

TECHNICAL NOTE

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Updating the firmware on 32-bit SD-Rack DAC cards (P16336 variant)

Symptoms:

As the number of 32-bit DAC cards in the market has increased, we have found that due to minor part tolerances there are a small number of the latest 32-bit DAC cards, with Zynq firmware chip (P16336), which can very intermittently fail to boot correctly. This manifests as the slot showing as empty in the Audio I/O window. As this is not wide-spread, we suggest only to update to firmware version 35 for cards that may intermittently fail to initialise.

V35 is an update to the previously released v33 firmware and provides an initialization specifically targeted at these edge cases. There is no requirement to upgrade all cards in your inventory. Cards which initialise reliably with the v33 firmware can remain on v33 firmware.

These instructions are provided to identify the different card versions and explain the necessary steps to successfully update the firmware and FPGA. (Earlier 32-bit DAC cards (P16239 variant) do not require any firmware upgrade.)

This document has three sections:

1. Identifying the variant of the output card
2. Installing required Windows drivers and updating card firmware
3. Simplified upgrade procedure with laptops that have the required Windows drivers installed.

You will need:

- Windows PC running Windows 7 or later
- 1 x USB Cable with type A to type B connectors and a length of greater than 1m
- **P16336 ESS DAC32B v35.zip**
Once unzipped, this file contains two sub-folders:
 - SDRackCardTiva - Working folder for SD TIVA firmware programming
 - TIVA_USBSER_Drivers_2022 – Tiva Windows drivers
- The DAC32 firmware version 35 for P16336 variant DAC cards (included in the above zip file).

If you have a laptop which you have used previously to update DAC cards, follow steps from section 2.0 below. However, if you have never updated cards before you will have to install the USB drivers first using the instructions from “1.0 - PROGRAMMING THE 32-bit DAC CARD (PA16336 ONLY)”

(Please note: The firmware version 18 for P16239 variant cards is also provided. This should not be used unless a card which was flashed with the incorrect firmware must be recovered.)

This Technical Note and the required software can be downloaded from here:

[Updating MOD-SDR-DAC32B \(P16336 ONLY\) \(TN579\) - DiGiCo](#)

