

**Document Title :** Procedure to Install BU-69092S1 AceXtreme C SDK in Linux with kernel 4.x & 5.x

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**Introduction :** This document explains the steps for installing the AceXtreme C SDK (BU-69092S1) on Linux. The steps, in general apply to all distributions of Linux like Fedora, RHEL, Ubuntu etc. with kernel 4.x and 5.x.

**Procedure :**

1. Pre-requisites for installation:

- Download the BU-69092S1 AceXtreme SDK for Linux from the website of Data Device Corporation ([www.ddc-web.com](http://www.ddc-web.com)). Please note that the SDK versions to be used as different for specific kernel versions of Linux. Ensure to download the correct version of the SDK to match your kernel version. Generally, Linux with kernel 4.x and 5.x require SDK version 4.9.x or higher.
- Build tools (also called build-essentials) are needed for the installation procedure to complete successfully. You may check if build tools are installed by running the “gcc” command on a terminal Window. If not installed, you will encounter a “command not found” error. Build tools may be installed as below:

- Ubuntu: Run the following command as root or user with *sudo* privileges:

```
$ sudo apt update
$ sudo apt install build-essential
```

- RHEL/CentOS

```
$ sudo yum group install "Development Tools"
```

OR

```
# yum groupinstall 'Development Tools'
```

2. Create a folder on Desktop named *DDC* and copy *BU-69092S1\_x\_y\_z.zip* (downloaded from DDC's website) into it.
3. Open a Terminal & change to “root” mode by typing command “su”. On Ubuntu, since the root user is usually disabled, you may run the command “sudo -i”.
4. Change directory (cd) to *DDC* folder on the Desktop and extract *BU-69092S1\_x\_y\_z.zip* file into it. (*x\_y\_z* here indicates the version number of the SDK). This creates a folder named *BU-69092S1\_x\_y\_z*.
5. Change permissions on folder *BU-69092S1\_x\_y\_z* and its sub-folders and files to *Read and Write*.
6. Change directory to *BU-69092S1\_x\_y\_z* and enable “execute” permission on file *acexInstall* (you may use “sudo chmod +x acexInstall” command).
7. Run the script file *acexInstall* by using below command

```
$ ./acexInstall
```
8. Once installation begins type “y” and press Enter key.

```
File Edit View Search Terminal Help
rttps@rttps-Desktop:~/DDC/BU69092S1_4_4_1_4$ su
Password:
root@Thunderbird Mail :op:/home/rttps/DDC/BU69092S1_4_4_1_4# ./acexInstall

#####
#####
####          #####
##            ##### #
#             #
#           ##
####
#####          #####          #####          #####
#####        ##    ##    ##    ##    ##    #
#####        ##    ##    ##    ##    ##    ##
#####        ##    ##    ##    ##    ##    ##
##           ##    ##    ##    ##    ##
#            ##    ##    ##    ##    ##
##           ##    ##    ##    ##    ##    ##
#####        #####          #####

DATA DEVICE CORPORATION
BU-69092S1 SDK Installation
-----
This will install the BU-69092S1 Software Development Kit. It will
install the library, build all of the necessary drivers, load the
appropriate driver for the first time, and launch the DDC Card Manager
so the user can initialize the logical device number

The user will be prompted twice during installation for the superuser
password to complete installation.
*****

Would you like to begin installation? (y/n)
y
```

9. Choose *path* to install the SDK. If you wish to install in a specific path then enter the path name as shown in figure below, else leave it blank and press Enter key.

**IMPORTANT:** The default path, (`~/acextreme`) is only accessible in “*root*” mode. So, if installed to this path, user applications that run in normal user mode (i.e. not *root* mode) will fail because they will **not** be able to initialize the 1553 channels. If the 1553 card is expected to be used by applications that run in normal user mode, then an install path must be provided which is accessible for normal (non-root) users.

```
File Edit View Search Terminal Help
rtips@rtips-Desktop:~/DDC/BU6909251_4_4_1_4$ su
Password:
ThunderbirdMailtop:/home/rtips/DDC/BU6909251_4_4_1_4# ./acexInstall

#####          #####
#####          #####
###           ##### #
##            #
#             ###
####
#####          #####          #####          #####
#####          ##      ##      ##      ##      #
#####          ##      ##      ##      ##      #
##            ##      ##      ##      ##      #
#             ##      ##      ##      ##      #
              ##      ##      ##      ##      #
#####          #####          #####

DATA DEVICE CORPORATION
BU-6909251 SDK Installation
-----

This will install the BU-6909251 Software Development Kit. It will
install the library, build all of the necessary drivers, load the
appropriate driver for the first time, and launch the DDC Card Manager
so the user can initialize the logical device number

The user will be prompted twice during installation for the superuser
password to complete installation.
*****

Would you like to begin installation? (y/n)
y
Please enter path to install SDK. Ex: /home/user/ddc_path
Or leave blank and press ENTER to install to default (-/acextreme)
/home/rtips/DDC/SDK
```

