HT-ICE Interface Card
# Reference Manual

January 2005

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Introduction

The HT-ICE hardware emulator is the main hardware tool to provide designers with a method of fully emulating the functions of the MCU. Although collectively known as the HT-ICE, the emulator is supplied in various types, each with its own part number, the required one depends upon which MCU device is being used. To ensure that designers have a convenient and easy way of connecting the HT-ICE to their application hardware or target board, various interface cards, each with different part numbers, are also provided. These interface cards, which directly plug into the front socket of the HT-ICE, provides connectors for easy connection to the user's application hardware as well as any necessary additional switches and indicators necessary for full emulation.

Note that as new devices are continually being released by Holtek, which may require new interface cards, for the latest information it is suggested that the Holtek website is consulted.

CPCB48MIO0001A Interface Card

This interface card is used in conjunction with the **CICE48C00CCF**
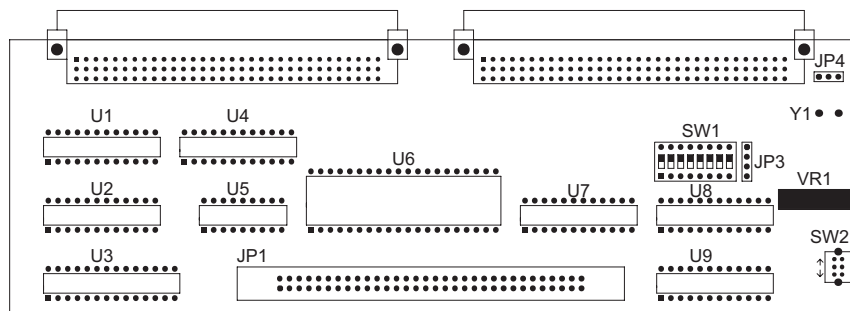
The external clock source has two modes, RC and Crystal. If a crystal clock is to be used, positions 2 and 3 should be shorted on JP4 and a suitable crystal inserted into location Y1. Otherwise, if an RC clock is to be used, positions 1 and 2 should be shorted and the system frequency adjusted using VR1. Refer to the Tools/Mask Option menu of the HT-IDE3000 User's Guide for the clock source and system frequency selection.

The four external signal trace inputs, marked as ET0 to ET3 at jumper location JP3, provide a means for external signals to trigger the internal breakpoint and trace functions. For more information, refer to the chapters on Breakpoint and Trace the Application Program within the Holtek HT-IDE3000 User's Guide.

The JP1 connector provides the I/O port connections as well as other pins. The DIP switch, SW1, should be set according to which device is selected and in accordance with the following table:

SW1	1	2	3	4	5	6	7
HT48X10	OFF	OFF	ON	OFF	ON	OFF	OFF
HT48X05-18	OFF	OFF	ON	OFF	ON	OFF	OFF
HT48X06-18	OFF	OFF	ON	OFF	ON	OFF	OFF
HT48X3X	ON	OFF	OFF	ON	OFF	OFF	ON
HT48X5X-28	ON	OFF	OFF	ON	OFF	OFF	ON
HT48X5X-40	ON	OFF	OFF	OFF	OFF	OFF	OFF
HT48X7X-40	OFF	OFF	OFF	OFF	OFF	OFF	OFF
HT48XA0-24	OFF	OFF	OFF	OFF	OFF	OFF	OFF
HT48XA6-24	OFF	OFF	OFF	OFF	OFF	OFF	OFF
HT48X37-24	OFF	ON	OFF	OFF	OFF	ON	OFF

Switch SW2 controls the carrier output of the HT48CA6 device. When in the up position, the PC0 pin is the carrier output. For all other MCU types or if PC0 is not used as a carrier output, the switch should be set in the down position.

SW2	MODE
↑	HT48CA6 CARRIER OUTPUT
↓	OTHERS

The U1 to U9 connectors are used for different MCUs whose assignment is shown in the following table.

