

iC-HTG EVAL HTG1D

EVALUATION KIT DESCRIPTION



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ORDERING INFORMATION

| Type | Order Designation | Description |
|------------------|-------------------|--|
| Evaluation Board | iC-HTG EVAL HTG1D | iC-HTG Evaluation Board Ready-to-operate, accessible by GUI using PC USB (not included) |
| Software | iC-HTG GUI | GUI software for Windows PC Device setup file generation, board configuration via USB For download link check www.ichaus.com/htg |

BOARD HTG1D

(size 80 mm x 100 mm)

TERMINAL DESCRIPTION

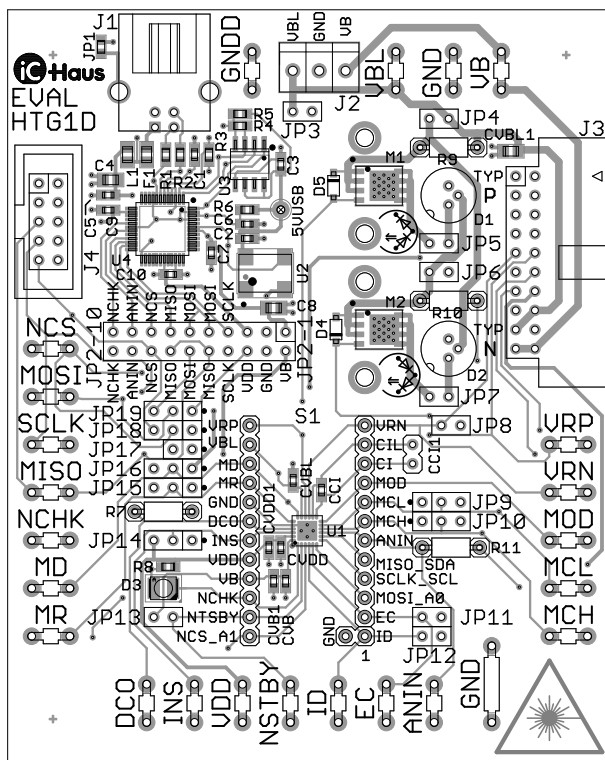


Figure 1: Component side

| | |
|----------|--|
| VB | Power Supply Voltage Input Connected to VDD_USB if jumper JP2-1 closed. |
| VBL | Channel Supply Voltage Input |
| VDD | +3.3 V Voltage Output |
| GND | 0 V Ground |
| VRN | N Transistor Regulation Input |
| VRP | P Transistor Regulation Input |
| CI | Integration Capacitor high side |
| CIL | Integration Capacitor low side |
| MOD | Analog Modulation Input |
| MCH | Current Monitor Input high side |
| MCL | Current Monitor Input low side |
| ANIN | Signal Output / Analog Input for ADC |
| MD | Monitor Diode Input |
| MR | Monitor resistor Output |
| EC | Enable Channel Input |
| NCHK | Check Output, active low |
| NSTBY | Standby input, active low |
| DCO | DC/DC Converter Trimmer Output |
| ID | I ² C A2 Input |
| NCS/A1 | Chip Select, active low / I ² C A1 Input |
| MOSI/A0 | SPI Master Out Slave In / I ² C A0 Input |
| SCLK/SCL | SPI Clock / I ² C Clock Input |
| MISO/SDA | SPI Master In Slave OUT Output / I ² C Data Input / Output |
| INS | I ² C or SPI Selection Input |
| D1 | Error LED (red) Connected to NCHK. |
| J1 | 4-pin USB-B Connector |
| J2 | 3-pin Power Supply Connector |
| J3 | 20-pin Mezzanine Connector |
| J4 | 10-pin Male Connector to SPI/I ² C |

RELATED DOCUMENTS

- IC Documentation
→ <http://www.ichaus.de/htg>
- GUI software for Windows PC: check here for download links
→ <http://www.ichaus.de/htg>

PC USB CABLE



Figure 2: PC USB cable (A-B)

USB-B Connector

| Pin | Slave | Function |
|-----|-------|----------|
| 1 | VBUS | +5 V |
| 2 | D- | Data- |
| 3 | D+ | Data+ |
| 4 | GND | Ground |

PINOUT OF CONNECTORS AND TERMINALS

J1: USB Interface (to PC USB)

10-pin connector - female

| Pin | Name | Function |
|-----|------|----------|
| 1 | VBUS | +5 V |
| 2 | D- | Data- |
| 3 | D+ | Data+ |
| 4 | GND | Ground |

