



USB VI HID Datasheet

USB HID Visual Indicator Lights

Delcom Products Inc. USBVIHID Datasheet

Revision 0 – 03/09/2011

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1 Product Overview

The Delcom USB HID Visual Indicator Lights provides visual status information for any application or system with a USB Port. The indicators are controlled and powered via the USB port. A separate power source is not required. These devices use the built in USB HID driver that comes preinstalled on most operating systems. Both 32bit and 64bit operating systems are supported. Therefore no USB driver is required. Each device has a unique software serial number so that multiply device can be used simultaneously on the same host computer. The USB lights are available in multiple enclosures styles, such as; beacon type, stacking, wall mount, traffic lights, desktop, panel lights and key fob. The USB lights can generate 1 to 4 primary colors. Light intensity, duty cycle and flash rate are all programmable. The USB indicators all use long life Light Emitting Diode (LED) to generate the visible light. Other available options on selected models, are built in switch and buzzer.

2 Sample Product Comparison Chart

Type	Beacon	Single Color	Traffic	Panel	Keyfob
Image				TBA	TBA
View Angle	360	180	180	180	180
High Bright	Yes	Yes	No	No	No
Mounting	Pole Mount, Surface Mount	Surface Mount	Surface Mount	Panel Mount	n/a
Options	Buzzer, Internal Switch	n/a	n/a	n/a	n/a
Colors	1-3	1	1-3	3	3
Enclosure Color	Black Beige	Red Amber	Black Beige	n/a	n/a
Price	High	Med	Low	Low	Low
Sample Product Number	904000	904402	907241	TBA	TBA

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3 Quick Start

To get started, simply plug the device in to a USB port. Your operating system will automatically recognize the device and load the preinstalled USB HID driver for it. Then just run one of the software examples to operate your device. See sample applications below.

C# and VB.Net / Direct Example

<http://www.delcom-eng.com/productdetails.asp?ProductNum=890630>

C++/MFC / Direct Example

<http://www.delcom-eng.com/productdetails.asp?ProductNum=890608>

Delcom DLL / Indirect Example

<http://www.delcomproducts.com/productdetails.asp?PartNumber=890512>

Windows Task Bar Example

<http://www.delcomproducts.com/productdetails.asp?PartNumber=890680>

Windows Command Line Utility Example

<http://www.delcomproducts.com/productdetails.asp?ProductNum=890601>

Linux C Example

<http://www.delcomproducts.com/productdetails.asp?ProductNum=890604>

Delcom USB HID ActiveX Control

<http://www.delcomproducts.com/productdetails.asp?ProductNum=890682>

4 Device Control

4.1 Overview

The following section describes how to connect to the device via software.

There are four steps to communicate with the USB Indicator device. The first step is to search the computer to find the unique device name of the device. This step only has to be done once. With the device name found we can open the device, send one or more commands to control the USB device and lastly we close the device.

- 1 – Find the device name
- 2 – Open the device
- 3 – Send a command
- 4 – Close the device

The commands allow us to control the many features of the USB indicator. Such as; on, off, flash, duty cycle, power level and others.

Basic light control is done by sending a command value with a data value to the device. The command value selects the command type. The data value sets the variable of the command. The following table 4.2 indicates which bits control which LED colors by device type. Setting the bit low (0) enables the light. Setting the bit high (1) (bootup/default state) turns the light off.

4.2 Port Pin Light Mappings

Device Type	Bit0 (P1.0)	Bit1 (P1.1)	Bit2 (P1.2)	Bit3 (P1.3)	Bit0 (P0.0)
Beacon GRB Indicators	Green	Red	Blue	Buzzer	Internal Switch
Beacon GRY Indicators	Green	Red	Yellow	Buzzer	Internal Switch
Single Color Indicators	LED Color	n/a	n/a	n/a	n/a
Dual Color Traffic Lights	Green	Red	n/a	n/a	n/a
Triple Color Traffic Lights	Green	Yellow	Red	n/a	n/a

5 Programming Methods

There are multiply ways to communicate with the USB Visual Indicator devices. They are the direct, indirect (DLL) and ActiveX methods. The direct method communicates directly to the USB driver via the OS API functions. The indirect method communicates to the USB device via the Delcom DLL or DelcomX control. The Delcom DLL or Delcom ActiveX controls are the easiest way of communicating with the USB device. The direct method provides the highest control and the fastest access, but requires a higher programming skill level. You can also mix indirect and direct functions. For example you can use the DLL to get the device name and then you can use the direct method to open, write, read and close the device.

5.1 Indirect / ActiveX Method

The DelcomX OCX is an ActiveX control that can run in any OCX enabled container. Such as MS Internet Explorer and other programs that support ActiveX (e.g. MS Word & MS Excel). The DelcomX allows your OCX programs to easily send commands to the Delcom USB HID devices. For more information on the ActiveX control see the following link.