SOCKET	SUPPORTED IC
U1	HT48R10A-1, HT48C10-1 (24 pins)
U2	HT48R30A-1, HT48C30-1 (24 pins)
U3	HT48R30A-1, HT48C30-1, HT48R50A-1, HT48C50-1 (28 pins)
U4	HT48X37-24
U5	HT48R06A-1, HT48C06, HT48R05A-1, HT48C05 (18 pins)
U6	HT48R50A-1, HT48C50-1, HT48R70A-1, HT48C70-1 (40 pins)
U6+U7	HT48R70A-1, HT48C70-1 (64 pins)
U8	HT48RA0A, HT48CA0 (24 pins)
U9	HT48CA6 (24 pins)

CPCB49C000001A Interface Card

This interface card is used in conjunction with the **CICE49C00CCAA**
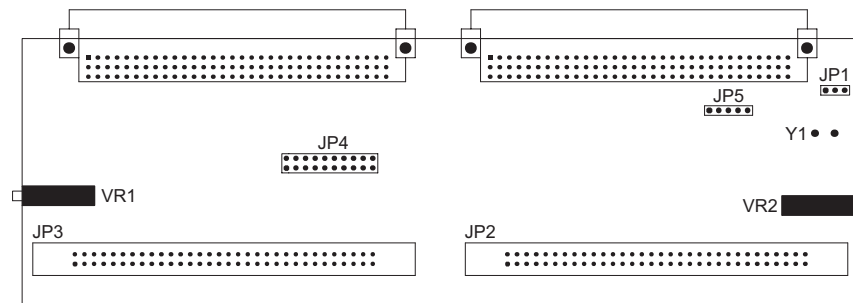
The external clock source has two modes, RC and Crystal. If a crystal clock is to be used, positions 2 and 3 should be shorted on JP1 and a suitable crystal inserted into location Y1. Otherwise, if an RC clock is to be used, positions 1 and 2 should be shorted and the system frequency adjusted using VR2. Refer to the Tools/Mask Option menu of the HT-IDE3000 User's Guide for the clock source and system frequency selection. VR1 is used to adjust the LCD voltage, VLCD.

The four external signal trace inputs, marked as ET0 to ET3 at jumper location JP5, provide a means for external signals to trigger the internal breakpoint and trace functions. For more information, refer to the chapters on Breakpoint and Trace the Application Program within the Holtek HT-IDE3000 User's Guide.

Connector JP2 is used for the HT49R30A-1/HT49C30-1 devices with 48-pin packages while connector JP3 is used for the HT49R50A-1/HT49C50-1 devices with 48-pin packages. For the HT49R50A-1/HT49C50-1 devices with 100-pin packages and for the HT49R70A-1/HT49C70-1, it is necessary to use both the JP3 and JP4 connectors.

CPCB46SER0001A Interface Card

This interface card, which is used in conjunction with the **CICE46C00CCEA,** includes the following functions:

- External clock source

- A/D converter HT46V00 or HTUY0001 in location U5

- MCU pin assignments, I/O, LCD common and segment output connections
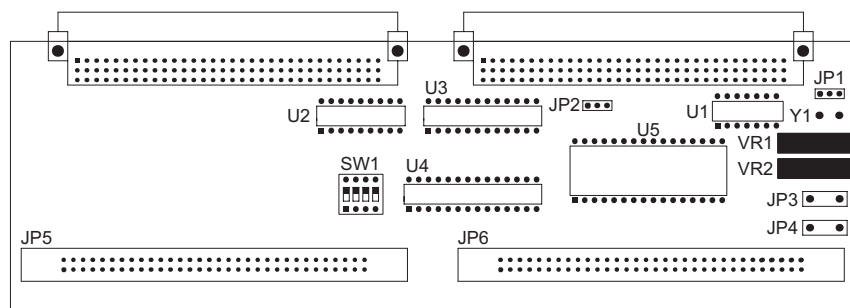
The external clock source has two modes, RC and Crystal. If a crystal clock is to be used, positions 2 and 3 should be shorted on JP1 and a suitable crystal inserted into location Y1. Otherwise, if an RC clock is to be used, positions 1 and 2 should be shorted and the system frequency adjusted using VR1. Refer to the Tools/Mask Option menu of the HT-IDE3000 User's Guide for the clock source and system frequency selection. VR2 is used to adjust the LCD voltage, VLCD.