J2: Supply Interface

(to laser and laser diode driver)

3-pin connector - female

| Pin | Name | Function |
|-----|------|----------------|
| 1 | VB | Power supply |
| 2 | GND | Ground |
| 3 | VBL | Channel supply |

J4: SPI/I2C Interface

10-pin connector - male

| Pin | Name | Function |
|-----|------|--------------------------------------|
| 1 | SCLK | SPI Clock |
| 2 | GND | Ground |
| 3 | MISO | SPI MISO / I2C SDA |
| 4 | n.c. | /SDA |
| 5 | MISO | SPI MISO / I2C SDA |
| 6 | n.c. | /SDA |
| 7 | SCLK | SPI Clock |
| 8 | MOSI | SPI MOSI / I2C address 0 |
| 9 | NCS | SPI NCS (low active) / I2C address 1 |
| 10 | GND | Ground |

J3: Mezzanine Interface

(to analog signals and supplies)

20-pin connector - male

| Pin | Name | Function |
|--------|------|--------------------------------|
| 1, 2 | GND | Ground |
| 3 | MD | Monitor diode |
| 4 | GND | Ground |
| 5 | MR | Monitor resistor |
| 6 | MCL | Current monitor low side |
| 7 | MCH | Current monitor high side |
| 8 | GND | Ground |
| 9 | VRN | N transistor regulation |
| 10 | VRP | P transistor regulation |
| 11 | GND | Ground |
| 12 | ANIN | Analog input for ADC |
| 13 | DCO | DC/DC converter trimmer output |
| 14 | VDD | Analog Ground |
| 15 | GND | Ground |
| 16, 17 | VBL | Channel supply |
| 18 | GND | Ground |
| 19, 20 | VB | Power supply |

Notes:

n.c. = not connected

DESCRIPTION OF JUMPERS

| Jumper JP1 | Function |
|------------|--|
| Closed | Shield USB to GND grounded |
| Open | Shield USB to GND not grounded (recommended, default). |

| Jumper JP2-1 | Function |
|--------------|---|
| Closed | 5V_USB supplies VB by USB connector J1. |
| Open | Keeps separate USB 5 V and VB (recommended, default). |

| Jumper JP2-2 | Function |
|--------------|--|
| Closed | GNDD to GND grounded (recommended, default). |
| Open | GNDD to GND not grounded. |

| Jumper JP2-3 | Function |
|--------------|--|
| Closed | VDD supplies VDD_IO of USB device U4. |
| Open | USB device U4 uses default VDD_IO of 5 V (recommended, default). |

| Jumper JP2-4 | Function |
|--------------|---|
| Closed | SCLK_U of USB device U4 connected to SCLK (recommended, default). |
| Open | Keeps SCLK input open. |

| Jumper JP2-5 | Function |
|--------------|---|
| Closed | MOSI_U of USB device U4 connected to MISO_SDA. |
| Open | Keeps MISO_SDA input open (recommended, default). |

| Jumper JP2-6 | Function |
|--------------|--|
| Closed | MOSI_U of USB device U4 connected to JP19/J4 (recommended, default). |
| Open | Keeps MOSI_A0 input open. |

| Jumper JP2-7 | Function |
|--------------|---|
| Closed | MISO_U of USB device U4 connected to MISO_SDA (recommended, default). |
| Open | Keeps MISO_SDA input open. |

| Jumper JP2-8 | Function |
|--------------|---|
| Closed | NCS_U of USB device U4 connected to JP18/J4 (recommended, default). |
| Open | Keeps NCS_A1 input open. |

| Jumper JP2-9 | Function |
|--------------|---|
| Closed | ANIN_U of USB device U4 connected to ANIN. |
| Open | Keeps ANIN input open (recommended, default). |

| Jumper JP2-10 | Function |
|---------------|---|
| Closed | NCHK_U of USB device U4 connected to NCHK. |
| Open | Keeps NCHK input open (recommended, default). |

| Jumper JP3 | Function |
|------------|---|
| Closed | VB supplies VBL (recommended, default). |
| Open | Keeps individual VB and VBL. |

| Jumper JP4 | Function |
|------------|---|
| Closed | Disables R9 shunt (recommended, default). |
| Open | Enables R9 shunt. |

| Jumper JP5 | Function |
|------------|--|
| Closed | enables LDAP path. |
| Open | Keeps LDAP path open (recommended, default). |

| Jumper JP6 | Function |
|------------|---|
| Closed | Disables R10 shunt. |
| Open | Enables R10 shunt (recommended, default). |

| Jumper JP7 | Function |
|------------|--|
| Closed | Enables LDCN path. |
| Open | Keeps LDCN path open (recommended, default). |

| Jumper JP8 | Function |
|------------|--|
| Closed | Enables VRN path. |
| Open | Keeps VRN input open (recommended, default). |

