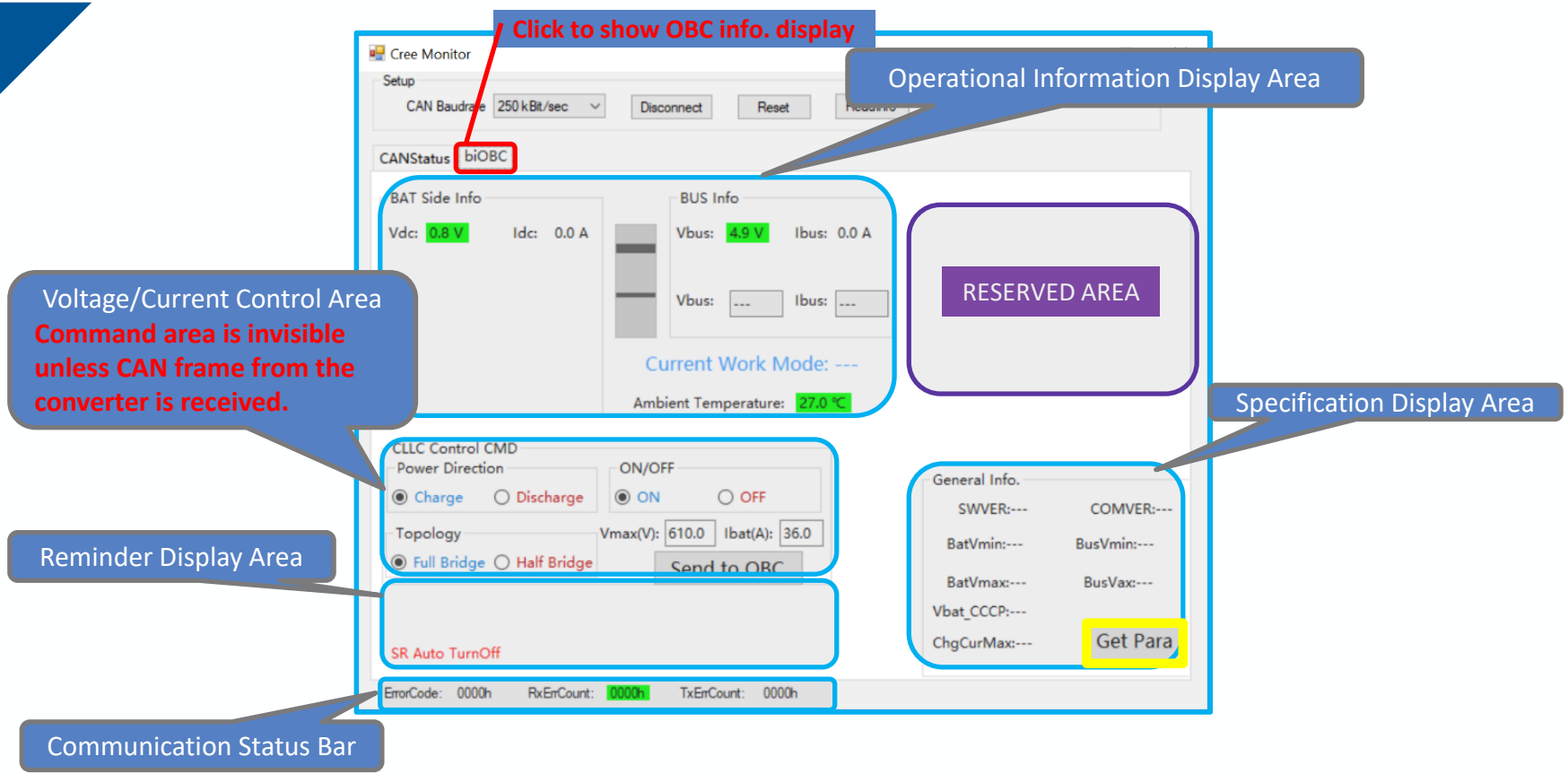


GUI Windows: CAN Status Tab



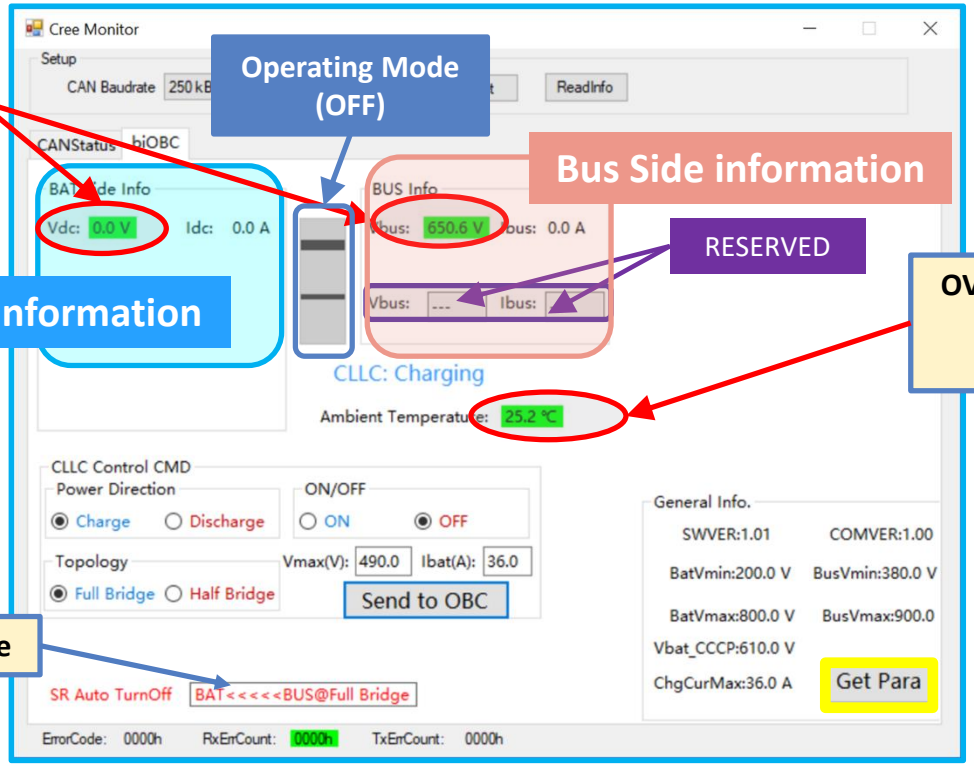
Step 3: Check for successful communication setup. If not, check CANH and CANL wire positions and if control board has power.

GUI Windows: biOBC Tab



Step 4: Open biOBC tab.

GUI Windows: biOBC Tab



OVER/UNDER VOLTAGE
RED: Fault
GREEN: Normal

Operating Mode (OFF)