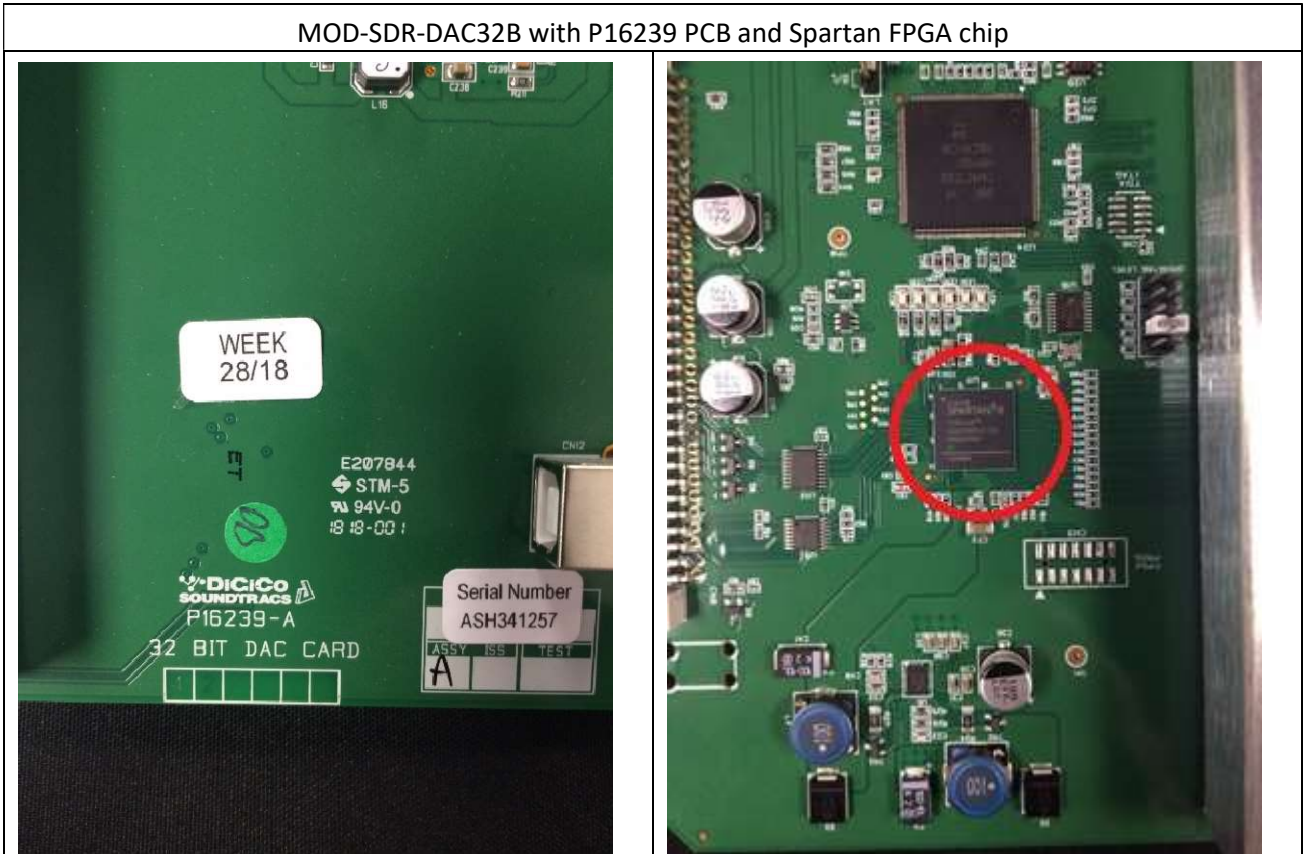
Identifying the version of the 32-bit DAC cards (MOD-SDR-DAC32B)

This section provides the information for correctly identifying the type of 32-bit DAC cards in use. Earlier 32-bit DAC cards use a Spartan FPGA chip, and the PCB board is part number P16239. The description printed on the card is '32 BIT DAC CARD' (see pictures below).

These cards are unaffected and DO NOT require any firmware update.

Flashing the card with the incorrect firmware will “break” the card and must be avoided. However, the card can be recovered by reprogramming it again with the correct firmware version. (see Appendix A)

