Description:	DSC- Software Release Notes, Universal Driver 6.01	Document No.:	SRN #0022

DSC-Software Release Notes, Universal Driver 6.01

DOC REVISION	DESCRIPTION OF CHANGE	DATE
A	First draft of release notes for Universal Driver 6.00	4/07/2009
B	Universal Driver version 6.01 release.	5/26/2009

1   REASON FOR CHANGE:

The Universal Driver 6.01 release is an incremental release from the version 6.00. The UNIVERSAL DRIVER 6.01 is backward compatible with the previous Universal Driver release version 6.00 except the Helios SBC support.

Universal Driver 6.01 is available for the following operating systems.
- Linux Kernel version 2.4.xx , 2.6.23 and 2.6.24
- Windows CE 6.0 R2.
- Windows XP Professional – SPI1.
- MS - DOS 6.22

2   DESCRIPTION OF NEW FEATURES:

Version 6.01 :

- Modified Helios support for the data acquisition circuit to add the unique range feature on DA circuitry. This allows the user to configure each DA channel with its own setting for gain and polarity as defined by the register at page 2 Base + 13.
- To use the DA individual range selection, it must be noted that for every channel the DAUR bit MUST be set to 1.
- The DSCUD.H file has the following changes.

    o DSCDASETTINGS structure has changed to accommodate the individual DA ranges as below.

```
typedef struct
{
    BYTE polarity;      /* INPUT: 0 = BIPOLAR, 1 = UNIPOLAR */
    BYTE load_cal;      /* INPUT: 0 = FALSE, 1= TRUE. Loads calibration from eeprom */
    FLOAT range;        /* INPUT: Absolute value of maximum voltage */
    BYTE gain;          /* INPUT: 0 = gain of 1, 1 = gain of 2, 2 = gain of 4, 3 = gain of 8 */

    // New for the Helios and later D/A-capable boards.
    BYTE dasim ;        /* DASIM bit for simultaneous update*/
    BYTE daPolEn;       /* In DA Mode Control, DA polarity enable bit; 0 - disabled 1 - enabled.*/

    BYTE daUR ;         /* DA Unique Range. 1 will setup range settings for the CH*/
    BYTE daURChannel ;  /* Unique range settings for the channel. Ignored if daUR is 0*/

} DSCDASETTINGS;
```

- daPolEn bit in the DSCDASETTINGS structure is not used in Helios board support in the driver. Now the polarity is always controlled by the software and not through jumpers.
- DAC_Config bit will define the status of the DAMODE bit in Base + 11 register. If the Helios board support is initialized with DAC_Config set to 1 in the DSCCB structure, then the driver software will set the DAMODE to 1 making the board behave as a 16 bit DAC and overriding the DASIZE bit status read.

- If 16 bit operation is not desired, it is highly recommended that the DSCCB structure be initialized to 0 using a memset command so that the DAC_Config element is set to 0. Otherwise, the software MUST set to the DAC_Config bit to 0 before calling dscInitBoard on the Helios board support driver.
- Removed support for the dscEnhancedFeaturesEnable function from the Helios driver layer. When this function is called on a Helios board, the function NOT supported error will be returned by the driver. The support for this function for the other boards on which the function is supported is unchanged.
- Setting the page bits to go to Page 1 and Page 2 has been fixed to write to register Base + 1 instead of previous Base + 3.
- The software applications developed for Universal Driver 6.00 or earlier versions, must be recompiled with the UD 6.01.
- Linux driver library file name is changed to LIBDSCUD-6.01.a.

Version 6.00 :

