

UM10553

DALI getting started guide

Rev. 2 — 6 March 2013

User manual

Document information

Info	Content
Keywords	LPC111x, LPC1343, ARM, Cortex M0/M3, DALI, USB, lighting control, USB to DALI interface.
Abstract	This user manual explains how to get started with the LPC1343 USB to DALI Master demo board and the LPC111x DALI Slave demo board using a DALI control application from NXP Semiconductors for Windows.



Revision history

Rev	Date	Description
2	20130306	<ul style="list-style-type: none">Updated Fig 4, Fig 5, Fig 8, Fig 10 and Fig 12.Added Section 4.2.Editorial updates.
1	20120306	<ul style="list-style-type: none">Initial version.

Contact information

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1. Introduction

This document describes how to get started with the NXP LPC111x Cortex-M0 DALI slave and LPC1343 Cortex-M3 DALI master demoboards in combination with a PC demonstration application.

The design information of the LPC111x Cortex-M0 DALI slave and the LPC1343 Cortex-M3 USB to DALI master can be found in application notes AN11174 [1] and AN11175 [2].

2. Required items

2.1 Required hardware

To get started the following hardware items are required:

1. LPC1343 USB to DALI master as shown in [Fig 1](#).



Fig 1. LPC1343 USB to DALI Master demo board

2. USB cable to connect the LPC1343 DALI master to a PC



Fig 2. USB cable for NXP DALI Master

3. NXP Cortex M0 LPC111x DALI Slave as shown in [Fig 3](#).

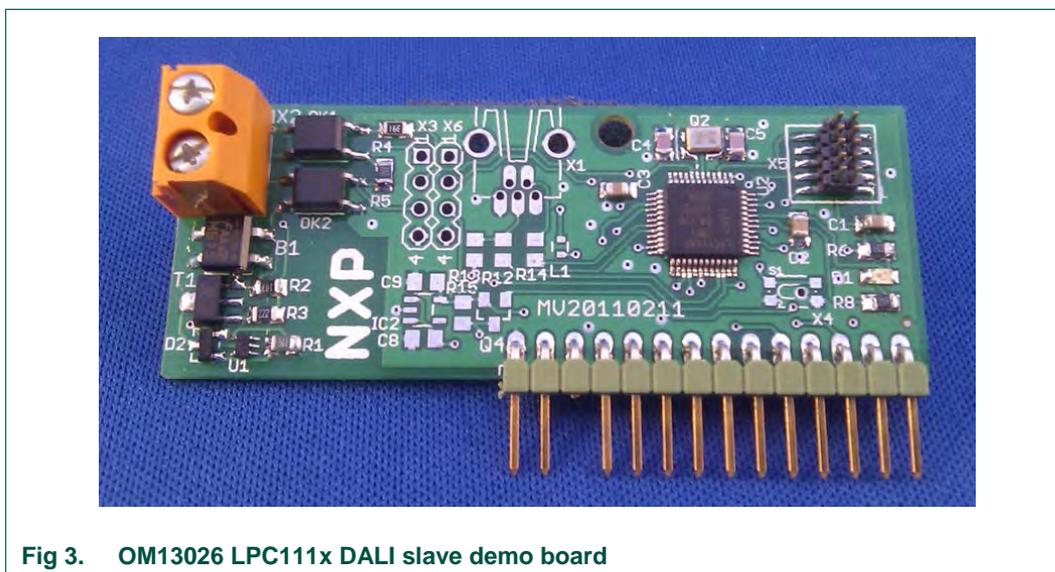


Fig 3. OM13026 LPC111x DALI slave demo board

4. Cable to connect DALI slave board to 3V3 supply
5. Low power LEDs or an LED driver to connect to the PWM1...4 outputs of the OM13026 board respectively.
6. DALI bus power supply to power the DALI bus
7. Windows7 or Windows-XP PC
8. Twisted wires to connect the DALI master, DALI slave and DALI bus power supply

2.2 Required software

To get started the following software items are required:

1. Windows7 or Windows-XP (Service Pack 3)
2. Microsoft .NET Framework 4 (default on Windows7)
3. NXP DaliController application. This .NET application can be downloaded from NXP website as part of the NXP DALI SDK.