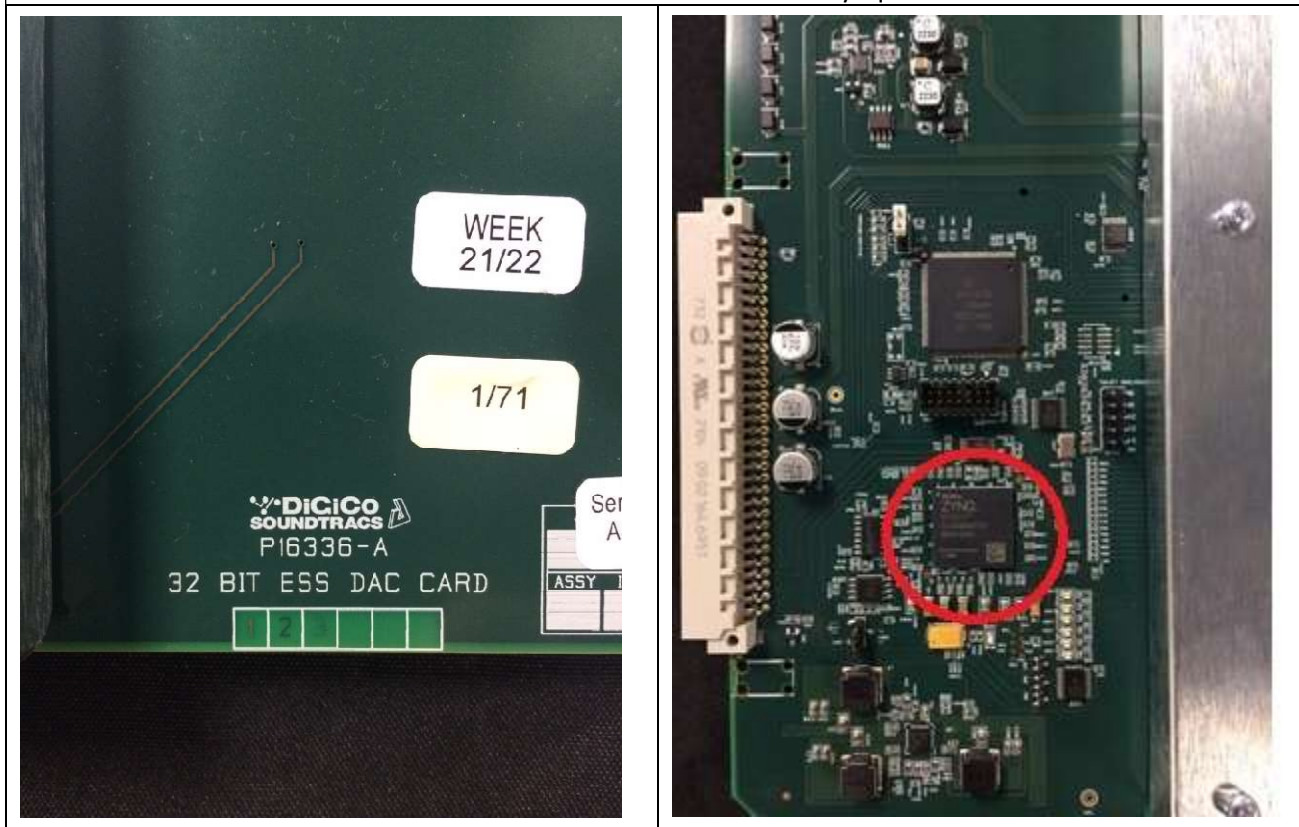
MOD-SDR-DAC32B with P16239 PCB and Spartan FPGA chip



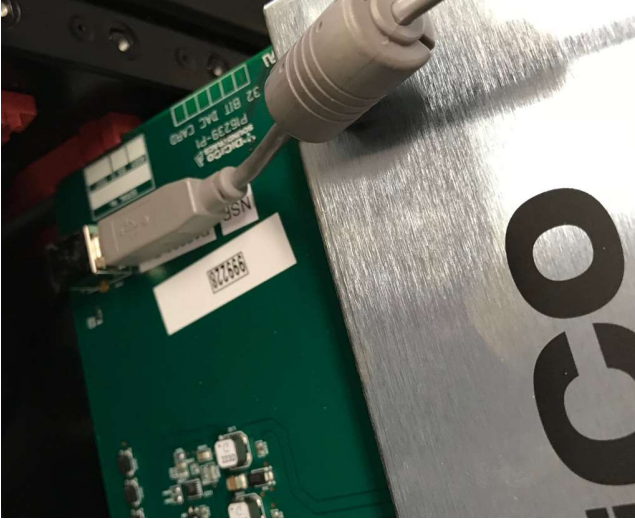
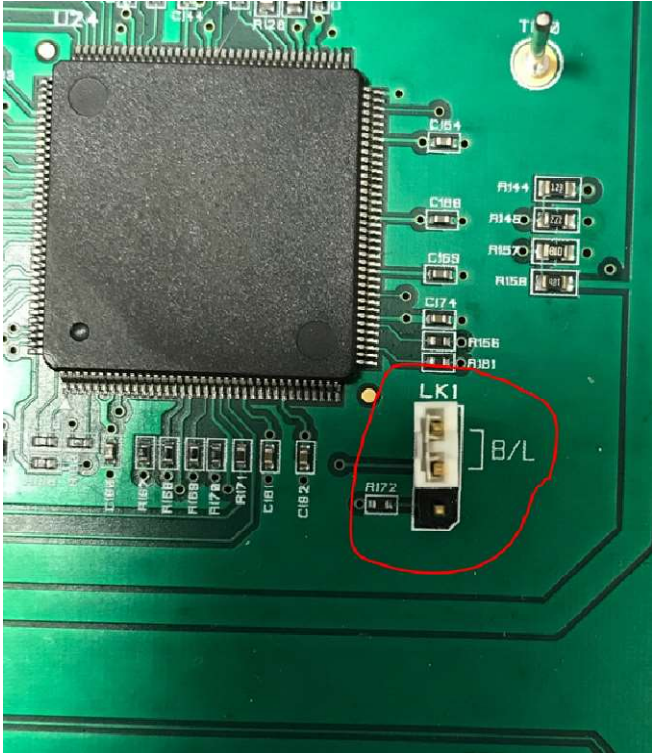
Later DAC cards (introduced from early 2022) use a Zynq chip, and the PCB board is part number P16336. The description printed on the card is '32 BIT ESS DAC CARD' (see pictures below).