- Added support of Helios board with Vortex 86SX/DX CPU.
- Added support of Neptune board.
- Added support of AthenaII board.
- Added support of DMM32-DX board.
- Added support of GPIO-11, GPIO-12 and GPIO-21 boards.
- Windows CE 6.0 device driver for UNIVERSAL DRIVER 6.00.
- New Linux kernel version 2.6.23 for UNIVERSAL DRIVER.
- For Helios board a new feature available to set DA modes through dscDASetSettings function. This feature allows the DA mode be configurable to 5 different modes as defined in the Helios Technical manual.
- Provides all the features from 5.92.1 and 5.92.2 universal driver release.
- Athena-II enhanced FIFO support. The universal driver 6.00 supports the latest changes for the Athena-II board relating to the enhanced FIFO feature. The driver provides capability to configure the FIFO threshold value in the enhanced FIFO mode to any value up-to a maximum of 2048. It is recommended that the FIFO threshold value of 1024 be used when using interrupt operations.
- DSCUD.H include file has changes to the following structures…
  - DSCDACALPARAMS. (Changes applicable to Helios board only)
    typedef struct
    {
        BOOL   fixed;
        BOOL   polarity;
        DFLOAT darange;
        FLOAT offset;
        FLOAT gain;
        FLOAT cal_point;

        BOOL ch0pol, ch0prog, ch0ext;
        BOOL ch1pol, ch1prog, ch1ext;
        FLOAT ref;

```
        // New for the Helios and later D/A-capable boards.
        BYTE darange_calibrate; /* The D/A range to calibrate. */
        BYTE boot_darange;  /* The D/A range to boot up in. */


    } DSCDACALPARAMS; /* Single D/A channel */
```

o DSCDASETTINGS. (Changes applicable to Helios board only)
   typedef struct
   {
```
        BYTE polarity;
        BYTE load_cal;
        FLOAT range;
        BYTE gain;

      // New for the Helios and later D/A-capable boards.
        BYTE dasim ; /* DASIM bit for simultaneous update*/
        BYTE daPolEn;   /* In DA Mode Control, DA polarity enable bit; 0 - disabled 1 -
   enabled.*/

    } DSCDASETTINGS;
```
o DSCCB. (Changes applicable to DMM32dx board only)
   A new parameter is added to the DSCCB structure used for dscInitBoard API. Although
   every board requires this structure and function, the usage of the added member to the
   structure is applicable to DMM32DX board only.

   typedef struct {

```
        BYTE boardtype;
        DSCB boardnum;
        WORD base_address;
        BYTE int_level;
        BOOL RMM_external_trigger;
        BOOL RMM_external_trigger_c3;
        WORD EMM_IOAddr[8];
        WORD EMM_Interrupt[8];
        BYTE clkfrq0;
        BYTE clkfrq1;
        BYTE clksel1;
        WORD address_space;
        BYTE DAC_Config; // ONLY USED FOR DMM32DX
    } DSCCB;
```
   The new member to the structure called DAC_Config has valid values of 1 or 0 and is
   provided for enabling the user to decide upon the resolution of the DAC to use on the
   board. If this member is set to 0, the driver will use the 12 bit DAC mode which is
   backward compatible with the DMM32X based designs. To use the 16 bit DAC, this
   member MUST be set to 1 by the user application.
- Since the DSCUD.H file has been changed, the applications developed using older universal
  drivers, MUST be re-compiled with the new driver libraries to make use of the latest additions.

HELIOS SBC SUPPORT:

The UD versions 6.00 and later support the Helios Data Acquisition features including interrupts. Helios support is defaulted to IRQ5 usage for the data acquisition circuit. The IRQ5 must be set as Reserved in the Helios board BIOS otherwise the interrupts might not work as USB might take up IRQ5.

The UD version 6.00 support of Helios has the addition of programmable D/A modes. The gain and polarity are programmable in Helios using the DA mode control register at location Base + 14 in Page 2.

The way the AD modes differ from AthenaII is that the Mode #4 – Unipolar – Gain of 1 is enabled in Helios. Thus in Helios all 8 modes of AD operation are available (unlike AthenaII where 7 modes were available) , 4 – BIPOLAR and 4 – UNIPOLAR.

AD FIFO behavior:

The UD for Helios supports the AD FIFO in both the standard mode and the enhanced mode.

- In the standard mode, the FIFO threshold parameter will be required to be supplied by the user application and the value MUST be between 1 and 48 samples. In this mode, the maximum FIFO depth available is 48 samples.
- In the enhanced mode, the FIFO threshold parameter is configurable in blocks of 8 samples. Recommended FIFO threshold value is 1024.