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| Jumper JP9 | Function |
|----------------------------|--|
| 1-2 Closed left-middle | Connects low side of R10 to MCL input (recommended, default). |
| 2-3 Closed middle-right | Connects low side of R9 to MCL input. |
| Open | Keeps MCL input open. |

| Jumper JP10 | Function |
|----------------------------|---|
| 1-2 Closed left-middle | Connects high side of R10 to MCH input (recommended, default). |
| 2-3 Closed middle-right | Connects high side of R9 to MCH input. |
| Open | Keeps MCH input open. |

| Jumper JP11 | Function |
|-------------|---|
| Closed | Connects VDD to EC input (recommended, default). |
| Open | Keeps EC input open. |

| Jumper JP12 | Function |
|-------------|--|
| Closed | Connects VDD to ID input. |
| Open | Keeps ID input open (recommended, default). |

| Jumper JP13 | Function |
|-------------|--|
| Closed | Connects VB to NCHK input (recommended, default). |
| Open | Keeps NCHK input open. |

| Jumper JP14 | Function |
|----------------------------|--|
| 1-2 Closed middle-right | Connects GND to INS/WKR input (recommended, default). |
| 2-3 Closed left-middle | Connects VDD to INS/WKR input. |
| Open | Keeps INS/WKR input open. |

| Jumper JP15 | Function |
|----------------------------|--|
| 1-2 Closed middle-right | Connects GND to MR input. |
| 2-3 Closed left-middle | Connects VDD to MR input. |
| Open | Keeps MR input open (recommended, default). |

| Jumper JP16 | Function |
|----------------------------|--|
| 1-2 Closed middle-right | Connects MDAN to MD input. |
| 2-3 Closed left-middle | Connects MDCP to MD input. |
| Open | Keeps MD input open (recommended, default). |

| Jumper JP17 | Function |
|-------------|--|
| Closed | Enables VRP path. |
| Open | Disables VRP path (recommended, default). |

| Jumper JP18 | Function |
|----------------------------|---|
| 1-2 Closed middle-right | Sets NCS_A2 = lo |
| 2-3 Closed left-middle | Connects NCS_A1 to JP2/J4 (recommended, default) |
| Open | Sets NCS_A2 = hi |

| Jumper JP19 | Function |
|----------------------------|--|
| 1-2 Closed middle-right | Sets MOSI_A0 = hi |
| 2-3 Closed left-middle | Connects MOSI_A0 to JP2/J4 (recommended, default) |
| Open | Sets MOSI_A0 = lo |

DEFAULT JUMPER SETTING

The default jumper setting is not instantly usable and the iC-HTG is not accessible without an external supply. Before any use a dedicated jumper setting and a device connection (shunt and emitting diode) is mandatory.

SPI Interface

The default jumper setting provides an SPI based communication with the USB serial bridge device on board. The SPI interface is the default interface option of the iC-HTG eval board software. The iC-HTG eval board software supports SPI and I²C for interface selection. With I²C there are 8 addresses selectable from slave 0 to 7 defined by the A0, A1 and A2 address bits input pin states.

| Jumper JP2-4 | Function |
|--------------|---|
| Closed | SCLK_U of USB device U4 connected to SCLK (recommended, default). Required to use the on board USB SPI master. |

| Jumper JP2-5 | Function |
|--------------|--|
| Open | Keeps MISO_SDA input open (recommended, default). Required to use the on board USB SPI master and no connection between MOSI_U of USB device U4 and MISO_SDA. |

| Jumper JP2-6 | Function |
|--------------|--|
| Closed | MOSI_U of USB device U4 connected to MOSI_A0 (recommended, default). Required to use the on board USB SPI master and no connection between MOSI_U of USB device U4 and MOSI_A0. |

| Jumper JP2-7 | Function |
|--------------|---|
| Closed | MISO_U of USB device U4 connected to MISO_SDA (recommended, default). Required to use the on board USB SPI master and no connection between MISO_U of USB device U4 and MISO_SDA |

| Jumper JP2-8 | Function |
|--------------|--|
| Closed | NCS_U of USB device U4 connected to NCS_A1 (recommended, default). Required to use the on board USB SPI master and no connection between NCS_U of USB device U4 and NCS_A1. |

| Jumper JP18 | Function |
|------------------------|---|
| 2-3 Closed left-middle | NCS_U of USB device U4 connected to NCS_A1 (recommended, default) |

| Jumper JP19 | Function |
|------------------------|---|
| 2-3 Closed left-middle | MOSI_U of USB device U4 connected to MOSI_A0 (recommended, default) |