Software tooling needed for software development:

4. LPCXpresso v5.0.10, or
5. IAR Embedded Workbench for ARM v6.40

Optional software tooling for modifying the PC application "DaliController":

6. Microsoft Visual Studio C# Express 2010

The DALI Slave board, when received from the demo store, doesn't have the latest firmware flashed in internal memory. Follow the instructions in AN11174 to reprogram the board.

3. Installation and setup

3.1 Microsoft .NET Framework 4

The DALI GUI application requires a PC running Microsoft Windows7 or Windows-XP, and an installation of the Microsoft .NET Framework 4.

The first step is to download Microsoft .NET Framework 4 from the link below, if it is not already installed on the demonstration PC (Windows7 by default has support for .NET 4).

Microsoft .NET Framework 4 Client Profile:

<http://www.microsoft.com/download/en/details.aspx?displaylang=en&id=17113>

3.2 DALI SDK 2.0

Download and install the NXP DALI SDK 2.0 from the NXP website [3].

3.3 Running the install program

After downloading the NXP DALI SDK 2.0 run the installer. The Welcome screen is shown in Fig 4.



Fig 4. Welcome screen of NXP DALI SDK 2.0

The next screen of the NXP DALI SDK 2.0 install program gives the user the freedom to choose the destination folder for the SDK. The default location is:

C:\nxp\lighting\DALI_SDK_v2.0\

The installation starts when the **Install button** is pressed. When the DALI SDK installation is completed the Start menu of the PC has been updated. [Fig 5](#) shows the new menu entries.

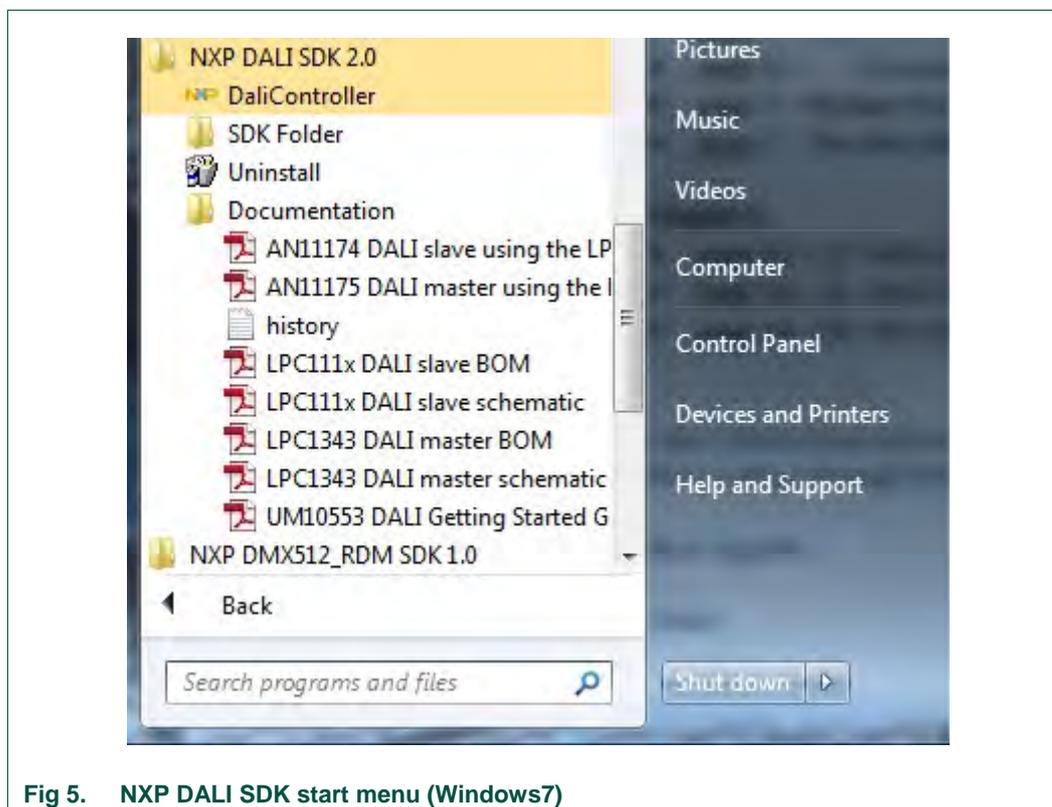
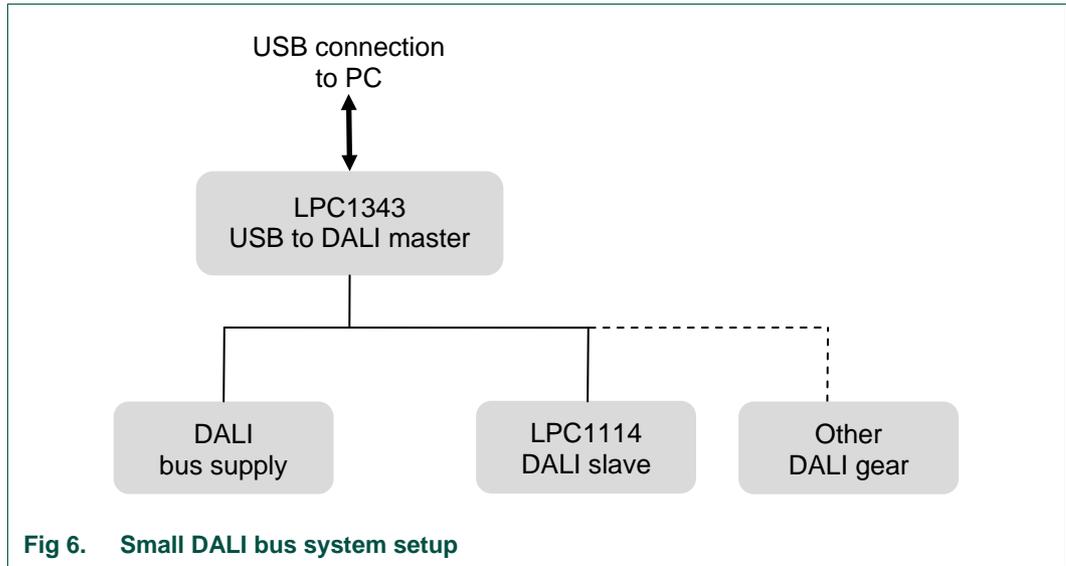


