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# Encore! Smart Cable User Manual

UM029403-0221

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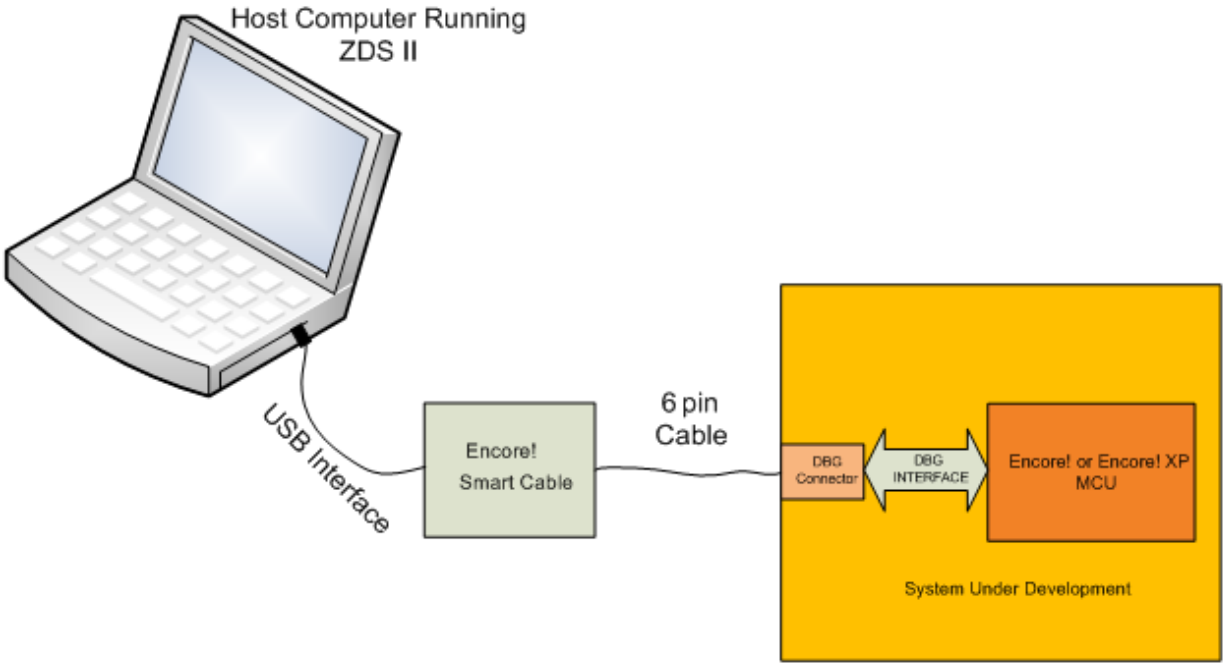
# Overview

Zilog's Encore! Smart Cable (ZUSBESC0200ZACG) is used to download program and debug systems based on Z8Encore! and Z8 Encore! XP microcontrollers using the ZDSII Z8 Encore! version 5.6.0 (and later releases).

This user manual provides instructions for installing the ESC hardware and its associated drivers and introduces user to debugging process with it. Also, this document provides information about connection of the ESC to the target system including necessary connector pinout and signals description
After completing installation and hardware setup, application firmware can be downloaded to the target and debugged using the ZDSII IDE as described in the relevant development kit documentation.

## Place in development process

ESC is a Hardware and Software interface between Host computer running ZDSII and System Under Development. See picture below.



