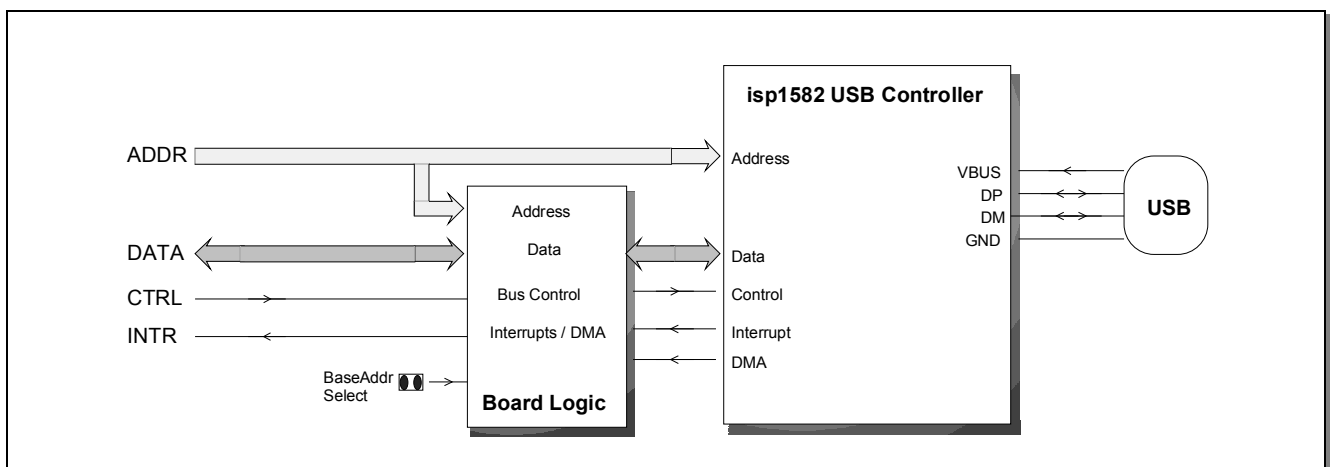


SUMMARY

- High-Speed USB 2.0 (480 Mbps) and Full Speed (12 Mbps) Support
- Philips isp1582 High-Speed USB Controller
- Up to 14 Endpoints with 8 K bytes Shared Fifo
- 16 bit Bus Interface
- PIO, Interrupt, and DMA Data Transfers
- 3.3V Supply, 5V tolerant I/O
- Industrial Temperature Range (-40 .. +85°C)
- Suitable for all 3.3V D.Module DSP Boards
- Cascadable with other Peripheral Daughter Modules
- Applications:
 - Data Logging
 - Real-Time Monitoring
 - Field Maintenance



The D.Module.USB2+ is a high-speed USB 2.0 Peripheral Daughter Module, suitable for the D.Module family of DSP boards. It extends your DSP system with a standard high-speed interface to any Personal Computer and adds capabilities like real-time data exchange, monitoring, and extensive data logging.

A DSP library is provided, which encapsulates hardware dependencies and USB-specific programming from the application. Data Transfers are possible using programmed I/O, interrupt, and DMA. For the PC-side a driver for Windows® 2000 and XP exists, as well as an API library for C++ application programs.

USB Controller

The Philips isp1582 high-speed USB2.0 controller provides up to 14 endpoints (7 IN, 7 OUT), with a total of 8 K bytes shared Fifo memory. For highest throughput, the endpoints are capable of double-buffering: While one buffer (typically 512 bytes for a high-speed connection) is read or written by the DSP, the other buffer is committed to the USB engine. Hence It is possible to use up to eight endpoints simultaneously without any speed penalty. Once an OUT endpoint buffer (data direction PC to DSP) is full, or a zero-packet has been received, an interrupt is generated to the DSP. On IN endpoints, an interrupt is generated after the buffer has been committed to the chip's USB engine.