Bus Side information

RESERVED

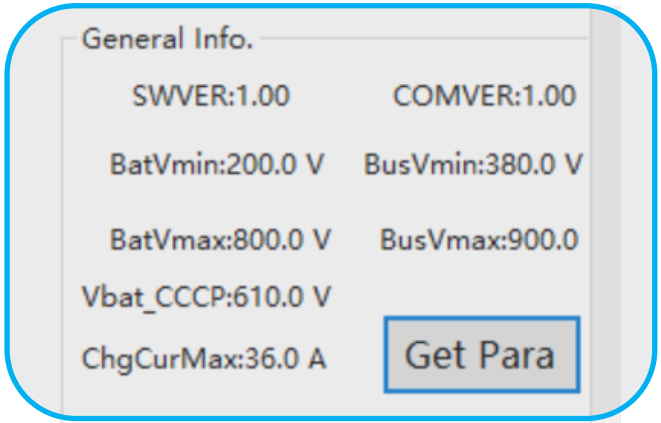
Battery side information

OVER TEMPERATURE
RED: Fault
GREEN: Normal

Current Operation Mode

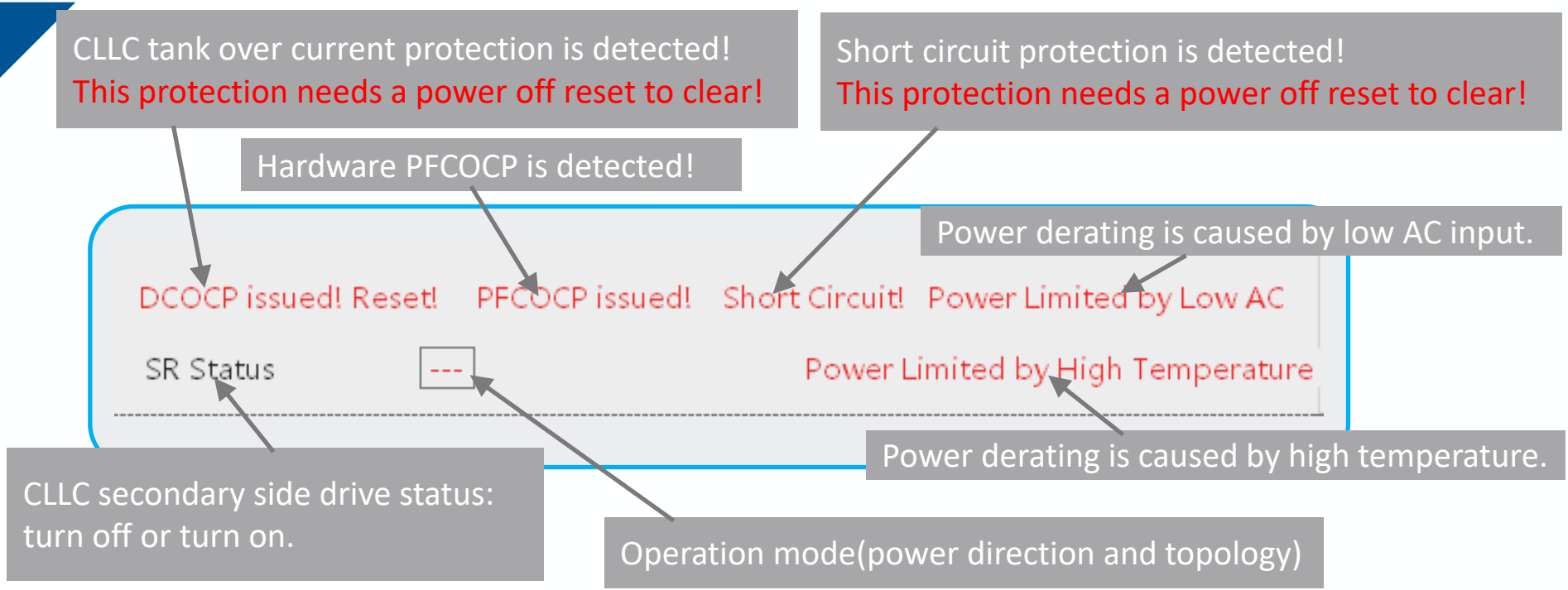
Step 4: Open biOBC tab.