The firmware update process described below is only intended for these cards.

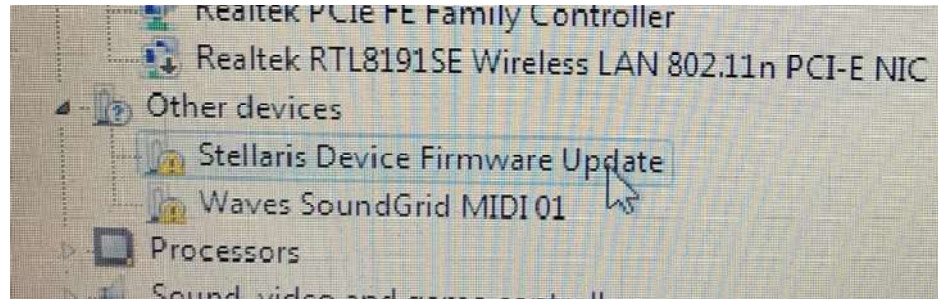
MOD-SDR-DAC32B with P16336 PCB and Zynq module



1.0 - PROGRAMMING THE 32-bit DAC CARD (PA16336 ONLY)

	ITEM	INSTRUCTION
1	<p align="center">USB Connection</p>	<ul style="list-style-type: none"> - Connect USB A-B from 32bit DAC USB B connector to PC USB A connector: 
2	<p align="center">LK1 Bootloader</p>	<ul style="list-style-type: none"> - On the first card to be updated, set jumper LK1 to Bootloader (B/L): 
3	<p align="center">Power</p>	<ul style="list-style-type: none"> - Plug 32bit DAC into any SD rack and turn power on

- Unzip **P16336 ESS DAC32B v35.zip**
- Navigate to Device Manager
- Find Stellaris Device, under 'Other devices'



