

Exiting DTM Mode

BL654 Series

Application Note

v1.0

1 INTRODUCTION

The goal of this document is to introduce the Laird Exit DTM utility for BL654 modules. This utility is used to switch modules from DTM mode back into interactive mode whereby the firmware can be upgraded or applications loaded to the module.

2 REQUIREMENTS

The following are required to use the Exit DTM utility:

- A Laird BL654 module in DTM mode – part # 451-00001, 451-00002, 451-00003, 455-00001, or 455-00002
- UART access to module (with hardware flow control) to a host PC
- Host PC running Windows (7 or newer), Linux (Kernel 3.16 or newer), or Mac (El Capitan or newer) with UART to the module or USB to UART converter to the module
- *ExitDTM* software – Provided by Laird at <https://github.com/LairdCP/BL654-ExitDTM>

3 OVERVIEW

To exit from DTM mode, you must use Laird’s development board or your own equivalent implementation to provide a UART access to the module, including CTS and RTS lines for hardware flow control.

3.1 Application Options

To access the application options from the ExitDTM software, follow these steps:

1. Download and run the ExitDTM software as described on the front Github page. This process varies depending on the host OS of your PC.
2. Once complete, run the application.

A window ([Figure 1](#)) appears with various options. Use the tab selection at the top of the window to switch the log display view (Display or Config) ([Figure 2](#)).

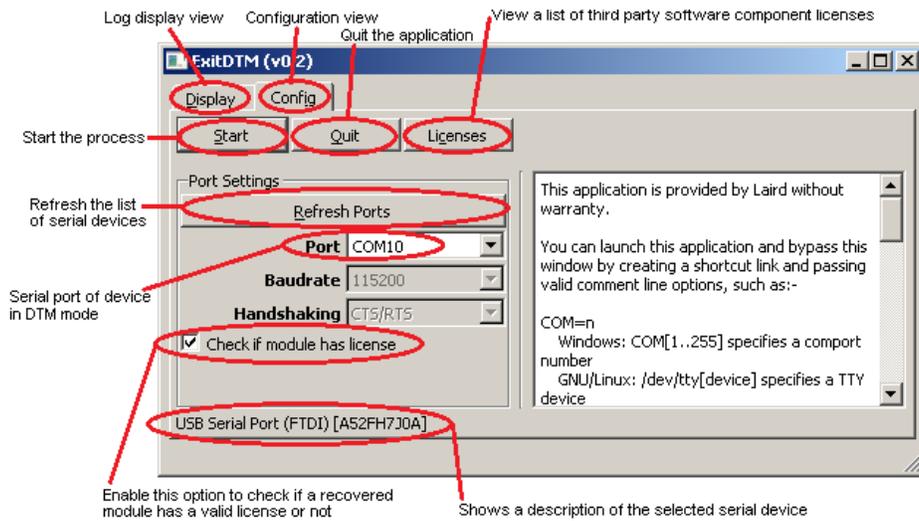


Figure 1: Annotated main interface, configuration tab

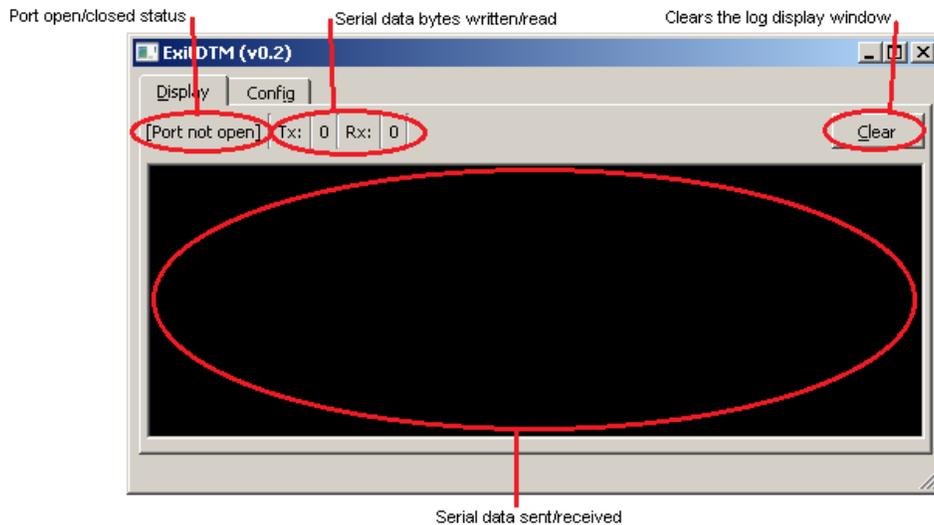


Figure 2: Annotated main interface, display tab

3.2 Exiting DTM Mode

To exit DTM mode, follow these steps:

1. Select the module's serial port from the drop-down menu. Ensure that the description of the port matches your serial port or driver.

