Holtek e-Link for 8-bit MCU OCDS User's Guide

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HT8OCDS-ICE Introduction

The HT8OCDS-ICE is Holtek's third generation simulator, especially for use with Flash MCU devices.

Compared with the e-ICE, the differences are as follows:

- The EV uses the OCDS (On-Chip Debug Support) structure that requires only two signal lines to debug.
- The EV pin number is the same or has 1 to 2 more pins than the IC pins which can be soldered to the application board making tests more convenient.
- Provides multiple breakpoint functions
- Provides a RAM real monitor function
- Wider operating voltage range of 1.7V~5.5V

HT8OCDS-ICE Composition

The HT8OCDS-ICE is composed of an e-Link (for HT8OCDS) + Target Board (with EV)

e-Link(for HT8OCDS)

- e-Link is the common name for the Holtek ICE series and has the same appearance. Holtek will provide an e-LinkBox.cmd for the updates for different applications. Here it should be updated as Holtek 8-Bits MCU OCDS.
- e-Link Appearance:

e-Link (Front)

e-Link (Back)

e-Link (Side)

Target Board (with EV)

The EV is an IC with an OCDS interface

- During the debug process, the e-Link will implement a series of operations such as single step, full speed, stop, breakpoint setting etc. by transmitting instructions to the EV.
- During the non-debug process, the EV is the same as an IC and works in the same way.

HT8OCDS-ICE Usage Flow Description

HT-HT-IDE3000 Software Update

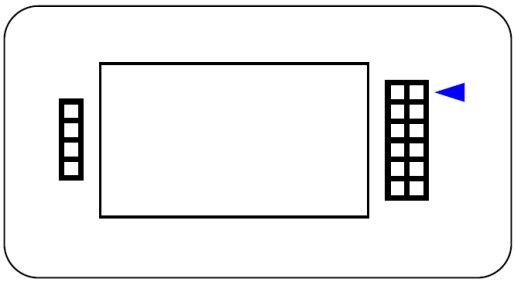
The third generation emulator software still uses the HT-IDE3000 but is only supported by versions starting from V7.6.

Log on to Holtek official website to download the latest HT-IDE3000.