Power Supply and GND

It is recommended to define the supply structure via schematic to ensure the right jumper settings before any supply of the devices.

| Jumper JP2-1 | Function |
|--------------|---|
| Open | Keeps separate USB 5 V and VB (recommended, default). An external VB power supply is required. |

| Jumper JP2-2 | Function |
|--------------|---|
| Closed | GNDD to GND grounded (recommended, default). The GND connection is required. |

| Jumper JP2-3 | Function |
|--------------|--|
| Open | USB device U4 uses default VDD_IO of 5 V (recommended, default). |

| Jumper JP3 | Function |
|------------|--|
| Closed | VB supplies VBL (recommended, default). VB and VBL are not connected for individual voltages. |

Load path

It is recommended to define the load path via schematic to ensure the right jumper settings before any supply or parameter control.

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| Jumper JP4 | Function |
|------------|---|
| Closed | Disables R9 shunt (recommended, default). R9 shunt is not used. |

| Jumper JP5 | Function |
|------------|--|
| Open | Keeps LDAP path open (recommended, default). LDAP (laser diode anode P-type) is not connected to M1 P-type transistor. |

For ACC or APC control JP5 or JP7 one needs to be jumpered to connect to one of the transistors M1 or M2.

| Jumper JP6 | Function |
|------------|--|
| Open | Enables R10 shunt (recommended, default). R10 shunt is usable. |

| Jumper JP7 | Function |
|------------|--|
| Open | Keeps LDCN path open (recommended, default). LDCN (laser diode cathode N-type) is not connected to M2 N-type transistor. |

For ACC or APC control JP7 or JP5 one needs to be jumpered to connect to one of the transistors M2 or M1.

| Jumper JP8 | Function |
|------------|--|
| Open | Keeps VRN input open (recommended, default). VRN is not connected to M2 N-type transistors gate. |

For ACC or APC control JP8 or JP17 one needs to be jumpered to control one of the transistors M2 or M1.

| Jumper JP17 | Function |
|-------------|---|
| Open | Disables VRP path (recommended, default). VRP is not connected to M1 P-type transistors gate. |

For ACC or APC control JP17 or JP8 one needs to be jumpered to control one of the transistors M1 or M2.

Monitoring photodiodes current path

The optional monitor diodes photo current can be used for APC in combination with the internal programmable logarithmic monitoring resistor.

| Jumper JP16 | Function |
|-------------|--|
| Open | Keeps MD input open (recommended, default). MD is not connected to the laser diode D1 MDCP nor to the laser diode D2 MDNP. |

For APC control JP16 needs to be jumpered to 1-2 or 2-3 to provide a current from a photodiode.

Shunt monitoring path

The monitoring shunt position may vary due to configured and jumpered current path.

| Jumper JP9 | Function |
|------------------------|--|
| 1-2 Closed left-middle | Connects low side of R10 to MCL input (recommended, default). To monitors R10 lower voltage. |

| Jumper JP10 | Function |
|------------------------|---|
| 1-2 Closed left-middle | Connects high side of R10 to MCH input (recommended, default). Monitors R10 higher voltage. |

Default Enable Channel state

The drivers channel is controlled by the external EC signal and the internal state and parameter.

| Jumper JP11 | Function |
|-------------|--|
| Closed | Connects VDD to EC input (recommended, default). Provides an Enable Channel state (VDD) at the EC input. |

For external channel control remove JP11 and provide a high signal for enable channel.

ID Control

With I²C there are 3 ID bits to select 1 of 8 addresses for this device. With SPI there is no ID use possible.

| Jumper JP12 | Function |
|-------------|--|
| Open | Keeps ID input open (recommended, default). Optional ID definition with I ² C interface operation only. |

Default Standby state

The default state on an open NSTBY pin is low and keeps the iC-HTG device in a standby state. To leave the standby state actively You need to provide a high signal at the NSTBY pin.

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| Jumper JP13 | Function |
|-------------|--|
| Closed | Connects VB to NCHK input (recommended, default). Device is not in STANDBY and for ready for operation. |

For external standby control remove JP13 and provide a high signal for no standby.