Jumper JP2 is used to select the MCU's A/D converter AVDD power supply source. Positions 1 and 2 on JP2 should be shorted if the HT-ICE 5V supply voltage is to be used as the source. For other externally supplied AVDD voltages, positions 2 and 3 should be shorted, the required voltage can then be provided from JP3 and JP4.

Note: Only the HT46R63 device has VADD, the other devices in the HT46 series MCU do not have this option. For these other devices VADD is the same as VDD.

DIP switch SW1 should be set according to which device is selected and in accordance with the following table:

| SW1	1	2	3	4
HT46X24	OFF	OFF	OFF	OFF
HT46X62	ON	ON	ON	OFF
HT46X63	ON	ON	ON	OFF
HT46X64	ON	ON	ON	ON
HT46X65	ON	ON	ON	ON
HT46X22	DON'T CARE			
HT46X23	DON'T CARE			
HT46X47	DON'T CARE			

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The JP5 connector provides the LCD common and segment outputs while the JP6 connector provides the I/O port connections as well as other pins. The sockets at locations U2, U3 and U4 are used for other purposes by different MCUs. Their assignments are shown in the following table.

SOCKET	SUPPORTED IC
U2	HT46X47
U3	HT46X22, HT46X23 (24 pins)
U4	HT46X23 (28 pins)
JP5+JP6	HT46X62, HT46X63, HT46X64, HT46X65
JP6	HT46X24

An A/D converter HT46V00 or HTUY0001, is located at location U5 which is used to emulate the function of the internal MCU A/D converter.

TPCB47C00-A-1 Interface Card

This interface card is used in conjunction with the **TICE47C-CCDA**
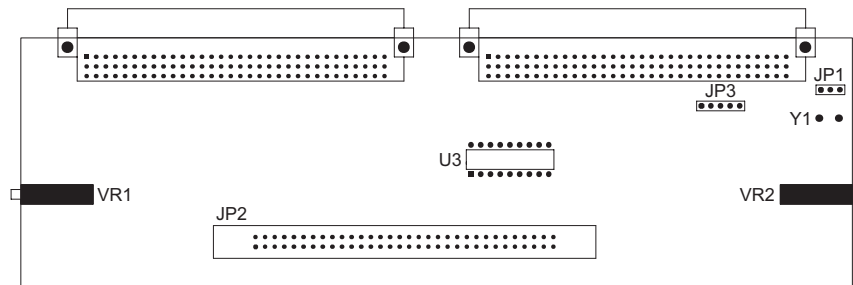
The external clock source has two modes, RC and Crystal. If a crystal clock is to be used, positions 2 and 3 should be shorted on JP1 and a suitable crystal inserted into location Y1. Otherwise, if an RC clock is used, positions 1 and 2 should be shorted and the system frequency adjusted using VR2. Refer to the Tools/Mask Option menu of the HT-IDE3000 User′s Guide for the clock source and system frequency selection. VR1 is used to adjust the LCD voltage, VLCD.

An RC oscillator type A/D converter is located at U3. Use the converter RFADOSC-1 for the HT47R20A-1/HT47C20-1 devices and the converter RFADOSC-2 for the HT47C20L device. The JP2 connector provides the I/O port connections and the LCD common/segment outputs.

TPCB47C100000A Interface Card

This interface card is used in conjunction with the **TICE47C100000A**
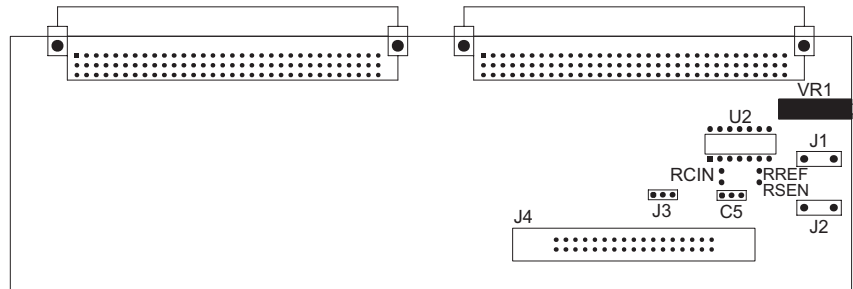
VR1 is used to adjust the LCD voltage, VLCD.