# Abbreviations and Acronyms

| | |
|---|---|
| ESC | Encore! Smart Cable |
| IDE | Integrated Development Environment |
| ZDS | Zilog Development System, IDE |
| DBG | Debug Interface/Connector or one of the wires in DBG interface/connector. Depends on the context. |
| SMR | Stop Mode Recovery |
| OCD | On-Chip-Debugger, silicon module on the chip responsible for communication with debugger (ESC) |
| T_MSG | Target Message. One of the signals in DBG interface |
| T_VDD | Target power |

# Kit contents

- Encore! Smart Cable, part number ZUSBESC0200ZACG
- 6-conductor flat cable
- USB-A to mini-B cable
- Encore! Smart Cable Flyer (FL0197)

# Operating conditions

| When target powered by ESC | |
|---|---|
| Operating temperature: | 25°C +/- 10° |
| Minimum T_VDD | 1.8V |
| Maximum T_VDD | 3.6V |
| Maximum Current supplied to target | 100mA |
| Maximum measured current | 30mA |
| Current measurement resolution | 0.01mA |
| When powered by external power supply | |
| Operating temperature: | 25°C +/- 10° |
| Minimum T_VDD | 1.8V |
| Maximum T_VDD | 3.6V |

# System Requirements

The Encore! Smart Cable is a high-power device requiring up to 125mA of current when powering target system at maximum current.

| USB Port Requirement | Full-Speed USB 1.1 (or higher) |
|---|---|
| Supported Operating Systems | Windows 10 (32-bit and 64-bit)<br>Windows 8 (32-bit and 64-bit)<br>Windows 7 (32-bit and 64-bit) |

# Features

- Supports target system clock frequencies between 4kHz and 24MHz at OCD baud rates of up to 500kbps.
- Provides up to 100mA of current to target systems before an external power source is required.
    - Target operating voltage can be configured in steps of 100mV between 1.8V and 3.6V.
- Measures target current consumption (up to 30mA) under control of the ZDSII IDE to provide a numerical result on demand, or a graphical output of measurements at 1ms (or longer) intervals.
    - Optional breakpoint can be enabled to trigger once the target current consumptions goes above, or below, a configurable threshold.
- Allows target application block OCD communications while in stop mode or performing critical operation. This can be accomplished via RESET- pin or new signalling pin named T_MSG, based on project configuration.
    - This feature can be used to enable debugging Encore! targets as they transition through stop mode without causing a power-on-reset event(1).

For more information regarding these features, refer to the ZDSII Help file integrated with the ZDSII Encore! 5.6.0 (and later) IDE.

(1) Requires the application to drive the appropriate signalling pin (T_MSG or RESET-) low prior to entering stop mode. During the SMR the signalling pin should be driven high, (if using T_MSG), or configured as the reset alternate function, driven high, (if using RESET-).

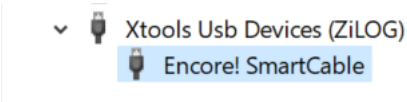
# Setup

The ESC drivers are bundled with the **ZDS II Z8 Encore! version 5.6.0** (and later) installation program available for download by clicking the following link: Software Downloads

During installation of the ZDSII Z8 - Encore! 5.6.0 (or later) IDE, the user is prompted to install the ESC drivers. By default, the necessary driver files will be installed.

These drivers must be installed before ESC can be used.

After installation of all drivers ESC can be connected to the host computer and in the Device Manager window one should see following:




# Connecting to target system

ESC is connected to target system through 6-pin connector, located at the side of the ESC opposite to the USB connector. This is Amphenol connector PN 75867-131LF. It has 2.54mm spacing between pins and rows. Below is description of the pins of connector.

| Pin # | Signal name | Signal description |
|---|---|---|
| 1 | T_VDD | Target VDD. This pin is target power connection between ESC and target system. ESC could be source of the target power, or this signal informs ESC that target power is present/absent if ESC was not selected as a source for target power. |
| 2 | RESET- | Reset, active low. This is used by the ESC to place target into reset state before the program can be downloaded. |
| 3, 5 | GND | Power Ground. |
| 4 | DBG | This is a bidirectional signal that provides communication between ESC and target MCU. |
| 6* | T_MSG | This signal, when driven LOW by target MCU informs ESC that target had entered STOP mode. While this signal is low there is no communications between ESC and target initialized by ESC. When target exits STOP mode it drives this signal HIGH to inform ESC about change in its status. |

***** Leave this pin unconnected on target system, so that it can be connected to any of the available pins of the MCU.

To avoid unexpected when connecting ESC to the target system always follow the procedure described below.