Interface selection SPI

The serial interface can be selected by pin and jumper or signal.

| Jumper JP14 | Function |
|----------------------------|--|
| 1-2 Closed middle-right | Connects GND to INS/WKR input (recommended, default). SPI interface mode is selected for default interface. |

MISC I/O of USB to serial device

Optional I/O pins of the USB to serial device are prepared to be used by PC software.

| Jumper JP2-9 | Function |
|--------------|--|
| Open | Keeps ANIN input open (recommended, default). The ANIN_U of USB device U4 is not connected to ANIN. |

The ANIN I/O pin is free to be used.

| Jumper JP2-10 | Function |
|---------------|---|
| Open | Keeps NCHK input open (recommended, default). The NCHK_U of USB device U4 not connected to NCHK. |

USB shield to GNDD

The USB-B connectors shield can be connected to GND.

| Jumper JP1 | Function |
|------------|--|
| Open | Shield USB to GND not grounded (recommended, default). This jumper is a solderable bridging option. |

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Jumper position and pin 1-2-3 position on the HTG1D evaluation board

On a 3 pin jumper the pin 1 is separated by a line.

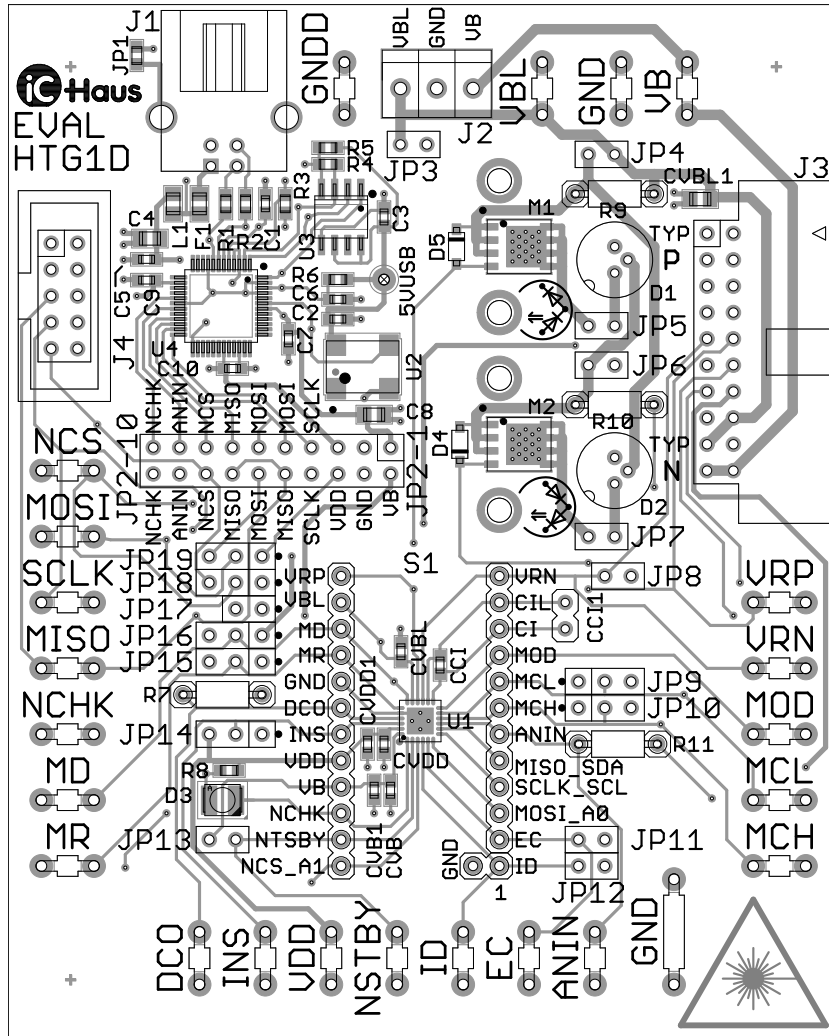


Figure 3: Component side with jumpers

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CIRCUIT SCHEMATIC

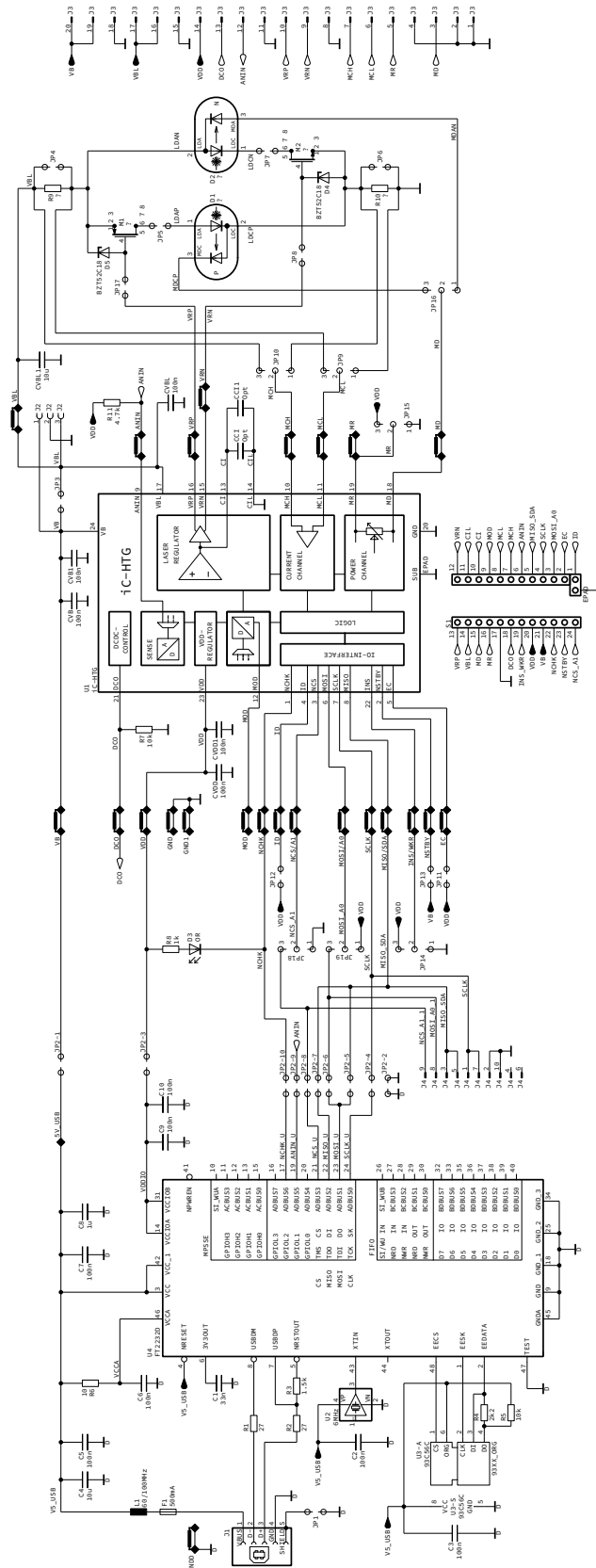


Figure 4: Circuit diagram