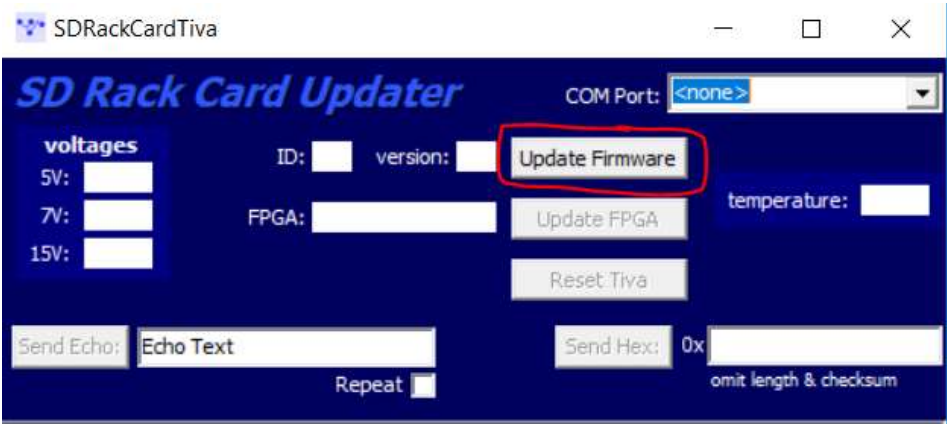
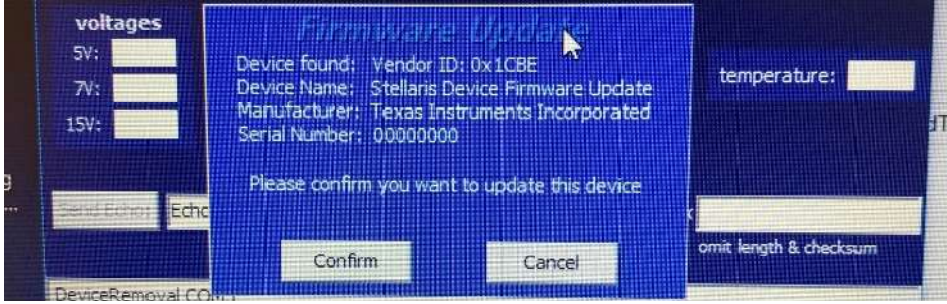
- Right click and select device properties
- Select "Update Driver"
- Select "Browse my computer for driver software"

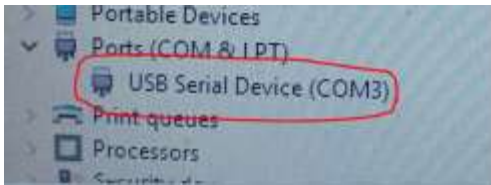
How do you want to search for driver software?



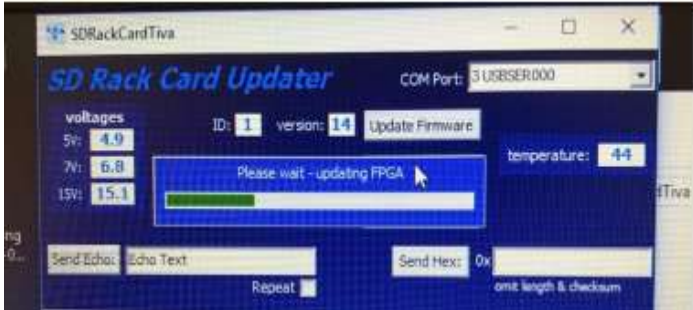
➔ Search automatically for updated driver software
Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.

➔ Browse my computer for driver software
Locate and install driver software manually.

- Browse to the **TIVA_USBSE_Drivers_2022** folder inside the **P16336 ESS DAC32B v35** folder and click "Next"
- Drivers will successfully install, and TIVA will display as a **Stellaris Device Firmware Update (DFU)**
- You may need to restart your PC for the driver to finish installation correctly. This will differ from PC to PC.

5	TIVA Programming	<ul style="list-style-type: none"> - Navigate to the SDRackCardTiva folder inside the P16336 ESS DAC32B v35 folder - Open the folder and run 'SDRackCardTiva.exe' - From "COM Port:" drop down menu, select <none> and click "Update Firmware" 
6	TIVA Programming	<ul style="list-style-type: none"> - A pop-up menu will confirm that the 32bit DAC TIVA DFU has been found - Click "Confirm":  <ul style="list-style-type: none"> - Wait for the progress bar to complete, then click "Close" - The TIVA is now successfully programmed - Close 'SDRackCardTiva.exe'
7	RESTART	<ul style="list-style-type: none"> - Unplug 32bit DAC card from SD rack (Power off) - Remove USB cable from USB port on the card - Remove the LK1 jumper from the bootloader setting (marked B/L) and set to normal - Plug 32bit DAC back into SD rack - Front panel GT and SPLIT LED will flash once during boot up.