Note: The description of the serial port is shown near the bottom of the window. For Laird BL654 development kits and USB dongles, it displays FTDI.

2. Once this is configured, press **Start** to begin the process.

If an error displays regarding permission issues (Figure 3) then this is likely caused by one of the following:

- Another application has the serial port already open

- A permission issue (for non-Windows systems) where a user was not granted access rights to certain devices. If this is the case, please follow the instructions on the UwTerminalX Github Wiki: [https://github.com/LairdCP/UwTerminalX/wiki/Granting-non-root-USB-device-access-\(Linux\)](https://github.com/LairdCP/UwTerminalX/wiki/Granting-non-root-USB-device-access-(Linux)).

If an error message displays about the module not being in DTM mode (Figure 4) then this means that this utility does not need to be used on this module as it is already in interactive mode.

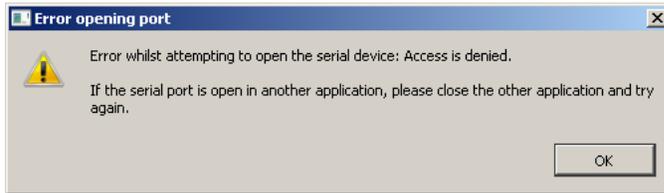


Figure 3: Access denied error message



Figure 4: Module not detected as being in DTM mode

If no errors occur, then the application switches to the display tab and begins the process of exiting DTM mode on the module. This can take up to 15 seconds. Commands being sent to and received from the module are displayed in the main log window (Figure 5).

Note: This control does not accept input data to be written to the serial port. Please use a terminal application like UwTerminalX, available from <https://github.com/LairdCP/UwTerminalX> for this purpose.

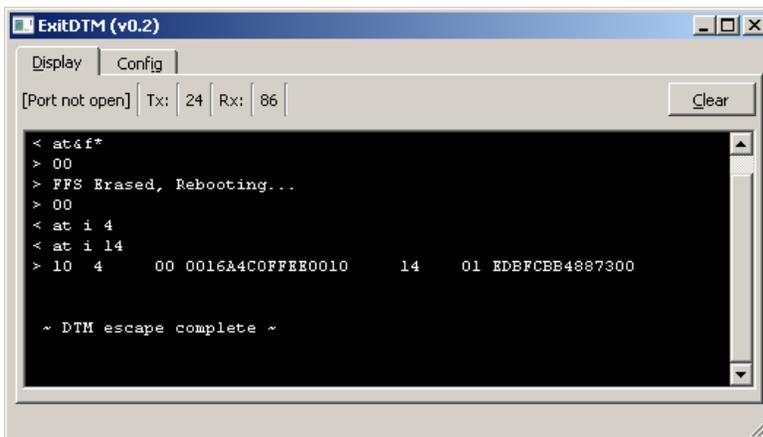


Figure 5: DTM exit progress display

Once complete, a message displays the result of exiting DTM mode. If successful, you can close the utility and communicate with the module in interactive *smart*BASIC mode using a terminal emulator utility (Figure 6).

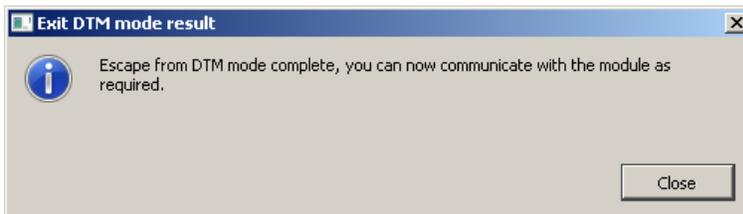


Figure 6: Exit from DTM completed successfully

If you have the license check option enabled and the exit DTM process successfully completes but does not find a valid license on the module, the following message displays (Figure 7). This message contains information which should be sent via email to the Laird Wireless Support team at cs-support@lairdtech.com

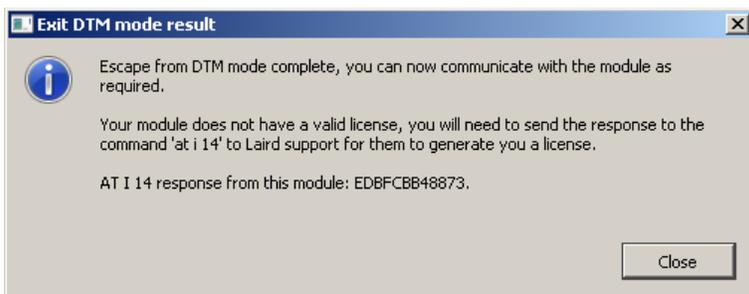


Figure 7: Exit from DTM completed successfully but module does not have a license

If there was a problem exiting from DTM mode, the following warning message displays which includes debugging information. This information can be used to narrow down where an issue is arising (Figure 8).