Hardware Connection

- e-Link(for HT8OCDS) Pin Assignment

e-Link（Back）

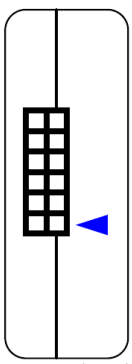


1	Reserve
2	Reserve
3	Reserve
4	Reserve

2: -	1: VDD
4: -	3: -
6: -	5: OCDSCK
8: -	7: X
10: -	9: OCDSDA
12: -	11: GND

e-Link（Back）

e-Link（side）



e-Link（side）

12: -	11: GND
10: -	9: OCDSDA
8: -	7: X
6: -	5: OCDSCK
4: -	3: -
2: -	1: VDD

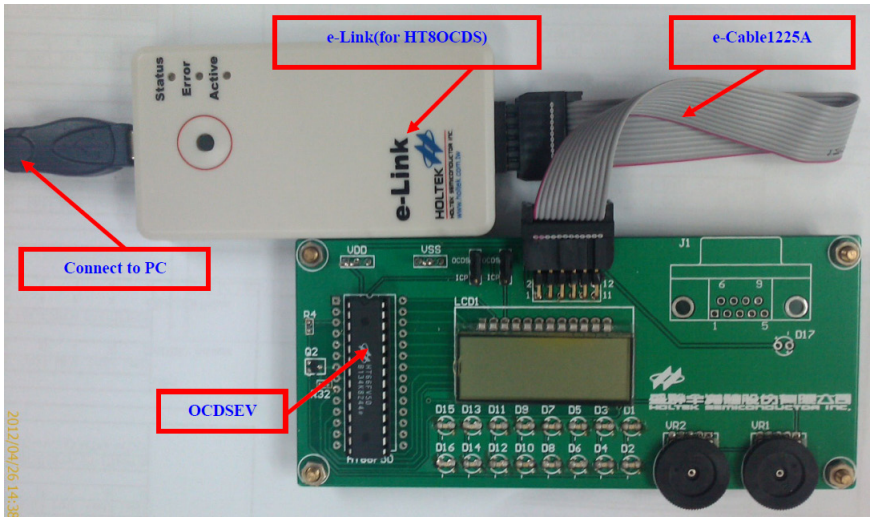
HT8OCDS-ICE Pin Definition

Name	Description	Direction	Paremeter
VDD	e-Link voltage output pin when the power is supplied to the Target Board.	e-Link→	1.7V~5.5V
	e-Link voltage input pin when the external power is supplied to the Target Board.	e-Link←	1.7V~5.5V
OCDSCK	The OCDS CLK signal during programming	e-Link→	1.7V~5.5V
OCDSDA	The OCDS Data signal during programming	e-Link ↔	1.7V~5.5V
GND	e-Link Ground	e-Link ↔	0V
Reserved	Reserved e-Link signal pin	Unknown	Unknown

Note: The VDD, OCDSCK, OCDSDA and GND are the necessary pins of the HT8OCDS-ICE. Even if the external power is supplied to the Target Board, the same VDD is still necessary so as to be used as the reference voltage of the output potential for the e-Link. Simultaneously the Options in the HT-IDE3000 must be set to VDD External.

Pins marked as Reserved in the e-Link are not NC pins for which the user should note that the voltage is unknown.

■ HT8OCDS-ICE Hardware Connection



Connect to the USB Port to Programming Using the HT-IDE3000

■ If the connection is successful, the following message will pop up:

Online Prompt

■ If the connection failed or no connection, the following message will pop up:

Offline Prompt

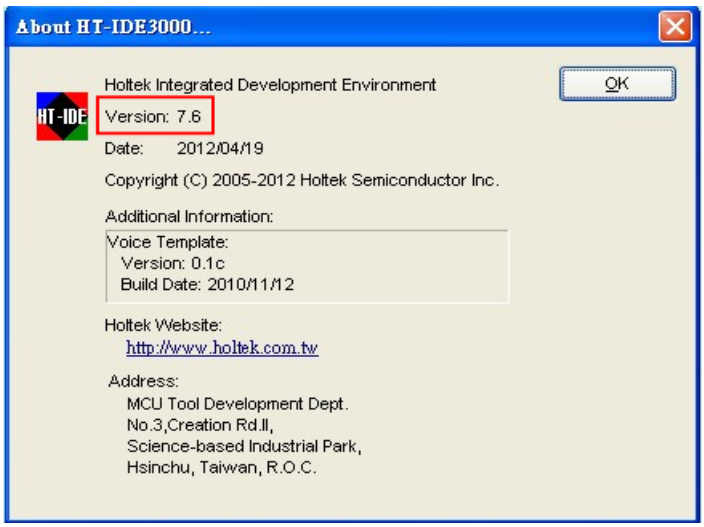
HT8OCDS-ICE Usage Considerations

About the HT-HT-IDE3000 Version

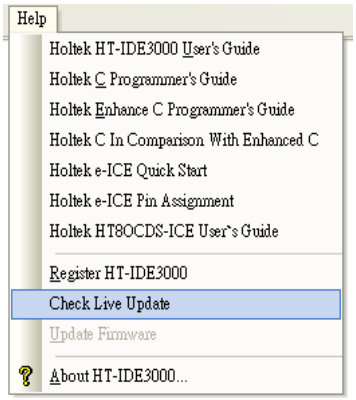
Before using the HT8OCDS-ICE, ensure that the HT-IDE3000 is the latest version.

- Check the "Help\About HT-HT-IDE3000…" in the function menu for the version information.
- If it is version is 7.6 or newer, when the HT-IDE3000 is enabled, the IDE will automatically detect if it is the latest version by prompting whether an update is required, or click "Help\Check Live Update…" for a manual update.