GUI Specification Display Area



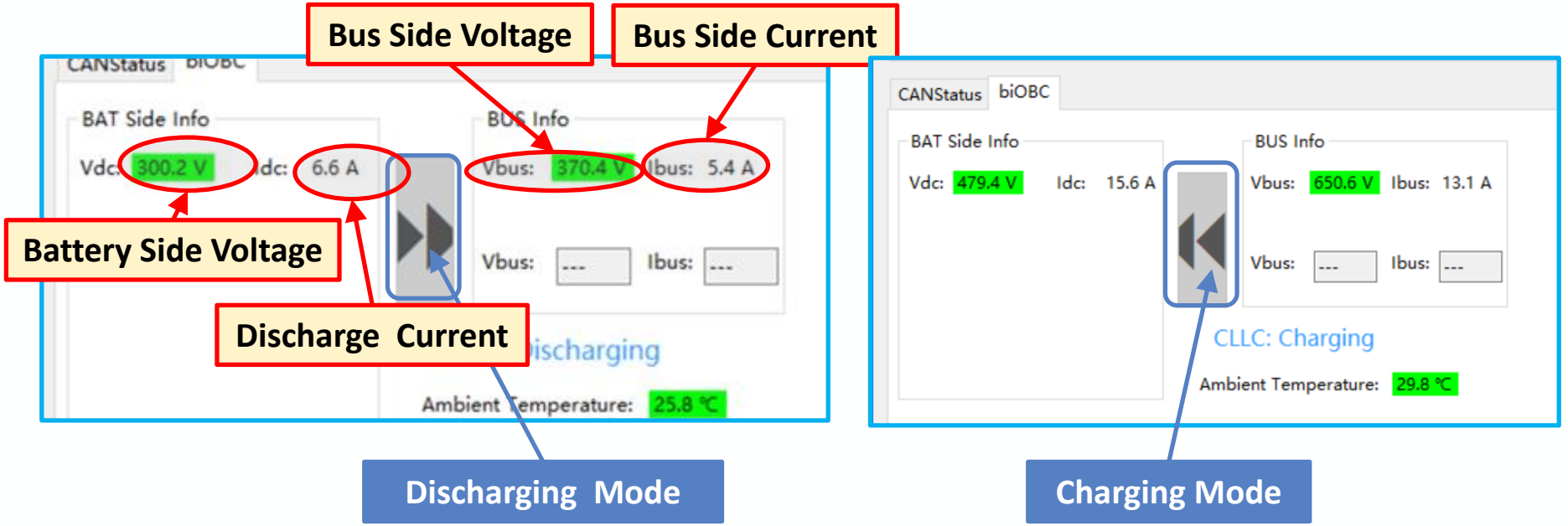
SWVE:	Software Version, Ver1.00
COMVER:	Software Version for Communication, Ver 1.00
BatVmin:	Vmin at battery side, 200V
BatVmax:	Vmax at battery side, 800V
BusVmin:	Vmin at bus side, 380V
BusVmax:	Vmax at bus side, 900V
Vmax_CCCP:	Max voltage (610V) with Max Current (36A): 22KW/610V/36A.
ChgCurMax:	Max Current in charging mode, 36.0A

GUI Reminder Display Area



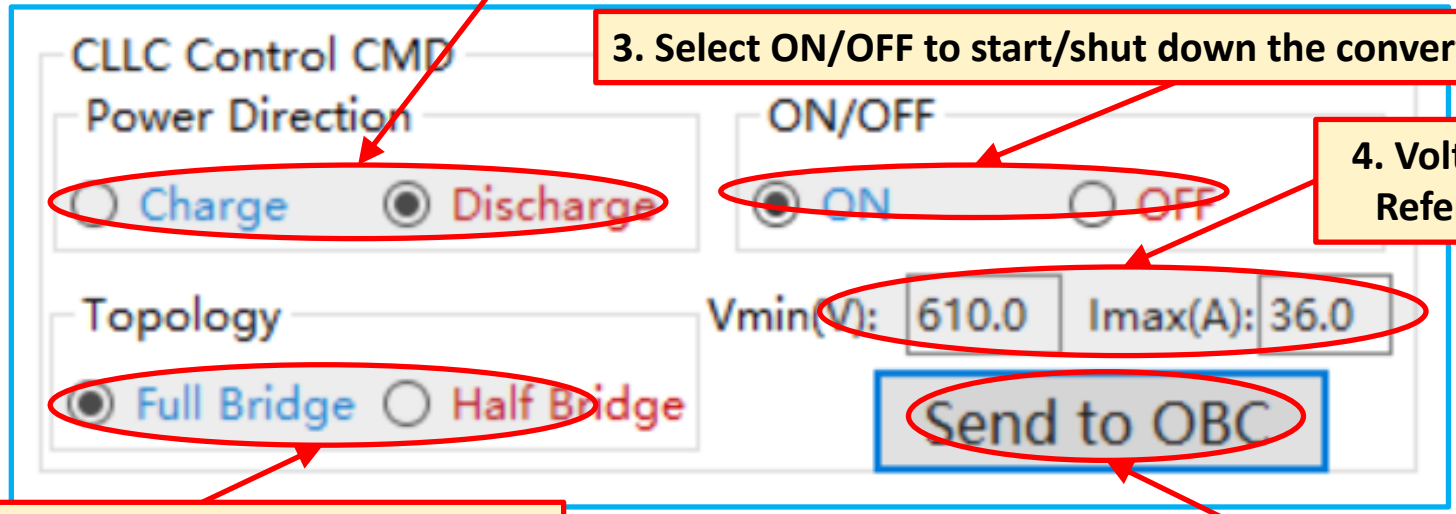
Note: Most reminders are invisible during normal operation.