iC-HTG EVAL HTG1D

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ASSEMBLY PART LIST

| Component (top) | Typical Value | Comment |
|--|-------------------------|--|
| C1 | 33 nF | |
| CVDD, CVDD1 | 100 nF | |
| C8 | 1 μ F | |
| C4, CVBL1 | 10 μ F | |
| R8 | 1k Ω | |
| R4 | 2k2 Ω | |
| R11 | 4.7k Ω | |
| R5, R7 | 10k Ω | |
| F1 | 500 mA | RSMD0805 |
| L1 | 60/100 MHz | LSMD0805 |
| U2 | 6 MHz | OSC4_SMD_7X5 |
| U3 | 93C56C | SO8_3.9_1.27 |
| J2 | AKL059-3 | RIACON_AKL059_03 |
| U4 | FT2232D | QFP48 |
| U1 | iC-HTG | iC-HAUS_QFN24-1_4X4X0.9_0.5 |
| CCI | Opt | CSMD0603 |
| CCI1 | Opt | FISCHER_MKLP41_2 |
| D5 | Opt | SOD123 |
| D3 | ORANGE | LED_PLCC2 |
| 5V_USB | S1-F | PIN_10 |
| S1 | S2X1_S11X1_S12X1 | DIL24_EP_PIN1 |
| JP3, JP4, JP5, JP6, JP7, JP8, JP11, JP12, JP13, JP17 | SLLP10972G | W2X1 |
| JP9, JP10, JP14, JP15, JP16, JP18, JP19 | SLLP10973G | W3X1 |
| JP2 | SLLP209720G | W10X2 |
| J1 | TYPE_B | CONN_USB_FEMALE_B |
| D1, D2 | SOCKET_TO18_3 | |
| D4 | SOD123 | |
| J3 | CONN_WSL_20_MALE_R | |
| J4 | CONN_WSL_10_MALE | |
| M1 | VISHAY_PPAK_SO8_1.27 | Si7143DP Vishay P-Channel 30V D-S MOSFET |
| M2 | VISHAY_PPAK_SO8_1.27 | SiR466DP Vishay N-Channel 30V D-S MOSFET |
| R10, R9 | Opt, user defined shunt | R0207 |

| Component (bottom) | Typical Value | Comment |
|--------------------|---------------|-------------|
| RF1, RF2, RF3, RF4 | | Rubber foot |
| HS1, HS2 | Opt | Heat sink |