Fig 5. NXP DALI SDK start menu (Windows7)

The menu items show *DALI controller* (the PC application to use with the LPC1343 DALI master), a direct link to the installed *SDK folder* that contains all software source files, hardware descriptions, and all documentation under the *Documentation* entry. The DALI SDK 2.0 can be removed by using Uninstall.

3.4 Creating a setup

To create an evaluation or demonstration setup, connect the LPC1343 DALI master to a DALI bus and connect the LPC1114 DALI slave to the same bus. Make sure the DALI bus is powered via an external DALI power supply. An overview of such a setup is given in [Fig 6](#).



If no DALI bus supply is present, a laboratory power source with an external series resistor of 100 Ohm, output voltage set to 16 V DC and the current limit set on 200 mA can act as a temporary replacement for a DALI bus supply unit.

4. The DaliController program

4.1 Startup

The DaliController program can be started via the PC Start menu (see [Fig 7](#)). When started, the “Start” tab shows a picture of the LPC1343 DALI master board.

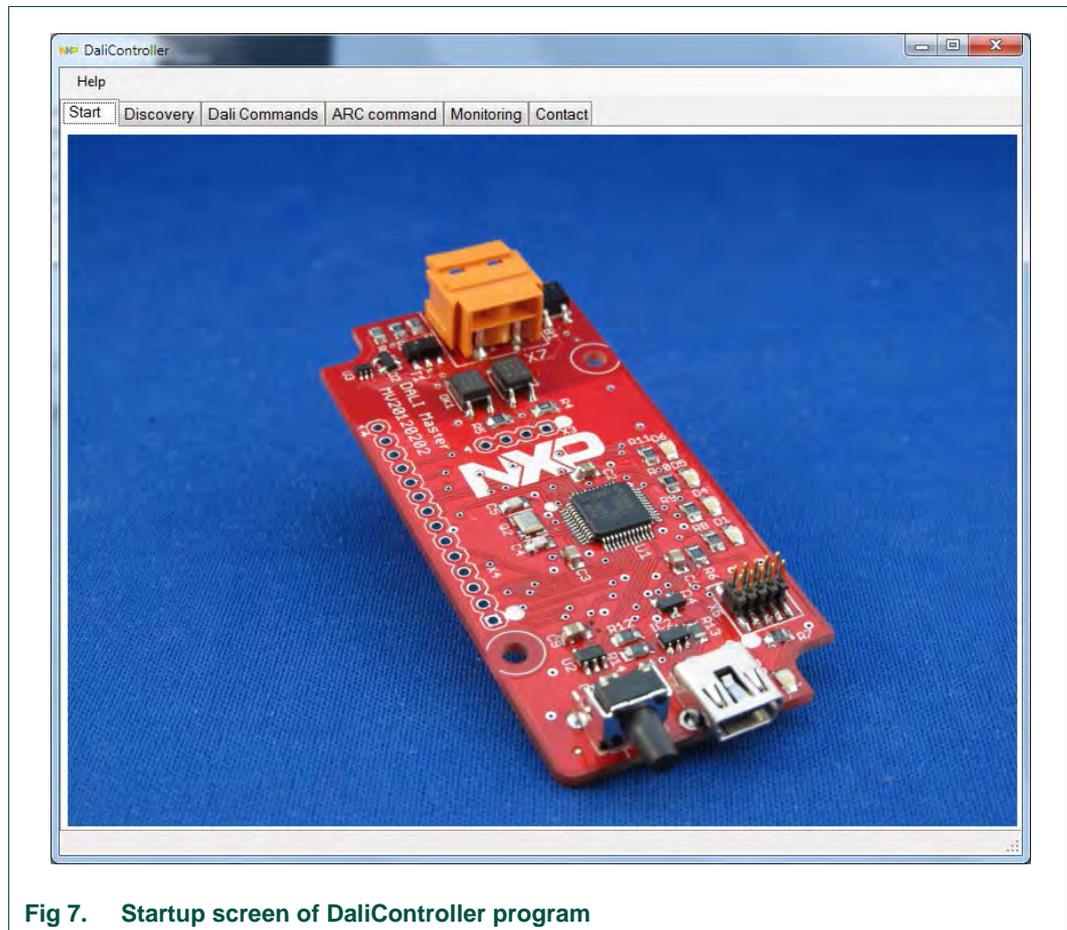


Fig 7. Startup screen of DaliController program

The NXP DALI Master uses the USB Human Interface Device (HID) class for communication between the PC and the master board. This has the advantage that no dedicated software driver needs to be installed to enable communication.

The status bar at the bottom of the Dali Controller program shows if a LPC1343 DALI master is present. After connecting an LPC1343 DALI Master to the PC, the DALI Master is detected by pressing the “Find Device” button in the Monitoring tab. The status bar shows “DALI Master: detected” (see [Fig 8](#)).