GUI Operational Information Display



GUI Voltage/Current Control Area

1. Referring to Chapter 6 in the Users' Guide, select the right power direction based on the set-up connection.



3. Select ON/OFF to start/shut down the converter respectively.

4. Voltage/Current Reference Input

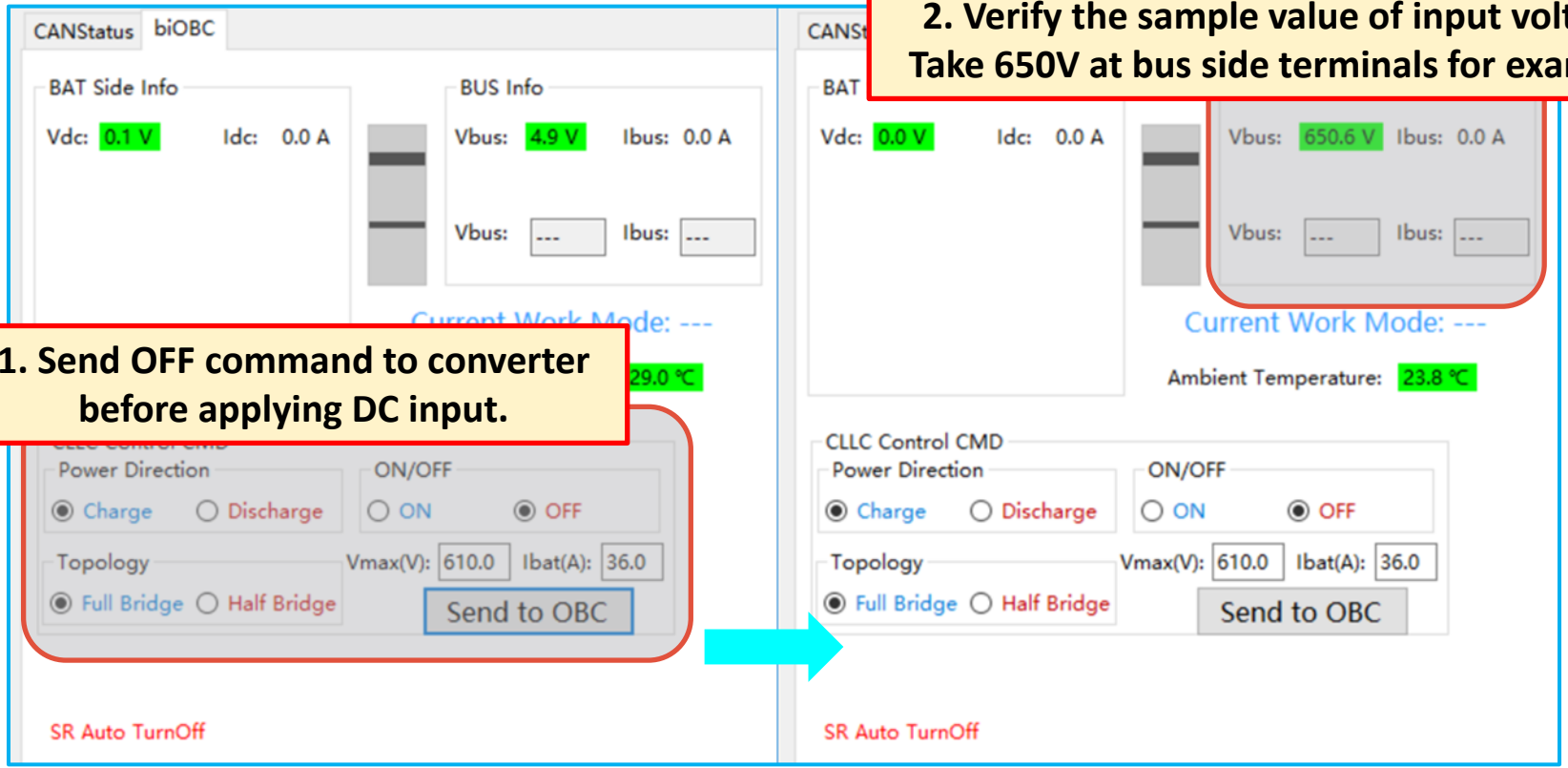
2. Referring to Chapter 2 in the Users' Guide, select topology selection for the input side.