When target system is powered by ESC:

1. Connect ESC to the host computer using USB-A to mini-B cable
2. Connect 6-pin flat cable to ESC
3. Connect the other end of the 6-pin cable to the target system

When target system is powered by external power supply:

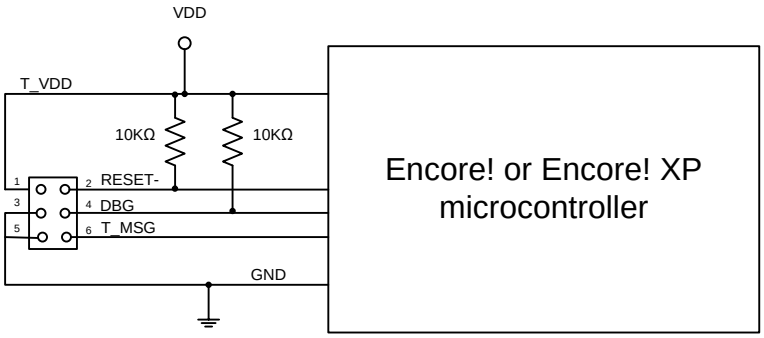
1. Repeat steps 1 through 3 from above
2. Apply power to the target system

# Power connection to the target board

When using the ESC to provide power to the target that has its own local power source, it is recommended to isolate the local source from ESC by jumper or zero-ohm resistor.

# DBG interface on the target board

When designing board with Zilog Encore! or Encore! XP device please follow schematic shown below. That will provide the most robust connection between ESC and target MCU.




# LED function

There is an LED on the top side of the ESC enclosure. When ESC is powered up, it shines steady yellow light to indicate that power is on and that the device was recognised by USB host and enabled to be used as USB device. If host was unable to enumerate the ESC the LED will stay off.

The LED will flicker when ESC is communicating with the target.

# Downloading code and debugging

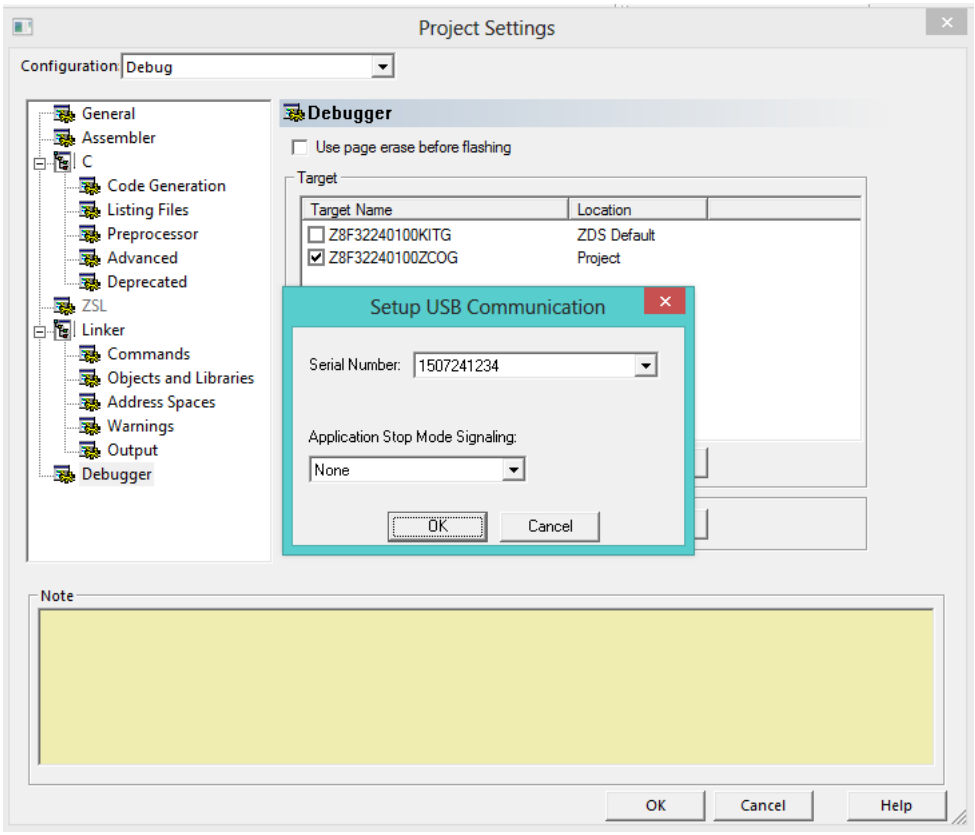
When measuring current consumed by the target, remember that ESC provides power to the target through pin 1 of the connector. If the entire target board is using the same power source as the Encore! device, the current measured by the ESC and displayed by the GUI will reflect total current consumed by the Encore! device and all other components mounted on the board.