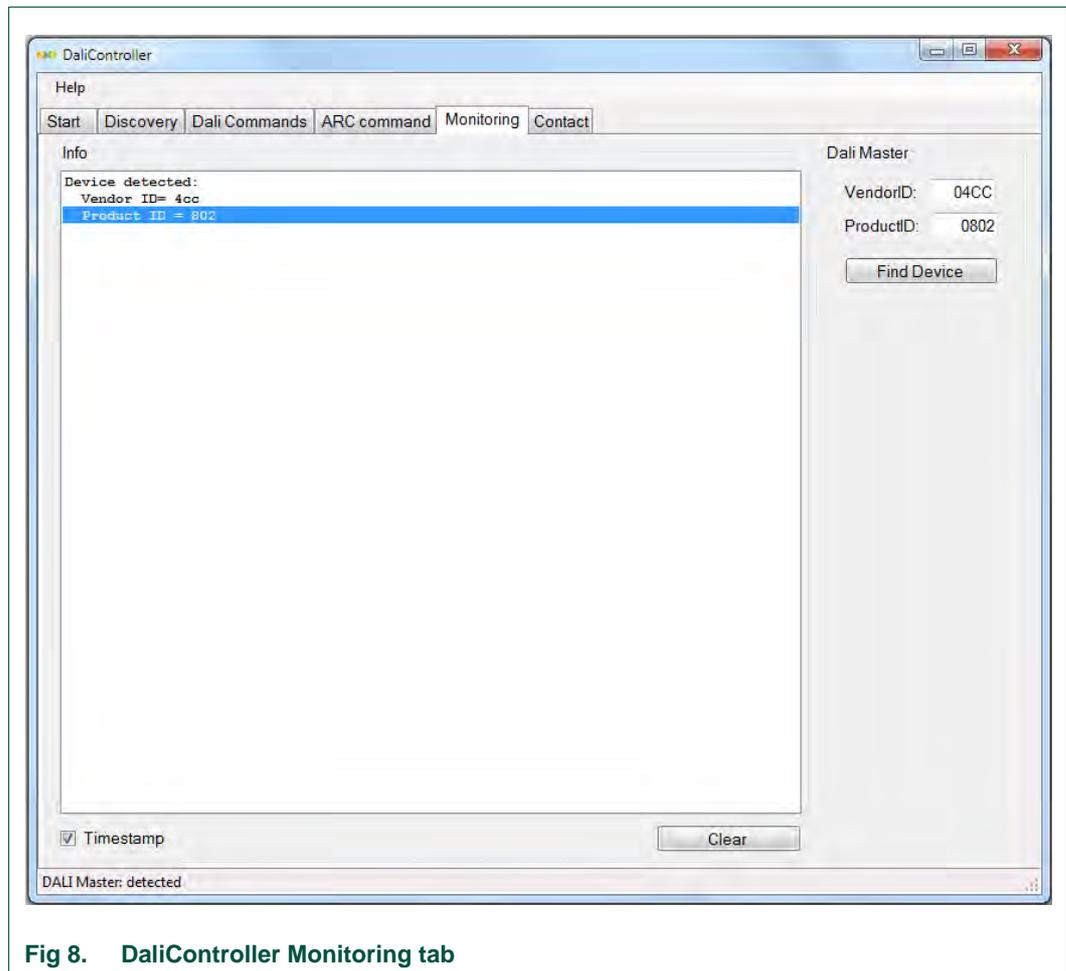


Fig 8. DaliController Monitoring tab

4.2 DALI device discovery

The “Discovery” tab (see [Fig 9](#)) function is to discover which DALI devices are connected on the DALI bus, and to automatically assign short addresses to these devices. By means of the “Discover” button the discovery process is started.