Windows Screen



Help Window



About the e-Link (for HT8OCDS) Version

- If the e-Link(for HT8OCDS) f/w is an old version, the following message will pop up when connecting to the HT-IDE3000

- If the EV is an old version, the following message will pop up when connecting to the HT-IDE3000.

System Frequency

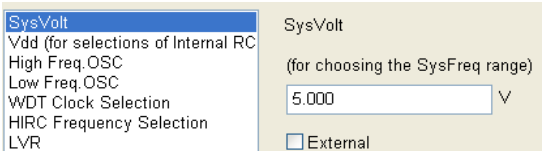
- The e-Link (for HT8OCDS) is not able to provide the system frequency for the EV. When using the HT8OCDS-ICE, it is necessary to connect the required HXT, ERC or LXT according to actual application requirements.
- Generally the HIRC calibration for the EV has been to the value at 5V when manufactured. Operation under other voltage points may cause some HIRC deviation.

Voltage and Current

■ The OCDS emulation can be powered by e-Link or external power supply. The operating voltage of the HT8OCDS-ICE ranges from 1.7V~5.5V.

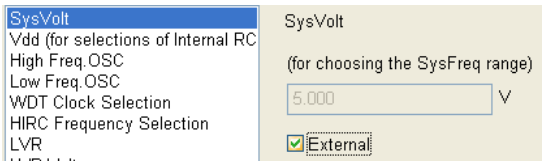
- e-Link supplies power to the Target Board and setup the voltage parameters:

e-Link supplies power to the Target Board



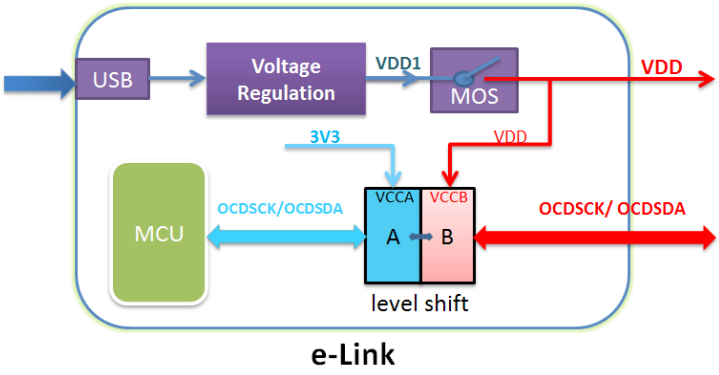
- External power supplies to the Target Board, check the External square:

External power supplies to the Target Board



■ e-Link internal power supply and signal voltage:

e-Link internal power supply and signal voltage

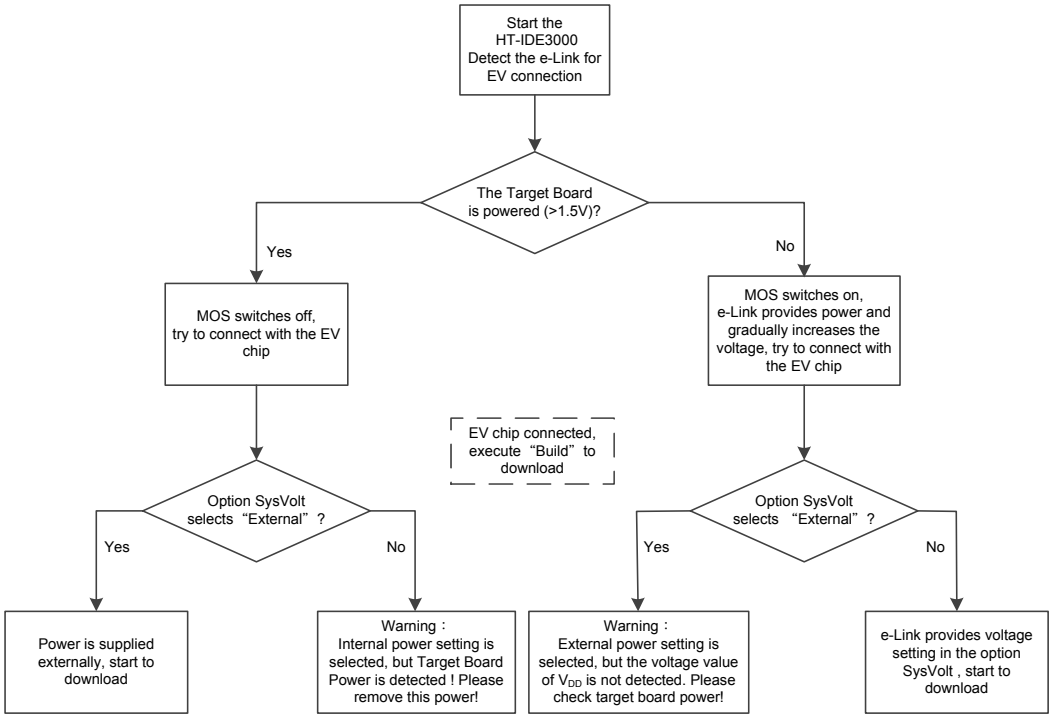


- The power output circuit contains a MOS switch to implement the switchover between the internal and external power supply. Users can switch on the MOS to select internal power or switch off the MOS to select external power supply.
- Signal will be output after passed through the Level shift, a function which can implement the signal level transformation and isolation. The output signal voltage level is determined by V_{DD}.

■ e-Link OCDS emulation power supply in HT-IDE3000 flowchart description

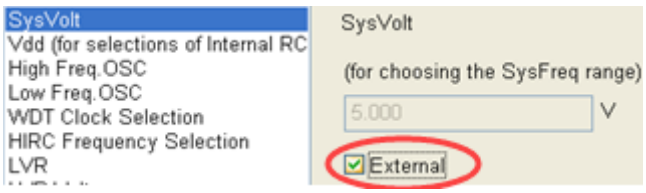
- If the target board is not powered, e-link will provide power automatically, and the voltage will be incremented gradually trying to connect with the EV chip. Maintain at the current voltage value when the connection is success. The e-Link operating voltage is selected by option after the "Build" is executed to download.
- If the target board is powered (the detected voltage ≥ 1.5V), this external voltage should be maintained to connect with the EV chip and download.

OCDS Emulation Power Supply Flowchart



■ If the external power is selected in the Option, the power will not switch immediately when connected to e-Link, it will only take effect when the "External" option is selected in the HT-IDE3000 when executing the "Build" to download.

Select External Power Supply



■ When e-Link is selected to supply power to Target Board, if there is still an external power supply to Target Board, in the HT-IDE3000 Build process, the prompt window which requires the removal of the external power supply will pop up to avoid power conflict.

power supply prompt window

■ In pratical applications, if the external power is selected, it is recommended that external power should be connected before connecting with the e-Link, otherwise the e-Link will provide power automatically when the external power is not detected, which will result in conflict after the external power is supplied.

■ When the e-Link supplies power to the Target Board, if the current load is large, some VDD output errors may occur.

eg: When the load current is 100mA~200mA, the actual VDD output will have a rather low value of 0.1V~0.2V.

It is recommended to configure the VDD together with the consideration of this error range.

Emulation Function Comparison of HT8OCDS-ICE and e-ICE

Differences between the HT8OCDS-ICE and e-ICE.