10. Choose “y” when asked if you would like to install ACE library support.

```

root@rtips-Desktop: /home/rtips/DDC/BU69092S1_4_4_1_4
File Edit View Search Terminal Help

=====
c Thunderbird Mail links
=====
- Creating link for ACEx
lrwxrwxrwx 1 root root 36 Dec 17 13:02 /usr/include/ddcacex -> /home/rtips/DDC/SDK/drivers/acex/src
=====
Create symbolic links
=====
- Creating link for DDC
lrwxrwxrwx 1 root root 25 Dec 17 13:02 /usr/lib/ddc -> /home/rtips/DDC/SDK/tools
=====
Create symbolic links
=====
- Creating link for remote access
lrwxrwxrwx 1 root root 50 Dec 17 13:02 /usr/include/ddcremote -> /home/rtips/DDC/SDK/libraries/ethernet_socket/src/
Platform is x86_64
Distribution is ubuntu
Distribution Version is 18.04

=====
Install the emacepl library
=====
- Removing existing emacepl library from /usr/lib/aarch64-linux-gnu
- Copying emacepl library to /usr/lib/aarch64-linux-gnu
- Creating library symbolic links...
- Removing existing emacepl library from /usr/lib/powerpc64-linux-gnu
- Copying emacepl library to /usr/lib/powerpc64-linux-gnu
- Creating library symbolic links...
- Removing existing emacepl library from /usr/lib/powerpc-linux-gnu
- Copying emacepl library to /usr/lib/powerpc-linux-gnu
- Creating library symbolic links...
- Removing existing emacepl library from /usr/lib/x86_64-linux-gnu
- Copying emacepl library to /usr/lib/x86_64-linux-gnu
- Creating library symbolic links...
- Removing existing emacepl library from /usr/lib/i386-linux-gnu
- Copying emacepl library to /usr/lib/i386-linux-gnu
- Creating library symbolic links...
Installed library binary files....
Operating as user: root

Would you like to install ACE library support? (y/n)
y

```

11. Select the driver type which you wish to load. Multiple drivers may be installed using the *insmod* command after completion of the setup. E.g.

```
$ insmod acexpci.ko
```

```

root@rtips-Desktop: /home/rtips/DDC/BU69092S1_4_4_1_4
File Edit View Search Terminal Help
./src/ddccm_flash.c: In function 'VerifyFile':
./src/ddccm_flash.c:625:5: warning: ignoring return value of 'fread', declared with attribute warn_unused_result [-Wunused-result]
ThunderbirdMail:alue, sizeof(U32BIT), 1, fpBinFile);

./src/ddccm_flash.c: In function 'IsUserReadyToFlash':
./src/ddccm_flash.c:806:9: warning: ignoring return value of 'fgets', declared with attribute warn_unused_result [-Wunused-result]
fgets(buff, sizeof(buff), stdin);

usr/include/ddcacex/os/lib_support/ddc_os_lib.c: In function '_config_file_lookup':
usr/include/ddcacex/os/lib_support/ddc_os_lib.c:105:5: warning: ignoring return value of 'fscanf', declared with attribute warn_unused_result [-Wunused-result]
fscanf(hDdcConf, "%u", &wTemp1);

usr/include/ddcacex/os/lib_support/ddc_os_lib.c:121:9: warning: ignoring return value of 'fscanf', declared with attribute warn_unused_result [-Wunused-result]
fscanf(hDdcConf, "%u", &wTemp1);

=====
Install ddccm
=====
rm -f /usr/bin/ddccm
rm -f /usr/bin/ddccm/ddc*.cfg
cp -f ../bin/ddccm /usr/sbin

Build Complete
=====

*****
* Note that the drivers must be loaded after every system startup. *
* The loader script can be executed automatically during system boot *
* by calling it from the system 'rc' startup facility. Unloading of *
* the drivers and deletion of the device special files is accomplished*
* by running the appropriate unloader script or command as root user. *
*****
* Load Device Driver for the 1st time *
*****
* Which driver would you like to load? *
* 1. acexpcl: BU-67x06, BU-67107, BU-67x10, BU-67118, BU-67114H *
* 2. enapcl: BU-65569, BU-65566, BU-65596 *
* 3. ezmausb: BU-65590UX, BU-65591UX *
* 4. acexusb: BU-67102UX, BU-67103UX *
* 5. NONE: Do Not load Driver at this time *
*****
Selection:
1

```

12. The DDC Card Manager (*ddccm*) is automatically run. In the card manager select 1 to show 1553 devices or 2 to show SRINC 429 devices.

```

root@rtips-Desktop: /home/rtips/DDC/BU69092S1_4_4_1_4
File Edit View Search Terminal Help
Install ddccm
=====
rm -f ThunderbirdMail:ddccm
rm -f /usr/bin/ddccm/ddc*.cfg
cp -f ../bin/ddccm /usr/sbin

Build Complete
=====

*****
* Note that the drivers must be loaded after every system startup. *
* The loader script can be executed automatically during system boot *
* by calling it from the system 'rc' startup facility. Unloading of *
* the drivers and deletion of the device special files is accomplished*
* by running the appropriate unloader script or command as root user. *
*****
* Load Device Driver for the 1st time *
*****
* Which driver would you like to load? *
* 1. acexpcl: BU-67x06, BU-67107, BU-67x10, BU-67118, BU-67114H *
* 2. enapcl: BU-65569, BU-65566, BU-65596 *
* 3. ezmausb: BU-65590UX, BU-65591UX *
* 4. acexusb: BU-67102UX, BU-67103UX *
* 5. NONE: Do Not load Driver at this time *
*****
Selection:
1
*****
* processing selection *
*****
Operating as user: root
*****
* Press any key to run the DDC Card Manager for the first time... *
*****

=====
Data Device Corporation Card Manager ddccm v4.4.1
=====

1 1553 Data Bus
2 ARINC 429

Enter desired product family (-1 to quit): 1