5. Click to send out the command.

GUI Usage Example

Take 650V input and charging mode as example

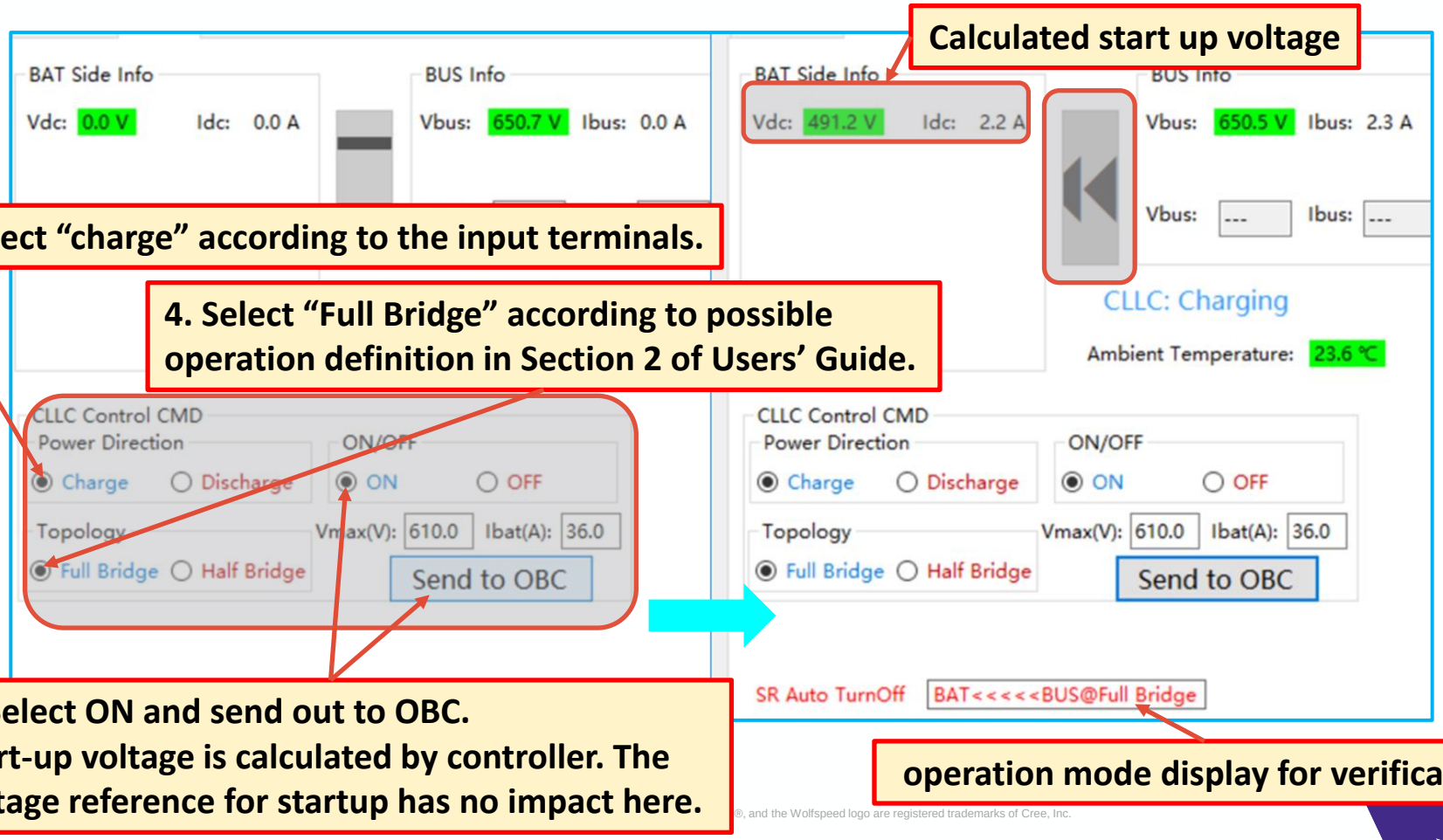