Before you can download your code into the System Under Development you must configure your tools – ESC. To do that follow steps listed below.

1. Open ZDSII IDE on the host system.

2. Navigate to your project:
   File > Open Project – locate your project and open it.

3. Find the development tool you are using by navigating as follows:
   Project > Settings > Debug Tool > Setup, should appear like the below image:

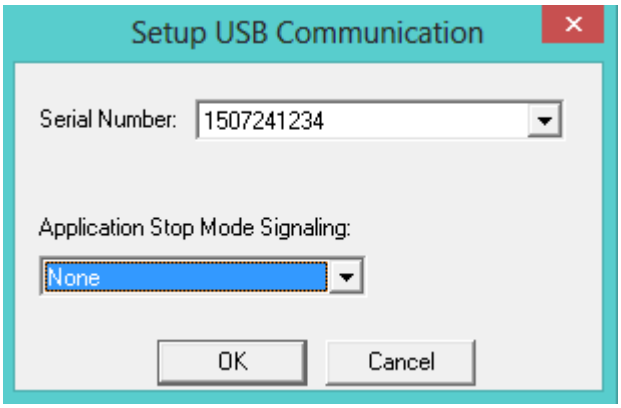



The serial number will be different, hit OK at this screen.

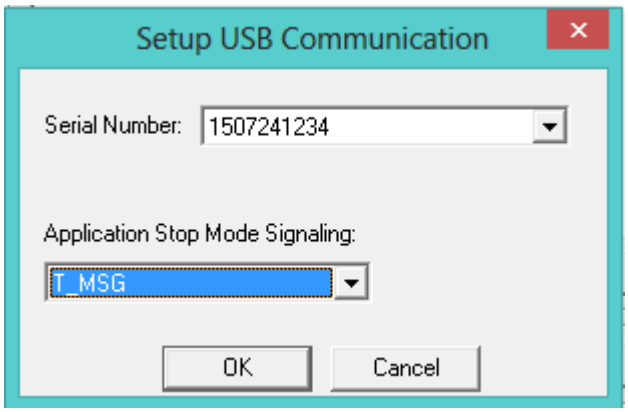
Now you are ready to download code and start debugging.

4. Optionally, Application Stop Mode Signaling feature maybe used as below:

   a. None - If the application does not enter stop mode or does not need to block OCD communications while in stop mode.




   b. T_MSG - if the application is using T_MSG to signal when it's in stop mode, then 'Application Stop Mode Signaling' should be configured as shown below:




   If using T_MSG (connected to say PJ3 on anF6482 MCU):