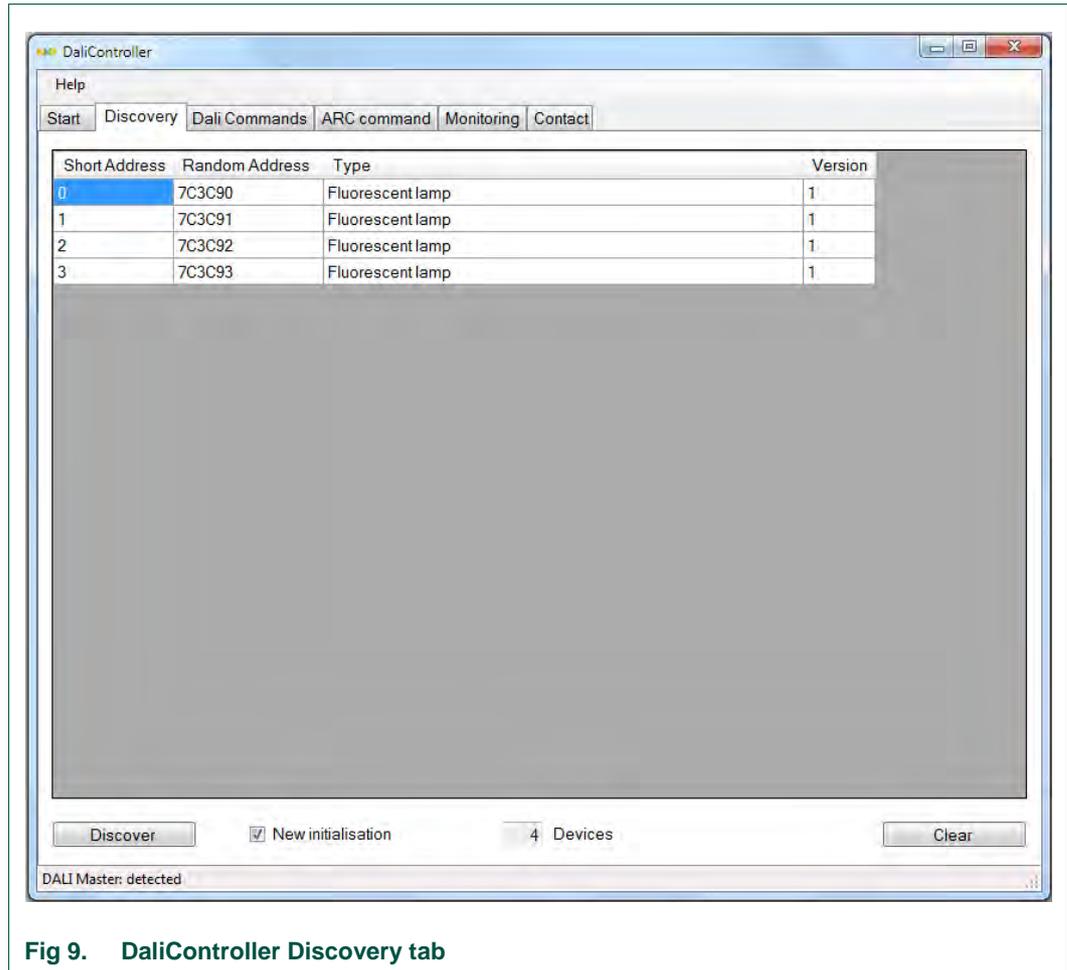


Fig 9. DaliController Discovery tab

For an existing system use the Discover button while the “New initialization” checkbox is not marked (the default behavior). For a new system the checkbox “New initialization” can be marked. When the “New initialization” checkbox is active, any existing assigned short and group address to DALI control gear are cleared and the DALI slaves (control gear) will get a new short address assigned. Not having the checkbox active will maintain any assigned short addresses and remove no longer active DALI devices from the list in the PC application.

Due to the nature of the randomization in the DALI specified bus discovery process for a new system (here the “New initialization” checkmark) it is unpredictable which “short address” (ranging between 0 and 63) is assigned to which DALI device.

After the discovery process, the assigned short addresses can be used in the “Dali Commands” tab and “ARC command” tab to address DALI devices.

4.3 Controlling DALI devices

In the “DALI Commands” tab, a more convenient method is used: the addressing mode and command can be set. When the send button is pressed, the PC application sends the DALI command to the DALI Master, which transmits the command on the DALI bus. If a response is expected, the DALI Master sends this back to the PC and the response is displayed in the “Response” field (see Fig 10).