<http://www.delcomproducts.com/productdetails.asp?PartNumber=890682>

5.1.1 ActiveX Visual Indicator Methods

LEDCtrl	Controls the LED state: On, Off and Flash.
LEDPower	Sets the intensity/power of the LED.
LEDDutyCylce	Sets the flash rate (duty cycle) of the LEDs.
LEDPreScalar	Sets the master flash rate prescalar.
LEDOffset	Sets the initial synchronous delay value.
LEDSync	Syncs all the LED pins.
ReadPort0	Read port 0
ReadPort1	Read port 1
IsDevicePresent	Determines if device is present.

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5.2 Indirect / Delcom DLL Method

The Delcom DLL contains the basic commands to control the USB Indicator. The Delcom DLL is very easy to use. Simply copy the Delcom DLL from our website and copy it to your applications directory and start calling the functions. Below is a brief list of all the Delcom DLL commands relevant to the USB HID Indicator. For the Delcom DLL manual and download see the link below.

<http://www.delcomproducts.com/productdetails.asp?PartNumber=890510>

5.2.1 DelcomDLL Indicator Functions

DelcomLEDControl	Controls the LED state: On, Off and Flash.
DelcomLEDPower	Sets the intensity/power of the LED.
DelcomLoadLedFreqDuty	Sets the flash rate (duty cycle) of the LEDs.
DelcomLoadPreScalar	Sets the master flash rate prescalar.
DelcomLoadInitialPhaseDelay	Sets the initial synchronous delay value.
DelcomGetButtonStatus	Returns the current state on the internal switch.
DelcomEnableAutoConfirm	Enables the audio confirm feature.
DelcomEnableAutoClear	Enables the auto clear feature.
DelcomBuzzer	Enables the internal buzzer.

5.2.2 DelcomDLL VB Example

```
' Simple DelcomDLL VB Example to put the green led in to flash mode.
Sub Form_Load()
Dim DeviceName As String * MAXDEVICENAMELEN ' Must predeclare size
Dim Result As Long
Dim DeviceHandle As Long
Dim Packet As PacketStructure
Dim DataExt As DataExtStructure
Text1.Text = "Delcom DLL VB Sample" & Chr(13) & Chr(10)
Result = DelcomGetNthDevice(0, 0, DeviceName)
If (Result) Then
    Text1.Text = Text1.Text & "Device Found: " & DeviceName & Chr(13) & Chr(10)
    DeviceHandle = DelcomOpenDevice(DeviceName, 0)
    Result = DelcomLEDControl(DeviceHandle, GREENLED, LEDFLASH)
    Result = DelcomCloseDevice(DeviceHandle)
Else
    Text1.Text = Text1.Text + "Device Not Found" + Chr(13) + Chr(10)
End If
End Sub
```

5.3 Direct Method

The direct method requires the program to first find the unique device name on the system, then open the device, write or read to the device and finally close the device. This section only briefly describes the write and read commands that relate to the USB Visual Indicator. For complete information on the direct method please refer to the USBIOHID datasheet. For command list see the Direct Write and Read Commands below.

<http://www.delcomproducts.com/downloads/usbiohid.pdf>

5.3.1 Direct Method C Write example.

```
// GEN2 USB HID Write Example - Sets port 1 to 0xFE - First LED pin ON
typedef union HIDPacketStruct {
    unsigned char Data[256];
    struct {
        unsigned char MajorCmd;
        unsigned char MinorCmd;
        unsigned char DataLSB;
        unsigned char DataMSB;
        unsigned char DataHID[4];
        unsigned char DataExt[8];
    } Tx;
    struct {
        unsigned char Cmd;
    } Rx;
} HIDPacketStruct, *pHIDPacketStruct;

HIDPacketStruct MyPacket;           // Declare the packet
MyPacket.Tx.MajorCmd = 101;         // Fill the packet
MyPacket.Tx.MinorCmd = 2;           // Set port 1 value
MyPacket.Tx.DataLSB = 0xFE;         // port 1 value
HidD_SetFeature(hDevice, MyPacket, 8) // lastly send the packet
```

5.3.2 Direct Method C Read example.

```
// GEN2 USB HED Read Example - Read port 0 and 1 values
typedef union HIDPacketStruct {
    unsigned char Data[256];
    struct {
        unsigned char MajorCmd;
        unsigned char MinorCmd;
        unsigned char DataLSB;
        unsigned char DataMSB;
        unsigned char DataHID[4];
        unsigned char DataExt[8];
    } Tx;
    struct {
        unsigned char Cmd;
    } Rx;
} HIDPacketStruct, *pHIDPacketStruct;

HIDPacketStruct MyPacket;           // Declare the packet
MyPacket.Rx.Cmd = 100;              // Fill the packet - read ports cmd
HidD_GetFeature(hDevice, MyPacket, 8) // lastly send the packet

unsigned char Port0 = MyPacket.Data[0]; // Port 0 results
unsigned char Port1 = MyPacket.Data[1]; // Port 0 results
```