	Description	Paremeter
FW Update	The emulator can update the FW through the HT-IDE3000.	Need to change MEV
Pin Assignment	Pins can be soldered on to the application board for direct adjustment. Good signal connection, quick and convenient	The EV is of 128QFP or 208QFP Requires DuPont line or other connectors to connect with the application board.
Break Point	Total of 7 Breakpoint modules; Breakpoint setting during free run; Breakpoint setup available in ROM, RAM, EEDATA; Diverse Breakpoint format	Breakpoint number unlimited; No Bbreakpoint setting during free run; Breakpoint setting only in ROM;
RAM Monitor	Supported	Not supported
HALT	Available at any location	Cannot be placed at the last address of ROM Bank0
OCDSDA/ OCDSCK	Pin Share function unavailable during rogramming	No restriction
Trace	Not supported	Instruction tracing
SysFreq	e-Link not provided	
Reset Pin	Reset circuit required when executing the Reset function	

Multiple Breakpoint Modes

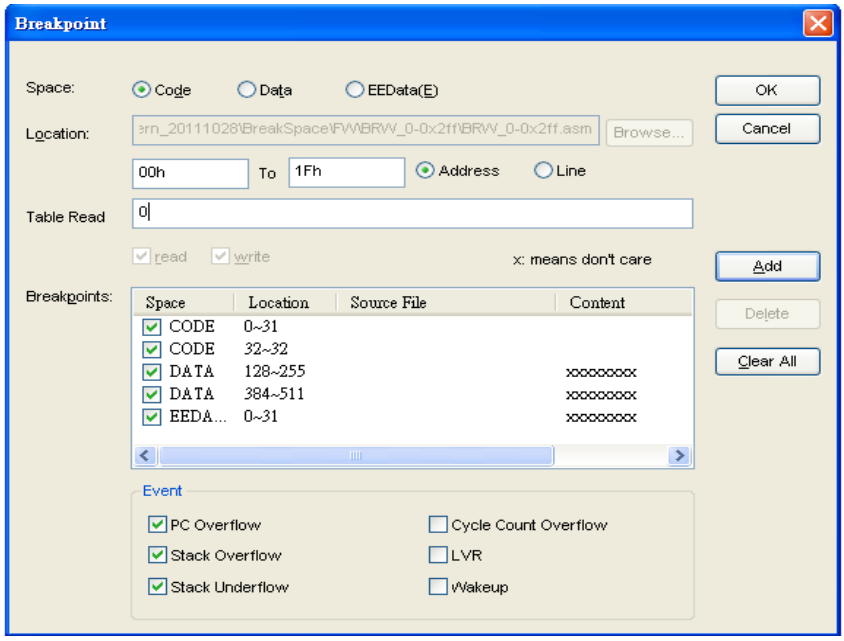
- In the HT-IDE3000 tool menu, select "Debug\Breakpoints" or use shortcut "Ctrl+B"
- Although only seven breakpoint modules are available, each breakpoint module can setup the object control and control range:

  Code type: When the PC access an address or a range is setup, it will break automatically.

  Data\EEData type: when an address or a range of RAM/EEData is read / written, it will break automatically.
- An Auto Break can be setup when any of the following conditions is satisfied, just tick in the Event condition box.