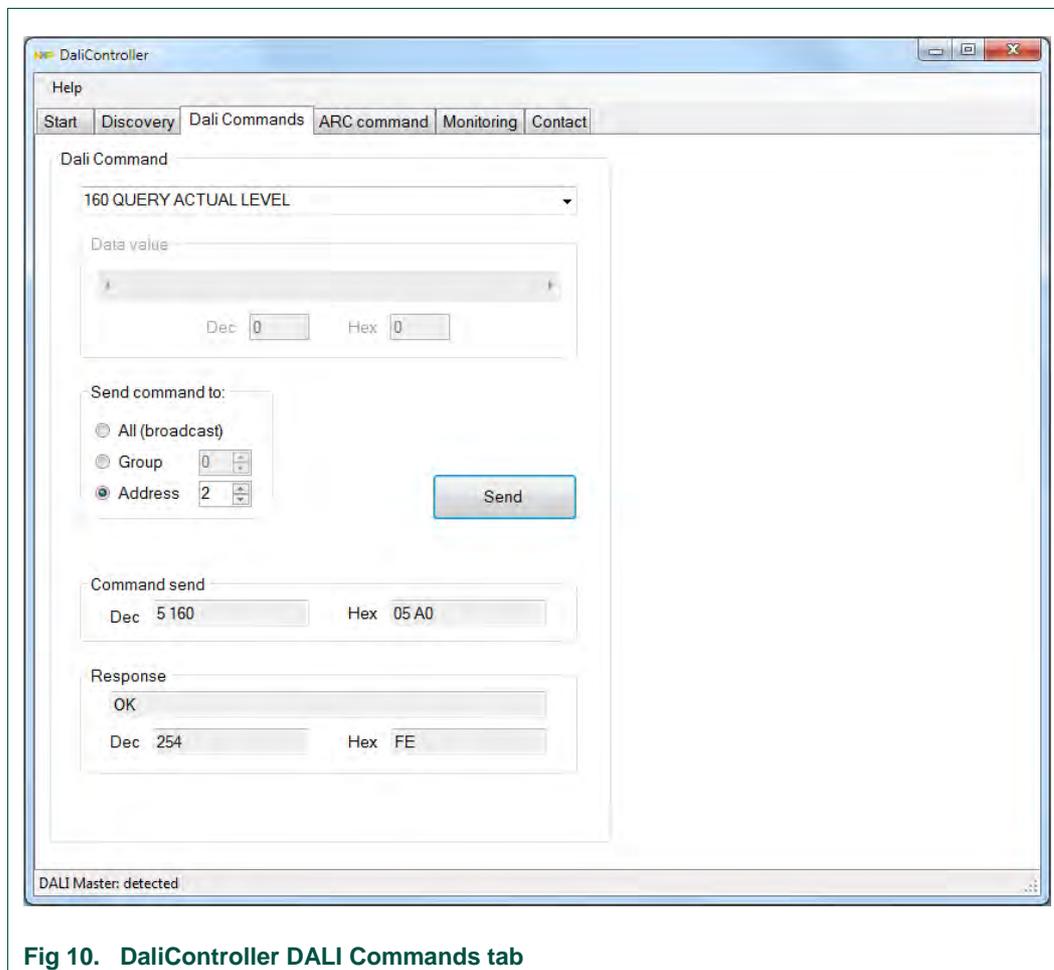


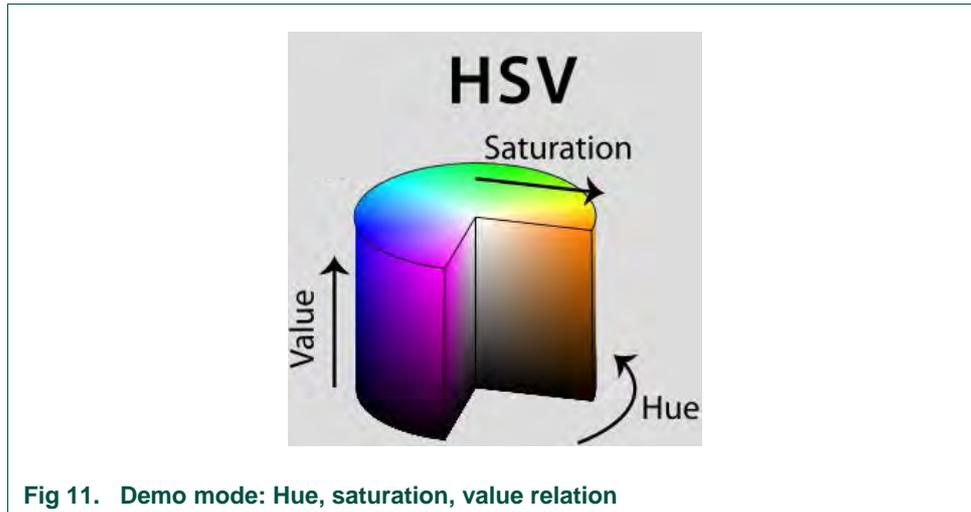
Fig 10. DaliController DALI Commands tab

The “ARC command” tab as shown in [Fig 12](#) allows sending Direct ARC Power Control commands using sliders. The address selection below each slider allows commands to transmit as broadcast, to individual addresses, or to a group address.