GUI Usage Example



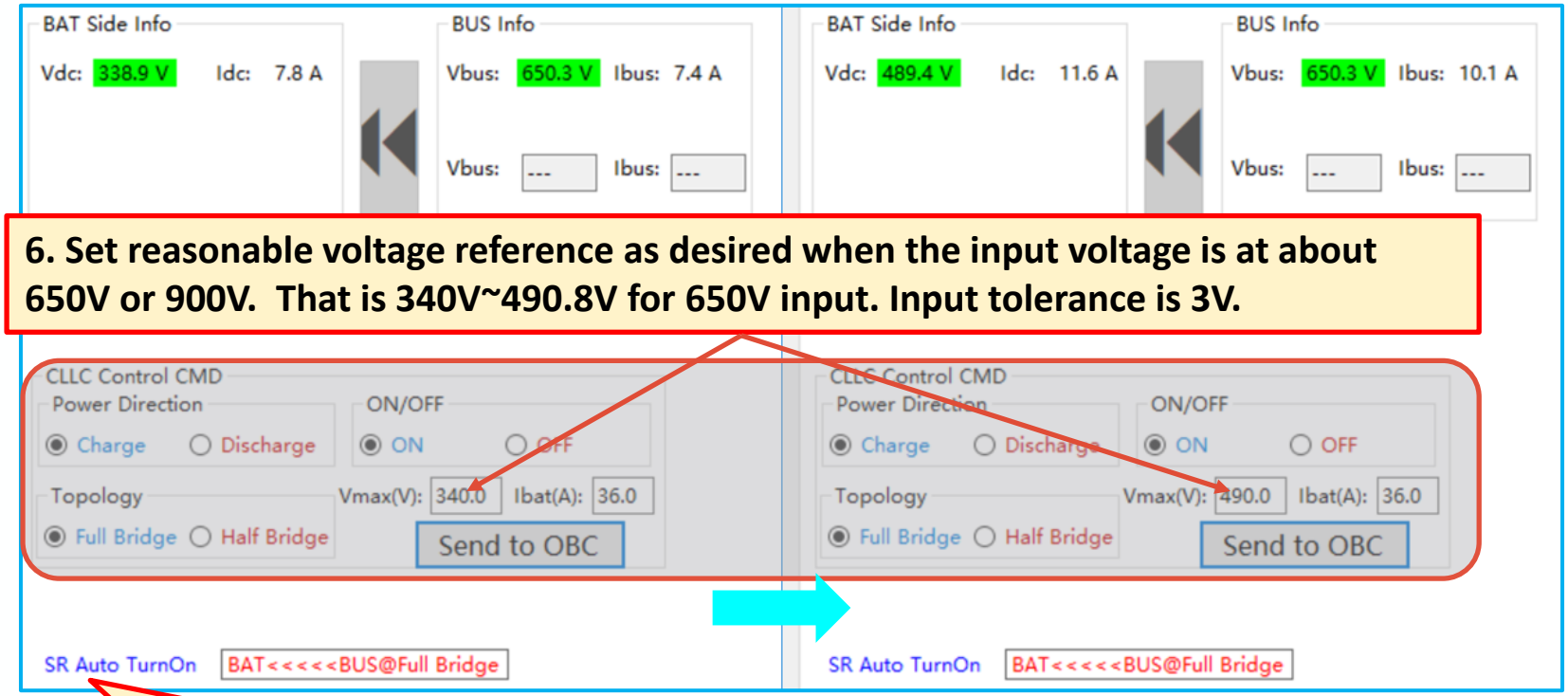
1. Send OFF command to converter before applying DC input.