  PC \ Stack \ Cycle Count Overflow \ Stack Underflow \ LVR \ Wakeup

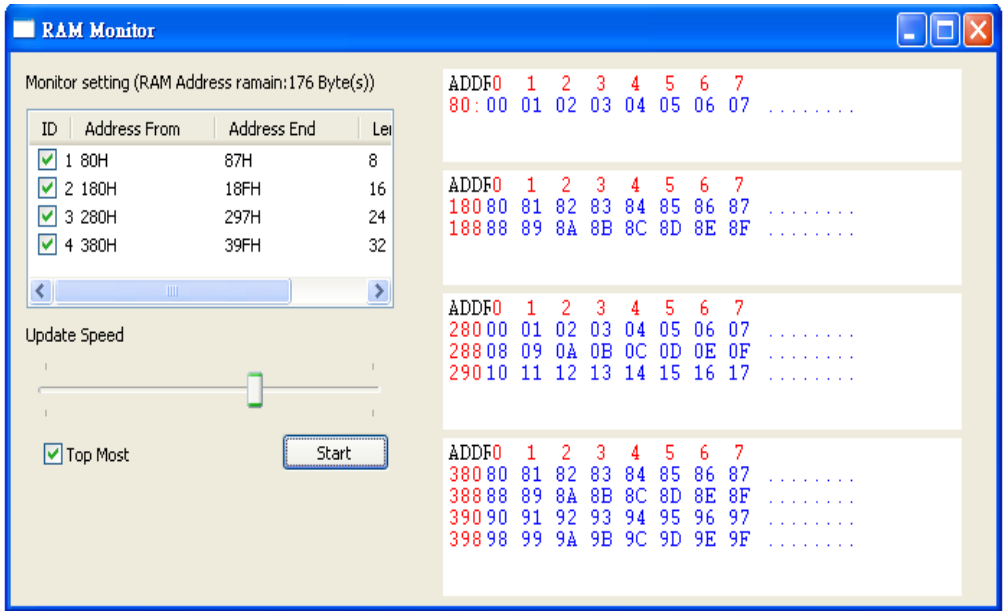
Breakpoint Setting Window



RAM Real-time Monitor Function

- In the HT-IDE3000 tool menu, select "Debug\RAM Monitor"
- Set the RAM monitor range, and tick it
- Monitor up to 256 RAM unit at the maximum , each group monitor addresses can not be repeated
- Click "start" to begin to monitor the RAM status
- Move "Update Speed" to control the refresh rate

RAM Monitor Window



OCDS or I/O Selection Option Function

■ When OCDSDA/OCDSCK is pin-shared with I/O, most of the EV can divide the shared pins into the OCDSEV mode and the Real IC mode through the OCDS or I/O Selection option;

OCDSEV mode: whether e-Link is online or offline, the pin-shared function of OCDSDA/OCDSCK is invalid;

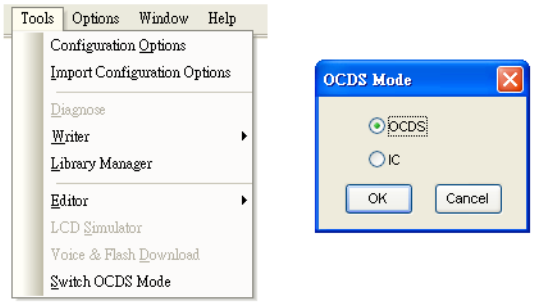
Real IC mode: when e-Link is offline, the pin-shared function of OCDSDA/OCDSCK is the same as the IC pins function; when e-Link is online, the function is still invalid;

Note: When the EV is setup to be in the Real IC mode, then if the target board power is externally supplied, no emulation can be carried out. However if emulation is required, then the external power must be first removed and it must be switched to the OCDS mode.

■ OCDS or I/O Selection option usage

After e-Link connects successfully, click "Tools\Switch OCDS Mode" in the HT-IDE3000 menu, the OCDS Mode selection screen will pop up.

OCDS Mode selection



In the OCDS Mode selection screen, the current EV mode is default. Users select the OCDS mode or the Real IC mode according to their needs, click OK to complete switch.

Note: when switching mode, the power supply to the Target Board must be removed.

■ If the EV has no OCDS or I/O Selection option, when e-Link connects successfully, the HT-IDE3000 menu "Tools\Switch OCDS Mode" in gray is unavailable.

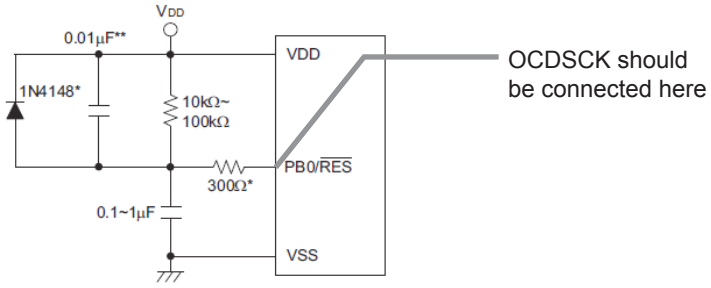
When e-Link is online, the pin-shared function of OCDSDA/OCDSCK is invalid.