Only minimum protocol overhead is presented to the DSP: once configuration and enumeration are done, the DSP only

has to read the interrupt source register, acknowledge the interrupt, set the endpoint index to the desired endpoint, and transfer up to 512 bytes of data. The isp1582 USB protocol engine handles all lower communication levels automatically.

Board Logic

the D.Module.USB2+ board logic handles address decoding, interrupt mapping and interface matching between the isp1582 and the DSP external bus interface. All I/O signals are 5V tolerant and make possible to use the module in a mixed 3.3V/5V environment. Base address and interrupt mapping are widely configurable and allow to use the module together with other daughter boards without resource conflicts.

Memory Map

The D.Module.USB2+ is decoded via the nIOSEL or nMEMSEL chip select line and address lines A16, A17, and A18. It occupies a consecutive 512 byte space (2K bytes for C6000 modules) in the selected memory area.

64 K Byte Block Select			Base Address Offset		
JPA18	JPA17	JPA16	C6000 DSP Modules		others
			IOSEL	MEMSEL	
open	open	open	-	0	0
open	open	closed	-	0x04.0000	0x01.0000
open	closed	open	-	0x08.0000	0x02.0000
open	closed	closed	-	0x0C.0000	0x03.0000
closed	open	open	0	0x10.0000	0x04.0000
closed	open	closed	0x04.0000	0x14.0000	0x05.0000
closed	closed	open	0x08.0000	0x18.0000	0x06.0000
closed	closed	closed	0x0C.0000	0x1C.0000	0x07.0000

Default Factory Setting: MEMSEL, offset 0

Register Map

Address Offset		Register
C6000 DSP Modules	Other	
0x0000 .. 0x0213	0x0000 .. 0x0087	isp1582 Registers
0x0214 .. 0x05FF	0x0088 .. 0x17F	not used
0x0600	0x0180	Board Configuration Register
0x0604	0x0184	EOT Register
0x0608 .. 0x07FF	0x0185 .. 0x01FF	not used

Board Configuration Register

D15..D8	D7	D6	D5	D4	D3	D2	D1	D0
don't care	1582 Reset 0 – Reset	1582 Wakeup 1 – Wakeup	INT2 MUX 00 – not used 01 – isp1582 interrupt 10 – isp1582DMA req. 11 – reseved	INT1 MUX 00 – not used 01 – isp1582 interrupt 10 – isp1582DMA req. 11 – reseved	INT0 MUX 00 – not used 01 – isp1582 interrupt 10 – isp1582DMA req. 11 – reseved			

Sample Software – DSP Side

The following example code, taken from the D.Module.USB2+ support software, shows the programming of a bulk in-endpoint (data flow direction DSP to PC) and data transfer:

```
void main (void)
{
    /******
    locals
    *****/
    USB_class *USB;
    USB_config_type USBc;
    short *DataBuffer;

    /******
    USB initialisation
    *****/
    USBc.base_address = MEMSEL_BASE;
    USBc.option       = USB_RESET | USB_POLL ;
    USBc.EPConfigHook = EPConfigHook;

    if ( (USB = usb_init (&USBc)) == NULL ) exit (1);
    /******
    main program loop
    *****/
    for (;;)
    {
        usb_poll (); // main usb polling function,
                    // can be replaced with USB interrupt

        /******
        send data
        *****/
        if ( !USB->not_connected )
        {
            /******
            send data on Bulk IN endpoint 1
            *****/

#ifdef USE_DMA
            isp1582_WriteBulkEndpoint_DMA (EPINDEX_EP01_IN, DataBuffer, USB->PacketSize);
            while (! isp1582_dmacomplete ( 0 ));
#else
            isp1582_WriteBulkEndpoint (EPINDEX_EP01_IN, DataBuffer, USB->PacketSize);
#endif
        }
    }
}
```

```

/*****
  callback function, called if device status changed
  *****/
void EPConfigHook (unsigned int Event, unsigned int BusSpeed)
{
  /*****
  configure endpoints if device reset was issued by the Host
  *****/
  if ( Event & CONFIG_RESET )
  {
    isp1582_enable_endpoint (EPINDEX_EP01_IN,  EPTYPE_BULK | EPTYPE_DBLBUF,
                             USB->PacketSize);
  }

  /*****
  notify application of device status changes if required
  *****/
  if ( Event & CONFIG_SET )
  {
    /* ... */
  }

  if ( Event & CONFIG_UNCONFIGURE )
  {
    /* ... */
  }
}