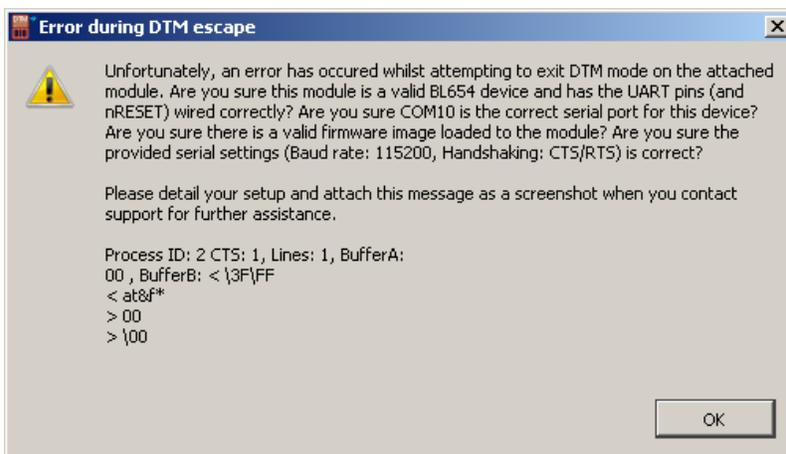


Figure 8: Error whilst attempting to exit DTM mode

If you get this error, first ensure that the module is powered correctly (at the same voltage level as the USB to UART interface chip, if used – 1.8 to 3.6v). Also ensure that you’re using the correct UART pins (with CTS and RTS connected correctly for hardware handshaking support) (Table 1).

Note: This application only exits DTM mode on modules. You cannot use it to prevent an autorun application from running. To prevent an autorun application from running, consult the BL654 datasheet (available from the Documentation tab of the [BL654 product page](#)).

Table 1: UART interface

Signal Name	Pin No	I/O	Comments
SIO_06 / UART_Tx	35	O	SIO_06 (alternative function UART_Tx) is an output, set high (in firmware).
SIO_08 / UART_Rx	29	I	SIO_08 (alternative function UART_Rx) is an input, set with internal pull-up (in firmware).
SIO_05 / UART_RTS	39	O	SIO_05 (alternative function UART_RTS) is an output, set low (in firmware).
SIO_07 / UART_CTS	37	I	SIO_07 (alternative function UART_CTS) is an input, set with internal pull-down (in firmware).

If you are unable to exit DTM mode or get this application working successfully after following the guide, please contact the Laird Wireless Support team via email at cs-support@lairdtech.com for support.

3.3 Batch Mode

This application can be automated from the command line as part of a test or development system. There are various command line arguments which can be provided to control the functionality of the application. These are explained in [Table 2](#).

Table 2: Command line arguments

Argument	Comments
COM=<port>	Used to specify the serial port of the module. <ul style="list-style-type: none"> On Windows, this can be a COM port string like <i>COM18</i> or the numerical part of the string, <i>18</i>. On Linux/mac this is the full path of a serial device such as <i>/dev/ttyUSB0</i>
NOLICENSE	When supplied, skips checking if the module has a valid license.
NORECOVERY	When supplied, prevents starting the process when the application starts.
AUTOEXIT	When supplied, automatically closes the application without waiting for user input.
NOWINDOW	When supplied, the application does not create a GUI.

Please ensure you check the latest files in the project on Github as the application may be updated with additional features/functionality which is not reflected in this document.

The exit code of the application determines if an error occurred or if exiting DTM was successful. These result codes can be found in the *DtmMainWindow.h* file. They are also displayed in [Table 3](#). Note that fully automatic operation must be enabled to use the exit code status.

Table 3: Exit codes

Return Code	Comments
0	Successfully exited DTM mode
-1	Invalid serial port selected
-2	CTS was asserted when it should not be
-3	Successfully exited DTM mode but the module is lacking a license
-4	The module did not respond within an allocated time limit to a request
-5	An error with the serial port occurred

4 FURTHER INFORMATION

Further information relating to the BL654 module is available from the BL654 product page of the Laird website:
<https://www.lairdtech.com/products/bl654-ble-thread-nfc-modules>.

5 REVISION HISTORY

Version	Date	Notes	Contributor(s)	Approver
1.0	23 July 2018	Initial Release	Jamie McCrae	Jonathan Kaye