Two operating voltage sources can be selected, an internal 1.5V or external 1.5V. If the internal 1.5V is used, positions 1 and 2 on jumper J3 should be shorted. Otherwise, if the external 1.5V is used, positions 2 and 3 should be shorted, the power supply can then be connected to J1 and J2. The proper resistors must be selected for RCIN-RREF and RCIN-RSEN, and a capacitor for C5. Refer to the RC type A/D converter of the HT47C10L data sheet for more detailed information. An A/D converter, the HTK025 is located at U2.

TPCB95SER0000A Interface Card

This interface card is used in conjunction with the **TICE95SER0000A**
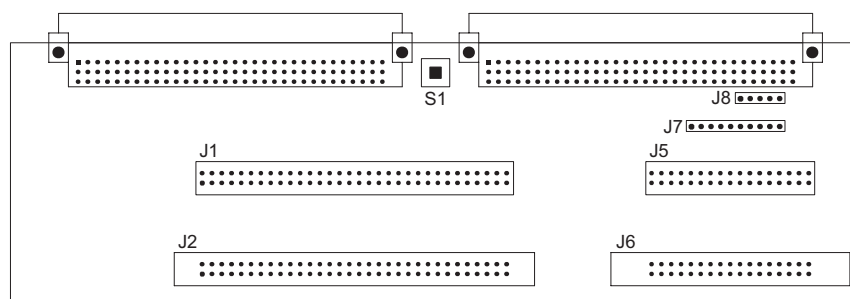
Switch S1 is used to simulate a low voltage condition, a situation which can be detected internally by the HT95L400/40P, HT95L300/30P, HT95L200/20P and HT95L100/10P devices. When switch S1 is pressed, the low battery flag (LBFG; bit 4 of LCDC register) will be set, resulting in a simulated low battery condition.
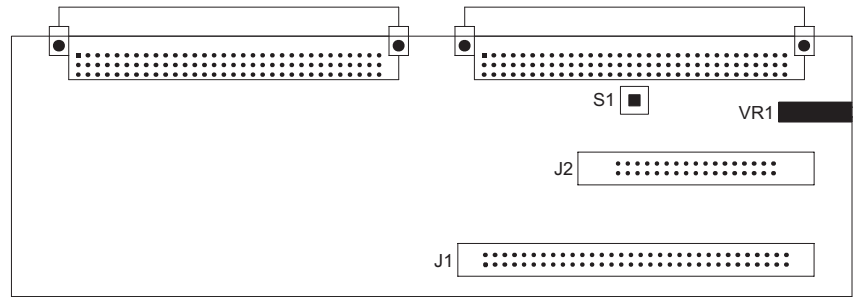
TPCBG2190-A Interface Card

This interface card is used in conjunction with the **TICEG2190-CCAA**
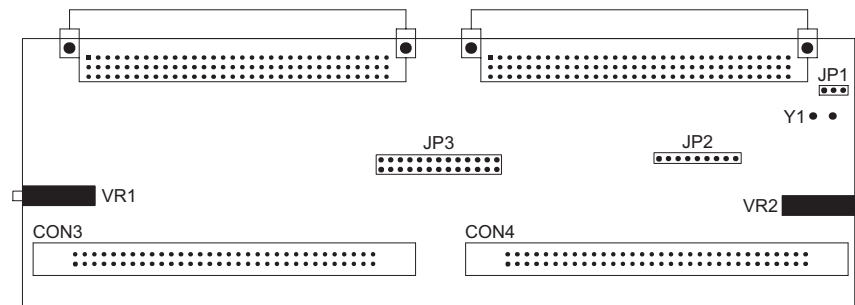
The external clock source has two modes, RC and Crystal. If a crystal clock is to be used, positions 2 and 3 should be shorted on JP1 and a suitable crystal inserted in location Y1. Otherwise, if an RC clock is to be used, positions 1 and 2 should be shorted and the system frequency adjusted using VR2. Refer to the Tools/Mask Option menu of the HT-IDE3000 User's Guide for the clock source and system frequency selection. VR1 is used to adjust the LCD voltage, VLCD.