NEPTUNE SBC SUPPORT:

UD 6.00 and later versions have support of Neptune board. All the functionalities of the Neptune data acquisition circuit is supported in the driver. The 4 RS-232 ports provided on the Neptune board are not supported by universal driver.

Universal Driver 6.01 Board and Operating System Support Matrix
The following table shows the support of the Universal Driver 6.01 on different boards and operating systems.

Board & Board Description	Operating System			
	MS-DOS6.22	Linux 2.4.xx 2.6.23/24	Windows XP	Windows CE 6.0
ATH400-128/ATH660-128 Athena SBC, 400/600MHz, 128MB RAM, data acquisition	✓	✓	✓	✓
ATHM500-256A/ATHM800-256A/ATHM800-256ALP Athena II SBC, 500/800MHz, 256MB RAM, data acquisition	✓	✓	✓	✓
DMM / DMM-XT Auto-calibrating 16-channel 12-bit analog I/O	✓	✓	✓	✓
DMM-16-AT Autocalibrating 16-channel 16-bit A/D + 4-channel 12-bit D/A, ext. temp.	✓	✓	✓	✓
DMM-32-AT Auto-Autocalibrating 32-channel 16-bit A/D + 16-bit D/A, ext. temp.	✓	✓	✓	✓
DMM-32X-AT Auto-Autocalibrating 32-channel 16-bit A/D + 12-bit D/A, ext. temp.	✓	✓	✓	✓
DMM32-DX-AT Auto-Autocalibrating 32-channel 16-bit A/D + 16-bit D/A, ext. temp.	✓	✓	✓	✓
DMM-48-AT Autocalibrating 16-ch. 16-bit bipolar A/D, 4 opto in, 8 relays, ext. temp.	✓	✓	✓	✓
DMM-AT Autocalibrating 16-channel 12-bit analog I/O extended temp	✓	✓	✓	✓
EMM-8M-XT Emerald-MM 8-channel RS-232/422/485 extended temp.	✓	✓	✓	✓
EMM-DIO-XT Emerald-MM-DIO 4 RS-232 + 48 digital I/O w/ edge detect, extended temp.	✓	✓	✓	✓
EMM-OPT4-XT Emerald-MM 4 RS-232/422/485 optoisolation + 24 DIO, extended temp.	✓	✓	✓	✓
GPIO-MM-XT / GPIO-MM-12-XT / GPIO-MM-21- XT General Purpose Digital I/O with 48/96 DIO and Counter/Timers, Ext. Temp.	✓	✓	✓	✓
HLV800-256AV Helios SBC, 800MHz Vortex86DX, 256MB RAM, data acquisition and video	✓	✓		✓
HRC400-5A128/HRC550-5A128 Hercules EBX, 400/550MHz CPU, 128MG RAM, DAQ	✓	✓	✓	✓
HRC800-5A512 / E Hercules II SBC, 800MHz, 512MB RAM, 5-28VDC Input, data acquisition	✓	✓	✓	✓
IR104 / IR104-PBF 20 SPST relays + 20 optoisolated digital inputs	✓	✓	✓	✓

MRC-100-XT/ MRC-224-XT Mercator PC/104-*Plus* Single/Dual Ethernet + 24 Digital I/O	✓	✓	✓	✓
NPT-LX8A-xxxA/ NPT-PM14-xxxA Neptune SBC, 500MHz LX800/ 1.4GHz Pentium M CPU, xxx RAM, data acquisition	✓	✓	✓	✓
OMM-XT Onyx-MM 48 digital I/O + 3 counter/timers extended temp.	✓	✓	✓	✓
OMM-DIO-XT Onyx-MM 48 digital I/O only extended temperature	✓	✓	✓	✓
OPMM-XT Opal-MM 8 opto inputs, 8 relay outputs, extended temp.	✓	✓	✓	✓
PMM-P / PMM-S Pearl-MM 16 SPDT relays, pin headers, extended temp.	✓	✓	✓	✓
PSDC20-xxxA / PSDE10-xxxA Poseidon SBC, 2.0/1.0GHz, xxxMB RAM with data acquisition	✓	✓	✓	✓
RMM-412-XT / RMM-812-XT Ruby-MM 4-ch/8 ch. 12-bit D/A + 24 digital I/O extended temp.	✓	✓	✓	✓
RMM-1612-XT Ruby-MM 16-ch. 12-bit D/A + 24 digital I/O extended temp.	✓	✓	✓	✓
RMM-416-XT Ruby-MM 4-ch. 16-bit D/A + 24 digital I/O, extended temp.	✓	✓	✓	✓

Universal Driver 6.01 Operating System support

The universal driver 6.01 is available for MS-DOS 6.22, Linux 2.6.xx, Windows 2000/XP (SP2) and Windows CE 6.0 operating systems.