```



- ```

root@rtips-Desktop: ~/home/rtips/DDC/BU6909251_4_4_1_4
File Edit View Search Terminal Help
* Which driver would you like to load? *
* 1. acevpc: BU-67x06, BU-67107, BU-67x10, BU-67118, BU-67114H *
* Thunderbird Mail BU-65569, BU-65566, BU-65596 *
* 3. eznausb: BU-65590UX, BU-65591UX *
* 4. aceausb: BU-67102UX, BU-67103UX *
* 5. NONE: Do Not load Driver at this time *
*****
Selection:
1
*****
* processing selection *
*****
Operating as user: root
*****
* Press any key to run the DDC Card Manager for the first time... *
*****

=====
Data Device Corporation Card Manager ddccm v4.4.1
=====

1 1553 Data Bus
2 ARINC 429

Enter desired product family (-1 to quit): 1

=====
Item Dev Device Name Model Ch Location Curr. Rec.
Num FW Rev. FW Rev.
-----
1 - BU-67210F2 2 1 02:02:00 10.3 10.3
2 - BU-67210F2 2 2 02:02:00 10.3 10.3
=====

Enter command ('h' for help): s

=====
Item Dev Device Name Model Ch Location Curr. Rec.
Num FW Rev. FW Rev.
-----
1 - BU-67210F2 2 1 02:02:00 10.3 10.3
2 - BU-67210F2 2 2 02:02:00 10.3 10.3
=====

[Show Applications] Ify (-1 to abort): 1
Enter new logical device number [0 - 31, or -1 to disable]> 1

```

- ```
root@rtips-Desktop: /home/rtips/DDC/BU6909251_4_4_1_4
File Edit View Search Terminal Help
Enter command ('h' for help): s
-----
Item  Dev  Device Name      Model  Ch  Location      Curr.  Rec.
   Num                               FW Rev. FW Rev.
-----
1    -    BU-67210F2        2      1  02:02:00      10.3   10.3
2    -    BU-67210F2        2      2  02:02:00      10.3   10.3
-----
Enter item to modify (-1 to abort): 1
Enter new logical device number [0 - 31, or -1 to disable]: 1
-----
Item  Dev  Device Name      Model  Ch  Location      Curr.  Rec.
   Num                               FW Rev. FW Rev.
-----
1    1    BU-67210F2        2      1  02:02:00      10.3   10.3
2    2    BU-67210F2        2      2  02:02:00      10.3   10.3
-----
Enter command ('h' for help): s
-----
Item  Dev  Device Name      Model  Ch  Location      Curr.  Rec.
   Num                               FW Rev. FW Rev.
-----
1    1    BU-67210F2        2      1  02:02:00      10.3   10.3
2    2    BU-67210F2        2      2  02:02:00      10.3   10.3
-----
Enter item to modify (-1 to abort): 2
Enter new logical device number [0 - 31, or -1 to disable]: 2
-----
Item  Dev  Device Name      Model  Ch  Location      Curr.  Rec.
   Num                               FW Rev. FW Rev.
-----
1    1    BU-67210F2        2      1  02:02:00      10.3   10.3
2    2    BU-67210F2        2      2  02:02:00      10.3   10.3
-----
Enter command ('h' for help): q
*****
* Would you like to build the sample applications? (y/n) *
* Samples will be placed in: /home/rtips/DDC/SDK/samples/enacepl/bin/ *
* ACE Samples will be in: /home/rtips/DDC/SDK/samples/acetomace/bin/ *
*****
y
```

- a) **USB Drivers:** Locate the USB driver file *acexusb.ko* in the folder "<SDK Install Path>/drivers/legacy/acexusb/prj/". If the file is not present, create it by running "make" on a terminal in this folder. Then, load the driver file using this command on a terminal in root mode:

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Bhadrappa Layout, Bengaluru - 560094, India • Telefax: +91-80-23416947 • [www.rtipsonline.com](http://www.rtipsonline.com)

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- b) **PCI Drivers:** Run the following script on a terminal in root mode: "<SDK Install Path>\drivers\acex\tools\ddc\_acexpci\_load"

```
$ cd <SDK Install Path>\drivers\acex\tools  
$ ./ddc_acexpci_load
```

17. If you wish to configure Linux to load the driver for the 1553 hardware upon every boot, please refer to Application Note AN0006 on the website of RTips Technologies here [Resources for Avionics Databus Products of Data Device Corporation \(rtipsonline.com\)](http://www.rtipsonline.com).