TPCB23B60-A-1 Interface Card

This interface card is used in conjunction with the **TICE23B60-CCXA**

VR1 is used to adjust the LCD voltage, VLCD.

The J1 connector provides the LCD common and segment outputs while the J2 connector provides the I/O port connections as well as other pins.

If S1is moved down into the locked position, it simulates an LBIN pin voltage that is less than the low voltage detection level. In other words the LCDC register bit4, LVFG=1. On the other hand if S1 is in the unlocked state, that is LVFG=0, this will emulate a LBIN pin voltage that is greater than the low voltage detection level.

TPCB86SER0000A Interface Card

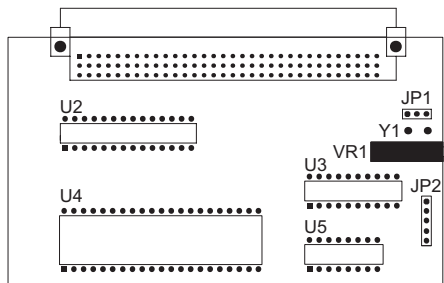This interface card is used in conjunction with the **TICE86SER0000A**
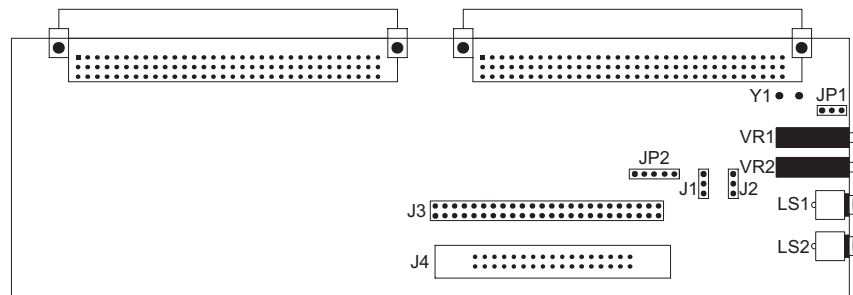
The external clock source has two modes, RC and Crystal. If a crystal clock is to be used, positions 2 and 3 should be shorted on JP1 and a suitable crystal inserted into location Y1. Otherwise, if an RC clock is to be used, positions 1 and 2 should be shorted and the system frequency adjusted using VR1. Refer to the Tools/Mask Option menu of the HT-IDE3000 User's Guide for the clock source and system frequency selection.

A speaker can be attached to LS1 or LS2 to obtain an audio voice output. If a higher quality amplified voice output is required, connect the speaker to LS1. Here the volume can be adjusted using VR2. However, a jumper must first be placed on J3 to select the port pin, which is to be used to enable the interface card's HT82V733 audio amplifier. The user program can now enable the HT82V733 amplifier by driving this same pin low. Otherwise, connect the speaker to LS2 only.

TPCB82K680000A Interface Card

This interface card is used in conjunction with the **TICE82K680000A.** The card should be plugged into the CN1 connector of the HT-ICE.


The external clock source has two modes, RC and Crystal. If a crystal clock is to be used, positions 2 and 3 should be shorted on JP1 and a suitable crystal inserted into location Y1. Otherwise, if an RC clock is to be used, positions 1 and 2 should be shorted and the system frequency adjusted using VR1. Refer to the Tools/Mask Option menu of the HT-IDE3000 User's Guide for the clock source and system frequency selection.

The U3 connector is used for the 20-pin packages while the U2 connector is used for the 28-pin packages. The U4 connector supports all pin assignments for the 48-pin packages, however as it is not fully compatible with the actual 48-pin packages, the necessary adjustments must be made by the user.