```

SIGNAL DESCRIPTION

External Bus Interface

Signal	Pin	Type	Description
D0 .. D15	V15 .. V30	IOZ	Data Bus
A0..A5 A6..A8 A16..A18	U9 .. U14 V2 .. V4 V12 .. V14	I	Address Bus
nIOSEL	U8	I	IOSEL memory area chip select, active low
nMEMSEL	V31	I	MEMSEL memory area chip select, active low
nRD	U2	I	Read Strobe, active low
nWR	U5	I	Write Strobe, active low
nRESET	U7	I	global Peripheral Board Reset, active low
nINT0 nINT1 nINT2	U3 U4 A19	OZ	Interrupt outputs, open drain, active low

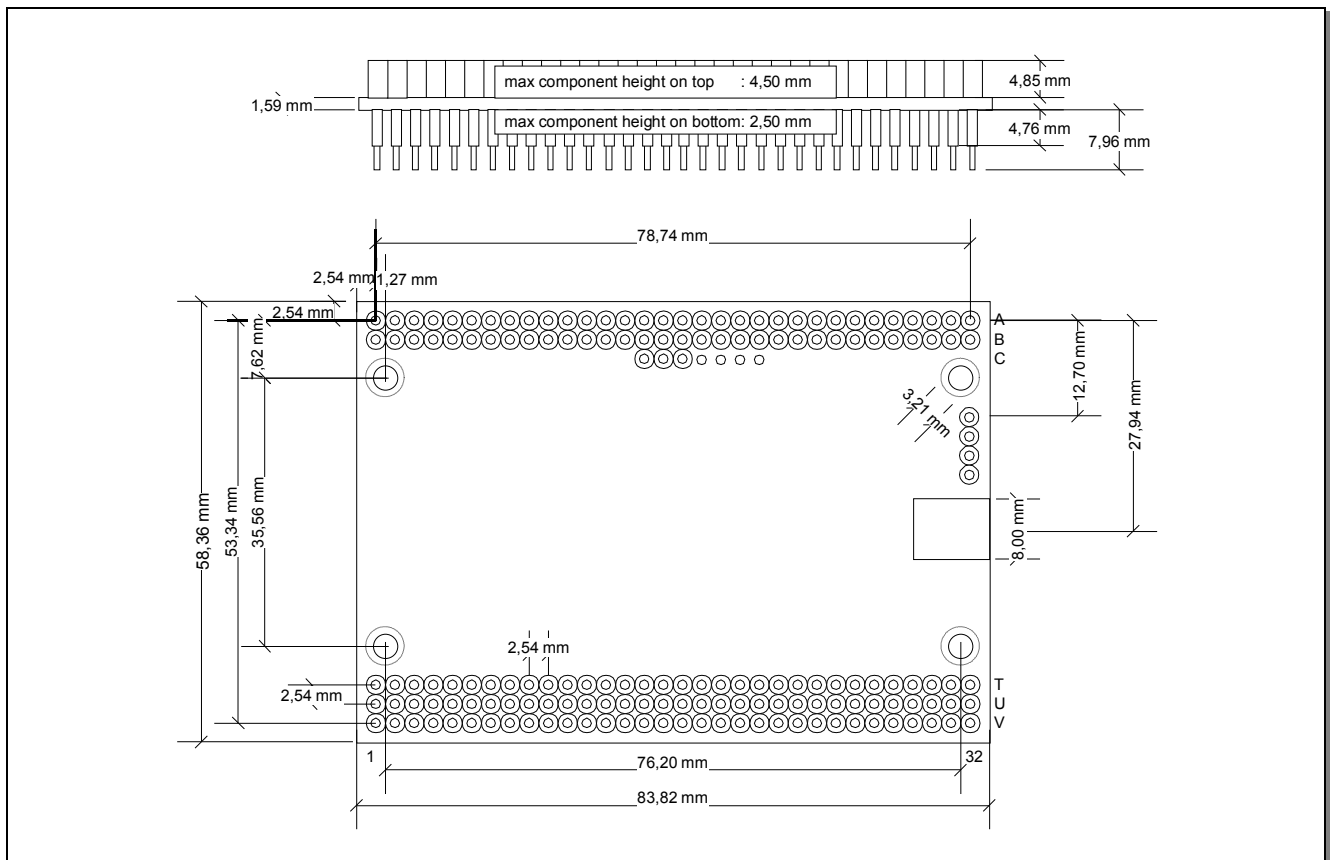
I – Input, O – Output, IO – bidirectional, Z – high impedance