EVALUATION SOFTWARE

iC-HTG software for PCs running on Windows® operating systems as well as the required USB driver are available as a ZIP file. iC-Haus software built with LabVIEW™ requires the installation of the LabVIEW™ Run-Time Engine (RTE). The RTE must be installed only once, hence there are two download links available.

Software overview online: <http://www.ichaus.de/software>

Download package

iC-HTG:

without RTE (small size)

http://www.ichaus.de/HTG_gui

including RTE (big size)

http://www.ichaus.de/HTG_gui_rte

Features

- IC configuration made easy by parameter tables and tool tips
- Editing of application-specific default setups (*.hex) with CRC calculation
- Access to DUT and transfer of setup data to RAM and/or EEPROM
- Storage of IC setups as intel® hex file for programming devices

Installation

After unzipping the iC-HTG software package HTG1SO_gui_xx resp. HTG1SO_gui_xxрте, the following files are located in the selected working directory (xx is a placeholder for revisions):

- Subfolder HTG1SO_gui_xx including the executable setup.exe which starts the installation routine.
- Driver package for eval board.

Notice: Administrator rights are required to run installations.

1. To access the iC-HTG evaluation board, interface eval board drivers for USB needs to be installed. The driver installation must be completed successfully before connecting the eval board to your PC.

→ Execute the USB_xx.exe installation package and follow the on-screen instructions. This can take a few minutes.

1.1 To complete the driver installation procedure, the eval board must be connected to USB finally, after driver installation (only required if the USB interface of the eval board will be used).

2. Install the evaluation software HTG1SO by executing the setup.exe located in the subfolder HTG1SO_gui_xx.

→ Follow the on-screen instructions to finish the installation.

3. After installation the executable HTG1SO_gui_xx.exe will be available in the selected working directory.

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GUI Description

The GUI is divided into four sections:

- 1: Menu section
- 2: Header section
- 3: Parameter tables and control buttons
- 4: Status section with transcript window and online help window.