CPCB82K960004B Interface Card

This interface card is used in conjunction with the **CICE82K960004A**
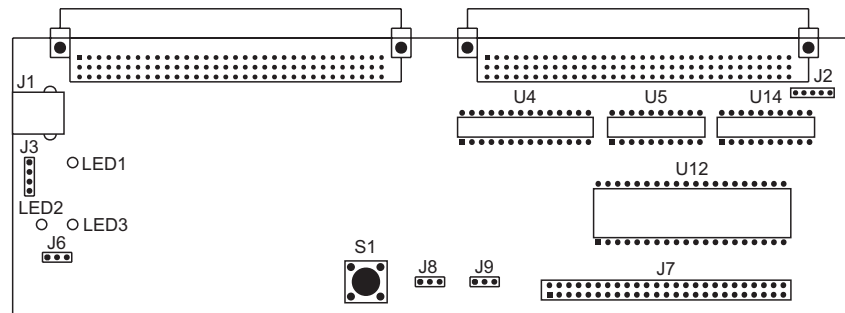
- HT-IDE3000 Configuration Option description:

   USB joystick: When the ADC function is to be used, the ″Enable joystick mode″ must be selected. After this has been completed, pins PB0~PB6 will be setup as A/D inputs, with the names, AN0~AN6, to the 8 bit ADC. Otherwise, select the ″Disable joystick mode″ which will allow the PB0~PB7 pins to be setup as normal I/O pins.

   Sys Freq: Do not select the ″Internal″ option. This is because the system frequency of the ICE is determined by the Interface Card settings.

- LED description:

   LED1: Yellow LED, when illuminated this indicates that the system is in its Active condition, when it is extinguished this indicates that the system in the Suspend condition.

   LED2: Red LED, when illuminated this indicates that the system frequency is 12MHz.

   LED3: Green LED, when illuminated this indicates that the system frequency is 6MHz.

- Jumper and Push Button description:

   J1 and J3: USB connector.

   J6: The frequency selection jumper. When in position 1-2, the 12MHz frequency is selected, when in position 2-3 the 6MHz frequency is selected. If the 6MHz frequency is selected, then the SYSCLK flag in the SCC register must be set to ″1″, if the 12MHz frequency is selected then the SYSCLK flag must be set to ″0″.

   J8 and J9: When using the ADC, to increase its flexibility an Internal Reference Voltage or an External Reference Voltage can be used. When using the Internal Reference Voltage, the ADREF flag in the USR register should be set to ″1″. Also J8 and J9 should be placed in position 2-3. If an External Reference Voltage is used, then the ADREF flag should be set to ″0″ and J8 and J9 should be placed in position 1-2. The VRH input is via PB7 while the VRL input is via PB6.

   S1: RESET input which corresponds to the MCU reset.

- Target board interface description:

  For interfacing to the user target board a choice of five connectors, U4, U5, U12, U14 and J7 are provided.

- Diagnose description:

  – Within the HT-IDE3000, select TOOL\Diagnose, then press the reset switch on the HT-ICE in accordance with the instructions.

  – Select Test All to enter the HT-ICE self-diagnostics. When the system enters the IO EV1 section, the message ″Press ′RESETB′ to test USB Connection″ will appear. Ensure first that the USB cable is connected correctly before pressing the S1 switch on the interface card. The USB connection will then be tested and if successful the message ″USB device connect successful″ will appear. If unsuccessful the message ″Connect USB Fail, Try Again?″ will appear.

  – When all of the tests are complete and the message ″Total Error 0″ appears, this indicates that there are no errors in the ICE. The Target Board can now be attached and used.