USB Mini-B Connector

Signal	Pin	Type	Description
VBUS	1	PWR	USB Bus Power, +5V, provided by USB Host VBUS is only used to detect a cable connection, no power is drawn from this line
DPLUS	3	IO	non-inverted data
DMINUS	2	IO	inverted data
GND	5	PWR	USB Signal Ground
nc	4		not used

I – Input, O – Output, IO – bidirectional, Z – high impedance, PWR – power

MECHANICAL DIMENSIONS



SPECIFICATIONS

Supply Voltage VCC	3.3 V +/- 5%
Power Consumption	typ: 100 mA, max. 150 mA
Operating Temperature	-40..+85°C
High Level Input Voltage	min. 2V, max. 5.2V
Low Level Input Voltage	min. -0.2V, max. 0.8V
Size	max. 85 x 58.5 x 15 mm
USB Connector	Mini-B (on-board) or external connector
Supported DSP Boards:	D.Module.C6201, D.Module.C6203 D.Module.C6701, D.Module.C6711, D.Module.C6713 D.Module.21065

ORDERING INFORMATION

D.Module.USB2+	USB 2.0 interface module
Options	-.
DS.USB2+	Development Support Base Package including Support Software, PC drivers, sample software for DSP and PC side, User's Guides and Manuals

Additional Options On Volume Purchase

For volume purchase D.SignT offers customer specific modifications of the hardware either to reduce costs through reduced functionality or to increase functionality to meet the customers application requirements. Extensive experience in custom designs and the powerful engineering tools of our development department bring your application tools and our DSP know how together for your solution. Please contact D.SignT directly.

Technical Support

Our products include free of charge technical support. You can reach the technical support by e-mail (support@dsigt.de) phone or fax.

Pricing

Please ask for our current price list and volume discounts.

Availability

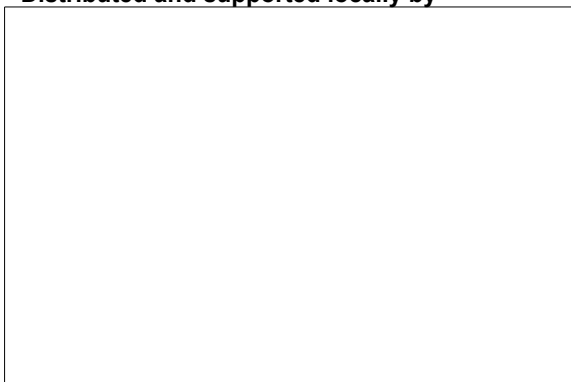
Our standard D.Modules are available typically ex-stock.- For special modifications or non-standard D.Modules please consult our sales department.

Warranty

All D.Modules come with a warranty of 12 month.

For additional information contact your local distributor or D.SignT directly.

Distributed and supported locally by



D.SignT

Digital Signalprocessing Technology

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