The Universal driver lets an application developer develop programs using the languages C/C++ for the target OS. Below are the details for using the universal driver on different operating systems.

- MS-DOS 6.22.

    o Library file – DSCUDBCL.LIB – large memory model
    o Include Header File – DSCUD.H
    o Usage :
        ▪ Used with BC++ 5.0 compiler/linker.
        ▪ Applications need to include the DSCUD.H file in the C code.
        ▪ The project file needs to include dscudbcl.lib file as a library file. The application will link to this library file to create an EXE of the application.
        ▪ Once the EXE is created, the library file is not required. The EXE can run by itself.

- Linux 2.6.x

    o Library File – LIBDSCUD-6.00.a.
    o Kernel Module – DSCUDKP.KO
    o Include File – DSCUD.H
    o Usage :

- Can be used with GNU compiler GCC 3.2.3.
- Applications need to include DSCUD.H file in the C code.
- The application MUST statically link the library file libdscud-6.00.a to the application by setting the path in makefile.
- The kernel module dscudkp.ko MUST be installed as instructed by the installation instructions. This module provides interrupt access to the application. If this module is not installed, the application will not be able to use the universal driver for interrupt based operations like the ADSampleInt, ADScanInt etc.

- Windows 2000/XP.

  - Library File – dscud.lib
  - Library DLL – dscud.dll (version 6.0.1)
  - Kernel driver – dscudkp.sys (version 6.0.1)
  - Windriver – windrvr.sys (version 5.0.5.1)
  - Usage :
    - Can be used with any Win32 based programming language. Applications can easily be developed using Microsoft Visual Studio IDE in C/C++ or even Visual Basic languages.
    - Applications need to include DSCUD.H file in the C code. (Separate .BAS file would need to be created to be used with Visual Basic language)
    - Application needs to link the file dscud.lib in their application.
    - DSCUD.DLL file must be present in the same folder as the application Executable in order for the application to run.
    - Windrvr.sys MUST be installed for any universal driver commands to work.
    - DSCUDKP.SYS MUST be installed using the installation instructions provided to use the Universal Driver 6.01 with interrupts.

- Windows CE 6.0 R2.

  - Library File – dscud_api.lib
  - Library DLL – dscud_api.dll
  - Kernel driver – dscud.dll
  - Usage :
    - Can be used to develop applications in Platform Builder 6.0 and Visual Studio 2005 in C/C++.
    - Applications need to include DSCUD.H file in the C code.
    - Applications need to statically link with the library file dscud_api.lib.
    - DSCUD.DLL driver MUST be present in the project.reg file of the platform. To include the universal driver in the user's platform, the platform will need to be re-compiled with the registry settings as described in the release documents.

3 BUG FIXES

<u>Version 6.01:</u>

None.

<u>Version 6.00:</u>

- GPIO-MM board does not get initialized on Linux.

4 KNOWN ISSUES / LIMITATIONS:

- VB.NET example programs support is not available on UNIVERSAL DRIVER 6.01 at this time.
- Universal Driver does not support any RS-232 functionality provided by any of the DSC boards. The RS-232 support is always provided by the operating system on which the board is running.
- LabView support for UD 6.01 is not available.
- Universal driver version 6.01 is not available for QNX or VxWorks operating systems.
- For support of end of life products, the Universal Driver version 5.92 or earlier should be used.

5 RELEASE HISTORY

Date	Details	Version
5/26/2009	UNIVERSAL DRIVER 6.01 RELEASE	6.01
4/07/2009	UNIVERSAL DRIVER 6.00 RELEASE WITH Helios support and earlier UD bug fixes.	6.00