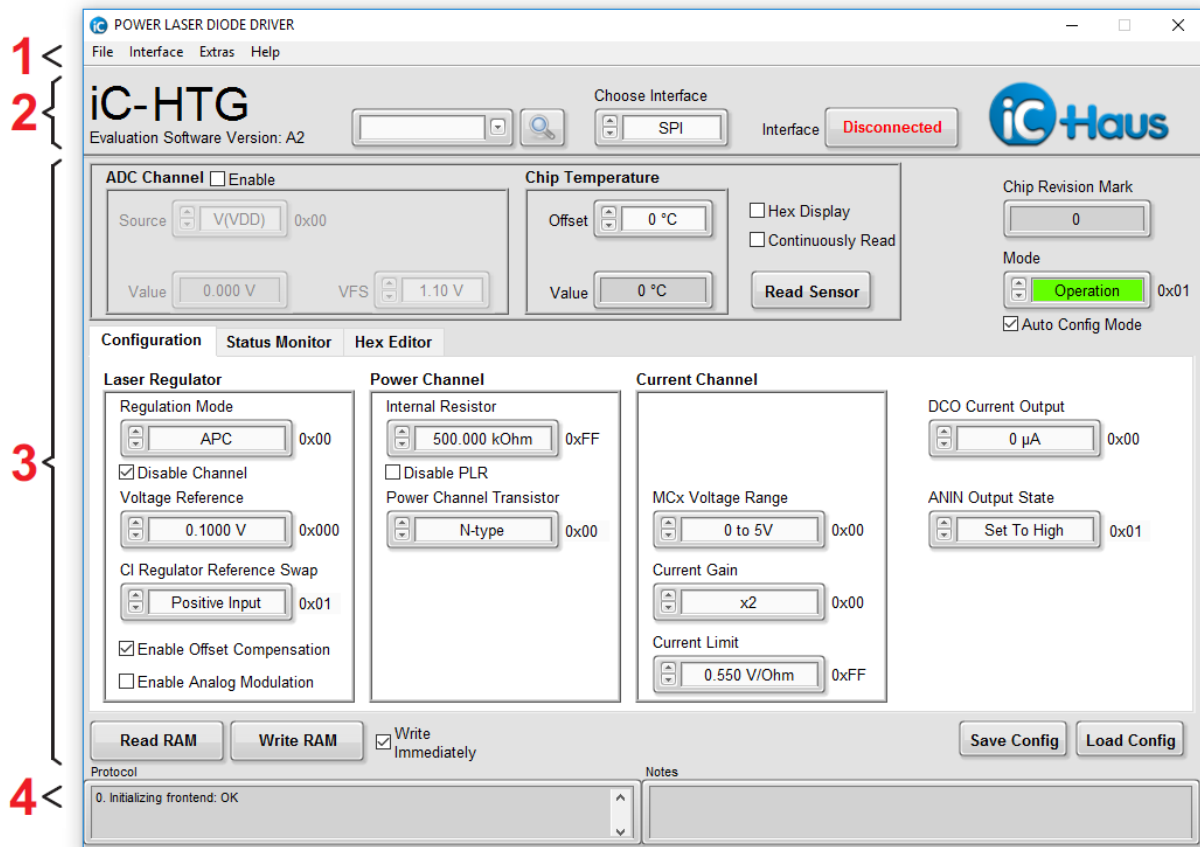


Figure 5: GUI start-up window.

| Menu | Button | Description |
|----------------------------|---------------------------------------|--|
| 1 Menu Section | | |
| <File> | Save Config File | Saves the configuration to a file, Intel Hex file format (*.hex) |
| | Load Config File | Loads the configuration to the IC, Intel Hex file format (*.hex) |
| | Exit | Quits the software |
| <Interface> | No Hardware | Disconnects the board and resets the communication between PC and eval board. |
| | iC-Interface ↔ SPI | Selection for SPI setup of HTG1D, SPI is the default jumpered interface. |
| | iC-Interface ↔ I ² C | Selection for I ² C setup of HTG1D, Slave range 0 . . . 7. |
| | Interface Options → Connect & Read | Checked: connects the eval board and reads the IC registers. Unchecked: connects the eval board without reading the IC registers. |
| <Extras> | Parameter Search | Enables a search field to locate a parameter's control field. If a name match is found, the corresponding control field will be highlighted and focused. |
| | Generate Report | Generates a *report.zip archive reporting the current software status. This report eases debugging software issues by the iC-Haus' support team. |
| | About | GUI and DLL release information |
| 2 Header Section | | Project title, chip version, software version and connection state |
| 3 Parameter Section | | Parameter configuration, read/write access to IC. |
| <Tabs> | Configuration | Refer to IC datasheet. |
| | Status Monitor | Refer to IC datasheet. |
| | Hex Editor | This tab is a different view of the IC's register content in HEX format. Changes made are not automatically updated to the other tabs. Push <Read RAM> to update the parameter tabs. |
| <Parameter> | Read RAM | Reads all parameters from the IC and refreshes the display. |
| | Write RAM | Writes all parameters from GUI to IC RAM. |
| | Write Immediately | If checked, any change to a parameter is transferred immediately. If disabled, the GUI can be used stand-alone without hardware. |
| | Save Config File | Saves the configuration to a file, intel Hex file format (*.hex) |
| | Load Config File | Loads the configuration to the IC, intel Hex file format (*.hex) |
| 4 Status Section | | Transcript and feedback messages of user actions. |

The GUI software starts with <Interface> *Disconnected*.

When moving the mouse cursor across an input box, a tooltip comes up and displays the real parameter name according to this box. If a functional parameter description is required, please refer to the IC datasheet.

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REVISION HISTORY

| Rel. | Rel. Date* | Chapter | Modification | Page |
|------|------------|---------|-----------------|------|
| A1 | 2018-02-15 | ... | Initial release | |

| Rel. | Rel. Date* | Chapter | Modification | Page |
|------|------------|------------------------|---|------|
| A2 | 2021-04-21 | BOARD HTG1D | New diagram | 1 |
| | | DESCRIPTION OF JUMPERS | Text update: JP2-4 is JP2-10, JP18 and JP19 added | 3-4 |
| | | DEFAULT JUMPER SETTING | JP18 and JP19 added | 5 |
| | | DEFAULT JUMPER SETTING | New diagram | 8 |
| | | CIRCUIT SCHEMATIC | New diagram | 9 |
| | | ASSEMBLY PART LIST | JP18 and JP19 added | 10 |

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