When e-Link is offline, the pin-shared function of OCDSDA/OCDSCK is the same as the IC pins function.

HT8OCDS-ICE Usage Restriction

- EV and IC Pin Assignment
  OCDSDA\OCDSCK may be pin-shared with an I/O or alone, so the pin number of the EV maybe the same or 1~2 pins more than that of the IC.
- OCDSDA/OCDSCK can not connect to capacitor, when OCDSCK is pin-shared with the reset pin, please refer to the following reset circuit.

Recommended Reset Circuit



- When e-Link supplies power to the Target Board, the maximum current consumption is 200mA. If the power consumption of the Target Board exceeds 200mA, the external power supply to the Target Board should be selected.
- When e-Link supplies power to the Target Board, the maximum capacitance which the VDD pin links to is 100uF.

HT8OCDS-ICE Switch and Indicators

Switch

The switch is used to reset the HT8OCDS-ICE.

Indicator

- Status

  Yellow shows if the e-Link is providing power "to the Target Board".

  Continuously on: Power to the Target Board

  Continuously off: No power to the Target Board

- Error

  Red means that the e-Link operation has an "error"

  Continuously on: Abnormal operation

  Continuously off: Normal operation

- Active

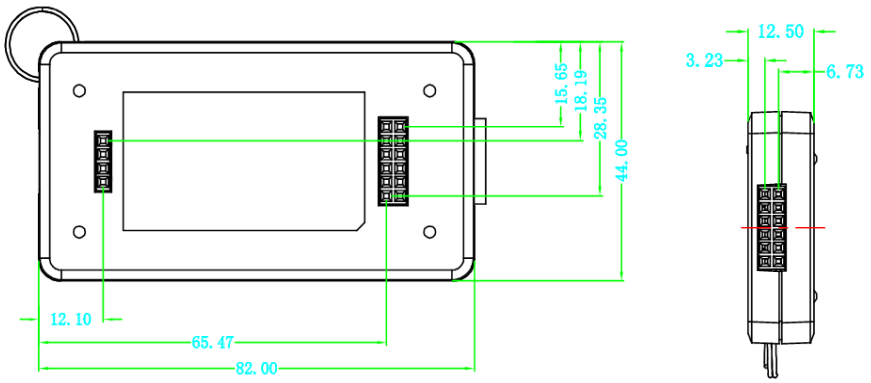
  Blue means the "duty load" of the e-Link

  Slow Flashing: Idle, standing by ready at an interval of 1s (HT-IDE3000 not operational)

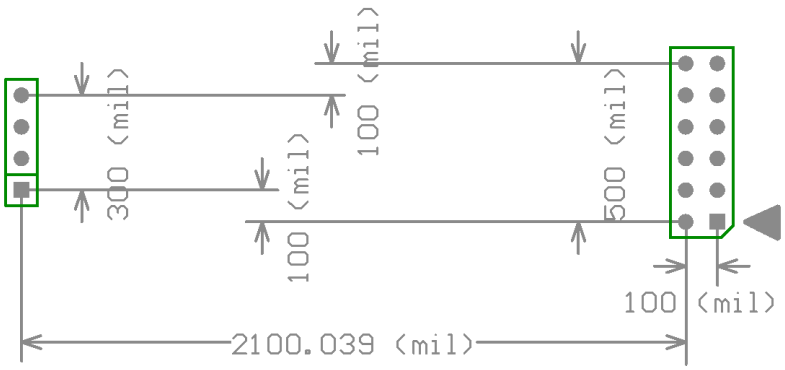
  Flasghin: Busy, the flash frequency and duration depends upon the number of duties.

e-Link Size

■ Back and side e-Link dimensions (unit: mm)



■ e-Link back slot dimensions (unit: mil)



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