HT-ICE (CICE82K960004A) and I/O Interface Card Outline

Target board

Interface Card

To USB Port

HT-ICE

To Printer Port

IBM Compatible
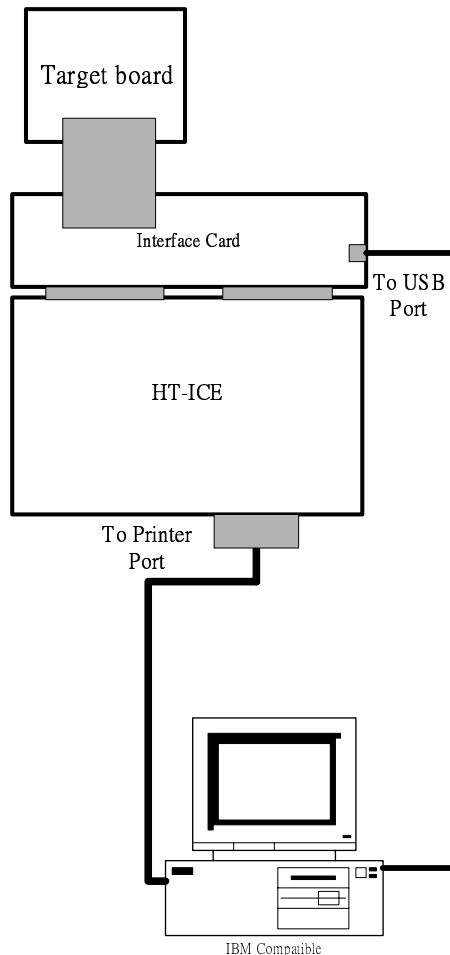
CPCB82M990004A Interface Card

This interface card is used in conjunction with the **CICE82M990004A**
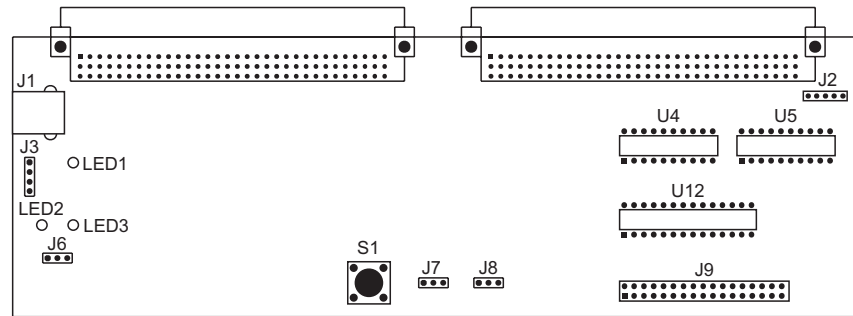
- HT-IDE3000 Configuration Option description:

  Sys Freq: Do not select the ″Internal″ option. This is because the ICE system frequency is determined by the Interface Card settings.

- LED description:

  LED1: Yellow LED, when illuminated this indicates that the system is in its Active condition, when extinguished this indicates that the system in the Suspend condition.

  LED2: Red LED, when illuminated this indicates that the system frequency is 12MHz.

  LED3: Green LED, when illuminated this indicates that the system frequency is 6MHz.

- Jumper and Push Button description:

  J1 and J3: USB connectors.

  J6: The frequency selection jumper. When in position 1-2, the 12MHz frequency is selected, when in position 2-3 the 6MHz frequency is selected. If the 6MHz frequency is selected, then the SYSCLK flag in the SCC register must be set to ″1″, if the 12MHz frequency is selected then the SYSCLK flag must be set to ″0″.

  J7 and J8: When using the ADC, to increase its flexibility an Internal Reference Voltage or an External Reference Voltage can be used. When using the Internal Reference Voltage, the ADREF flag in the USR register should be set to ″1″. Also J7 and J8 should be placed in position 2~3. If an External Reference Voltage is used, then the ADREF flag should be set to ″0″ and J7 and J8 should be placed in position 1~2. The VRH input is via PB7 while the VRL input is via PB6.

  S1: RESET input which corresponds to the MCU reset

- Target board interface description:

  For interfacing to the user target board a choice of four connectors, U4, U5, U12, and J9 are provided.

- Diagnose description:

  – Within the HT-IDE3000, select TOOL\Diagnose, then press the reset switch on the HT-ICE in accordance with the instructions.

  – Select Test All to enter the HT-ICE self-diagnostics. When the system enters the IO EV1 section, the message ″Press ′RESETB′ to test USB Connection″ will appear. Ensure first that the USB cable is connected correctly before pressing the S1 switch on the interface card. The USB connection will then be tested and if successful the message ″USB device connect successful″ will appear. If unsuccessful the message ″Connect USB Fail, Try Again?″ will appear.

  – When all of the tests are complete and the message ″Total Error 0″ appears, this indicates that there are no errors in the ICE. The Target Board can now be attached and used.

HT-ICE (CICE82M990004A) and I/O Interface Card Outline