2. Verify the sample value of input voltage. Take 650V at bus side terminals for example.

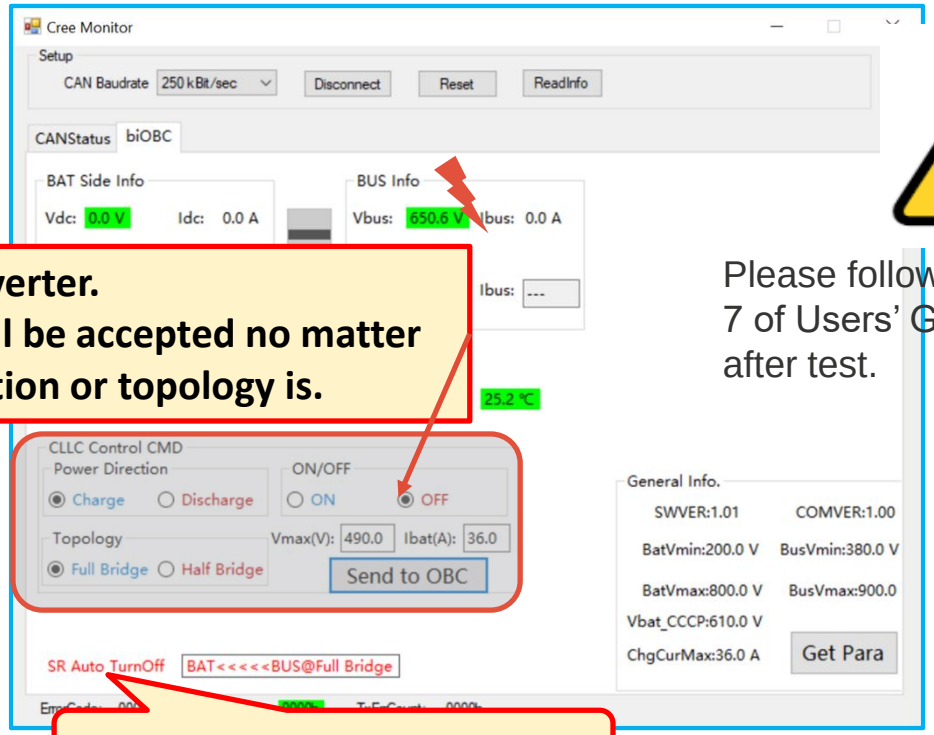
GUI Usage Example



GUI Usage Example



GUI Usage Example



7. Shut down the converter.
The OFF command will be accepted no matter what the power direction or topology is.

SR is disabled automatically.

Please following the procedure in Section 7 of Users' Guide to shut down the power after test.