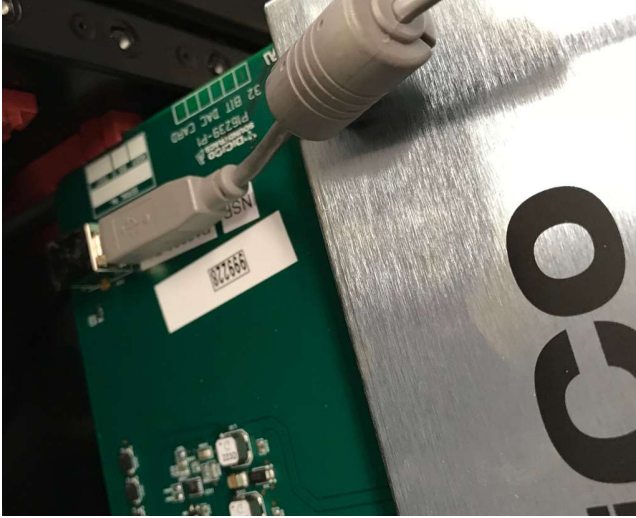

8	<p>FPGA Programming</p>	<ul style="list-style-type: none"> - Power off SD Rack - Remove 32 bit DAC Card - Insert USB Cable back into the USB port on the card - Power SD rack back up - In Device Manager on your PC 32 bit DAC TIVA should now display as a Virtual COM Port  <p>Note: The COM number will differ depending on other connected systems</p>
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9	<p>FPGA Programming</p>	<ul style="list-style-type: none"> - Open SDRackCardTiva.exe - Select COM Port : USBSER000 – The “Voltages”, “ID:”, “Version:” and “temperature:” displays will be populated  <ul style="list-style-type: none"> - Click “Update FPGA”  <ul style="list-style-type: none"> - “Please wait – Updating FPGA” 
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		<ul style="list-style-type: none"> - Once FPGA has finished updating, the notification panel will display “FPGA updated successfully” - “DeviceRemoval COMx” - “DeviceRemoval COMx” <div style="text-align: center;"> </div> <ul style="list-style-type: none"> - Programming is now complete
10	Restart	<ul style="list-style-type: none"> - Unplug 32bit DAC card from SD rack (power off) - Plug 32bit DAC card back into SD rack - Front panel GT and SPLIT LED will flash once during boot up

11	Programming subsequent cards	<p>If additional cards need programming, it is not necessary to set the LK1 jumper to bootloader mode because the correct USB drivers are now installed on the PC. Leave jumper LK1 as is.</p> <ul style="list-style-type: none"> - Plug the USB cable into the card and insert the card into a rack slot - Run ‘SDRackCardTiva.exe’ from the SDRackCardTiva folder - Select the card from the COM port drop down menu and hit ‘Update Firmware’ - Then complete the remaining steps as before.
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2.0 FIRMWARE/FPGA UPDATES (IF STELLARIS DRIVER IS ALREADY INSTALLED)

	ITEM	INSTRUCTION
1	USB Connection	<ul style="list-style-type: none"> - Connect USB A-B from 32bit DAC USB B connector to PC USB A connector: 
2	Power	<ul style="list-style-type: none"> - Plug 32bit DAC into any SD compatible rack and turn power on
3	FW/FPGA Update	<ul style="list-style-type: none"> - Unzip P16336 ESS DAC32B v35.zip - Open the SDRackCardTiva folder - Run SDRackCardTiva.exe - From "Com Port" drop down menu select USBSER000 - The "Voltages", "ID", "version" and "temperature" displays will now be populated:  <ul style="list-style-type: none"> - To update TIVA click "Update firmware" - To update FPGA click "Update FPGA" - Once complete the new FW revision number will display in the application
4	Power Cycle	<ul style="list-style-type: none"> - Power Cycle the rack before using the card

Appendix A:

Recovery of an early MOD-SDR-DAC32B card (P16239 variant) which was flashed with the incorrect firmware version.

- Open the '**SDRackCardTiva**' folder.
- Open the '**RECOVERY v18 for P16239**' folder.
- Run '**SDRackCardTiva.exe**' from within this folder
- Proceed with the firmware update as described in this document from Step 5 onwards.