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5.3.3 Direct Write

Writing to the device is done by setting up a small data structure and passing this packet to the device. The data structure is shown below. The major command number set the packet size. Set it to 101 for 8 bytes packets and 102 for 16 byte packets. The minor command specifies the command type. And the DataLSB, DataMSB, DataHID[0..3] and DataExt[0..7] are the parameters for the command type. Depending on the command, one or more of the data bytes will be used. The following table briefly describes the write commands related to the USB visual indicators. See port pin light mappings above for port pin assignments. Refer to the USBIOHID datasheet for more information.

```
// Write Command Packet Format
Major Command      1Byte
Minor Command      1Byte
DataLSB            1Byte
DataMSB            1Byte
DataHID[0..3]      4Bytes
DataExt[0..7]      8Bytes (Optional)
```

5.3.4 Direct Write commands

Command # (Major – Minor)	Description
101-1	Write Port 0. Writes the LSB data to Port0.
101-2	Write Port 1. Writes the LSB data to Port1. Setting the pin low will turn on the corresponding LED pin.
101-10	Write both the port 0 and port 1 values. The LSB data is written to Port0 and the MSB data is written to Port1.
101-11	Sets or resets the port 0 pins individually. The LSB resets the corresponding port pin(s) and the MSB sets the corresponding port pin(s) on port 0. Resetting the port pin(s) takes precedence over setting.
101-12	Sets or resets the port 1 pins individually. The LSB resets the corresponding port pin(s) and the MSB sets the corresponding port pin(s) on port 1. Resetting the port pin(s) takes precedence over setting.
101-19	Loads the Clock Generator Global Prescaler value. This value is passed in the LSB register. Increasing this number decreases all the clock function frequencies. Prescaler range is 1 to 255 and the boot up default value is 10. This is the master prescaler for all the LED pins. Increasing this number will slow down the flash rate.
101-20	Enables or disables the clock generator on port 1. The lower nibble of the LSB disables the corresponding port pin(s) and the lower nibble of the MSB enables the corresponding port pin(s). Disabling the port pin(s) takes precedence over enabling. This command enables the flash mode on the appropriate LED pin. Note you must also turn the LED pin on with one of the port control commands (e.g. 101-2 or 101-12)
101-21	Loads the frequency and duty cycle for port 1 pin 0. The LSB data sets the high duty cycle and the MSB data sets the low duty cycle on port 1 pin 0. This command will set the flash rate and duty cycle on the LED pin.
101-22	Loads the frequency and duty cycle for port 1 pin 1. The LSB data sets the high duty cycle and the MSB data sets the low duty cycle on port 1 pin 1. This command will set the flash rate and duty cycle on the LED pin.
101-23	Loads the frequency and duty cycle for port 1 pin 2. The LSB data sets the high duty cycle and the MSB data sets the low duty cycle on port 1 pin 2. This command will set the flash rate and duty cycle on the LED pin.
101-25	Synchronizes the clock generation. This command synchronizes all the clock generators to start now plus an initial phase delay, see below. The lower nibble of the LSB enables this function on the corresponding pins P1.0 to P1.3. The lower nibble of the MSB presets the initial value on the corresponding pins P1.0 to P1.3. Initial phase delay resolution is in 10ms and is passed in the LSB

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	register. Initial phase delay registers are cleared after this command is sent. Therefore the initial phase delay registers must be set each time this command is called. Use this command to sync a LED flash pattern.
101-26	Load initial phase delay on port 1 pin 0. Sets the LSB data as the port1 pin0 initial delay value. To be used with command 25.
101-27	Load initial phase delay on port 1 pin 1. Sets the LSB data as the port1 pin0 initial delay value. To be used with command 25.
101-28	Load initial phase delay on port 1 pin 2. Sets the LSB data as the port1 pin0 initial delay value. To be used with command 25.
101-29	Load initial phase delay on port 1 pin 3. Sets the LSB data as the port1 pin0 initial delay value. To be used with command 25.
101-34	Load the PWM values. Port pins P1.0 through P1.3 can be placed in PWM mode by writing the PWM value with this command. The LSB Data parameter is the port pin number, range is 0-3. The MSB Data parameter is the PWM value, range is 0-100. This command is used to set the power or brightness for the LED pins. Default value is 80 (80%).
101-38	Enable/Disable Events Counter. This command sets up the event counter. This command is useful for capturing the internal switch event on models that have a switch. The event counter is a more efficient than just polling the port pins for the event. See the USBIOHID datasheet for more information. The internal switch is mapped to port 0 pin 0.
102-70	Buzzer Control. This command is used to drive a buzzer on port 0 pin3. See the buzzer control description in the USBIOHID datasheet for more information.
101-72	Auto Clear & Auto Confirm Control. This command enables/disables the Auto Clear and Auto Confirm feature. Bit 6 of the DataLSB controls the Auto Clear feature and bit 7 controls the Auto Confirm feature. A high value enables the feature and low disables it. When enabled the auto clear control will turn off all the LED pins when the internal switch (P0.0) is pressed. When enabled auto confirm control is sound two quick buzzer tones to indicate that the switch was pressed.