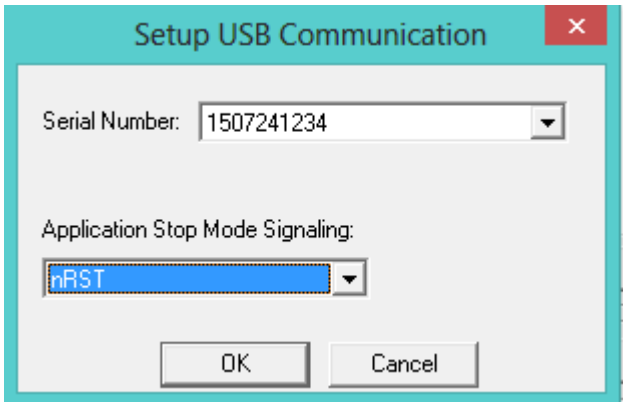
   - On startup and after SMR, configure PJ3 as a high-level GPIO output. The example below configure PJ3 for open drain operation, but this is not necessary due to open drain level shifters on ESC board:

```
/*
* Configure PJ3 as TMSG signal pin
*/
PJOC  |=  BIT3;
PJPUE |=  BIT3;
PJOUT |=  BIT3;
PJDD  &= ~BIT3;
```

   - Prior to entering stop mode, drive T_MSG low:

```
PJOUT &= ~BIT3;
```

c. nRST - if the application is using nRESET to signal when it's in stop mode, then 'Application Stop Mode Signaling' should be configured as shown below:




If using nRST for stop mode signaling:

- On startup and after SMR, configure PD0 (nRST) for alternate function mode to operate as the reset pin:

```
/*
 * Configure PD0 as the reset pin with open-drain and internal
pull-up
 */
PDAFS1 &= ~BIT0;
PDAF   |=  BIT0;
PDOC   |=  BIT0;
PDPUE  |=  BIT0;
```

- Prior to entering stop mode configure PD0 as low-level GPIO output:

```
/*
 * Drive PD0 low to indicate the device is entering stop mode.
 */
PDOUT &= ~BIT0;
PDDD  &= ~BIT0;
PDAF  &= ~BIT0;

asm( "STOP" );
asm( "NOP" );
```

# Troubleshooting

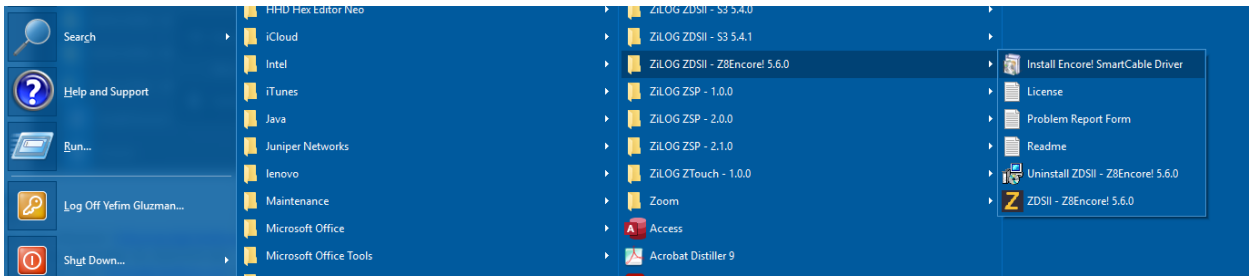
## Manual installation of the ESC driver

In case there is a need to manually install ESC driver do the following:

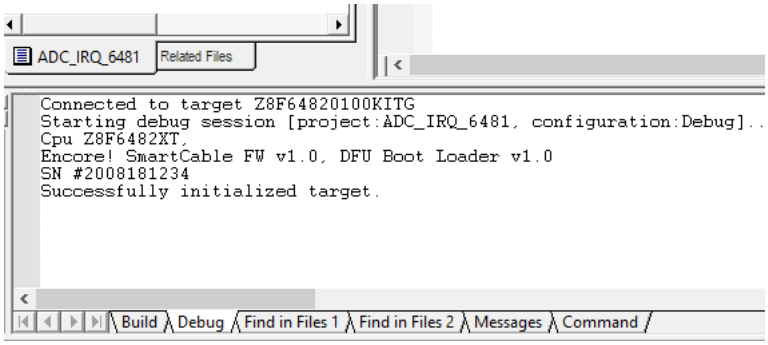
1. Navigate steps:

   Window prompt > Programs > Zilog > Zilog ZDSII- Z8Encore! 5.6.0 >

   Right click on the “Install Encore! Smart Cable Driver” and select option “Run as administrator”.