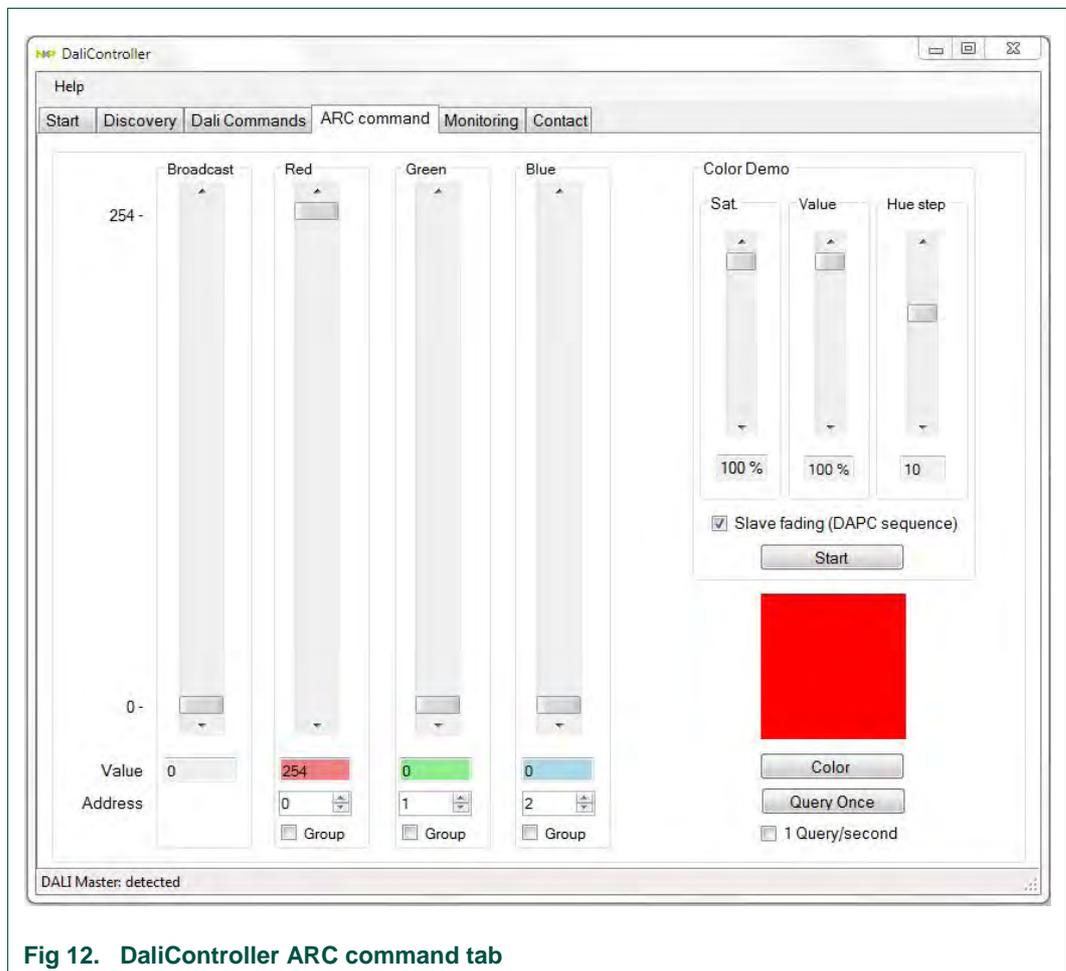
The Color Demo mode sends direct arc power control commands to the three addresses defined under the Red, Green and Blue labeled sliders. For this demo, the LPC1114 slave PWM outputs PWM1, PWM2 and PWM3 should be connected to Red, Green and Blue LEDs.

In the Color demo mode, every 150 milliseconds, the application makes a Hue step (1...15 degrees defined by Hue step slider) through the Hue circle (0...360 degrees). Furthermore, Saturation and Value can be set using sliders. This results in a color demo showing all available colors as depicted in [Fig 11](#).

When the checkbox “Slave fading” is checked (default it is checked) the application will send “Enable DAPC sequence” commands to the DALI slave during the Color demo. This enables automatic fading by the slave from one arc power setting to the next arc power setting, resulting in a smooth color demo.



When not using the demo mode, the color can be chosen using the Color Button. This shows a pop up to select a color. After choosing a color and confirming the selection with 'Ok' the color sliders adapt accordingly and the command is sent on the DALI bus.



5. Document management

5.1 Referenced documents

- [1] AN11174: DALI slave using the LPC111x, Rev. 2, NXP, 6 March 2013.
- [2] AN11175: DALI master using the LPC134x, Rev. 2, NXP, 6 March 2013.
- [3] DALI Development Kit (LPC11xx/LPC13xx DALI release 2.0), NXP, 2013.

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