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5.3.5 Direct Read

Reading the device is done by setting the first byte in an 8 or 16 byte packet to the appropriate read command number. The size of the packet depends on the read command. On a successful read the returned read value will be returned in the same packet. Refer to the USBIOHID datasheet for more information.

5.3.6 Direct Read Commands

Read Command #	Description
100	Read ports 0 and port 1. This command will read the currently port values. The first byte (LSB) will contain the current value on port 0 and the second byte (MSB) will contain the current value on port 1. The third byte returns the clock enable status on port 1. And the fourth byte returns the Port2 values. This command is usefully in reading the internal switch and LED pin states.
10	Reads the firmware information. Byte 0-3: Unique Device Serial Number. DWORD Little Endian. Byte 4: Firmware Version. Byte 5: Firmware Date. Byte 6: Firmware Month. Byte 7: Firmware Year. It's always a good idea to test that the firmware is at least a minimum version. For example firmware version 20.
8	Reads the event counter value. This command returns the 4 byte event counter value and then resets the counter. If the counter over flows then the over flow status byte will be set to 0xFF otherwise it will be 0x0. The event counter is returned in the first 4 bytes and the over flow byte is in the 5 byte. This command is usefully in reading the internal switch.

6 Specifications

6.1 Absolute Maximum Ratings

Storage Temperature	-65C to +150C
Operating Temperature	-0C to +70C
Max Voltage	5.5V

6.2 Electrical Characteristics

Idle Operating Current	< 10mA
Max Operating Current	500ma
Max Power Dissipation	2.5 Watts
VCC Operating Limits	4 to 5.25V

6.3 Communications

USB 1.1 Packet Bandwidth	100 Packet/sec
USB 2.0 Packet Bandwidth	1000 Packet/sec

The USB 1.1 Low Speed specification defines the maximum packet period to be 10ms. Therefore you can send a read or write command every 10ms or 100 packets per second.

The USB 2.0 Low Speed specification defines the maximum packet period to be 1ms. Therefore you can send a read or write command every 1ms or 1000 packets per second.

6.4 Cable Lengths

Cable length and cable wire size should be selected in order to maintain an operating voltage at the USB device of at least 4.25 volts. Failure to maintain 4.25 volts at the USB device will cause it to reset.

The USB specification limits the USB cable length to 5 meters. Lengths above this can be achieved also long as a voltage of 4.25 is maintained at the device.

For longer lengths you can also use a [USB Powered Extension Cable](#).

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7.1 Beacon Dimensions



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7.4 Panel Mount Dimensions

TBA

7.5 Key fob Dimensions

TBA

8 References

8.1 Documentation Links

Delcom USB HID Documentation and Examples

<http://www.delcomproducts.com/productdetails.asp?productnum=900000>

Delcom USBIOHID Datasheet

<http://www.delcomproducts.com/downloads/usbiohid.pdf>

Delcom DLL

<http://www.delcomproducts.com/productdetails.asp?productnum=890510>

8.2 Example Code & Applications Links

C# and VB.Net / Direct Example

<http://www.delcom-eng.com/productdetails.asp?ProductNum=890630>

C++/MFC / Direct Example

<http://www.delcom-eng.com/productdetails.asp?ProductNum=890608>

Delcom DLL / Indirect Example

<http://www.delcomproducts.com/productdetails.asp?PartNumber=890512>

Windows Task Bar Example

<http://www.delcomproducts.com/productdetails.asp?PartNumber=890680>

Windows Command Line Utility Example

<http://www.delcomproducts.com/productdetails.asp?ProductNum=890601>

Linux C Example

<http://www.delcomproducts.com/productdetails.asp?ProductNum=890604>

Delcom USB HID ActiveX Control

<http://www.delcomproducts.com/productdetails.asp?ProductNum=890682>

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Appendix A. Revision History

Rev	Date	Author	Description
0	03/04/2011	DL	Initial Release

Appendix B. Notices

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