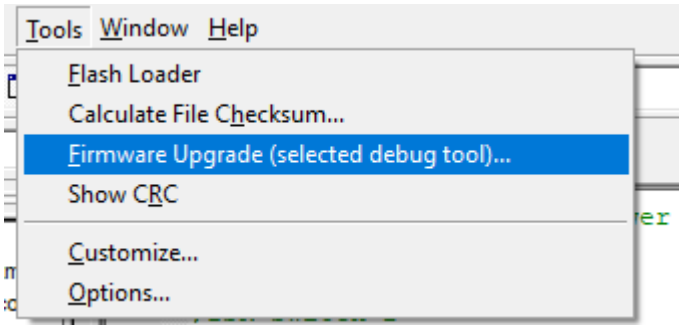



Firmware version of the ESC could be seen in ZDSII “Debug” tab once the project was configured with proper debugging tool and code is downloaded into the target or connection was made with the target see below

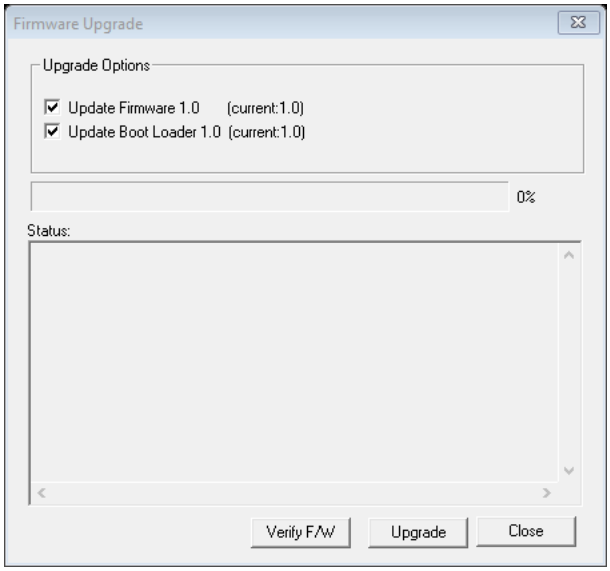



If there is a new FW releases or ESC had malfunctioned the FW update is possible by following steps listed below.

1. From ZDSII GUI select: Tools > Firmware Upgrade (selected debug tool)




2. Once selected you should see a popup




You can select “Verify F/W”, or if new firmware is available “Upgrade”. Then follow prompt as it being verified or upgraded.

If a hardware failure is suspected, contact support.zilog.com for assistance. In all other cases follow steps listed below.

# Encore! Smart Cable not recognized

To determine if the Encore! Smart Cable has been detected, open Windows Device Manager and, if present, expand the **Xtools Usb Devices (ZiLOG)** section as shown below:


If the “Xtools Usb Devices (Zilog)” line is missing or “Encore! Smart Cable” is not listed, try disconnecting the ESC from the USB port on the host PC and connecting it to a different USB port. If the ESC is still not recognized try the following:

- Connect the ESC to a USB port on the host PC versus an external hub
- Reinstall ESC drivers manually
- Disconnect all other USB devices (including your keyboard and mouse). If this resolves the problem, reconnect the other devices, one at a time, to isolate the conflicting device.
- If none of the above works, try using different PC
- If still no success contact Zilog Customer Support support.zilog.com

# Revision History

Each instance in this document's revision history reflects a change from its previous edition. For more details, refer to the corresponding page(s) or appropriate links furnished in the table below.

| Date | Revision Level | Description | Page |
|---|---|---|---|
| Dec 2020 | 01 | Original issue. | All |
| Jan 2021 | 02 | Added "Power connection to the target board" | Page 6 |
| Feb 2021 | 03 | Added a paragraph under Downloading code and debugging | Page 7 |

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